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Officers and Directors

MARCUS A. DOW, Past President.
DR. LOUIS I. DUBLIN, Metropolitan Life Insurance Company.
A. F. DUNNEBACKE, Automotive Section.
E. K. EASTHAM, St. Louis Safety Council.
FREDERIC W. EASTON, Blackstone Valley Safety Bureau of NSC.
W. H. ELAM, Nashville Safety Council.
R. W. EMERSON, Electric Railway Section.
E. E. EVANS, Toledo Safety Council.
E. ROSS FARA, Woodworking Section.
F. W. FISHER, Rochester Gas & Electric Corporation.
FRANK FLOURNOY, Memphis Safety Council.
GEORGE T. FONDA, Elliott Service Company, New York City.
R. FRAME, Cement Section.
CLARENCE R. GILMORE, Texas Council of Safety.
ISAIAH HALE, Atchison, Topeka & Santa Fe Railway Company.
A. HARDGRAVE, Kansas City Safety Council.
E. C. HARDING, Construction Section.
G. T. HELLMUTH, Chicago, North Shore & Milwaukee Railroad Company.
CHAS. E. HILL, New York Central Lines.
GEORGE HODGE, International Harvester Company.
E. M. ISRAEL, Harrisburg Safety Council.
J. H. JENKINS, Dallas Safety Council.
R. F. JOHNSTONE, Chicago Safety Council.
DANA JONES, Manufacturers' Association.
CAPT. W. P. KAIN, Marine Section.
IRA V. KEPNER, Pennsylvania Salt Manufacturing Company.
J. P. McGOLDRICK, Inland Empire Safety Council.
MILLER McCLINTOCK, Harvard University.
S. A. MARSHALL, Rome Safety Council.
FRANKLIN J. MAYER, Safety Division, Milwaukee Ass'n Commerce.
A. G. McGUIRE, Youngstown Safety Council.
JAMES MADDEN, Paterson Safety Council.
R. M. LITTLE, New York Department of Education.
WALTER G. KING, American Optical Company.
T. H. McKENNEY, Illinois Steel Company.
THEO. O. MEISNER, Power Press Section.
L. L. MILES, Louisville Taxicab & Transfer Company.
CHAS. J. MOORE, Springfield Safety Council.
ARTHUR T. MOREY, Past President.
C. W. MOULTROP, Montgomery Safety Council.
LEE MUNGER, Erie Safety Council.
E. D. MURPHEY, Tulsa Safety Council.
HOMER E. NIESZ, Commonwealth Edison Company.
HERMAN J. NORTON, Rochester Safety Council.
JOHN A. OARTEL, Western Pennsylvania Safety Council.
GEORGE OPP, Public Utilities Section.
F. J. O'ROURKE, Hammond Safety Council.

JOHN F. O'RYAN, Public Safety Bureau, Westchester Co. Cham. of Com.
LEW R. PALMER, Equitable Life Assurance Society.
W. J. PEACOCK, Paper and Pulp Section.
GEORGE PERRING, Beloit Safety Council.
C. E. PETTIBONE, American Mutual Liability Insurance Company.
W. B. PETTIBONE, Cleveland Safety Council.
BRAINARD PLATT, Louisville Safety Council.
EDWIN PUGSLEY, New Haven Safety Council.
EDGAR G. QUESNEL, Tri-City Safety Council.
F. H. RANSOM, Oregon & Columbia Basin Div.
ROBERT J. RENDALL, Hudson County Safety Council.
HENRY A. RENINGER, Lehigh Valley Safety Council.
DR. A. D. RISTEEN, The Travelers Insurance Company.
JUDSON G. ROSEBUSH, President Patten Paper Co., Appleton, Wis.
G. E. SANFORD, General Electric Company.
W. L. SCHNEIDER, Rubber Section.
CHAS. B. SCOTT, Bureau of Safety.
H. J. SIMPSON, Bay City Safety Council.
H. R. SINCLAIR, Worcester Safety Council.
COL. JAMES SINKE, City of Grand Rapids.
DR. L. A. SHOUDY, Bethlehem Steel Company.
J. E. SKAGGS, Atlanta Safety Council.
MATTHEW S. SLOAN, Brooklyn Safety Council.
J. T. SMITH, Taxicab and Fleet Owners' Section.
ROBBINS B. STOECKEL, Commissioner Motor Vehicles, Hartford, Conn.
VERN D. SUTTON, Food Section.
C. M. TALBERT, Standard Underwriters Agency.
C. P. TOLMAN, Past President.
A. J. VAN BRUNT, Newark Safety Council.
DAVID VAN SCHAACK, Aetna Life Insurance Company.
CLYDE WALTON, Everett Safety Council.
FRANCIS C. WALTON, Chattanooga Safety Council.
HERBERT WARREN, Duluth Safety Council.
A. L. WATSON, The Koppers Company.
HARRY M. WEBBER, Illinois Bell Telephone Company.
J. D. WHITE, Steam Railroad Section.
S. E. WHITING, Chemical Section.
A. W. WHITNEY, National Bureau of Casualty & Surety Underwriters.
D. E. WIEDMAN, Bellingham Safety Council.
DR. F. WILLSON, Reading-Berks County Safety Council.
WM. ROBERT WILSON, Detroit Industrial Safety Council.
W. H. WINANS, Union Carbide & Carbon Corporation.
PROF. C. E. A. WINSLOW, Yale University.
J. M. WOLTZ, Youngstown Sheet & Tube Company.
ARTHUR H. YOUNG, Past President.
HOWARD I. YOUNG, Mining Section.
R. J. YOUNG, Illinois Steel Company.

National Safety Council

Annual Meeting of Members

Detroit, Michigan

Monday, October 25, 1926

CHARLES B. SCOTT, Chairman
President, The National Safety Council

THE opening session of the Fifteenth Annual Meeting of the National Safety Council convened at 10:15 o'clock at the Book-Cadillac Hotel Detroit, Michigan, Charles B. Scott, President of the Council, presiding

PRESIDENT SCOTT: Our deliberations will be opened with prayer by the Rev. Edgar DeWitt Jones, of Detroit.

DR. EDGAR DEWITT JONES: Eternal Father, strong to save, we draw near unto thee that thou mayest draw near unto us. Thine is the love that wilt not let us go. Thy mercy endureth forever. Thy loving kindness, O, how great. Thou art the fount of every blessing, giver of every good and perfect gift.

Almighty God, our Father, we invoke thy blessing upon this important gathering. We pray thee to bless those who are to preside over the various sessions. Inspire those who are to speak and we pray thee to direct those who bear the burden of routine responsibilities. Consecrate the mirth, sanctify the pleasure seeking of our guests, and use mightily we pray thee, this gathering for the furtherance of the teaching that we are our brother's keeper and that love is the greatest thing in the world

Our Father, we pray that the sacredness of personality and the value of a single human being may become more apparent as time goes on that in every-day life we may indicate our interest in all peoples, but especially the aged, the afflicted and the youth, and that our thoughts and our plans may be in consideration of others.

Our Father, we pray thee that the spirit of Him of whom it was said "a bruised reed He would not break and smoking flax He would not quench," may animate those who lead us in the great industries and in commerce and, whatever our vocations, we may somehow feel the obli

gations of working together for the conservation of life. Forbid it, our Father, that praise and power and affluence should ever blind our eyes to common justice or dull our ears to the cry of suffering humanity.

Our Father, we bless thee for this high privilege of prayer. Over this shining pathway great hosts of men and women have come unto thee. They came, weak and enfeebled, and thou didst make them strong; they came confessing ignorance and thou didst impart unto them wisdom; they came confessing that their lives were broken by sin and suffering, and thou didst make them whole.

Our Father, we meet with these our brother pilgrims and sojourners and we come unto thee in prayer today, thanking thee for the power of this highway and the wonder of it all. Shine out upon this gathering, O Spirit, and brood over this gathering and lift it and inspire it and direct it mightily, we pray, for human good in thine own glory.

We ask it in the name of Him in whom it pleased thee to reveal in us thy father heart and show us the pathway of power and peace—in His blessed name we ask all. Amen.

(A motion was regularly made, seconded and carried that the roll call be dispensed with.)

ANNUAL ADDRESS OF THE PRESIDENT

Charles B. Scott, Bureau of Safety, Chicago, Ill.

We extend to all of you a most cordial welcome to the Fifteenth Annual Safety Congress. We are delighted to see such a representative assembly of those who have an interest and a part in our cause and our work. The people of Detroit have done everything possible for our convenience and comfort. We thank these people and assure them that all of our members are deeply grateful for their kindness and hospitality. We know what it means to entertain and care for such a convention as the one here assembled. To the mayor of the city and to all the other public officials; to the president ond other officers of the Detroit Safety Council and the several local committee chairmen and their associates; to the speakers on our program, to the press and to everyone else who has worked to make this Congress a success, we extend the thanks of the National Safety Congress. Let us arise for a moment, as an expression of our appreciation, so these friends may know we are grateful to them for having spent so much effort, time and money in our behalf. (The audience arose.)

It is with a reasonable measure of pride in the accomplishments of the National Safety Council and with an appreciation of the responsibilities and possibilities for this gathering which must largely determine the future work of our organization, that we begin these sessions.

The administrative year, of which this Congress marks the close, has not been characterized by spectacular achievements, but has been marked by steady progress of the national safety movement, of which this organization is the recognized leader. The purposes which prompted the

creation of this Council, the advance it has made and is to make hereafter in the accomplishment of these purposes, can never be justly judged by any momentary success with some specific phase of accident prevention, but can be measured by the active interest shown by both the public and industry in their determination to prevent that needless waste of life and man power which has so long characterized us as a nation.

Progress in industrial development is indeed essential to our advancement, but this progress must not be made at the cost of the waste of lives and limbs it was designed to benefit. This country can not afford even such commendable progress as it is now making without due regard for human life. The responsibility for awakening and maintaining an industrial and public interest in the conservation of life so needlessly sacrificed in our advancement is the chief responsibility and greatest task of this Council. Organizations like the National Safety Council, designed to mould public opinion and lead public effort, can succeed only when the public has entire confidence in the seriousness and diligence of the leaders and in the practicability of their plans. Such conviction of the importance of the cause and such confidence in the organization and its plans have been justified by the past history of this Council.

An Organization with the Broadest Purposes

This organized body is in no way limited as a service bureau for industry or as a propagandist for public safety. Its reasons for existence, its place in our industrial and social life, and its ultimate aims are greater than those of service to industry or the moulding of public opinion, because the Council has not only aroused the interest, but also the participation of industry and the public in sound measures for the solution of the problems. The responsibilities of the Council are far greater than if its activities were confined to less essential requisites of advancing civilization, dealing as it does with the lives of men, women and children, both as to preservation and development. The interest of the people to be served must be far more vital and of deeper concern than is necessary or possible in matters of economy or convenience. So long as this body of men thus conceives its responsibilities and opportunities, just so long will this organization be properly esteemed as a vital factor in our industrial and civic life.

As in all meritorious national movements, the founders of this accident prevention institution dimly conceived the part it was to have in our national life, or the growing importance of the work for which it was originally established. Responsibilities and opportunities were obscured by impossibility to foresee the increasing hazards to human life that would be the natural results of scientific developments in manufacture and transportation and the increasing complexities of our advanced civilization. There was need for the Council long before it was organized by its founders; their aims and ideals were fully justified

by the conditions at the time it was created, but there are now far more reasons for the Council's existence than ever before.

Today it should not be necessary to prove what was once a theory —that accidents can be prevented. It should not be necessary to present the economic and other advantages to the industries of our country; nor should it be necessary to assume the burden of proof as to how and why the public may be benefited. The accomplishments of the National Safety Council and its affiliated branches during the last decade furnish a sufficient answer to these questions which at one time held our attention. The industries which have made a real test of the value of organized accident prevention work have reaped a harvest of benefits in efficiency, economy, production, employee relations, company spirit, and above and greater than any of these, in the humanizing of their industries in a way and to a degree that was never before imagined. The public, too, has become convinced of the necessity and practicability of conserving lives and limbs, and there is at this time a growing sentiment for a safer and saner citizenship that bespeaks a more enlightened people because of a greater concern for human welfare.

A Body of Loyal and Steadily Cooperating Members

The financial problem of the Council from the beginning has been wisely considered and intelligently dealt with. At no time have there been available more funds than were required for the most important expenditures, and a business-like surplus to keep it solvent. It is, and always should be, a non-profit making cooperative institution, the administrator of a trust fund, with a full appreciation of its responsibility. During the present year, it became necessary to increase the scale of dues from our industrial memberships to meet the growing demands for greater service and to increase the scope of our work. The increase was met with a most gratifying response. As a further aid to the solution of the Council's financial problem, and particularly that angle presented by the needs for public safety work, a sustaining membership plan has been evolved for those individuals and institutions who desire to share the privilege of assisting the Council in meeting its ever increasing problems.

This organization is different from many others by reason of the constant, loyal, consecrated service which it receives from an army of volunteers who receive no financial remuneration. It is the contribution which these volunteer workers have made that stands out as the main cause of its growth, vitality and continuing usefulness. It is, therefore, my privilege and my most important duty to pay deserved tribute to these men and women in summing up the work of the year. No greater influence for the continued life of the Council and the accomplishment of its purpose is necessary or can be desired than the maintenance of this loyalty, interest and service from these volunteer workers. As long as this unselfish service is given so freely and wil-

lingly, this Council will continue to grow in achievement, and always to these people will be due the homage of a grateful public.

One of the oustanding and significant indications of the increasing importance of the problems of industrial and public safety has been reflected during the past year in the serious attention given these subjects by our Federal and other governmental bodies. The activities of these agencies have been very perceptible and helpful to the Council. Due expressions of appreciation are tendered on behalf of the Council, to the President of the United States, Secretary of Commerce, Secretary of Labor, Governors, State Industrial Commissions, Municipalities and other governmental organizations for their efforts. Wise law enactment is unquestionably helpful to our cause. The greatest possible degree of cooperation should constantly be maintained between the Council and these agencies. We should continue our policy of giving every possible assistance to such efforts as have been made by these governmental bodies whose aims and purposes are the same as ours, but whose avenues of influence and approach are different. We pledge to these law enactment and enforcement bodies the continued support of the National Safety Council and its membership.

Developments in Meeting the Public Safety Problem

To those of us who have carefully sensed the future of accident prevention, the task of meeting the public safety problem looms as a most stupendous one. Without magnifying or perhaps even appreciating the lack of finances to carry on the work of public safety, the Council and its locals have continued their efforts with unabated zeal. The national body has fully realized its inability to make desired headway in such a difficult duty with almost negligible funds. Notwithstanding this handicap, it has tried to make the best of its opportunities. It has been instrumental in arousing the sympathetic interest of the public to its opportunities for safety. The field of public safety is almost limitless and the requirements are clearly apparent. The proper financing of this most important work is now under consideration. Through Mr. John D. Rockefeller, Jr., we are the recipients of a provisional contribution of $177,500. The acknowledgment of the Council and the interested public for this contribution is most gratefully made. This fund, supplemented by the amount necessary for its payment to us, will assist very materially in meeting the demands of the present situation.

Intimate contact with and service to the Community Councils has been developed. Several new councils have been organized during the year, making a present total of 66 associated councils. The quarterly conferences of community safety council secretary-managers have been well attended and productive of good results.

There has been an increasing interest in safety in many other nations, as is evidenced by the attendance at this Congress of representatives from Canada and other countries. A sincere welcome is extended to these

visitors, with the assurance from the National Safety Council of its desire to render every possible cooperation.

The Education Division has made unusual progress through the services of its Executive Secretary and three Field Secretaries, made possible by the generous assistance of the National Bureau of Casualty and Surety Underwriters. This division has been represented at all the important meetings of educational leaders; it has continued its contact with hundreds of public school systems throughout the country and has continued its monthly publication for schools, entitled, "*Safety Education*." It has continued its distribution of school posters and has established new demonstration centers. Cooperation has been continued with other national bodies such as the Playground and Recreation Association of America, The National Congress of Parents and Teachers and others. This division was represented at the meeting of the National Education Association and supervised the preparation of the yearbook on safety education in the schools which was presented at the annual meeting of the department of superintendence.

Constructive Work of the Industrial Sections

We are justly proud of the constructive work accomplished during the past year by our 20 industrial sections and the American Society of Safety Engineers. The success of the Council depends to a very large extent upon the activities of the individual industrial sections and the responsibilities that are assumed by the sectional officers. Both of these factors have been evident during the year and have been appreciated. The increasing number of members reporting summaries of their accident statistics makes valuable comparison possible. Research activities employed are helping to throw light on some of the most important hazards existing in industry. Sectional meetings and regional safety conferences are educating executives and workers concerning the need for approved methods used in practical accident prevention work. Service in the formulation of safety codes and standards is of unquestioned value in promoting uniformity, and in raising the minimum requirements for the conservation of life.

There is a marked development in the number and usefulness of national trade associations giving service to particular groups and industries. The activities of these organizations in many instances, are of especial effectiveness because of the close contact with men who have intimate knowledge of industrial hazards of the particular business represented by the several trade associations. There should be a much closer cooperation between the National Safety Council and these organizations. The question of a plan which will provide more effective cooperation is being carefully studied.

Most of us know and appreciate the successful accident prevention activities by such organizations as the Safety Section of the American Railway Association, the American Electric Railway Association, the Portland Cement Association, American Gas Association, National Electric

Light Association, United States Bureau of Mines, Bureau of Standards and numerous other national organizations. These are doing much for the cause of safety. We should not let this opportunity pass without also expressing appreciation for the support and cooperation we are receiving from the various national organizations of women, the Red Cross, Boy Scouts, engineering societies and other like bodies, too numerous now to recite.

It is regretted that industries and the public generally are not better informed of the purposes and work of the Council, its sections and its locals. If these purposes and activities were sufficiently known there would be a greater appreciation. During the past year the National Council has recognized the necessity of giving this information and has diligently sought to do so through every available channel to such an extent as our resources would permit, but with results which have been only fairly satisfactory. Efforts by the Council sections and locals are being continued to develop plans by which more effective publicity may be obtained. Such efforts are designed to reach not only trade association conventions, but all industries and the public as well: While some of the national magazines may not be giving the safety movement the recognition to which it is entitled, we express our appreciation to the editors of the thousands of daily newspapers, trade, technical and class publications who have generously devoted valuable space to us during the past year.

Grateful Acknowledgment to Many Individuals

This resume briefly reflects the higher spots in the year's accomplishments. These and the many other achievements have only been possible by the devotion to the cause of safety and the contributions made by the general and special committees provided by the Council's organizational structure, the local councils, sectional officers and committees and the office staff of the Council. To each one of these most grateful acknowledgement is made. It is only by such continued devotion, loyalty and service that the National Safety Council may ultimately hope to approach the achievement of purposes which are of such vital concern to our national welfare.

It has been the history of organizations such as this, that they are beset by dangerous temptations born of an enthusiasm unquestionably sincere, but generally unwise. Those who have the responsibility for the direction of such institutions are often confronted with the question whether to continue on the definite conservative basis upon which the organization was founded or to broaden out and enter newly conceived fields of usefulness. With respect to these dangers, the men who have directed the affairs of the Council and the sentiment of those who have been influential in its affairs are to be highly commended. The history of the Council reflects wise conservatism and close adherence to the purposes of its creation. There are other phases of our modern industrial and public life which demand organized effort for the control of harmful

influence. There are obvious needs for constructive service in the development of many other essentials to the well being and happiness of our people, but these should not be confused with the cause of industrial and public safety. They should not be allowed to deflect us from our main objective, the one that underlies and is the foundation for the existence of the National Safety Council.

We have a very definite work before us. The name of our organization very clearly defines our aim. The needfulness of our work is a growing one. Our problem is a specific problem big enough, important enough —yes, essential enough to require our every endeavor. Therefore, our objective must always be the solution of our particular problem. It would seem entirely proper in relinquishing the leadership which has been intrusted to me to give this word of admonition to those who are to follow me and to express the earnest hope that this body of men will never succumb to the temptation to weaken their cause and their devotion to it by diverting the activities of the Council into unwise channels.

Let us constantly and diligently strive to direct wisely this movement, designed to make a more thoughtful and a safer citizenship.

PRESIDENT SCOTT: The Executive Committee appointed three inspectors of election. The Chair will appoint these three as tellers also. These gentlemen are Elmer L. Hewitt, chairman; Clifford Penland and William J. Guilbert.

(A motion was regularly made, seconded and carried dispensing with the reading of the minutes of the last annual meeting.)

PRESIDENT SCOTT: The next item of business is the report of the Nominating Committee. Will Mr. Spring, as chairman, report for this committee?

DR. RISTEEN: In the absence of Mr. Spring I have been requested to present this report, as follows:

REPORT OF THE NOMINATING COMMITTEE

Complying with your instructions, we, the Nominating Committee appointed by you, with the approval of the Executive Committee, and as provided for in Section 4, Article VI, of the By-Laws of the Council, and as further provided in Section 5 of Article VI of the By-Laws, present herewith the report of nominations for successors to the Directors whose terms of office expire at the annual meeting October 25, 1926.

The following list has been approved by the committee and is herewith submitted:

George Hodge, Assistant Manager, Industrial Relations, International Harvester Company, Chicago, Ill.

W. H. Winans, Industrial Relations Department, Union Carbide and Carbon Corporation, New York City.

Judson G. Rosebush, Treasurer and General Manager, Northern Paper Mills, Green Bay, Wis.

Miller McClintock, Harvard University, Cambridge, Mass.

Col. James Sinke, Director of Public Safety, Grand Rapids, Mich.

The names of the following Directors whose terms expire October 25, 1926, are submitted for re-election:

L. A. DeBlois, John A. Oartel, C. E. Pettibone, H. A. Reninger, A. D. Risteen, Charles B. Scott, A. L. Watson, H. M. Webber, A. W. Whitney and J. H. Harvey.

Very Respectfully yours,

E. C. SWING, Chairman
HARRY J. BELL
W. E. WORTH
A. D. RISTEEN
M. G. LLOYD

PRESIDENT SCOTT: No member's ticket having been presented, a motion that the nominations close will be in order.

(The motion was made, seconded and carried.)

PRESIDENT SCOTT: As there have been legally nominated just men enough to fill the positions, the Chair suggests, in order to facilitate the transaction of business, that the secretary be directed to cast a ballot for the candidates named for the terms for which hey have been nominated. Do I hear such a motion?

(The motion was made, seconded and carried.)

SECRETARY CAMERON: The ballot is cast.

PRESIDENT SCOTT: The Secretary has cast the ballot. The inspectors who are serving as tellers will please report the result of the vote.

MR. HEWITT: Your tellers have examined the proxies and find that there are 2,054 votes for the candidates as nominated.

PRESIDENT SCOTT: The report of the tellers shows that 2,054 votes have been cast for the nominees and none against. It therefore gives me a great deal of pleasure to announce to you that the gentlemen whose names have been presented are to serve as your directors for the terms specified.

I would like Mr. David Van Schaack, chairman of the Resolutions Committee, to present any resolutions which, in the judgment of the committee, should be entertained by this convention.

REPORT OF THE RESOLUTIONS COMMITTEE

Public Safety Resolution

MR. VAN SCHAACK: You all have printed copies of a resolution expressing our continued interest in public safety and our thoughts as to how public safety could best be advanced. I move, Mr. Chairman, the adoption of this resolution.

(The motion was seconded and carried for this resolution as follows:)

WHEREAS, Government, municipal and civic agencies have tabulated statistics showing that last year approximately 90,000 persons were killed in accidents that occurred in industry, on the streets and highways, in

other public places and at home, causing great sorrow and resulting in an economic loss to the United States which is estimated at billions of dollars, and

WHEREAS, After fifteen years of research studies devoted to the problem of preventing accidents and the expenditure of several million dollars generously contributed by industries, associations and public spirited citizens interested in conserving lives and limbs and property, it has been conclusively demonstrated that the majority of these 90,000 deaths could have been prevented and that thousands of accidents were actually avoided through organized safety efforts, and

WHEREAS, Such accidents can be prevented only through the united cooperation of all of the people of this country who must devote more thought to this subject if this nation is to be relieved of this terrible annual toll of fatalities and injuries which affect every community, and

WHEREAS, Organized accident prevention work by the members of the National Safety Council, other associations, organizations, agencies, etc., to check this toll has been favorably received by Federal, State and Municipal authorities who have called meetings of interested citizens to plan methods of improving the situation and the President of the United States, all of the Governors and hundreds of civic officials have placed themselves on record to the effect that the time has come for united action to remedy the traffic situation, therefore be it:

RESOLVED: That the members of the National Safety Council assembled here in Detroit at their Fifteenth Annual Safety Congress go on record as being unanimously in favor of a more comprehensive campaign designed to better traffic conditions, pledge their individual efforts to the further conservation of lives and limbs and property, the human and economic resources of the United States, agree to continue their past policy of cooperating in every possible manner with all other associations, authorities and citizens concerned with this problem, and recommend for the consideration of everyone interested:

1. That aditional community safety councils be organized wherever practicable so that more cities will conduct activities along the lines now being successfully followed by the present affiliated branches of the National Safety Council; that more national, state and local associations, societies, clubs, etc., support organized safety work and thus show their realization of the seriousness of the problem and their appreciation of the efforts being made to prevent deaths and injuries on the streets and highways, in public places and in residences; that the general public be invited to participate more fully in such endeavors and that the attention of the editors of the nation be called to the importance of not merely recording in their columns news about accidents but presenting the remedies that have been definitely ascertained by traffic students.

2. That we believe the solution of the traffic problem rests upon national, state and local authorities adopting three main principles which are essential for the prevention of automobile accidents, namely, (A) Engineering revision of streets. (B) Regulation of traffic and respect

for and enforcement of traffic laws. (C) Education of both motorists and pedestrians.

3. That all persons interested in the traffic problem should cooperate in their endeavors to convince both motorists and pedestrians that it is essential for them to accept the principle that each has rights while on the streets and highways but failure to respect each other's rights may result in death, personal injury or economic loss. We feel that a large number of traffic accidents may be traced to the failure of motorists and pedestrians to accept this principle.

4. That all public, private and parochial schools of elementary and high school grades should include in their courses of study the principles of personal and public safety so that the youth of the nation may be trained to avoid the hazards of life so as to enjoy more fully the real adventures of life.

5. That the traffic problem be given the serious consideration it deserves by officials of states, cities and towns, who should obtain, compile and distribute uniform, standard statistics, charts and accident spot maps which are essential for the study of the causes and remedies of such accidents. It is important that the authorities obtain accurate data showing where, when, why and how accidents occur and exchange their findings with fellow officials.

6. That the various States of the Union pass and enforce uniform traffic laws to eliminate the present confusion that exists throughout the country.

7. That every state in the Union should have a license law for motor vehicle operators who would be required to pass an examination conducted by competent and honest officials to determine the moral, mental and physical qualifications of the applicants. That licenses should be suspended or revoked for cause.

8. That Federal, state and local authorities and the steam and electric railways should continue to cooperate in the country-wide campaign to reduce accidents at highway crossings,

9. That all laws, rules and regulations designed to lessen the hazards of modern life and to prevent accidents be enforced. Both motorists and pedestrians should be inspired with a greater respect for traffic regulations. We feel that until the majority of the people of the nation cooperate more enthusiastically in observing these rules there will be no marked reduction in the number of accidents. Law observance is the need of the hour. Fearless judges should be in charge of traffic cases and political influence should not be a factor in the disciplining of habitual reckless, careless and thoughtless motor vehicle operators. Drunken drivers should be given jail sentences!

10. That the Fifteenth Annual Safety Congress delegates and officers express their deep appreciation of the cooperation that has been received from all other national associations, societies, Federal, State and Municipal officials, the editors of the country, etc., participating in the national safety movement whose successful progress is prolonging the lives of

thousands of men, women and children and preventing the loss of countless limbs, to say nothing of the sorrow and suffering which cannot be measured in terms of dollars and cents.

MR. VAN SCHAACK: You have also before you in printed form a copy of a similar resolution on industrial safety. I move the adoption of that resolution.

(The motion was seconded and carried for this resolution as follows:)

Industrial Safety Resolution

WHEREAS, statistics show that during the past year more than 23,000 workers have been accidentally killed, and hundreds of thousands injured in factories, workshops, and other industrial establishments, resulting in the needless shortening of thousands of lives, in the crippling and blinding of many of those injured, in the causing of sorrow and suffering to their families, in the delaying of production, in the interrupting of orderly processes, and in the cost to both employers and employees of billions of dollars; and

WHEREAS, more than 4,000 employers, who are members of the National Safety Council, have learned that the majority of all accidents can be prevented through organized cooperative safety methods and devices, and have actually succeeded in materially reducing the severity and frequency of accidents; and

WHEREAS, the members of the National Safety Council have demonstrated that what has been accomplished in some industries can be achieved in all fields of industrial endeavor if all employers, both large and small, will realize that the prevention of such accidents is both a public and personal responsibility which should be shouldered by every employer, therefore be it

RESOLVED, that the delegates to the Fifteenth Annual Safety Congress, held by the National Safety Council at Detroit, Michigan, go on record as recommending:

1. That all employers in the United States immediately inaugurate a survey of their respective establishments to ascertain the chief causes of accidents and take steps to install effective safety methods and devices as rapidly as possible.

2. That employers, realizing that safety is as important a part of their major operations as production, have all dangerous machinery safeguarded. Hazardous machinery now installed should be protected by necessary devices. New machinery should be equipped with the essential appliances, and all dangerous processes should be given prompt attention.

3. That all employers have their superintendents, foremen and workmen generally instructed in safe methods and habits of work which shall protect them while employed, on the streets and highways, in public places and at home.

4. That employers support the efforts now being made by community safety councils, the National Safety Council and other national associa-

tions, organizations, societies, Federal, State and municipal officials, etc., to protect men, women and children from hazards on the streets, highways, in public places and in residences, so as to conserve the nation's greatest resources.

5. That comparatively small employers especially become actively engaged in accident prevention work. We suspect that untold thousands of owners of factories, shops and other industrial establishments feel that their plants are too small to warrant organized safety activities, and we wish to call their attention to the fact that it is not necessary for every workshop to have a trained accident prevention specialist or install new machinery, as the plant superintendent or foreman can conduct a modified safety campaign which will be productive of fruitful results and the installation of safeguards on old machinery does not involve prohibitive expense.

6. That employers encourage the inclusion of safety education in the courses of public, private and parochial schools of elementary and higher grades so that pupils may be instructed in the principles of safeguarding themselves and others.

7. That more colleges and universities should incorporate accident prevention material in existing engineering courses, so that graduate engineers will realize that safety work is an integral part of production. and be it

RESOLVED, that the delegates to this congress express their thanks to the thousands of employers, both within and outside the membership of the National Safety Council, who have been conducting accident prevention campaigns in their shops and supporting the public safety campaigns designed to protect people in public places and at home, and acknowledge their indebtedness to the radio stations, editors of daily newspapers, trade, technical and class periodicals who have given generously of their facilities to the national safety movement, the successful progress of which has made the United States and foreign countries better places in which to live and work because of the conservation of lives and limbs and property.

Safety Recognition in National Organizations

MR. VAN SCHAACK: Mr. Chairman, I desire to offer a resolution.

WHEREAS, the National Safety Council has enjoyed throughout its entire existence the opportunity of cooperating in a helpful way in the interest of safety with many national organizations, the list of which is too long to be here recited; and

WHEREAS, there has recently been an increasingly marked and definite trend on the part of the most influential engineering societies and commercial and industrial associations toward the inclusion of specific safety planks in their platforms as part and parcel of their avowed purposes; and

WHEREAS, the mutual helpfulness of these societies and associations

and of the National Safety Council has distinctly accelerated the solution of the safety problem;

THEREFORE, Mr. Chairman, I move that it be expressed as the sense of this meeting that we view with keen interest and hearty commendation the growing adoption of safety activities as an essential part of the programs of national organizations and pledge to all such our continued and increasing cooperation and support.

(The motion was seconded and carried.)

Resolutions of Appreciation

MR. VAN SCHAACK: Mr. Chairman, I desire to offer this resolution:

WHEREAS, Charles B. Scott has served the National Safety Council as President during the past year with conspicuous faithfulness and liberality, giving to this institution untiring effort and inspirng leadership, the results of which are reflected in expansion and intensification of activities, increase in membership and the sound financial condition of the Council; therefore be it

RESOLVED, that the Fifteenth Annual Safety Congress, assembled at Detroit, Michigan, expresses to Mr. Scott, by a rising vote, its deep appreciation of his services as President and of his notable contribution to the safety movement.

(The motion was seconded and carried unanimously by a rising vote.)

MR. VAN SCHACK: Then I have the following resolution:

WHEREAS, the holding of this Fifteenth Annual Congress of the National Safety Council in the City of Detroit, Michigan, and the notably successful arrangements made for it are distinctly due to the sincere interest and support of the public officials, civic organizations, and leading citizens of Detroit; and

WHEREAS, the National Safety Council feels that the exceptional interest and ability which these agencies have shown in coping with the accident problem of Detroit is a demonstration of successful safety work which makes a most valuable contribution to the cause of safety, and desires to express its admiration and to pay tribute to those responsible for this demonstration; therefore be it

RESOLVED, that a vote of thanks be extended to the City of Detroit, its public officials, civic organizations, industries and leading citizens for the inspiration and help which their demonstration of the possibilities of successful accident control has given to the entire national safety problem; and be it further

RESOLVED, that the National Safety Council extend to the City of Detroit, through its mayor, Wm. Robt. Wilson, the various sub-committees of the General Congress Committee, and the Detroit Industrial Safety Council, its thanks for and appreciation of the opportunity now afforded those attending this conference of observing the practical

methods employed in furthering accident prevention and their results, and the hospitality of a city and people deservedly far-famed as hosts.

I move the adoption of this resolution. (The motion was seconded and carried.)

ANNUAL REPORT OF MANAGING DIRECTOR

W. H. Cameron, Chicago, Ill.

During the past fiscal year 749 new members have joined the National Safety Council. A comparison of the total membership for the past two years shows:

Membership July 31, 1926	4,224
Membership July 31, 1925	4,023
Net gain	201

The net gain in membership revenue was $43,909.99. The total amount of dues now being paid by the 4,224 members is $237,881.79, or an average of $56.32 per member. The increase of 25 per cent in dues billed to members, commencing February 1, has been generously accepted by the members. Only two resignations can be traced to the increase. The remaining resignations were due to the fluctuations in business and to other causes.

The NATIONAL SAFETY NEWS has gained in circulation and in importance. The quality has improved and the number of special features and articles has increased. The minimum number of pages per issue has increased from 56 to 64. There has also been an increase in the number of extra copies ordered by members. The success of this magazine is made possible only through the continued generosity of members in contributing special articles, photographs, data on special hazards and safeguards, and statistical information of a very valuable character.

The Safety Bulletins and Posters have been published regularly and have been steadily improved in quality. More time and money have been spent upon their preparation, and well known artists have furnished illustrations. The addition of four large size posters and the change in the method of presenting samples to the membership have been generally accepted as improvements of the service. Economies in printing resulting from this change have made it possible to increase the number issued monthly from 36 to 40. More than nine million posters were used by our members during the year. The Council's street posters, distributed through community councils, have filled a need for continued education of the public in the safe use of the streets. An up-to-date safety poster catalogue containing 252 miniature illustrations of selected posters was reprinted at the beginning of the calendar year. These posters are kept in stock for use by new and old members in conducting safety campaigns.

The Safe Practices Pamphlets have appeared bi-monthly under the supervision of Mr. R. J. Young and the Conference Committee of 75 safety engineers. Six of these pamphlets have been revised and reprinted. Six new pamphlets have been produced. This "Safety Encyclopedia" now in-

cludes 83 separate treatises on the fundamentals of safety engineering practice in a majority of the industries. New members are ordering complete sets of these pamphlets for reference purposes. Four hundred and sixty-eight sets have been ordered by members during the fiscal year.

The Consultation Service has answered 6,069 requests for information. For the fiscal year ending July 31, 1922, there were 2,677 such inquiries. There is a marked increase year-by-year in the use of the facilities of the Library and Information Bureau. During the past fiscal year 40,439 pieces of information were distributed in answer to the 6,069 inquiries, including books, pamphlets, clippings, photographs, blueprints, bulletins and similar material. Thirty thousand eight hundred and thirty-three new pieces of material have been added to the library files during the past year. Twenty-nine exhibits were prepared and sent to various association meetings and expositions—the largest number in any one year.

Films and Slides are Increasingly Useful

Films and Slides have been in demand by members in increasing quantities. The two albums of photographic reproductions of the entire slide collection (now numbering more than 1725) are in constant circulation among members. There is a continued demand for the Council's first film, "Ask Daddy," and the Council's second film, "Hindsight vs. Foresight," shown first at the Louisville Congress, is also being used by many of the members. Twenty-eight copies of these two films have been sold and 16 copies are in constant circulation. The new film, produced under Council auspices, "The Fall of Man," has received popular approval and has been in constant circulation. As soon as the film fund increases through sales and rentals another new film will be produced. Several members in foreign countries have ordered copies of the Council's films. The list of motion picture films was revised and reprinted during the year.

The Safety Calendar increases yearly in popularity as a medium for reaching the worker and his family, school children, and the general public. Five hundred and sixty-five thousand copies of the 1926 calendar were distributed. The 1927 calendar, now ready for mailing, is a further improvement over the 1926 edition. The information on the reverse sides of the 1927 calendar sheets relates to health conservation.

The 1925 *Congress and Exhibit* eclipsed every previous Safety Convention in attendance, number of speakers, exhibits and interest. The proceedings of that Congress contained 1154 pages devoted to industrial and general sessions and 164 pages devoted to public safety, with complete alphabetical index. A cumulative index to the proceedings of the Council, 1919-1925, inclusive, was prepared and sent to the membership. The 1926 Congress program, now ready for mailing, contains 76 pages.

National Safety Codes have continued to receive the careful attention of your committees and staff. Representatives of members of the Council are assisting in the formulation of 44 of the national standard codes. The Council continues to contribute towards the expenses of the American Engineering Standards Committee.

Editors of Employees' Magazines have continued to receive a special service including original safety illustrations and accompanying stories. Other special material and assistance have been accorded members publishing plant magazines or contemplating the establishment of this type of publication, including copies of the addresses presented at a June meeting of the editors in Chicago. An attractive program has been prepared for the annual meeting of these editors at the Detroit Congress and a new feature has been added to the NATIONAL SAFETY NEWS through editorial advice to the publishers of employee magazines.

The Industrial Sections have been more active than ever. All of them have held executive committee meetings and have continued intensive service to the members within their groups. There has been an increase in the number of sections issuing monthly News-Letters. Many of the sectional committees have conducted energetic membership campaigns and performed invaluable service to fellow-members by stimulating the furnishing of statistical data, material for posters and an interchange of safety experience. Eleven of the sections held important district or regional meetings during the year.

The Engineering Section held 18 successful regional safety conferences during the year, an increase of six over 1925, including the Third Pacific Coast Safety Congress. Eight additional regional conferences have been planned for the remainder of the calendar year. Seventeen research committees have been at work. An all-day safety conference was held in New York, November 18, with the four Founder Engineering Societies. The almalgamation of the American Society of Safety Engineers and the Engineering Section, which took place at the Louisville Congress, has proved the wisdom of cooperation and has continued the unity of effort and strength necessary to win respect for the safety cause. During the year a special pamphlet entitled "Accident Prevention and the Engineer" was printed.

General Sections: Eighteen industrial sections have been rendering service to the members during the year plus the health, education, engineering, public safety, plant publications and employees' benefit associations.

Activities in a National Public Safety Conference

Public Safety: The National Conference on Street and Highway Safety, called by Mr. Herbert Hoover, Secretary of Commerce, was held at Washington March 23, 24 and 25. Your Council's representatives served on the committees presenting reports at this second Congress and the Director of the Public Safety Division gave special assistance as consultant. The Council continued to contribute financially to this national activity. Representatives of the Council have been asked to serve on the continuing committees. Much of the Council's activity for safety on the streets and in the homes has been directed towards the formation and upbuilding of community safety organizations. A new booklet was prepared during the year entitled, "Essentials of a Community Safety Program," presenting an analysis of the experience of the affiliated local community coun-

cils. A series of six leaflets on safe driving, "You and Your Car," were distributed. The report of the Committee on Public Accident Statistics has been widely distributed. Seven community safety surveys were completed. The new standard accident reporting plan has made great strides. Ninety-eight cities and four states are now reporting to your national headquarters their monthly record of public and home accidents. There has been a marked increase in the public safety publicity of the Council. The following special pamphlets were published during the year following intensive study: "Safety in Winter Sports"; "Safety on the Farm"; "Safe Use of Gas in the Home." State and municipal authorities have been furnished with copies of the Council's public safety material. Mr. John D. Rockefeller, Jr., has generously offered to contribute substantially toward the much-needed extra money for the expansion of the Council's public safety activities; it is expected that the entire amount required will be contributed within the next few months and plans have already been completed for the expenditure of these funds on an enlarged nation-wide campaign to cut down the public accident toll. A Public Safety Advisory Committee, composed of fifteen national leaders in the official, business and civic groups most concerned with public safety, has been organized and has held its first meeting.

The Education Division Accomplished Important Work

The Education Division has made unusual progress through the services of its executive secretary and three field secretaries, made possible through the continued generous assistance of the National Bureau of Casualty & Surety Underwriters. (See record of contribution in the treasurer's report.) The Education Division has been represented at all of the important meetings of educational leaders, has continued its contact with hundreds of public school systems throughout the country, has continued its monthly publication for school teachers entitled, SAFETY EDUCATION, has continued its distribution of school safety posters and has established new demonstration centers. Cooperation has been continued with other national bodies, such as the Playground and Recreation Association of America, The National Congress of Parents and Teachers, and numerous others. A hand book for schools entitled, "Junior Safety Council Manual," was prepared and the Safety Bibliography for teachers and pupils was revised. This division was represented at the meeting of the National Education Association and had the honor of supervising the preparation of the Yearbook on safety education in the schools which was presented at the annual meeting of the Department of Superintendent.

Our Educational Publicity Service in the industrial and public safety fields has been considerably increased. Scores of news stories, special articles, seasonal safety lessons, photographs, charts and other propaganda have been used by hundreds of daily and weekly newspapers, magazines, trade, technical and class publications. Dispatches and feature stories have been cleared through the national news distributing

agencies. Daily radio talks have been broadcast through a special service sent to more than 70 radio stations in different cities at their request. Special material has been given to community councils and members for local publicity campaigns. Numerous periodicals have published editorials commending the Council's work. Our news release clip sheet service is now printed and sent to more than 1,000 newspapers and 500 trade, technical and class periodicals. A trial mat service is being sent to more than 100 newspapers on request.

Local Councils: Our intimate contacts with and services to the community councils have been greatly developed. Six new councils have been affiliated with the National Safety Council during the year, making a total of 67 affiliated councils. The quarterly conferences of community safety council secretary-managers have been well attended. The ten volume loose leaf encyclopedia, "Standard Practices for Community Safety Councils," has been kept up-to-date and copies of revision sheets sent to all users. The monthly News-Letter of specific information to community councils' officials with valuable enclosures has been continued. Two field representatives have given all of their time to the organization of and service to community safety councils.

External Relations and General Activities

External Relations: Friendly relations have been maintained with other institutions interested in safety, such as the American Red Cross, American Museum of Safety, Chamber of Commerce of the United States, Canadian Safety League, American Association of Industrial Physicians and Surgeons, American Railway Association and its Safety Section, American Gas Association, the safety bureaus of the insurance companies, National Fire Protection Association, National Education Association, Joseph A. Holmes Safety Association, International Association of Chiefs of Police, Playground and Recreation Association of America, National Child Welfare Association, American Automobile Association, Associated General Contractors of America, International Labor Conference of the League of Nations, and state and federal government departments, as well as the American Engineering Standards Committee and the National Bureau of Casualty & Surety Underwriters. The Council has maintained its policy of cooperation with these institutions and has looked for opportunities for closer contacts with those leading the safety movement in their respective spheres of influence. Twenty-nine Safety exhibits have been furnished on request for trade association meetings and other affairs.

General Activities: The new research committee to study the health problem of spray painting has been completed and an appropriation of $10,000 set aside for the expenses of the field staff, laboratory work and publication of reports. The final report of the Benzol Committee has been printed and distributed. The report of the special committee for the abandonment of the constitution was accepted and the revised By-Laws, approved at the annual meeting of the directors, has been published. Three hundred and thirteen bulletin boards have been distributed among mem-

bers. A new pamphlet, "Make It Safe," has been prepared for distribution by the members among workers. Distribution of the booklet entitled, "Safetyize," relating to the elimination of accidents in the home, has been continued. A condensation of the experience of members has been prepared in a four-page leaflet and entitled, "Industrial Safety Program to Fit Your Needs," and is being sent to each new member. A series of 14 sample letters from the manager to the foremen were distributed to all of the members under the caption, "Personalized Safety." A series of six four-page lesson outlines on "Fire Prevention" have been printed. These comprise a course in safety instruction in industrial fire prevention. They have been used particularly by the community councils in their school activities. A six months' campaign was conducted in the art departments of 150 high schools and more than 1800 original posters contributed. Five hundred dollars in prize money was sent to the winners and a loving cup given to the high school submitting the best collection of posters.

The Unique "Staff" of the Council

Another printing press has been added to the Council's equipment. On January 1 the Council moved its offices and now has twice the floor space. The foreign membership has increased and the Council has augmented its foreign service. The staff now numbers 65 persons.

Staff: The real "staff" of the National Safety Council is the membership, a large percentage of which has contributed to the NATIONAL SAFETY NEWS, the Safety Poster Service, the Safe Practices pamphlets, the upbuilding and service of the sections, the Annual Congress, the film and slide collections and all of the committees, both sectional and local. More than one thousand persons now serve on these committees. During the Year John M. Sandel, Safety Engineer; Carl L. Smith, Field Representative; R. T. Solensten, Director, Poster Division; A. Mark Smith, Director, Business Division, and Mary Noel Arrowsmith, Executive Secretary, Education Division, resigned. The leaders in the headquarters staff now are:

William H. Cameron, Managing Director.
Sidney J. Williams, Director, Public Safety Division.
W. Dean Keefer, Director, Industrial Safety Division.
Willard L. Wheeler, Director, Business Division.
Lee H. Gardiner, Director, Poster Division.
Arnold A. Mowbray, Director, Public Information Division.
Paul F. Stricker, Field Representative.
E. Williams Corn, Field Representative.
Carman T. Fish, Editor, NATIONAL SAFETY NEWS.
Guy M. Briggs, Associate Editor, NATIONAL SAFETY NEWS.
Stanley H. Kershaw, Safety Engineer.
George E. Burns, Safety Engineer.
Earl J. Reeder, Engineer, Public Safety Division.
Carroll E. Robb, Statistician, Public Safety Division.
Herbert H. Greenwald, Accountant.

George O. Lindquist, Supervisor of Purchasing and Shipping.
Idabelle Stevenson, Executive Secretary, Education Division.
Marian L. Telford, Field Secretary, Education Division.
Florence Nelson, Editor, SAFETY EDUCATION, Education Division.
Mary B. Day, Librarian.
Mary M. Wells, Assistant Librarian.
Myrtle H. Mollan, Chief Clerk.

ANNUAL REPORT OF THE TREASURER OF THE NATIONAL SAFETY COUNCIL

H. M. Webber, Treasurer, Chicago, Ill.

COMPARATIVE BALANCE SHEET—JULY 31, 1926 AND 1925

ASSETS

	As at July 31, 1926	As at July 31, 1925	Increase	Decrease
Current Assets:				
Cash	$13,954.26	$ 8,266.35	$ 5,687.91	
Investment Securities	19,913.75	19,913.75		
Accounts and Notes Receivable	23,216.30	14,646.96	8,569.34	
Advances for Traveling Expenses	4,575.00	2,225.00	2,350.00	
Inventory of Supplies	3,640.45	2,662.68	977.77	
Deposit with Postmaster	364.29	284.23	80.06	
			$17,665.08	
Total Current Assets	$65,664.05	$47,998.97	$17,665.08	
National Safety Council Reserve Fund Investments	59,990.94	42,288.81	17,702.13	
Office Furniture and Equipment	15,726.11	11,802.31	3,923.80	
Deferred Charges	11,412.28	28,177.49		$15,765.21
			$39,291.01	$15,765.21
	$152,793.38	$129,267.58	$23,525.80	

LIABILITIES

	As at July 31, 1926	As at July 31, 1925	Increase	Decrease
Current Liabilities:				
Accounts Payable	$	$ 2,245.75	$	$ 2,245.75
Current Accounts (Local Councils)	246.25	511.68		265.43
				$ 2,511.18

Total Current Liabilities	$ 246.25	$ 2,757.43		$ 2,511.18
Accrued Expenses	220.00	470.00		250.00
Sustaining Membership Fund	9,350.00		9,350.00	
Special Film Fund		18,898.31		18,898.31
Unexpended Balance—Education Section	3,740.66	2,938.82	801.84	
Sundry Special Funds		70.03		70.03
Reserve for Future Service to Members	59,990.94	42,288.81	17,702.13	
Surplus	79,245.53	61,844.18	17,401.35	
			$45,255.32	$21,729.52
	$152,793.38	$129,267.58	$23,525.80	

STATEMENT OF GROSS REVENUES AND EXPENDITURES
Fiscal Year Ending July 31, 1926

GROSS REVENUE

Membership Dues: Active	$222,454.36
Sales of 1926 Calendars, Pamphlets, Bulletins, Chauffeurs' Lessons and Miscellaneous Receipts	223,032.64
Contribution of National Bureau of Casualty and Surety Underwriters Toward Expense of Education Section	31,000,000
Contribution of National Bureau of Casualty and Surety Underwriters Toward Expense of Field Work	1,666.66
Gross Revenue, National Safety News (Dues From Council Members Not Included)	20,777.40
Interest Earned	1,443.09
	$500,374.15

GROSS EXPENDITURES AND DISPOSITION OF NET REVENUE

Annual Congress Expense	$ 3,000.84
Annual Congress Exhibit	2,054.61
1925 Annual Congress Proceedings	8,107.28
Automobile Dash Cards	353.56
1926 Calendars	78,569.47
Chauffeurs' Lessons	990.01
Depreciation, Office Furniture and Equipment	2,798.04
Exchange	328.23
Field Work, Including Salaries	16,844.87
General Local Council Expense	845.93
General Bulletins	19,,877.61
General Office Expense	4,302.95
Library Expense	550.84
Membership Solicitation Expense	13,243.79
Miscellaneous Publication Expense	1,672.80
National Safety News	33,068.17
Office Printing and Supplies	4,736.88
Postage	5,157.36
Publicity	2,205.03
Rent, Light and Power	19,678.21
Safe Practice Pamphlets	2,042.88
Salaries of Officers and Staff	127,827.92
Sundry Activities	56,632.79

Taxes and Insurance	129.69
Telephone and Telegraph	1,899.87
Traveling Expense—Administrative, including National Committee Expense	2,708.87
Loss on Exchange of Equipment	3.60
Moving Expense	815.54
Equipment Written Off	384.08
Sectional Activity Expense, including Printing Bulletins	19,775.71
Education Section Expense from Contributions of National Bureau of Casualty and Surety Underwriters	31,000.00
Education Section—Sundry Disbursements	6,477.66
	$468,085.09
Transfer to Reserve for Future Service to Members	14,887.71
Transfer to Surplus	17,401.35
	$500,374.15

H. M. WEBBER, Treasurer.

We have examined the above Comparative Balance Sheet of the National Safety Council as at July 31, 1926, and July 31, 1925, and the attached Statement of Revenues and Expenditures for the year ending July 31, 1926, and have compared them with the books and vouchers and have found them correct.

ARTHUR YOUNG & COMPANY,
Certified Public Accountants.

Chicago, Illinois, August 16, 1926.

The Temperamental Interest of the Public in Safety

PRESIDENT SCOTT: You will remember that a few months ago the city of New York went wild over the death of a certain moving picture idol. It happened that on the same day one of the greatest educators of this age passed away. Our public press gave thousands of columns devoted to the incidents following the death of the movie idol but very little space was given to to the demise of the educator. We Americans are peculiar.

When the recent disaster in Florida was flashed over the country we responded with interest and with funds for relief. We are quick to respond to the call for any disaster affecting human lives. But during the same month in which this Florida disaster occurred there were more deaths caused by automobiles in this country than the total loss of life in this Florida catastrophe; yet that fact received little notice in our press and it was not emphasized to us.

I think the work of the man who is engaged in industrial and public safety is sometimes a discouraging work. He starts out with enthusiasm and appreciation of the loss of life and the importance of the work that he is doing. Then he gets into a certain routine that causes him to lose the larger vision of the thing that he is really doing. He seems to forget, as he becomes more accustomed to his duties, that he is doing work like the minister, like the scientist—work for humanity.

This morning we are to have an outsider give us his views as to the meaning of this national loss of life that is constantly going on. We

are going to hear from a man of many parts. He admits he is a college graduate, is proud of the fact that he worked as a clerk for an insurance company, recalls with pleasure his studies with a law firm and does not deny that at one time he was an editor. We have learned that he launched a civic revival in Trenton, New Jersey, and that he founded an anti-bribery society in that state. Our investigations have also brought forth the fact that he was secretary of the Michigan State Peace Commission and we know that he is the author of several books.

With such a background, our speaker should bring us a real message. I know he is going to do more than meet our expectations and it is with great pleasure that I present to you the Rev. Alfred Wesley Wishart, of Grand Rapids, Michigan.

THE DRAMATIC ASPECTS OF OUR NATIONAL ACCIDENT TOLL

Alfred W. Wishart, D. D., Pastor of the Fountain Street Baptist Church, Grand Rapids, Mich.

Your program is crowded with technical topics that have to do with safety appliances, safety education, factory and mine management and traffic regulation. I am not qualified to speak upon these technical themes but it is fitting that at the outset of this Congress we should direct our thoughts for a few minutes at least to some of the moral and spiritual phases of this crusade against the perils of our modern civilization.

Notwithstanding all of the progress that has been made in the application of science to industry and the increasing efficiency of economic organizations, we still have with us the old problem of human nature. It is not within the power of machinery and organization to improve the quality of man, to give him knowledge, to teach him discipline; and so we have before us, as always in the past, this old, old problem of improving the quality of our human nature.

There is nothing in mechanical progress of itself to make man wise or good. There is nothing in mechanical progress to fit a man to live. The real cause for progress, for civilization, for all the achievement of all time, is not in things, not in that which lies external to ourselves, but in the creative moral and spiritual purpose of man. It is the will of man that is the real secret of all substantial achievement, and so the problem of our life is not the problem of things but the problem of personalities, the problem of moral and spiritual and social development.

Human progress is not inevitable. That which science and skill and thought build up—achievements of civilization, of organized society and individual effort—may be torn down almost over night by the inhumanity of man, by his ignorance, by his selfishness, by his blindness to spiritual values, by his sordid ambitions.

We have seen many of the achievements of our modern civilization

1926

TRANSACTIONS

OF THE

National Safety Council

FIFTEENTH ANNUAL
SAFETY CONGRESS

VOLUME I
GENERAL SESSIONS
AND
INDUSTRIAL SECTIONS
(A to F, Inclusive)

Volume II of these Transactions contains Industrial Sections M to W, inclusive.

Volume III of these Transactions contains the Public Safety and Education Sessions.

October 25 to 29, 1926
Hotels Book-Cadillac, Statler, Tuller and Wolverine
DETROIT, MICHIGAN

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NOTE

Volume III of these Transactions, containing the Public Safety and Education Sessions of the Congress, is being sent automatically to certain members of the National Safety Council who are believed to be interested in this subject. Any other member of the Council may also receive a copy of this Volume III without charge by requesting it.

National Safety Council

108 East Ohio Street, Chicago

HONORARY MEMBERS

ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS
ELBERT H. GARY and ROBERT W. CAMPBELL

OFFICERS (1926-1927)

WALTER G. KING, President.
W. F. AUSTIN, Vice-President for Engineering.
CHAS. E. HILL, Vice-President for Public Safety.
HOMER E. NIESZ, Vice-President for Public Relations.
C. E. PETTIBONE, Vice-President for Industrial Safety.
HENRY A. RENINGER, Vice-President for Local Councils.
DR. LOYAL A. SHOUDY, Vice-President for Health.
HARRY M. WEBBER, Vice-President for Finance and Treasurer.
A. W. WHITNEY, Vice-President for Education.
W. H. CAMERON, Managing Director and Secretary.

EXECUTIVE COMMITTEE (1926-1927)

C. B. AUEL, Past President.
W. F. AUSTIN, W. E. Wood Company.
ERNEST W. BECK, ASSE-Engineering Section.
T. G. BRABSTON, Birmingham Safety Council.
A. D. BROWN, Syracuse Safety Council.
R. W. CAMPBELL, Past President.
W. W. CLOUD, Baltimore Safety Council.
L. A. DE BLOIS, Past President.
MARCUS A. DOW, Past President.
E. K. EASTHAM, St. Louis Safety Council.
ISAIAH HALE, Atchison, Topeka & Santa Fe Railway Company.
A. HARDGRAVE, Kansas City Safety Council.
G. T. HELLMUTH, Chicago, North Shore & Milwaukee, R. R. Co.
CHAS. E. HILL, New York Central Lines.
CAPT. W. P. KAIN, Marine Section.
WALTER G. KING, American Optical Company.
T. H. McKENNEY, Illinois Steel Company.
CHAS. J. MOORE, Springfield Safety Council.
ARTHUR T. MOREY, Past President.
HOMER E. NIESZ, Commonwealth Edison Company.
GEORGE OPP, Public Utilities Section.
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shattered during the late war within a very few years. So we have no guarantee that what we have won will be kept, but we are making progress in the realization of the nature of our goal and of the conditions of achievement.

For centuries man labored under the delusion that most of the ills of his life were acts of God. God was to blame for the misfortunes heaped upon him by natural causes; God was to blame for disease; God was to blame for war. So by incantation and prayer he bombarded heaven asking God to do things for him, lift burdens from him, open up paths for him, with the implication behind the prayer, that God was responsible. It is only within recent years that we have begun to realize that the key to the prison house lies in our own mind and in our own will. If disease is to be eliminated from life or its ravages avoided we must discover the causes and apply the remedies.

I used to say at the grave, as most ministers do, "Whereas it has pleased Almighty God to take out of this world the soul of our deceased brother —or sister." I say it no longer because I realize that many times it was quite clear that it was not the pleasure of God to do this thing at all, but somebody had blundered and someone had sinned and someone had broken a law, and the man was in the grave because of his own fault or his own ignorance or that of someone else. I never prayed once during the war that God would stop the war, because I did not believe God started it. If a man sits on a powder keg and applies a match, all the prayer in the world will not keep his feet on the earth.

What Shall We Do with Our Machinery of Life?

Wars will stop when man wants them to stop and no sooner. We have the remedy in our own hands if we would apply it. We are wise, we are progressive, we are rich, we are powerful, that is true; and yet think of all the effort put forth by this wonderful organization and its thousands of coworkers all over this country, of your magazine and newspaper articles, the posters, the educational efforts in schools and colleges, the conferences, the heart-to-heart talks, the appeals, the factory discussions—all to save relatively few lives; and then think how, with a more wonderful organization, a more skillful management, a wider application of science, we banded together (I mean the men of the world) to slaughter, on the field of battle, ten million men, with other losses of life and property beyond our imagination to conceive.

So the question arises as to what we are to do with our knowledge, what we are to do with our organizations, what we are to do with invention, what we are to do with the machinery of life? It is the old, old problem of man versus the machine. It is not a problem of the conflict of physical forces, material energies—it is man against the machine, against his own machine, his own physical organization, to control all for the highest good.

So we have come to realize that true progress is the result of a ra-

tional, conscious effort toward a worthy end. It is the result of endeavor wisely directed and sustained by high and noble motives. So we come to see this whole work of our modern life as a great crusade for improved manhood and womanhood, for better living.

We have accepted the challenge of nature. We have come to realize how much we can do when we have freedom from fear, and the knowledge that brings control over nature's forces, the power that comes from an understanding of nature's sequence. Again we find the prime cause of power and wealth within the soul of man.

Men Are Captains of their Own Souls

So today we are no longer ready to take the view of certain of the old Greek dramatists who loved to portray the great drama of life as the struggle between man and fate, with man always dominated by fate, under the heel of the gods. We believe we are captains of our own souls, masters of our own destiny, or at least such achievement and victory is possible for the human soul. So we venture forth in the conquest of the world; so we go out to overcome ignorance and superstition. We have abandoned magic for research and the old miracle for the modern miracle of man's power, God-given, in the conquest of nature and the discipline of life. That is a very great game.

I remember in one of Kingsley's novels he describes the people having gathered in a little church in England to ask God to stop the plague of England, to forgive their sins, for they thought that their sins were the cause of the plague; and a modern-minded doctor comes to the door of the church and says to the people, "If you will come out with me and clean up this town, I will stop the plague."

That is the spirit of the modern man—no less reverent than the old type of thought in life because in our venture we recognize that it is God who works in and through us for his own good will and purpose; because we realize that we can win only by moral and intellectual spirit; because in this kind of work and from this high motive we do honor God by using our own mind and respecting, as our brother prayed today, human personality and the work of the individual.

So we have come through the long struggle of the ages to achieve organized society with law and order. We have come to an unprecedented knowledge of nature's processes. We have come to a higher, purer, more practical, more human, a truer form of religion. We have come to a new sense of the worth and value and importance of man as man.

Your work, then, my friends, is a crusade to prevent disaster. As your Chairman intimated, it is sometimes a discouraging undertaking—it lacks what men commonly think is dramatic, spectacular, appealing to the imagination, exciting newspaper comment, for as of old men could only see the working of God in the flashing meteor, in the hurricane and the earthquake, so today men can only see the nobility of man in the reformatory work. They see it in the greatness and dignity and self-

sacrifice of man in the coast guards, pushing their boat through the surf to rescue lives on the sea. They do not see the heroism and self-sacrifice and dignity and dramatic feature of the worker in the laboratory who will one day discover how to send messages across the sea. The wireless in one year has saved more lives than all the coast guards of all the seas —the work of prevention.

There was an old saying that a fence at the top of a precipice is better than an ambulance at the bottom. But the fence is not very dramatic. The ambulance with clanging bell and white clad nurse and doctor—that is spectacular, that is dramatic; everybody hears the clamor. Nobody pays any attention to the fence (*laughter*)—and you are building fences and nobody is excited about them. You are trying to prevent disaster.

When will we learn that the world's benefactors are neither those old saints who ran away from the world to find God in peace and save their own souls, nor are they alone those who are engaged in picking up the wrecks of humanity, patching up the lives that have gone to ruin, and who go about dealing out alms to the poor.

That is all beneficent work, beautiful work, and I would not detract from their glory or withhold an atom of praise, but there are other people to be honored also and their activities are to be included in the field of religion and they, like you, are to be seen as workers in the kingdom of God, standing on as high a platform as the preacher of the Gospel. (*Applause.*)

The Highest and the Lowest are the World's Benefactors

They are the school teachers throughout the country, molding, influencing, directing lives—guiding the personality in its unfolding. The world benefactors are all of the executives of industry who, through their wise, honest, efficient management, help men to guard against poverty by keeping them employed, by not being a failure, by leading them to prosperity. All of the toilers in factories and mines and railroads who minister to a human need, for we have our human need, the need of our daily bread —those who minister in this humble way, honestly giving an honest day's work for their pay, are also the world's benefactors, without whom we could not advance or live.

Men, where is the field of moral endeavor for the layman who is not a professional religious man if not in his daily life? If it is my duty to pray to God when I go into the pulpit, that He will help me speak the truth, help me to be humble, help me to be honest with myself and my people, is it not the business of the editor, whose words reach thousands more than mine or any other minister's thus molding their citizenship and directing their mental and moral life—is it not his duty also to regard himself as the mouthpiece of Jehovah whose blessing he should seek that he too may be honest and free from base motives? (*Applause.*)

And if it is the duty of the minister and the doctor and the charity

worker and the social reformer not to seek profit, but human welfare, is it not also the duty of the business man to join to his desire for a profitable business—that is an on-going business, a successful business—the desire to make his life count for something in the lives of other men, to be his brother's keeper?

Why should the high and holy motive of self-sacrifice, of service, be denied the worker in the secular field? I can not help but think, with all due reverence to the scholars of the Church in the past, that this is a fatal, misleading, harmful distinction which has always been made between the sacred and the secular, as if there was a field where God was and another where he was not, as if the minister and the Sunday school teacher and the charity worker were in the Kingdom of God and laboring for the Kingdom of God and all of the people in their respective vocations in the secular life of the world were engaged in unholy callings.

Religions are Tested by the Lives of Common People

That has been the view of many men who have tried to keep the preacher out of the practical life of the world—to deny the application of the spiritual truth to the daily concerns of life. I think it is a false distinction. A man can tell the truth and bless humanity while running a factory as well as when preaching the Gospel; and sometimes I think that Christianity and Judaism and all of our religions are really tested, not so much by the lives and teachings of ministers, as by the lives and teachings of the representatives of those religions in their daily contact with men in business and in the home. (*Applause.*)

Indeed, the great religions of the earth—Christianity, Buddhism, Zoroastrianism, Mohammedanism—were founded by laymen who stepped out of the secular life before the world as the founders of great faith and the proclaimers of great ideals.

So that is your work—the crusade for the prevention of misfortune. If that is true, you should conceive your work in that light. That is the way we spiritualize our activities, by seeing them in their broad implications. I sometimes tell the furniture workers of our city that when they make a table, for example, they must remember that that table is going into a home and around that home will be father and mother and the kiddies. It will be the center of holy influences, of delightful intercourse—the table of the home. Why not make it a good table? Why have a lie staring these people in the face—something that is not what it pretends to be? Put conscience and honor and religion into this work.

A man's work bench can, in that sense, be the altar where he worships. Just as in the play, "The Servant in the House," the drayman fixing the sewer down below performs his function so that the worshipper above may be healthful and not go to his home long before his time; he too is an agent of God.

So I say, let your motive be more than economic. I believe if a careful analysis were made of much of the industrial betterment movement

of our time, we would discover, contrary to the teaching of a good many people, that the economic motive is not dominant, that there are thousands of men in this country who are trying to prevent accidents and improve working conditions and hours and wages and benefit their brothers, not from an economic motive, but because they feel they ought to render a service and because they love their fellow men. All the love of man is not confined to the people who work for wages. There are many men in this world in high station who are trying to discharge their function in society, to employ their high talent for the good of mankind; and that is why some of them are noble, for what makes real nobility of character is a high motive and a broad purpose; you are just as big as your cause and if your cause is dollars you are going to have a mean, shriveled up soul.

The Boy Who Had the Usual Dream of Riches

I never will forget the story of the boy who said to an old rich miser, "How can I get rich?"

"Well," said the old man, "save every possible cent you can save to get a hundred dollars and put it in the bank. It will draw interest. Do not touch the interest. Wear your clothes as long as you can. Don't spend your money for the theater and concerts and cigars. Save and save and save, and when you get as old as I am you will be as rich as I am and as mean as the devil."

There are many men like that whose eye is fixed on the profit, and perhaps some have crept in here unawares, who are interested in the safety movement because it may reduce their overhead or their expenses, their insurance or something like that. There is money in it for them; it is going to pay them to look after their fellow men.

Why degrade a noble calling, an occupation of supreme value? Why supreme value? Because your success, men and women, is to be measured not only by the statistics of the number of reductions in accidents, the amount of dollars saved; but whenever you prevent, by your labor, an accident, you do more than save a life, you save a home. The boy and the girl now have an opportunity because the breadwinner is alive; they would not have had money for an education; they would have been crowded into the factory before their time; now they can go to school. You save tears. You prevent heart aches. You minister to life, make it happier, give it a chance to be pure and true. That is what we do when we save life.

Let us conceive of ourselves as a part of that great host of men and women who today are beginning to realize the glory and beauty of service in the daily life of man, the beauty of fidelity in the factory and mine and railway and bank and newspaper office.

The Master of old, speaking of religion, said to his disciples, the field is the world. And so it is. The field of moral endeavor is not limited to Sunday and the church, to kneeling in prayer or to performing rites

and ceremonies or reciting creeds. It includes your daily thought, your daily plan, your daily motive.

PRESIDENT SCOTT: Dr. Wishart, if there was any discouragement in our hearts when we came here this morning, it has been removed and I am sure everyone here will feel deeply grateful for the inspiration, the new view, the splendid view of our work which you have so well presented, and we thank you for addressing us.

In the absence of the Mayor, he has delegated one of his staff to give the official welcome to this delegation, I have great pleasure in presenting to you, as the Mayor's representative, Mr. John Atkinson, Assistant Corporation Counsel.

AN OFFICIAL WELCOME FROM THE CITY OF DETROIT

John Atkinson, Assistant Corporation Counsel, Detroit, Mich.

Mr. President, fellow guests and members of the National Safety Council: There was a time when we didn't need safety in Detroit at all—when, if we had a few acidents a year, it was wonderful and they got the front page of the paper. Detroit was so sleepy and so safe that it needed nobody to stand at the corners and warn us to stop, look and listen. About 12 or 13 years ago we woke up and we began to step out beyond any man's judgment or prophecy. We gradually came into our own in what is known as the automobile industry. Previous to that time we had had our great industrial plants and we thought we were quite some city. Our streets were beautiful; we had made up our minds that certain families were going to be the wealthy families of all generations to come, and each man had fitted into his slot and was apparently content to run his race in the line in which he was heading.

But when the new era came in and we began to manufacture motor cars, not only the individuals went crazy but collectively the city went crazy. So we have expanded and expanded and expanded again, until today Detroit is a great, huge, throbbing metropolis where before it was a sleepy, well-cared-for old town, and the beauty of the thing—or perhaps the devastation, if you want to call it that—is that as we go to bed at night we don't at all know where the limits of the city are going to be the next day.

There was a time here when our friend Henry Ford got up to a capacity of 1,000 cars, and we thought it wonderful. I tried a condemnation suit the other day in which we sought to put a street across his Highland Park plant and discovered that the output of the plant is as high as 9,500 cars a day. When his witness told me that he thought Henry was a great philanthropist, I told him I wasn't so sure but what he would have a lot to answer for when he got to heaven. (*Laughter.*)

So we have gone on in this city, gentlemen and ladies, and we have just

built our city by sheer strength. Our city is no longer pretty. We are getting higher buildings and some of them are structures of beauty like this building; we think we are going to be a great, beautiful city. We are spending millions of dollars for parks; we are spending millions of dollars for wider streets; we are just lavishing money in every direction with the idea that some day we will amount to something, but right now we are a great, huge, lumber camp that is just busy doing things.

I don't know so much about safety. When I came over here I had an idea, (being a man who drives a car), that it applied entirely to the ability to get through a street without having seven or eight Fords go over the top of you. (*Laughter.*) I appreciate that it means more than that and I appreciate that men like yourselves—unless you have a love of the thing, unless you are fired by real zeal—probably never would get together in an assemblage of this kind to work for the benefit of your fellow men. I have had one or two fellows run into me recently that I could recommend to you strongly. (*Laughter.*)

Speaking seriously, it is worth while to have a crowd of men like yourselves who come in and say, "This world war that killed so many people, when life grew so cheap, is all over and we have to get back to first principles where a life is of inestimable value and must be saved." For that reason I feel that this Council is entitled to particular consideration and I am particularly sorry that the Mayor couldn't be here to welcome you in person, but I want to tell you from the bottom of my heart, in behalf of the city of Detroit, that we are glad to have you here and we hope you will like us well enough to come again.

Thanks and Appreciation to the City of Detroit

PRESIDENT SCOTT: We know what it means to a city to entertain such a vast number of people, and the fact that we are all comfortable and happy demonstrates that Detroit was equal to the occasion.

I want the representative of the Mayor to convey to him our appreciation for all that the city of Detroit has done for us and to assure these people that we deeply appreciate the time and the expense they have gone to for our entertainment.

I will take this occasion also to express appreciation to others to whom we are indebted for the success of this meeting and its program. I want to give an expression of appreciation to the president of the Detroit Industrial Safety Council and to his local committees and their chairmen who have been of such great assistance in this work; to the speakers who are on the program, to the press, and in fact to everyone who has worked to make this Congress a success, we extend the thanks and appreciation of this entire convention.

We have been up on the precipice and have been building the fence and we have had a view of our work and what it means by that beautiful illustration that was given by Dr. Wishart. Now we are going down to

the foot of the precipice and we are going to hear something about what goes on down there, where the ambulances are and the hospitals and the cots and bandages and the first aid equipment, and we have selected a minister for this presentation also.

Mr. Cameron is accustomed to handing the president a biography of all of these gentlemen and if any of you want to see these biographies after the meeting is over, I shall be glad to submit them to you in detail. But for the purpose of introduction I will only say that the next gentleman who is to address us has the distinction of being president of the Catholic Hospital Association of Milwaukee and a representative of the American Conference on Hospital Service. In addition, he is the acting dean of the College of Hospital Administration of Marquette University, at Milwaukee.

It is with great pleasure that I take this opportunity to ask Dr. Moulinier to address you.

THE HOSPITAL'S PART IN PREVENTION AND CURE OF DISABILITIES

Rev. C. B. Moulinier, S. J., President, Catholic Hospital Association, Milwaukee, Wis., and Representative of the American Conference of Hospital Service.

I am beginning to think that you are a very pious group of people. You have had three ministers here to talk to you today. I think the other two ministers have told you about enough, as coming from the ministerial side of things. I am a priest and pretty old and really haven't practiced in the ministry, except in a personal way, for a number of years.

The association of which I am president is continent-wide. I saw 12 years ago that hospitals weren't all that they should be and I said to myself (being at the time regent of a medical school and knowing something about medicine and also being a priest), that if I could induce the 750 hospitals conducted by Catholic sisters to become better places for the sick, I would accomplish something.

Two years after that, having organized this group of people, I was invited to join the American College of Surgeons in its effort at standardizing all of the hospitals of this continent. During these years of travel all over the continent, I have been studying not only hospitals, not only preventive medicine and curative or restorative medicine, but I have been studying in as thorough a way as I could, in the midst of many occupations, the general health problem.

When I was asked to come here and make this talk to you today I started in to learn what I could of the progress you have been making since the meeting you held in Milwaukee 14 years ago, when I talked to you for five or ten minutes. I got your program; I got your literature;

Dr. Mock, that great salvage surgeon, has written to me; I have met the local men of Milwaukee and have gotten all of their literature; I have written a paper which I don't think I will use because I have gotten a great deal of knowledge and inspiration here this morning. I had the inspiration that the reverend gentleman has been giving you all along except that it was revived and strengthened and I have been analyzing for the last couple of weeks or more, your whole proposition as far as I am able to grasp it.

Big Organizations All Working Together

Of course, I am a layman. I am not an M.D.; I am not a nurse; I am not a health officer; I am not a safety first expert. But, if you will pardon my presumption, I am going to try to tell you something that has been growing up in my mind by way of mere lay suggestion. I consider it a great honor to be here, a great joy to be here with you, and if I can just suggest a few little things, I shall be fully repaid.

My topic is "The Hospital's Part in Prevention and Cure of Disabilities." The emphasis of the thought this morning has been on the prevention side. That is very important, but don't forget the curative and restorative and rehabilitation side. I have been dealing with big national organizations and it is a joy to come in contact with another one. We are all working together. I would like to see a joint meeting of the American Medical Association, the American College of Surgeons, the American College of Physicians, the Protestant Hospital Association and the Catholic Hospital Association.

Our work is really one and the same in its purpose, as was so beautifully brought out here today—the saving, the prolonging of human life, the most sacred God-given thing we have next to our soul and its immortal value.

You are educating the public by publicity. You are getting into many of the city schools. You are educating the men in the shops and in transportation. You have a wonderful system of publicity through your posters and your literature, but I am wondering, as your president did in his address, whether there isn't room for more work in these lines. Why can't you get into the parochial and private schools, in the grade and high schools? I offer my services to get you there if you want them. (*Applause.*)

I know that in Milwaukee the director of parochial schools is in close touch with the Safety Council there, but the same thing could be done all over this continent by a little bit of concerted action. In order to develop an instinct for safety, an attitude to be safe and to keep safe, you must get at the young. You get into the home through the workers in the shops. You must get there thoroughly and completely over this whole continent through the schools. The young must be trained to appreciate that priceless gift of life. They must be made thoughtful and careful—a difficult thing, of course, but possible, provided you begin

when they are young enough, and train the teachers and train the visiting nurses and give them enough of thought and fact.

I am told that there were about nine millions of people injured in accidents last year—nearly one-thirteenth of our population. Very likely if you hadn't been so active for these last 15 years, there would have been twenty millions injured. Your aim, therefore, must be to reduce, year by year, the accidents in spite of the fact of our growing complex civilization and the dangers that are becoming more numerous all about us from day to day, and from month to month. How can this be done? You must get better laws from the legislature governing traffic; you must get laws requiring licensed chauffeurs and demanding careful examination before a machine may be driven by anyone; you must train the police forces all over the country—they are being trained but I think not enough. The traffic laws within the city, I believe, can be improved. You can, with the machinery you already have, make that training and that preparation against accident more thorough.

The Hospitals Should Be Enlisted in Safety Effort

The hospital organizations have not yet, as far as I know, entered into your movement for the prevention of accidents. I don't see any of your posters, I don't hear of any of your literature being distributed in the nearly 8,000 hospitals of our own country. How are they going to help you in accident prevention unless they know more about your movement, unless your local councils and the National Council get into these hospitals and instruct the people there—the managers, the nurses, the orderlies, the internes, the doctors? When they are thoroughly educated every patient that comes to the hospital will go out educated, and there are between ten and twelve millions of people who pass through these hospitals every year. See the field that hasn't been touched, as far as I know, except through the natural reflection of prevention in medicine, prevention of disease. Now, gentlemen, there is a field there and I hope before your meeting closes that some committee newly appointed, or some committee already in existence, will take up that problem of reaching this great body of hospitals.

I was introduced as being regent of a college of hospital administration, the first of its kind in the world. It is now in its third year. Why such a college? In order to give a real, scientific hospital training to those who are to manage the hospitals of this continent, regardless of creed or sect. There are $4,000,000,000 invested in hospitals, $600,000,000 annually paid for the maintenance of them, and some $500,000,000 being invested every year in additions or new hospitals. Just think of the tremendous investment and of the people managing, handling and directing those hospitals who have had no specific scientific training. They have just grown up as hospital executives. The nurses get a training, yes, but the executives, the ones who decide on the policies, the trustees, are mere laymen and hardly know what a hospital is except that it is a place where the sick go and where doctors treat them. They are not trained.

May I ask a question? Are your safety officers being trained? You are getting experience; you have grown up in the shops, on the railroads; you have read a great deal; and I have no doubt this body is made up of a wonderful group of experts; but what about the scientific analysis of the whole problem? What about your knowledge of first aid, of medicine? What about your knowledge of mechanical safety devices and your practical technical knowledge? What about your whole view of the health situation of our people?

Gentlemen, in this College of Hospital Administration we have a department planned for the training of health officers, safety officers and all connected with human health. Think of it; deliberate upon it; get some one of your committees at work on it. You have done wonders and are doing a great work in the world, the like of which can hardly be duplicated anywhere. The number of lives you have saved and the injuries you have prevented can't be estimated, but isn't it time to get right down to solid analysis, to see whether every worker in every shop and on every line of transportation has had a training that fits him for his work, not only the practical but the theoretical?

The Medical Profession Has Been Lagging

There is a science of preventive medicine and prevention of accident, just as there is a science of restoration. The medical profession itself is lagging way behind. I am sure that Dr. Mock will tell you some things that perhaps you know—perhaps you don't know—about the tremendous development in surgery, restorative, rehabilitative surgery and the application of physiotherapy as an aid to surgery. I have heard him speak a number of times. He is, perhaps, the leader in that phase of medical and surgical work in this country. You are to be congratulated in having this year for the first time brought in the hospitals and the medical profession in the matter of human salvage. The medical profession is an infant in its knowledge of orthopedic surgery and the application of physiotherapy as an aid to surgery. I say infant because only a few years back—and the war has aided the progress—it began. You yourselves must know that in your shops the disabled are returned to work rather inefficiently. The National Industrial Surgeons Association, only a few years ago, began to realize the importance of their work, began to analyze and study themselves, and began to see that the industries too often took medical men into their shops and turned over the workers to them rather in view of the small salaries for which such service could be gotten than the expert knowledge and skill they possessed. That is changing. We are coming into a new era. Everybody, every organization of considerable size, is realizing that the terrific industrial expansion of our country calls for the very highest and best service.

Next in importance to preventing an accident is the restoring of the injured person to economic and social value. I like to differ a little from my reverend friend, Dr. Wishart. You represent industry. You represent the railroads. All this work, no matter how beautiful and how

wonderful and how sweet and how glorious it is, must pay—must pay your employers, must pay the industries—and I say that it will pay better than it has in the past the more scientific it becomes, the more thorough and sure, and the better trained are all the men who have in their charge the safety work and the restorative first aid and medical and surgical care.

I am not preaching. I am just telling you what seems to me to be the basic principle. Your president said you must be wise; you must conserve your financial resources. Absolutely you must, and you must conserve the resources of the big industries and the railroads which you represent. You must convince them by your scientific care in the prevention of disease and the restoration of the injured. You must combine all these tremendous agencies of the medical profession and the hospital people to give you the kind of service which a thorough study of the situation will enable you to judge is wise, and you must convince your higher-ups that a cheap doctor, a cheap surgeon, is a waste of money. You must have the best.

So it is with all your safety officers. If they are not trained, if they don't know, if they are not thoroughly conversant with every phase of prevention of accident and restoration, if they don't know what the hospitals are and can do and should do and aren't doing, you are not giving them the service, you are not getting for them the return on their investment and you are not saving for them the money that you might.

A Personal Message to Henry Ford

If Mr. Ford were in this audience, I would say to him, "Mr. Ford, invest some of your millions in the best way possible, and that is to help this movement for the prevention of accident and the restoration of the injured and look to it that the hospital world of this country and the medical profession become more and more keenly alive to what they can do with the growing knowledge of surgery and of physiotherapy." (*Applause.*)

I don't know what your expenditures have been year by year. Let me say they are a million dollars. I say to you, Mr. President, and all of you officers and members, if it has been a million dollars per year, put in five million and you will save more money to industry and to the world; and of course you will save more lives and you will restore more lives, because in order to do all this more effectively, getting everywhere, not only in the shop, not only on the transportation line, not only in the home through the shop, but also in the schools, and bringing along with you as cooperators all of the hospitals of this continent, you will save millions of dollars and thousands of lives and you will restore them to economic productiveness and human happiness far beyond any estimation we can make now.

I recommend that you have a committee to study this situation and I would like to make one final suggestion. This whole problem (I speak of it as one great problem) needs more survey work to get the facts,

not only the facts of accidents but the facts of every kind that have any bearing on human health in industry, on the streets, in the home, in the schools, on the playgrounds—everywhere. Next to that you need a group of research people. You are doing some research. Are you doing it systematically? Have you people whose work it is to make research in every direction affecting human health in industry and in every other occupation of life?

Then your publicity. It is splendid. I have been amazed at it and yet I can see where much more can be done. Perhaps you haven't the money. Get the money. Tell the people who have the money that they are wasting their time and energy in not putting in more money so you can make this publicity greater among the laboring men, among the general public, so that they will realize that industry, that money makers, that the wealthy people who are guiding the destinies of the finance of this country have hearts, have souls, have consciences. How can they prove it? By putting their money into it. They have done some of it. They should do more.

Then this same group of surveyors, of research people, should have with them, or be themselves, publicity agents. And, finally, there should be a teaching corps, made up of the same group of men or others.

I suggest that you go to Henry Ford before you leave town (*laughter*) with a committee—if I could stay here, I would go with you—and tell him that you need about five million dollars to establish a group of fellowships for the survey, the research, the publicity and the teaching of the value of human life and the various means of preventing accident and restoring those who are the unfortunate victims of accident. You can do this, gentlemen. You see how bold I am. I am a clergyman only. Perhaps if I had a position in a shop, I wouldn't talk this way. I might feel that I were jeopardizing my position. I don't owe anything to any industry or to any group of people. I am giving my services without salary to this whole country in the betterment of hospitals, and it is a rare delight to me to be able to come here and say these few plain, but-spoken words.

ADJOURNMENT.

Executives' Session

October 25, 1926

WM. ROBERT WILSON, Chairman
President, Detroit Industrial Safety Council, and President, Guardian Trust Company, Detroit, Mich.

THE Executives' Session convened at 2:30 o'clock, President Scott presiding.

PRESIDENT SCOTT: At the opening of this second session of our Congress it gives me great pleasure to introduce to you the chairman who is to preside at the session this afternoon. Mr. William Robert Wilson is the recently elected president of the reorganized Detroit Industrial Safety Council. Mr. Wilson is also the president of the Guardian Trust Company of Detroit and chairman of the board of the Murray Body Company. He is also chairman of the board of the Copeland Products Company as well as other organizations engaged in the automobile manufacturing business.

The chief and outstanding fact in connection with Mr. Wilson follows: Mr. Wilson started his business career in Chicago and at one time was vice-president of the Irving National Bank in New York. He then became the president of the Maxwell Corporation and is now devoting his energy to the Guardian Trust Company and other corporations mentioned. Mr. Wilson is a graduate of the Armour Institute of Technology of Chicago.

It gives me a great deal of pleasure to introduce to you the chairman of the afternoon session, Mr. William Robert Wilson.

CHAIRMAN WILSON: It might be embarrassing to have all of your ancient history as well as modern so thoroughly developed on an occasion of this kind. I appreciate the fact that Mr. Scott forbore going any farther than he did.

If you have traveled by day from Buffalo to Toronto you will recall how, after some journey on the high level plateau which makes the gorge of Niagara possible, suddenly there bursts on your view the great expanse of Lake Ontario, and later the city of Hamilton is laid out underneath your eyes. It is a view like that of Duluth from the heights

behind the city, and excelled, I presume, by that of Rio Janiero from its nearby mountain.

Like a hundred million Americans, I have believed in safety for years but have taken a matter-of-fact view—a view arising from ordinary and often small reminders. Riding along a smooth asphalt street in preoccupied fashion one is occasionally given to profane expression by an abrupt jolt from one of those warts in the pavement made to mark a safety zone. Or again in boarding a railroad train one is given to sardonic humor by the safety signs which confront you, when you may feel that they should more properly face the railroad operator. It has not escaped my attention, as one of the small reminders in any home with children, that this safety idea starts early and only takes on a new significance at the grave.

But the program of this National Safety Congress, like the sudden view of a great city from the heights, brings an impressive realization of the comprehensiveness of this great movement for safety.

It reaches into more and more industries, into mining, quarrying, transportation and the various other works of men. It not only enters his occupations but like an all-pervading protecting influence surrounds him everywhere. In fact, if safety continues to have the attention it has already enjoyed, it will be a kindly influence almost as pervasive as Providence.

Modern Civilization Has Multiplied the Hazards

But the comprehensiveness of this expanding work for the protection of human life and happiness should not be construed as paternalizing us with a coddled comfort. It can not be said that the instincts of the savage were sharpened to any more alertness against danger nor his fibre better developed. The amazing development of material civilization, while it has freed us from some of the cruder dangers, has brought an infinite train of new and often more terrible tests. The savage was in no danger, by a misstep, of electrocution by 100,000 volts; the savage had none of the menaces typified by our towering blast furnaces where, if the mix gets out of control, an explosion may bring a flood of white iron to engulf hundreds of workers in a twinkling. It seems to me our progress develops more alertness of faculties and a sterner fibre. One look at the thoroughfare just outside at 5 p. m. brings a trail of reminders of the narrow thread of life.

So I am sure you will agree that the enlarging refinement of this great endeavor for safety is not weakening the fibre of our people, but is, on the contrary, the only fitting accompaniment to the high pressure of life, the imminence of disaster, and the swarm of new dangers presented by our rapid material progress. It seems to me that if we regard our present civilization as one of those great armies stretching across hundreds of miles of a "Western Front," then the amazing organization for safety is only comparable to the sum total of those many ministering agencies of welfare best typified by the great Red Cross. It is ordered

that civilization must forge ahead with all its increasing hazards, but with it we must push right along, as a service of supply and welfare, the attendant guardian host of safety.

It is befitting the importance of this magnificent work that you should be addressed by notable men engaged in one or another aspect of it.

Most of you safety representatives are old enough to remember some of the terrible disasters that have happened to steamboats on which people went to enjoy a litle recreation. Our memories make it seem that in the old days many such vessels were often not fit for travel. Thousands of men, women and children have been drowned because greedy, selfish, criminal owners did not protect their passengers. But times have changed. Today you are to understand that you are as safe on a steamer as in your own home.

You are going to hear what Uncle Sam is doing to protect you and yours when on board a steamship. And the man who will tell you about this development is an authority. I refer to Mr. D. N. Hoover who is the Supervising Inspector General of the U. S. Steamship Inspection Service, Department of Commerce, Washington, D. C.

We are, indeed, gratified to know that two big men of the same name are personally interested in the National Safety Movement and particularly in our own Council. All of you know what Mr. Herbert Hoover has done to encourage the Public Safety meetings which have been held at Washington and in which the officers and members of the Council participated.

You will now be addressed by Mr. D. N. Hoover of Washington, D. C. While his title is Supervising Inspector General I think we should call him Admiral.

SACREDNESS OF HUMAN LIFE

D. N. Hoover, Supervising Inspector General, Steamboat Inspection Service, Department of Commerce, Washington, D. C.

I want to cover about two thousand years in about ten minutes, and hence, in order to do that, I must speak rapidly and, of course, go into very little detail in regard to the subjects that I intend to touch.

My subject is the "Sacredness of Human Life," and first of all it might be well to examine the definitions and find just what some of these terms mean. In the first place, a thing we call sacred is that which is set aside for religious or divine use. In the next place, we know what life is and it is not necessary to go into any extensive definition of it. But, as compared with the word life, there is also the word death, which is exactly the opposite and we know it to be the cessation of this active life we are here living. Lastly, there is the word human as distinguished from that which is divine or material or animal.

Has it ever occurred to you that, notwithstanding that we live this life, and notwithstanding that we are told that in the midst of life we are in death, yet that very seldom do people undertake to express the thought that none of us has any control whatever over the fact that we

are here, and that none of us is able to escape from here by any other door except that of death? Has it ever occurred to you that while good friends and while the clergy may undertake to make the passage through that door as easy as possible, yet neither good friends nor the clergy can erect a different door through which to pass. Possibly this is the thing which is at the back of the love of human life, for should it happen that there should be a disaster in this city in the way of an earthquake that would affect the foundations of this building, the first thing that each man would do would be to try to protect himself, to try to get out, the law of self-preservation asserting itself at once. And yet, notwithstanding how dear human life is to us, has it ever occurred to us how cheap human life has in the past been held?

The Pyramids a Monument to Human Waste

Some of you have doubtless been to Egypt and have seen the great Pyramids there. If you have, you know that surrounding those Pyramids is a great waste of sand, a dry desert. Has it ever occurred to you that those Pyramids, concerning which engineers have been prone to debate as to their construction, were built with human blood? Has it ever occurred to you that they were built almost entirely by slave labor and that they were not particularly careful as to how they destroyed the labor? Has it ever occurred to you, as you read of the life of the Hebrews in Babylon, that a certain number of tribes of those people were absolutely lost, were wiped out, were consumed? We do not know where they have gone. There have been interesting treatises on what became of them, but all of it goes back to the period of the world when there was absolutely no value placed on the individual life.

If you come down from that ancient time to the time of Rome, you will find it was the custom of those people to have gladiators and circuses and prize-fighting rings. You may say, in the light of modern rings, that we, too, have prize fights. We do. But they had contests between men and beasts in a way such as is not known today and such as would not be permitted today even in those communities that are considered to be the most progressive.

Again, if you come down to our own times, to the Middle Ages, you will find life was sometimes even less valuable than in those very ancient times. I am sure all of you have read of the crusades conducted by the Church during the Middle Ages, the purpose being to take the city of Jerusalem from the Turks. But I do not remember reading in any history of an event which was known as the Crusade of Children, when little children, three, four and five years old, were marched across Europe to the gates of Constantinople, where many of them were taken slaves. They had the idea, honest enough to be sure, built upon a faith perfect but ignorant, that if soldiers could not take the Holy City the faith of the little children could. But that idea, perfect as it may have been in faith, gave no consideration whatever to the value of the life of a child.

Coming down further we come to the time of the feudal system. Any of you who have read of it must know that while our law of real property is based upon it, it is also true that under the feudal system the barons had rights which even at times permitted them to take the life of a serf or servant.

It may seem that from that day to this day is a long step, and it is. Yet in this day things are by no means perfect. But we have made tremendous advance, namely, there is a public conscience now awake that demands that human life shall be given proper consideration. Over against that period of time, covered from the ancient down through the Middle Ages to modern times, has stood, however, a force that has forever fought for right—you may say not always intelligently, sometimes with fanaticism; you may say sometimes with bigotry; yet, nevertheless, it is a force we must take account of in Christian civilization, and I refer to the work that was done in the Middle Ages, even as it is done in modern times, by the Church. Because while it is true that in the Middle Ages there were violence and darkness and ignorance, yet on the other hand there was kept alive in the monasteries and schools of learning conducted by the Church the idea that, after all, it doesn't necessarily follow that might is right—the idea that there is such a thing as righteousness for its own sake.

Men Progressed Rapidly After the Reformation

After the Reformation and after the Renaissance and after the general revival of letters, there then came a rapid step forward by people thinking along the line of protecting life more than they had done before; until now, today, we may see, as we travel over this country, all kinds of refuges, schools, hospitals, and the like, that have their origin in what is essentially Christian training. And we find in modern times all of the public welfare associations working hand in hand with religious organizations for the betterment of conditions.

As I came down the streets of Detroit this morning after I had gotten off the train from Washington, I was impressed by a certain fact, (and possibly you may have been, too). Have you ever stopped to consider the number of windows that there are in the buildings of this great city? Have you ever stopped to consider the number of window panes in those windows? They must run into millions. Remember and keep in mind this thing: that in the Middle Ages, especially in France, every opening in a house was taxed. Hence you can find in France today houses owned by the poor peasants where there is but one opening, a door, because in the Middle Ages, if they had more than a door, more than a window, every one of them was taxed. Compare, if you please, now, therefore, the city of Detroit or any modern city and the millions of instances where you have windows, holes cut in the walls, in order that light may come in.

In other words, it seems to me we have turned our faces to the sun and to the fact that it is not sufficient to be content with a mere saving

of life, but, what is just as essential, that we shall have life and have it more abundantly.

CHAIRMAN WILSON: Ladies and Gentlemen, with respect to our second speaker, Dr. Finley, I am sorry to have to tell you that through a combination of circumstances which he could not foresee it was impossible for him to be here. He sent this telegram to President Scott:

> "Regret exceedingly that it will be impossible for me to be in Detroit Monday. Conditions here which I could not foresee compel me to be in my office here in New York. I am deeply disappointed for I wanted to say a word for children and pedestrians, but you do not need me with such a fine list of speakers.
>
> "JOHN H. FINLEY."

We should congratulate ourselves on having with us this afternoon a physician recognized as a specialist of renown. Hundreds of children whose deaths would be mourned by their parents are alive today as a result of his skill. Dr. Chevalier Jackson, Consultant Bronchoscopic Clinic, Jefferson Hospital, Philadelphia, is going to tell you how to safeguard the lives of children. His message is one that should be in the hands of every parent in America. I hope the newspapers will give a full report of his address because of the pertinence of his suggestions for the safety of children—the hope of every nation.

Dr. Jackson will relate to you facts that it has been part of his life work to obtain.

WHAT 2,000 CHILDREN HAVE TAUGHT ME

Dr. Chevalier Jackson, Consultant, Bronchoscopic Clinic, Jefferson Hospital, Philadelphia, Pa.

(Address illustrated by numerous lantern slides)

Many afternoons would not suffice to tell you the lessons I have learned in regard to safety of children from the children themselves, from say 2,000 children. Broadly speaking, the children have taught me that mothers in general, almost without exception, are unaware of many of the dangers that confront their children every day in the home, even in the mother's arms. A mother instinctively feels that there is no place on earth where the child is so safe as right in her arms; and yet we have hundreds of cases showing that the accident happened right there in the mother's arms because the mother did not know. It is necessary to educate the mother in regard to these particular dangers.

Railway executives have concentrated on the elimination of avoidable accidents until today the passenger is about as safe as the pedestrian. When I was a boy one of my intimate friends was an engine man and he was a great hero to me. One day one of his friends said to him. "Chev, if you keep on running an engine, you are going to get killed." And killed he was in a disaster some 50 years ago. Today the engine man is just about as safe as the man in the street, and probably safer than the man in the automobile.

It is unnecessary for me to refer you to what boards of health have done, to what industrial men are doing, to what the executives of railroads have done. I only refer to those things, because you probably know more about them than I do, by way of contrast. While all of that accident elimination has been going on, the same dangers are lurking right in the household, right in the mother's arms. So far as I know, up until the last few years, until we who are especially interested in it took the matter up, nothing was done to educate the mother, nothing was done to prevent accidents to children in the home.

(*Slide*) My subject is divided into two separate parts. The first part is in regard to household lye. Here is a little child who was brought into the hospital unable to swallow a drop of water. The tongue was swollen until it clove to the roof of the mouth and there were big patches of burns. This child had swallowed common household lye. Every household in the country has this lye on the floor—not up in the medicine cupboard where they put the carbolic acid and other things. That is the first point I wish to make.

The Little Child Was Unable to Swallow

What happened? These burns around the mouth healed, but in the course of about a month or two the mother discovered that the child couldn't swallow very well. She delayed bringing the child in until finally when she was brought into the hospital we gave her a glass of milk to swallow, but it came right back into the basin. She had swallowed common household lye which was on the bottom shelf, and is on the bottom shelf of pretty nearly every kitchen in the country, and the mother doesn't know enough to keep it out of the reach of the children. We have hundreds of cases like this.

(*Slide*) Here is a second child burned with lye. He couldn't swallow and a surgeon was called in and saved the child's life by putting a tube in through the abdomen. Because the child couldn't get food or nourishment, he is emaciated to a skeleton and completely dehydrated for want of water. That child couldn't get down one drop of water for nearly a whole week because he had swallowed lye.

(*Slide*) Here is another case of a similar accident with a different brand of lye. You all know perhaps that a burn makes a fearful scar. Lye burns just like a red hot iron. After the ulceration has ceased and the scar has taken its place, the scar contracts and that makes what we call a stricture and that shuts up the tube through which the food is taken from the mouth to the stomach. This child couldn't get any food into his stomach. An operation was performed and a tube was put right in his stomach in order to save his life. No picture was taken when he first came in, but after a few weeks when he had had some water and food and was feeling better a photograph was taken. All of the food and water he can get is what goes through the funnel which gives him the necessary nourishment to live. He chews up the food and

spits it into the funnel. We will get that passage opened up eventually but it takes a little time.

(*Slide*) All of these children were victims of that same accident—a household lye burn and a stricture, and they couldn't swallow and they were sent in for treatment. Most of them can be cured, it is true, but there is a long agonizing time and it is a preventable accident. You can't tell me that it can't be prevented, that is, that these children can't be prevented from swallowing lye.

It isn't always necessary to do the operation to put the water into the stomach, but valuable time has been lost somewhere and the surgeon is called in from some distant city and puts in a tube and saves the child's life until he can be shipped into one of the now numerous centers where that kind of trouble can be completely cured. All of these children were shipped into the hospital within a few months of each other.

(*Slide*) Here is a clipping from a newspaper: "Left alone baby eats lye. May die." Mrs. Karick was carrying the family supper home from the corner grocery store when she saw some of her neighbors all excited about her house.

"Where is George?"

"He ate the lye you left on the table."

When he did that she was probably buying more lye at the grocery store, that is where it is sold. (*Laughter.*) The druggist must put a skull and crossbones on carbolic acid and such things, but the corner grocery store doesn't have to take any such precautions. I just want to ask you a plain question: Would she leave carbolic acid with a skull and crossbones on it on the table where a child could get it?

The Mother Doesn't Know the Danger

She doesn't know. If she had known that lye could kill her child, she wouldn't have left it within reach of the child. The mother must be educated. The first point in the education is to put a label on the can so that she will know that it is lye and that it is poison.

(*Slide*) This child came in in a very pitiable condition. Notwithstanding my 40 years of being more or less immune to human suffering, I can not help but cry when some of these children come in in the pitiable state in which they arrive. But here is this child fattened up because a surgeon has done an operation. She has since gone home entirely cured. The tube has been taken out and she can swallow the same as she ever did, through her mouth. She swallowed "Cleanall."

(*Slide*) The label on this package says, "Does not injure the finest fabric or the most delicate skin." Not only is there no poison label on it, but there is a directly misleading statement. What mother would ever think this could possibly harm her child when it won't harm the most delicate skin or the most delicate fabric? That is over 75 per cent sodium hydroxide. That takes water out of the tissue and it burns just like a red hot iron.

(*Slide*) That is not an isolated instance. Here is another as a result of the same preparation and the child was burned in the same way. It meant months and months of suffering and of treatment.

(*Slide*) As a result of agitation we finally secured a poison label on this package. But you don't see it and you won't see it. It is camouflaged. I don't say that it is done intentionally, but there is a checkerboard design and that is printed in red obliquely. After the agitation it was printed horizontally and a little more conspicuously. As a result of a law passed, it is now printed horizontally in type of specified size.

When these cases first began to come in we discovered that there was no poison label. As the result of agitation a law was passed in Pennsylvania and the word poison was printed in prominent type.

Laws have been passed in thirteen states simply specifying that they put the word poison on in type of a certain size, but it is a law only in those thirteen states.

Camouflaging the Label is Unfair Business

(*Slide*) What is the effect of that? The worst kind of unfair, unjust competition. Here is a firm that puts the word poison on here as required by the state of Pennsylvania in large letters. Now then you go into the grocery store and you find there a preparation that won't injure the most delicate fabric and another preparation that is marked poison. You wouldn't hesitate a moment in buying "Cleanall" and yet that is just as dangerous as this. In the state of Pennsylvania the packer of lye is compelled to put this scare-label on it, while up in Massachusetts, which has no such law, the packer can put on anything he pleases, even that it won't hurt the most delicate skin. What is needed is federal legislation that will be absolutely fair to all. It won't stop the sale of lye; it won't stop anybody from buying a single can of lye; but they will know when they buy it that they must put it up out of reach. (*Applause*)

When I was a boy and worked in the mill we had a big pair of miter gears that we called man eaters. The law now requires that all of these gears be guarded. In those days there wasn't any such law and the gears took their toll of arms and legs and heads or anything that got in their way. Not only does the law now require that all such gears be guarded, but those gears are in mills where there are trained mechanics and where the child labor law forbids children to go. But here, in such packages as I have been describing, is your man eater, your child eater, and it goes into the household without a guard on it. They might as well put on it, "This is safe!"

What is needed is a federal law requiring that the word poison be put on the can. It is poison if swallowed. It wil burn the eye and fingers, but it would be sufficient to put on it, "Poison. Keep it out of the reach of children."

There is such a bill pending in the Federal Congress and here are the numbers—S. 2320, H. R. 8305. I hope everyone present will write to his Congressman in Washington about it and ask his support on the

Federal Caustic Act with these respective numbers. It can be modified, if you please. I don't know anything about law. I don't know an earthly thing about legislation. But these pitiable cases come to me and I feel something must be done.

(*Slide*) Now we take up part two of the subject, another class of danger that lurks in the home.

These pieces of meat, each one of them, was taken out of the throat of an adult, not a baby, but every gluttonous eater who choked on a piece of meat learned to eat gluttonously in childhood. Children ought be taught to eat slowly. It is not my province to tell you about digestion and mastication—that is the province of the general physician—but all of this choking and strangling and many of the fatal cases you see or read about in the papers are cases where a man has choked to death at the table.

(*Slide*) We get hundreds of cases of bones lodged in the throat, nearly always due to carelessness in two forms, carelessness in hasty eating and carelessness in preparation of the food in the kitchen. Bones are not properly an article of diet. Somebody is careless if they get down somebody's throat, whether it is the individual or the cook, and it happens very, very frequently.

One Result of Carelessness in Eating

(*Slide*) This was a patient who was eating oysters and not wearing her glasses. She gulped down an oyster and thought she had a piece of shell stuck in her mouth, and here you see it was the cap off the catsup bottle. (*Laughter*) It goes without saying that that is careless eating. Nobody could possibly gulp that down unless he was careless—he would feel it in his mouth. However, the matter of glasses must be considered. Everyone who needs glasses for reading needs them also for eating. Inspect the food before you put it in your mouth. If the cook needs glasses for reading, the cook needs glasses for preparing food.

(*Slide*) Here are nuts, seeds, and shells. For instance, we have some 35 or 40 kinds of water melon seeds taken out of the lungs of children because someone was careless in giving those children water melon without taking the seeds out. The same is true of orange seeds and various pits of fruits, and so on. These grains of corn were being used as toys. This dried corn was being used as toys and not as food.

(*Slide*) Every one of those represent a peanut kernel out of the lung of a child, and a very, very sick child. Peanut kernels in the lung of a young child under two or three years of age set up a violent trachia bronchitis and very quickly runs to bronchial pneumonia. There is no reason why little children should be given peanuts. It is very careless to give a child who has no molars peanuts or any other kind of nuts in candy or in cake or in any form whatever.

(*Slide*) We know there is a pin in this lung and we know there is a peanut kernel in this one. How we know is a matter for the x-ray expert, but we know it is there. It is the worst kind of carelessness. That little baby should not be allowed to have such things.

(*Slide*) All of these coins were taken out of lungs of children where they had stuck. Coins are filthy things, to begin with. Think of the railroads being compelled to supply individual drinking cups and then think of the mother giving a coin to her child and allowing it to put the coin in its mouth. (*Laughter.*) That is a circumstance which actually happened. Think of all of the filthy hands that handled that coin. That is all because the mother didn't know any better. She wouldn't do it wilfully.

(*Slide*) Here is a baby who saw his mother putting coins in her mouth and he naturally thought that was the place to put them.

It has struck me very strongly that one of the safeguards is, never set a bad example to a child by putting any inedible substance in the mouth smaller than a spoon.

(*Slide*) We get many pieces of jewelry. Here is a bead. We have had about 12 or 14 cases of beads down in the lungs of little babies.

(*Slide*) Here is a three-months-old baby who had a cuff link in his esophagus, that is half way between the mouth and the stomach.

(*Slide*) Here is a baby who, when he was only one month old, had his own little finger ring in his throat. If you want to give the baby a finger ring, tie a string on it. Here is a very serious condition and a very difficult one with which to deal but entirely needless. There is no reason in the world why a three-months-old baby should be given a thing like that to play with.

And a Daddy Who Tried to Amuse the Child

(*Slide*) Here is a case where daddy was careless. He was leaning over the baby and a loose collar button fell into the baby's mouth while the baby was crying. We have a great many cases of this kind where people try to amuse the children with collar buttons because they are bright and take the baby's attention.

(*Slide*) Here is a collection of hardware. We have all kinds of hardware which we have gotten out of the lungs of children. There is no reason in the world why any child should be allowed to play with double pointed tacks. We have had 14 or 15 cases of double pointed tacks and we have had some 40 cases of brass umbrella headed tacks. That tack acts as a regular parachute—any deep breath will take it into the lung.

(*Slide*) These are all x-ray pictures, you understand. They show the shadow of the foreign body. Here is a staple down in the lung of a litte child only 14 months old.

(*Slide*) Here is a screw. We have a great many cases of accidents with screws.

(*Slide*) Here are pencil caps. Some of those are other kinds of caps. We get ammunition occasionally, which the child has been given for a toy.

(*Slide*) Here is a primer taken out of a child's lung. It had been in quite a long time and no one knew about it. No doctor was consulted and that lung has almost gone to smash.

(*Slide*) This is a bullet that was setting up a very violent reaction,

making the child very ill. It was inspirated through the mouth. There are more children who have died from these foreign bodies than have ever died from firearms.

(*Slide*) Here is a tin whistle. Nearly every old hospital has in its museum a record of some child who died with one of those whistles in his throat. Modern methods permit removal through the mouth, but in the old days it was always a case of a museum specimen after the post mortem. Little children ought not to be given those toys.

(*Slide*) Here is a pair of toy opera glasses stuck in the throat of a doctor's child.

(*Slide*) Here are jacks. We get a good many cases of jacks, and children ought not to be allowed to put them in their mouths. They are a very serious danger. A child too young to teach should not be allowed to have them in his hands.

Many a Toy is a Dangerous Thing to Children

(*Slide*) Here is a toy that went into a child's larynx. It is about as big as half of your little finger and it almost strangled the child to death; they barely got him to a hospital in time to save his life. But the point is that a child should not be allowed to have such a small toy. Have the toy big enough so he can't get it down his throat.

(*Slide*) Here is a toy dog. Those small toys should not be given to very young children.

(*Slide*) Here is the wheel from a toy automobile. The child detached the wheel. Care ought to be taken that there is nothing detachable that a child can get down into the throat.

(*Slide*) Here is a washer from a Ford automobile.

(*Slide*) Here is a commutator spring from a Studebaker.

It is true that in the modern clinic we are able to remove probably from 95 to 98 per cent of these foreign bodies and save the child's life, but it is a preventable accident. These accidents ought not to occur. There are many that occur that are never discovered and the child is dead and buried in consequence.

CHAIRMAN WILSON: Next on our list is an engineer who once upon a time was a college professor. Then he stepped into industry as the assistant general manager of a large industrial corporation. From business he entered into the service of the Red Cross. His ability was recognized by the American Engineering Council, which induced him to become their executive secretary. He is noted in engineering circles for his constructive research work and his books and articles have been widely circulated. Many of you know him as having been elected President of the Eye-sight Conservation Council of America.

I am not going to dwell any more on his achievements, as I don't believe in "painting the lily," but will ask Mr. Lawrence W. Wallace to address us.

RELATIONSHIP BETWEEN INDUSTRIAL ACCIDENTS AND PRODUCTION

L. W. Wallace, Executive Secretary, American Engineering Council, Washington, D. C.

Accidents and production are common to industrial activity. Each has been the object of thoughtful attention and effort. Probably nothing startlingly new can be said or done concerning either accidents or production. But a consideration of their relationship—of the influence of the one upon the other—is a new approach. No comprehensive study has been made to determine their relationship. Some have held that accident prevention effort interfered with production, while others have expressed the view that a reduction of accidents resulted in an increase of production.

No one has definitely determined whether high or low accident frequency rates accompanied high productivity, or if effective management as expressed in high productivity was also reflected by low accident frequency rates.

There is no body of data available by which to judge the effect of accident prevention efforts upon the quantity of production. This is not surprising, perhaps, inasmuch as accident prevention effort has been based upon humanitarian considerations rather than on economic ones. The economic phase is important, nevertheless. It is reasonable to suppose that accident prevention effort has economic advantages as well as humanitarian ones. If this be so, there is a two-fold reason why accident prevention effort should receive careful and continuous executive direction and support. That some executives do not give the matter careful attention is undoubtedly true.

Mr. Albert W. Whitney and associates of the National Bureau of Casualty & Surety Underwriters, as is well known, are very directly interested in all phases of the accident problem. They have most carefully considered the relationship between accidents and production. Their deliberations led them to the decision that a comprehensive study of the subject should be made by a competent, non-partisan and influential group. Their investigations satisfied them that the experience, ability and integrity of American Engineering Council was of such character as to fulfill all requirements. Consequently, an invitation was extended to the American Engineering Council to make such study.

The Council, following its established policy, formed a special committee to make a thorough investigation of the need—the possibilities—the practical value of such a study. This committee recommended that American Engineering Council undertake the study, which recommendation was approved. Later articles of agreement were drawn up by representatives of the National Bureau of Casualty & Surety Underwriters and American Engineering Council. This agreement specified that the National Bureau of Casualty & Surety Underwriters would place at the disposal of American Engineering Council a sufficient sum of money to

defray the expenses of the study. The agreement further specified that the American Engineering Council would plan and execute the study and prepare a report thereon according to its established policy of independence of action and freedom from bias and interference in any particular.

Considerations leading to making the agreement extended over a period of more than a year. Consequently, all angles of the problem were most carefully considered and weighed.

In the fall of 1925, the American Engineering Council named the personnel of its Committee on Safety and Production, the duties of which were to develop the plan of action, employ the necessary staff, direct the investigation, and prepare a report.

The personnel of this committee was carefully selected. It includes: A. W. Berresford, past president of the American Institute of Electrical Engineers and the executive vice-president of the Nizer Corporation; L. P. Alford, officer of the American Society of Mechanical Engineers and editor of *Manufacturing Industries*; L. W. Wallace, past president of the Society of Industrial Engineers and executive secretary of American Engineering Council; C. F. Loweth, past president of the American Society of Civil Engineers and chief engineer of the Chicago, Milwaukee & St. Paul Railway; L. W. Hatch, Chief Statistical Bureau, Department of Labor of New York; J. P. Jackson, past Commissioner of Labor of Pennsylvania, with the New York Edison Company; W. W. Nichols, vice-president, Society of Industrial Engineers and chief engineer of D. P. Brown & Company; L. A. DeBlois, past president of National Safety Council, formerly safety director for the Du Pont interests, now with National Bureau of Casualty & Surety Underwriters; Bradley Stoughton, formerly secretary, American Institute of Mining and Metallurgical Engineers, and now professor of mining and metallurgy, Lehigh University.

The committee employed as director, J. E. Hannum, formerly efficiency engineer of Diamond Chain & Manufacturing Company, and Red Cross Institute for the Blind, now research engineer for the Eye Sight Conservation Council of America, and as assistant director, P. E. Holden, formerly assistant manager, manufacturing department of the Chamber of Commerce of the United States, now professor of industrial management, Stanford University.

The Plan of Action of the Committee

The plan of action adopted and followed by the committee in brief was as follows:

(1) Concerted effort was made to obtain data from the ten basic industries: (a) Iron and Steel; (b) Steam Railways; (c) Mining; (d) Cement; (e) Machine Building and Metal Working; (f) Woodworking; (g) Paper and Pulp; (h) Textile—cotton, woolen and silk fabrics; (i) Building Construction; (j) Electric Utilities. In addition to the foregoing, information has been obtained from a very wide variety of other industries.

(2) Assurance was given each firm supplying data that the firm name would be held in confidence by the committee and by American Engineering Council. This assurance conforms to the established practice of American Engineering Council in regard to such matters.

We regret that during the progress of the work some people were so unscrupulous and unfair as to endeavor to give the impression that the names of the firms would not be held in confidence and the data would be used for some ulterior purpose. We desire to impress upon such people that American Engineering Council is an honorable body, with an enviable record, and is directed by reputable men.

(3) Fifteen areas for intensive study were blocked out and an experienced engineer placed in charge of each. This organization covered quite thoroughly all industry east of the Mississippi. Territory not thus covered was reached either by local engineering committees or by correspondence.

The officers of the National Safety Council and managers of its affiliated Community Safety Councils were exceedingly helpful in organizing the work. In many instances the local manager was chairman of the local committee. In practically every instance he served on the committee.

Many Local Committees Cooperated

(4) Forty-six local committees functioned. Since some five men served on each committtee, therefore approximately 230 engineers contributed time and effort to the study. One local committee, at its own expense employed a field engineer.

(5) A carefully prepared manual of instructions was given each field engineer and committee. This manual and a questionnaire comprise the working tools of the men in the field. The questionnaire was made as simple as possible and as far as practicable information was sought in the form supplied to the National Safety Council and state commissions.

The study has been conducted along two lines, with two objectives in view.

The first objective has been to establish the trend of accident frequency and severity rates and production rates by plants and groups of plants. For this purpose, accident and production data have been secured from the experience records of as many plants as possible for as long a period as the records permitted.

The number of plants covered is of interest and significance. From the Bureau of Mines, Department of Labor, Interstate Commerce Commission and several trade associations, information was obtained relating to 13,362 companies. Through the work of field engineers and local committees, and by correspondence, some 5,000 plants were approached. Up to October 21, data had been received from 927 of these plants. Therefore, information is now in hand from 14,289 plants.

The information obtained from the 927 plants represents 3,342 company years. The approximate number of employees in the 14,289 plants is 2,250,000.

The foregoing discloses the wide scope and spread of the experience record collected.

The second objective has been to endeavor to determine exactly what took place in the way of loss of production and time when an accident occurred.

For this purpose, a selected number of plants were requested to collect such information during July and August. We recognized this effort as purely an experiment, hence we did not undertake it on a broad scale. Some most illuminating information has been secured. The analysis will disclose some sidelights never before thought of or considered. One observation is that the indirect losses accompanying an accident are more pronounced than has been assumed. This phase of the report should stimulate further studies in the same direction.

The foregoing discussion may be determined as the background for the findings to be set forth in the report. The significance and value of any report is determined by the scope and character of the investigation upon which it is based and the carefulness and ability of the investigating agency. It is hoped that you will agree with us that the particulars named have been so adequately cared for that the report will be authentic and important and hence deserving of the most careful thought.

We are now in the midst of compiling the data. It is a difficult task and will require the utmost care and constructive thought. In many respects there are no precedents by which to be guided. Some features involve mathematical and statistical procedure about which apparently little is known. We have already consulted with some of the best authorities about them and some are now endeavoring to solve the problems confronted. We believe a solution will be evolved and hence the report will contain unique and striking results.

Significant Sidelights Upon the Data Collected

As is always the case in making a national study, many interesting and significant sidelights came to view. It is fitting at this time to mention some of them.

Of the 3,438 plants approached by the field engineers, three per cent refused to give information; 30 per cent could not supply the data in the form requested—many of these had neither accident nor production data. Forty-six per cent promised the data, 15 per cent actually sent in the data.

Many plants report accidents to their insurance carriers and keep no records themselves. Some seem to feel that it is a matter about which they need have little concern, inasmuch as they carry insurance or else operate under the provisions of some compensation law. We view this attitude as being most unwholesome. There is no meeting ground for employer and employees where there is no mutual understanding and cooperation through accident prevention; such a condition inherently offers opportunities for developing a low morale and a large labor turn-

over. Consequently, the potentialities for good or bad results should not be entirely left to a third party, be it an insurance company or a compensation commission.

There appears to be an attitude on the part of some that, since, they operate under a compensation law, accidents are of little concern. This apparent result of compensation acts is indeed serious and should be counteracted.

A rather thorough canvass was made of all industrial plants of any consequence in the territory east of St. Louis, Chicago, and Milwaukee, and north of the Ohio and Potomac rivers. In general, there appears to be no marked difference between the conditions prevailing in any locality as compared with other localities, as disclosed by the percentage of plants having reliable information and willingness to release it. However, the Pittsburgh, Cincinnati, Detroit, St. Louis and Grand Rapids territories showed a much higher percentage of plants not having the information desired than did the other territories.

Council Influence Encourages Keeping of Records

Many plants stated they had recently become a member of the National Safety Council and had found the connection very valuable. A number also stated that they were beginning to keep records as advised by the National Safety Council. There is a marked attitude regarding the desirability of keeping better records. There is also a feeling that the form in which accident data are recorded and reported should be standardized. This is in line with the objectives enunciated at the Accident Prevention Conference held under the auspices of the United States Department of Labor in Washington, last summer.

Many complained of the number of reports which had to be made to Federal and state agencies. This condition, more than any other thing, accounted for some refusing to supply us with information. Undoubtedly industry is really burdened in this regard. The National Association of Manufacturers and others are now giving the subject constructive study and some remedy may be anticipated.

Apparently piece work is an important factor as regards the loss of production incident to an accident. If the employees are distracted by an accident, they put forth more effort following it, resulting in the same amount of production. Some also hold that since the men realize that if they are injured there will be a reduction in their earnings, they are more careful. A few employers seem to feel that their interest is fully protected by compensation insurance and the piece rate system of payment. The influence of piece-rates and other forms of wage payment upon accidents should be carefully studied.

Since the task of compiling the data has not been completed, no definite conclusions or recommendations can be made at this time. However, in general, the data that have been analyzed clearly show a marked increase in production per worker during the last five years. The trend

curves thus far drawn also show a reduction in the number of accidents per worker. We are confident that the complete analysis will show that, industry by industry, there has been an increase in production per worker and a decrease in accidents per worker. In other words, as management has become more effective, greater production and fewer accidents have been the result.

In conclusion I wish to acknowledge the splendid and valuable assistance we have received from your president, Mr. Charles B. Scott, and to no lesser degree from Messrs. W. H. Cameron and Sidney J. Williams. Through their influence and the inherent interests of the managers of local safety councils far more has been accomplished than could otherwise have been the case. If the findings and the recommendations of the report are to find lodgment in fertile soil, and accomplish the good we hope for, it must of necessity, arise through your good auspices. Your attitude and action in the past assures us that the report will be sympathetically received, carefully studied, and the recommendations earnestly applied.

CHAIRMAN WILSON: "Ashes and the Undertaker" is the title of our next address. The subject does not sound very pleasant. It is not a talk for morticians and undertakers, however, but a serious presentation of the dread hazards of our ancient friend and enemy, fire—fire, which the ancients themselves dignified as one of the four elements of the universe, with air, earth and water. The man who is going to deliver it is known to everyone in fire prevention circles as manager of the Fire Prevention Department of the Western Actuarial Bureau, with headquarters in Chicago. He has achieved a wide reputation.

It would be futile in the presence of this authority to attempt any figuring of the toll taken by fires. That they can be prevented in the majority of cases is just as clear as in the prevention of accidents. There are few so qualified to speak on the damage and prevention of fire as Mr. Richard E. Vernor of Chicago.

ASHES AND THE UNDERTAKER

Richard E. Vernor, Manager, Fire Prevention Department, Western Actuarial Bureau, Chicago, Ill.

I am very happy to be here today with the privilege of addressing so fine an organization, for two reasons. In the first place, I am permitted to return to my home city, and in the second place I am permitted to address you upon the subject which is closest to my own heart. I want to thank the National Safety Council for permitting the time to be taken on their program for the discussion of this subject which I think is so important.

Did you ever try to write that word "safety"? Just visualize it for a moment. After you have started to write it and you write the "s" and "a"

you come to a letter which takes up all of the space above the line and all of the space below the line. That letter "f' stands for "fire," and to me that is a very important feature as connected with safety work.

Somebody has said that any fool can start a fire, but it takes a careful man to prevent one. Why should a Safety Council or a Safety Congress be interested in so dry and uninteresting a subject as fire prevention? The other day in a city not very far from here—in this state, if you please—there were four families living in an old barn which had been converted into a dwelling.

A family on the second floor expected to move that day down below, and the mother of three small children was downstairs conferring with the man who was working in the apartment which she expected to occupy—a twenty-two-year-old mother. Something happened upstairs. Whether an oil stove was tipped over or a fire came up from below is still a question. But in a fraction of time the mother discovered that her apartment was afire and she did what almost every mother is almost certain to do under the circumstances—she dashed up the stairs through the flames thinking of her babies.

The Tragedy of a Mother and Her Family

By this time one of the neighbor women had come, and taking a position outside of the window she called to her to drop the young baby into her arms. This twenty-two-year-old mother, groping about in the smoke, managed to pick up a pillow, which she wrapped in a curtain, and, thinking that it was her baby, she dropped it out of the window. Then, having discovered her mistake and although the flames were burning her, she groped about until she did find the baby, and succeeded in saving its life, after it had been severely burned, by dropping it into the arms of this waiting woman. The two other children, four and six, crawled under a bed and the mother collapsed. When the fire department arrived the first rush of the water in the room washed the bodies of these two children out from under the bed.

That is why you ought to be interested as safety people in fire prevention. That isn't the only fire that ever took human life in the United States. Allentown, Pennsylvania, had a hotel that existed for a great many years without any great trouble. It was built in eighteen hundred and something, early in the century. Originally it was a three-story building made of stone, and in 1890 they remodeled the building and put two more brick stories on the three-story section; then they built a four-story wing in the rear and connected the two together with a wing. There was one fire escape on the section in front and one in the rear.

Everything went along beautifully in that hotel until on a January night last winter, when a fire broke out upstairs in the early morning hours. It was discovered by a taxicab driver and he rushed in and told the clerk that the hotel was on fire. The clerk jumped over to the telephone and tried to warn the people on the upper floors, but discovered that the telephone connections were burned off. Then he jumped into

the elevator and tried to go up there himself, and when he got as far as the third floor he discovered there was something wrong and he jumped off of the elevator just in time to save his life as the cable broke and the elevator dropped to the bottom of the shaft.

Then somebody thought of the fire department. The first piece of apparatus that arrived consisted of a hook and ladder—automobile equipment manned by two men past 60 years of age. When they stopped in front of the hotel in the car track in some manner the forward truck on the apparatus turned at right angles to the rear truck, and there the rescue apparatus stuck. They called another piece of apparatus and that was a hose cart without sufficient ladders to be of service, and it was 30 minutes after the fire was discovered before it was possible to commence taking people down from the upstairs windows, and it was too late. Only two people succeeded in reaching the fire escape and 13 bodies were dug out of the ashes. You can't afford to take into consideration in your city any safety program that doesn't include the matter of the prevention of fire.

Incidents Gathered in State of Oklahoma

I don't want to be melodramatic. I want to tell only what is true. I have here an innocent looking little piece of cloth. Do you remember a couple of years ago out in southwestern Oklahoma on Christmas eve when a schoolhouse burned down at a Christmas tree celebration when Santa Claus pulled a branch over a lighted candle? Here is a piece of the overall of one of those country boys who died in that fire. Thirty-seven bodies were taken out of that ruin.

I have been up and down the countryside in southwestern Oklahoma and I have talked with the survivors of that fire and I have seen the tragedy of that thing written in their eyes. And you talk about safety precautions! What possible safety precautions were taken there? Every window in the one-room schoolhouse was fastened securely shut with heavy wire mesh screen and was bolted clear through the building from the outside with seven-inch bolts. Nobody even thought of a bucket of water to have handy around the Christmas tree. No blankets were available. There was one exit door opening in and that one stuck on the floor as it swung in its arc.

Fire prevention is a safety matter. It is a humanitarian matter. I have in an envelope a picture that I would not be permitted to show to this gathering because it is too ghastly. It is just a pile of bodies of little girls from six to 18 years of age in a certain California city. A Boy Scout was riding his bicycle along the street one day when he passed a schoolhouse in flames. There were subnormal girls housed in that frame schoolhouse. When he saw that fire he didn't do what most every Boy Scout in America would do now. He didn't stop on the corner and send in an alarm, but he rode his bicycle for two miles past a number of alarm boxes to the fire station. Then the fire department re-

sponded, and of course by the time they got there, after all of that delay, the walls of the building were falling in. They dug 22 bodies out of that ruin.

If you will just refresh your memory you will remember a fire in a school down in Cleveland, South Carolina, a year or so ago during their commencement exercises, when 76 people were burned. So on it goes up and down the line.

I happen to be a member of a committee that is attempting to gather some reliable fire casualty statistics and I would like to read you two or three brief cases that have come to our attention; all of these things happening in 1926.

A List of Injuries Through Fire During 1926

I will read you the injuries first. You can't imagine people doing such foolish things and yet they are true.

From Watertown, Massachusetts. The man's name is Parsecan. A friend told him to take a foot bath in gasoline to cure rheumatism, and so he tried it. It did feel nice, so he sat back and lighted a cigarette. Somehow the two got mixed. This cured completely the tired feeling that Parsecan's feet had suffered. His burns were dressed at a hospital.

Here is one from California. Mike Calding, aged nine, fires toy pistol into 50-gallon distillate tank. Badly burned.

Lawrence, Massachusetts. Mrs. Joseph Reitel, badly burned using stove polish thinned with gasoline on hot stove.

Bluefield, West Virginia. William Pugh, aged two. Baby climbed upon hot stove, burning feet and hands. Condition serious.

E. A. Johnson, adult. Was getting gallon of gasoline from the barn. The gasoline became ignited and the hay and straw started to burn. The farmer with Johnson threw a bucket of gasoline on him to extinguish the flames, but he had presence of mind enough to run and jump into a pond and thus save himself.

William Dederman of Saint Louis, Missouri. During a rest period three employees started a water fight. One threw gasoline and then they started throwing matches. Dederman caught fire and was severely burned. They submerged him in a water tank and sent him to the hospital.

Mrs. Higginbottom, from Missouri, put a hot iron in a pan of gasoline in which she was washing clothing. Burned on hands and arms.

Here is another one from Missouri. Fred Monehan took a nap on roof of chicken coop and awakened to find that his shoe was a mass of flames. Evidently someone had tried to play a joke on him. Man in critical condition.

Here is a case where a cigarette was dropped into an uncorked five-gallon can of denatured alcohol, causing a blaze.

Mrs. J. W. Andrews, of Kansas City, was washing clothing in gasoline when friction of rubbing caused explosion. Burned hands and arms.

Pearl Smith, at Cape Girardeau, Missouri, poured gasoline into an automobile tank and then took a lantern to see how much gas she had.

L. Crawford, of Danville, Arkansas, playing with matches and dynamite stick in barn.

These are deaths:

Mrs. Uterle and son Chares, two. Attempted to rekindle fire by pouring coal oil on smoldering flame. The son died en route to the hospital.

Esther Nevenin, on a Minnesota farm, seven years old. Oldest boy resorted to the dangerous practice of starting a fire with coal oil and the can exploded. The father picked up the two children and was obliged to pass through the fire with them. He lost Esther, and although he was back in an instant he was unable to recover her.

Butterfield, Missouri. Daughter of Mr. and Mrs. L. W. Nichols. The girl and brother were playing in backyard with old stove. She lit paper in stove in order to burn some ants and her dress caught fire, at which she started to run and the brother could not catch her until she was badly burned.

Miss Clara Dyer, aged 50. Fire from paper she was tossing in the furnace when the paper ignited.

Mrs. Sophie Komelman. Asphyxiated from smoke from burning clothing in wash boiler, the water of which had boiled away, permitting the clothing to catch fire.

Wilbur Davidson, four, in the city of Detroit. Electric iron left turned on in the kitchen of dwelling. Burned to death while sleeping.

Two Boys Playing With a Gasoline Hose

William Lindsay. Playmate turned gasoline hose on him and soaked him with it. Then he fired a cap pistol and the spark ignited his clothing.

Here is a seventy-one-year-old lady burned to death preparing dinner. Her apron caught fire.

Three daughters—this is a rather peculiar name and I won't attempt to pronounce it. They were three years, five years and four months old. I won't give you the details.

It is a continuous story. You can scarcely pick up a paper anywhere in the United States without finding somewhere in it an account of a death by fire.

Safety to your life; it is also a matter of safety to your pocketbook. It is a question of such great importance that the President of the United States annually asks us to spend a week of our time thinking and studying about fire prevention, about this billion dollar fire waste of ours, because it runs easily over that.

The speaker before me indicated something along the line that accidents and misfortunes were more or less the concern of the insurance companies and that other people ought not to be interested in them. There are too many people in the United States who have an idea that a fire is only the concern of the insurance company, the fire chief and the man having the fire.

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Suppose an industrial plant burns down in a moderate sized city. What happens? The wage earners are thrown out of employment. They may be buying their homes in building and loan associations. They have to suspend their payments. They may have a little money saved up. Of course, they have to live, so they go to the savings bank and withdraw their savings accounts, and they can't spend money on luxuries, on amusements, on church contributions, and frequently they can't spend it on necessities. Let us get this insurance thing straight once.

Everyone Pays Toll to the Fire Fiend

There are a lot of people who seem to think that fire prevention as well as accident prevention is a matter for the insurance companies. Insurance is a necessary institution. It is the foundation of our whole system of credit. You couldn't borrow five cents on a piece of property on which you couldn't secure adequate insurance. No exchange of a few dollars from one pocket to another has ever replaced destroyed property. The minute you have a fire the national wealth of the United States is reduced immediately by that amount. Why, you pay the fire loss and I pay the fire loss, and if you don't like the high cost of living remember that a billion dollars of it has to do with our fire waste!

When you check out of this hotel you will be handed a nice bill. They say, "We are very glad to have had you gentlemen for visitors and guests in our hotel, but will you please kick in with your share of our insurance overhead before you leave?" The Book-Cadillac Hotel doesn't pay the insurance on this hotel. You do and I do and there isn't any escape from it. And the same thing applies to any commodity that you purchase whether it is a pair of shoes or a hat or a bunch of bananas. You can't get away from it. You have an interest in it. It affects your pocketbook just the same as it does that of anybody else.

What is being done about the fire waste? Where does the safety movement come in in connection with the solution of this problem? If you noticed President Coolidge's proclamation recently you may have observed that he said this: "We must rely upon cumulative contributions of communities throughout the land if fire prevention is to be made an actuality."

The vice-president of the United States Chamber of Commerce said this: "Fire waste is a problem which affects the entire country, but unlike our other so-called national problems, such as transportation and immigration, it must be treated locally. You can't legislate the fire waste out of existence. You can't force people to be careful."

It must be treated locally. Well, what is being done to treat it locally? There are a good many men and women in this room at this time who can tell me some very startling things that are being accomplished in their own communities, and I think I owe the safety movement the fact that I am standing here addressing you at this moment.

The Detroit Industrial Safety Council a few years ago had an industrial school, a plant superintendents' school, and I was just enough interested

in the safety movement so that I went over and enrolled and attended the lectures and graduated and received such an inspiration from that school in fire prevention that I have the pleasure of standing here today talking to you about it.

Have you ever been over in Milwaukee? Have you seen that wonderful fire prevention movement they have over there? You will find the Safety Council of the City of Milwaukee a prime mover in it.

If you will pardon a personal reference again, a couple of years ago I had the pleasure of standing in the Milwaukee auditorium and addressing that safety school. There were over 5,000 enrolled in it last year. I want to tell you that when I got up on the platform in front of those people my knees certainly did rattle together. You can go to almost any of our larger cities now and you will find fire prevention courses being conducted under the auspices of the local safety council.

A Noteworthy Campaign Going on in Kansas City

I hope that Julian Harvey is in this room. He has done a wonderful thing in Kansas City in this prevention of fire movement. There is a city which is growing and yet the Safety Council in Kansas City has succeeded in reducing the number of dwelling house fires by a very simple method. Every child in that school for the past four and one-half years has taken home an inspection blank designed by Mr. Harvey and has filled it out after inspection and returned it. Julian told me a few minutes ago that he has received some 60,000 of these filled-out inspection blanks which have just been returned in his ninth semi-annual campaign.

In Kansas City, in 1922, they had 2,217 dwelling house fires. In 1923 they had 1,931. In 1924 they had 1,633. In 1925 they had 1,430, a reduction of 800 dwelling house fires in Kansas City and there isn't any other explanation of the situation than the good work of the Safety Council there.

I just returned from performing a little service in the city of Cleveland for our good friend Carl Smith, and I saw some of the most interesting literature for the teaching of fire prevention in the schools that I have had the pleasure of seeing anywhere.

So I say to you that you are contributing a great deal to the cause of fire prevention. A gentleman called in our office the other day and he said, "We would like some material to put on the back of the National Safety Council 1928 calendar." It may surprise you when you see that the 1928 calendar is going to be pretty largely concerned with the matter of fire prevention, because fire prevention is certainly a safety measure.

Not very long ago I had the pleasure of standing on the shore of Little Traverse Bay in Northern Michigan. Some of you have seen that beautiful bay. As I was looking across that bay I saw what I thought was a brush fire, and a gentleman standing close by handed me a pair of field glasses. He said, "It looks to me as though a summer home was burning." I looked through the field glasses and I saw that it was a summer home and I also saw that there wasn't any part of it that was

going to be saved. As I watched, the upper floor fell in and the side walls of the first story collapsed. Then several of us got in the motor boat and went over there.

We climbed up the bluff along by the roaring brook and we passed along by some beautiful cottages. I noticed that the faces on the people standing there were very grave. As I came up a little closer to what was then just a smoldering ash pile I noticed the fire department was just dribbling water in one spot and a hearse standing close by. Then when I came up within a very few feet of this tragedy, I had the experience of seeing the most ghastly thing that I hope I ever have to witness as long as I live, the roasted body of the forty-eight-year-old mother of four children. A boy and a girl were in swimming down on the beach. A fourteen-year-old boy came up and stamped around and said, "Where is my mother?" The father was in Europe with the other two children.

This lady had violated one of the simplest laws of physics, that when you rub silk you generate static electricity, especially if the silk has been dipped in gasoline. If you rub silk you may expect an explosion.

A man working in the garage tried his best to rescue that woman, but it was impossible. What a terrific tragedy to pay for just the violation of a simple law?

Here is something you have probably heard a thousand times: "I am more powerful than the combined armies of the war. I am more deadly than bullets and I have wrecked more homes than the mightiest of siege guns. I steal, in the United States alone, more than one billion dollars each year. I spare no one, but find my victims among the rich and poor alike. The old and young, the strong and weak, widows and orphans know me. I massacre thousands upon thousands of wage earners each year. I lurk in unseen places and do most of my work silently. You are warned against me but you heed me not. I am relentless. I am everywhere—in the home, on the street, in the factory, on the railroad, and on the sea. I bring suffering, degradation and death, and yet, if you seek, you can avoid me. I give nothing but I take all. I am your worst enemy. I am carelessness."

ADJOURNMENT

Safety in the Small Plant

October 26, 1926

THOMAS P. KEARNS, Chairman
Superintendent, Division of Safety and Hygiene, The Industrial Commission of Ohio, Columbus, Ohio

THE General Session on Safety in the Small Plant convened at 2:15 o'clock in the Reception Room, Fourth Floor, Book-Cadillac Hotel, Detroit, Michigan, Mr. Thomas P. Kearns presiding.

CHAIRMAN KEARNS: I presume I need not say that I am delighted with the large attendance here this afternoon. I am more than pleased to see so much interest manifested in the important subject that we are to discuss. We regret very much that we haven't larger quarters in which to hold this session, but no one expected such an audience as this, it being the first session of this kind that has been held by the Congress. Next year, we shall make provision for a larger meeting and will furnish much better quarters.

The National Safety Council is organized to advance the cause of safety in industry, in public and in the home; its business is to know where it can render the most effective assistance in the prevention of accidents.

In industry the Council logically and wisely has been directing its efforts toward enlisting the cooperation of large employers of labor but has not been unmindful of the important position held by the smaller employer in connection with the industrial accident prevention movement, as it recognizes the fact that universal safety can not be attained until safety methods are practiced in the small as well as in the large industrial establishments.

The Safety Council officials inform me that for several years there has been an increasing demand amongst the membership of the Council, especially the smaller employers, for a meeting such as we are holding today, where the accident prevention problems of small employers, which differ in many respects from those of the larger plants, might be discussed with a view to working out, insofar as possible, a practical solution of them.

With the thought, therefore, of complying with this demand, coupled with the desire to be of service to all employers, you have been invited to this Congress, and this special meeting has been arranged as an

initial step in extending greater service to, and stimulating increased interest among the small employers, in this great humanitarian movement, namely the conservation of human life and the preservation of the life, limb and health of our fellow workers and citizens.

Probably one of the first questions that will be asked is, what constitutes a small plant? This has not been definitely determined, of course, but I think that for the purpose of this meeting we could differentiate between the large and small plant by somewhat arbitrarily drawing the line at approximately 300 employees. I believe that the employer of that number or less can maintain a direct contact with and wield a certain amount of personal influence over the entire personnel, as well as plant activities, which can not be maintained when that number is exceeded.

My work as chief of the Workshop and Factory Division of the state of Ohio, over a period of more than 12 years, brought me in close contact with most employers of the state, and as the small employers are in the large majority, I feel that I am intimately familiar with most of their problems, their trials, their disadvantages and advantages. I appreciate the fact that competition is keen and that they are frequently confronted with serious labor and financial problems and that production is a vital question at all times.

The Small Shop Manager Has One Outstanding Advantage

But on the other hand, the small shop manager does have one outstanding advantage over the big shop manager, in that it is possible for him to get a greater degree of efficiency; assuming of course, that the management itself is efficient. In the large establishment, authority and responsibility must necessarily be delegated to others and the larger the organization, the more must authority and responsibility be extended down the line; and every degree that authority and responsibility are broken down or removed from the manager, may mean a lesser degree of efficiency.

The small employer does not have to depend on others to execute his plans but his failure or success depends generally only on his own managerial ability and business acumen. If he is possessed of the qualifications necessary to successful management, he will be able to imbue his whole organization with that spirit, that efficiency, which emanates from him to all with whom he comes in contact. This direct personal contact also tends to build up the morale in the plant which is a very important factor in the success of every phase of the plant's activities and in particular safety and welfare activities.

The experiences of industry for the past 15 years have proved that it is good business to protect the lives and health of employees. The more that has been done to make the work safe and to make employees contented in their work, the greater have been the results. The beginning of this awakened interest in the welfare of the employee was born largely of safety. The whole structure of safety and welfare or indus-

trial relations came into being because it was realized that efficiency and these activities go hand in hand.

While you are rushing production and doing your utmost to keep ahead of the other fellow, you can not afford to neglect the protection of your workers from illness and injury, for without them your machines will not function and your production will suffer. Don't allow yourself to argue that the installation of safeguards is an unnecessary expense and that the adoption of safe practices will retard production, for it is not a true argument. Practical safety measures and devices wherever adopted, not only do not retard your output but actually increase production, either directly on the particular machine or operation, or indirectly by the conservation of men and material; reduction of your labor turnover; less interruptions of the work; improved morale; all of which ultimately result in reduced cost of operation.

Safety Devices Have Speeded Up Production

I could recite case after case where the installation of safety devices has speeded up production and increased efficiency of workers but time will not permit. Our new Division of Safety and Hygiene, the primary duty of which is industrial educational safety work, has been in active operation for less than one year, but I wish I might read to you some of the many letters we have received from employers (mostly from the group of small employers), expressing their sincere appreciation of the services rendered them by the division in the promotion of safety in their plants, and of the reduced accident experience resulting from the installation of mechanical safeguards and safety educational programs amongst their workers in accordance with our recommendations and instructions.

The results have been highly gratifying and are, I think, an indication that employers generally, large and small, have commenced to realize the importance and necessity of accident prevention and the advantages of providing a safe place for their employees to work.

The point I wish to emphasize to the small employer is the importance of taking more interest in the safety and welfare of your employees and becoming more familiar with the methods and devices that will prevent accidents, not only because you are morally obligated to do so, (and I am sure every one of you does sense the humanitarian side of this question), but because it is a business proposition; because it pays in dollars and cents. Preventable industrial accidents—and it is conceded by those who have made a study of the problem and ought to know that 75 per cent of all accidents are preventable—are an economic waste, a waste of men, money and material, that can not be satisfied from any point of view.

The first speaker on the program is the Industrial Commissioner of the state of New York. I have the pleasure and honor of introducing the Honorable James A. Hamilton of New York.

THE NEED FOR SAFETY IN THE SMALL PLANT

James A. Hamilton, Industrial Commissioner, State of New York, Albany, N. Y.

In discussing this subject it is necessary to adopt *a priori* methods almost entirely. This is due to the lack at present of statistical data of a kind to afford precise information on the relative seriousness or the nature of the problem of industrial accidents in small plants as compared with large plants or enterprises.

Yet it is generally recognized that there are undoubtedly important variations in conditions between large and small undertakings, for which there are more or less obvious reasons which it is important to take into account in developing safety work.

The following discussion will endeavor to point out some of these differences and some practical points as to safety work suggested by them. In the present consideration of the subject, attention will be confined chiefly to the manufacturing field of industry.

Relative Importance of the Small Plant

Taking New York as an example of the situation, in a state with highly developed and diversified manufacturing industries, the U. S. Census of 1919 returned a total of 49,330 manufacturing establishments in the state. These concerns had 1,228,130 employees. These figures may be taken as a general measure of the field of industrial accident hazard. The census classification of these factories and shops by size, measured by number of employees, affords the following very suggestive comparison.

Establishments with employees numbering—	Establishments			Employees		
	Number	Percentage In grade	Cumulative	Number	Percentage In grade	Cumulat.
Over 1,000	106	0.2	0.2	226,236	18.4	18.4
501 to 1,000	206	0.4	0.6	143,650	11.7	30.1
251 to 500	432	0.9	1.5	151,320	12.3	42.4
101 to 250	1,309	2.6	4.1	204,318	16.7	59.1
51 to 100	2,107	4.3	8.4	148,875	12.1	71.2
50 or less	45,170	91.6	100.0	353,731	28.8	100.0
Total	49,330	100.0		1,228,130	100.0	

These figures become very significant when it is recalled on the one hand that the problem of bringing about safety in industrial plants is primarily that of inducing individual employers to act, and on the other hand that one measure of success in safety work is the number of employees brought under safe conditions. They show unquestionably that the problem of safe conditions of work for the great majority of factory employees lies with a comparatively small number of employers. For nearly 60 per cent of the employees it is a matter of action by only four per cent of the employers, and for 72 per cent of the employees it is less than eight and one-half per cent of the employers who are involved.

Or to put the matter in another way, in New York state, if only 4,162

employers out of a total of nearly 50,000 should maintain maximum safety conditions in their plants, the problem of accident prevention in manufacturing would be solved for nearly three-quarters of the factory employees of the state.

If, therefore, the common impression be correct that accident prevention has been better developed in large than in small plants, that can only be regarded as development of the most fruitful portion of the field and as sound strategic development of the moment.

But that does not, of course, imply that the remainder of the field may be overlooked or neglected. It is indeed a smaller field in numbers of employees to be benefitted, but from the point of view of those employees and from the social point of view, it presents the same degree of need for action as the field of the large plant. Life should be made as safe for the 29 per cent of employees in New York factories having 50 or fewer employees per plant as for the 30 per cent in plants having over 500 employees per plant.

Special Problems of the Small Plant Field

1. *The Number of Plants.* If for purposes of discussion the small plant field be considered to include those having not over 50 employees per plant, the figures above show that in New York, in 1919, the problem of safety in such plants and shops was one spread out in over 45,000 different establishments scattered throughout the state. The mere number of detached and separate units presents obvious difficulties to any agency, public or private, which undertakes to inspire them to or guide them in, accident prevention.

2. *The Remoteness or Infrequency of Accident Experience in the Small Plant.* The number of employees in a single small plant, and consequently the exposure to accidents, is so low that accident occurrence in it is too infrequent to impress its own object lesson upon the employer either through his humanitarian or through his business instincts. It is difficult to create an impression in such a case by the less lively, but just as truly significant, group experience of his particular industry as a whole.

3. *Inapplicability of Insurance Carrier Merit Rating.* Closely akin to the foregoing is the fact that small plants are largely below the minimum limits at which schedule or experience rating can be applied by insurance carriers, so that that pointed method of bringing home to the employer the lessons of accident experience is unavailable for this field.

4. *Preoccupation of the Small Employer with Production and Marketing.* The proprietor of the small plant, under the stress of competition and with an executive or supervisory staff limited or lacking, naturally relegates to second place or brushes aside anything not on the face of it essential to his main necessity of success in producing and selling goods, which is what he is in business for. This, under the circumstances, entirely natural attitude not infrequently finds expression in statements to the effect that compensation insurance has been paid, and that takes care of the accident proposition.

5. *Limitations on Expenditures for Accident Prevention.* Nearly related to the foregoing is the limited capacity of the small firm to make expenditures for safeguards, rearrangement of apparatus, or plant, etc., which safety consideration might dictate. The fact that such expenditures may actually be good business and only seem to be uneconomical does not alter the special sensitiveness of the small proprietor toward such outlays.

6. *Inertia in Organization.* It is probably true that for almost any purpose it is more difficult to bring about combination or organization of small concerns than larger industrial units, and this may also be mentioned as a potential factor of difficulty in the small plant safety problem standing in the way of local or trade cooperative efforts.

Without attempting to push this enumeration of the factors entering into the small plant problem to a complete analysis, the foregoing is sufficient to make it clear that the small plant presents in many ways a distinct problem in accident prevention work with a number of factors producing special difficulties. This being so, the question next to consider is—how may the problem best be dealt with?

What Agency Can Best Deal With Safety?

Recalling again that the problem of safety in industry is fundamentally a problem of inducing the right action by employers, the peculiarities of the small plant situation seem to indicate quite clearly that the question of safety in small plants is more than anywhere else a question of action by some outside agency. In other words, while experience has shown that in the large plant, accident prevention has frequently and naturally developed through internal initiative of executives and management, in the field of the small plant the situation of the employer is such as largely to preclude such initiation and make progress chiefly dependent upon initiative and aid from outside. If this is so, which of the possible outside agencies is best adapted to handle the problem in this field?

Such agencies include the state, insurance carriers, safety organizations, and trade or commercial organizations. If the relative capacity or appropriateness of each of these be considered in the light of the peculiarities or needs of the small plant situation, either those above enumerated or others, there seems clear ground for concluding that the state is in the best position to deal with this field of accident prevention work. The peculiar difficulties above enumerated, which give the small plant situation its special aspect, are more serious or even impossible for other agencies to deal with, whereas the state is in a position to overcome them so far as necessary.

Glancing briefly over some of the peculiar features or difficulties of the small plant problem, as above noted, the advantageous situation of the state to deal with them is not difficult to see. To refer to the two most significant ones, the great number of small employing units to be

dealt with, which means that if covered at all by other agencies they will be split up between them, offers for the state only a matter of volume of work and no problem of divided jurisdiction or effort; and again, while the other agencies are in a position only to persuade or educate for accident prevention the state has in addition to those means the unique one of being able to require and enforce safe conditions.

Without undertaking to make further comparisons along this line, it may be well to point out the two general features of state accident prevention work which make it peculiarly well adapted to the small plant field. One is closely related to some points already noted about that field, the other touches a fresh aspect of the matter.

Taking up the first of these, the state undertakes in its accident prevention work to do two main things. First, by statute or, more progressively today, by industrial safety code rules, it establishes standard safety requirements which are uniform for all employers under like conditions. In the second place, it insures universal observance of these standards by inspection and enforcement proceedings.

Uniformity over the whole field is thus a distinctive characteristic of state accident prevention. By this uniformity two important results are obtained. One is the obvious one of full effectiveness over the whole industrial field affected; the other, which is less frequently noted perhaps, is the removal of any obstacle to improvement of safety conditions growing out of considerations of business competition as preventing the necessary expenditures for the purpose.

Economy of Accident Prevention Work by the State

With all employers required to come to the same standard conditions for safety, competition so far as such expenses are concerned is equalized. This essential element of economic justice in universal safety standards is one of much deeper significance that is sometimes realized. The state, and it alone, is in a position to apply safety standards free of any obstacle, real or imaginary, growing out of consideration of business competition. Its safety requirements set the plane of competition itself.

In the second place, a point, not of principle but of practical weight, not heretofore touched upon is the general economy of accident prevention work in the small plant field by the state. The great number of units to be dealt with in this field suggests at once that it offers some problem of economy of effort. It would seem to be fairly obvious that the more generally the work can be organized the more economically per unit it can be handled. The comprehensiveness of the state's jurisdiction over the field seems to make it clearly the agency to handle such work under one general organization.

Add to this the fact, that the state exercises regulatory supervision of the same field for other closely related matters, such as child labor, hours of work, etc., by the same general methods, and the further consideration that in this part of the field of accident prevention, more

perhaps than in any other, it seems feasible to combine accident prevention with other state service, and the economy of state work becomes still clearer.

While data for precise appraisal of the small plant problem in other fields are even more scanty than for manufacturing, there is no reason to doubt that the problem has the same general aspects in those other lines. In fact, it is probable that in some lines the small plant or firm presents difficulties even more serious than is the case in manufacturing. The significance of this is considerably increased by the fact that these other fields as a whole present a larger accident problem than is always realized.

For example, in New York state the construction industries, in the year ended June 30, 1925, contributed one half as many compensated accidents and nearly three-quarters as much cost in compensation as did manufacturing, and trade and personal service enterprises contributed 44 per cent as many cases and 46 per cent as much compensation cost as did manufacturing.

In these other fields, the view that, just as in the case of manufacturing, the state would seem to be in an advantageous position to deal with the problem, seems for similar reasons logical.

Every Aid of Private Agencies to be Encouraged

Lest any false impression should be conveyed that the conclusion above reached, implies any idea of opposition to other efforts, it should be added most distinctly and emphatically, that any such inference would be wholly false. Anything that private agencies can develop in this field is to be welcomed and encouraged to the utmost.

There can be no conflict of interest in this matter. Whatever one's conclusions as to the most strategic agency or means may be with regard to any phase of accident prevention work, cooperation of all agencies which can render service can not be too widely extended.

CHAIRMAN KEARNS: I am sure you have all enjoyed this wonderfully instructive and interesting paper by Mr. Hamilton. I am wondering if there is any one who would like to ask Mr. Hamilton any questions in reference to the subjects covered?

R. B. MORLEY (Industrial Accident Prevention Association, Toronto, Canada): I was very much interested in what Dr. Hamilton had to say in enumerating the four phases, or four groups, who might carry on accident prevention work in the small plants.

We have in Toronto, as Dr. Hamilton has said they have in New York state, a very high percentage numerically of our plants of the small type, that is to say, about 85 per cent of our plants pay an assessment to the Workmen's Compensation Board of less than $100 per annum.

We have in Toronto a state fund, that is to say, there is no competition. I want to call your attention today to something that I think will supplement what Dr. Hamilton said in regard to the state. We have in

Ontario a condition that you have not in any of the states on this side of the line, a combination of state and employer that works out very satisfactorily. Under our Compensation Act, the industries may form Accident Prevention Associations, and my office is simply a federation of 15 of those Class A associations. We have the employers directing the activities of the organization, determining how much money will be spent, and how far they shall go in their individual plants. That, I think, gentlemen, is perhaps just one step beyond absolute state control, because you have the people who are furnishing the money in the first class for compensation determining exactly how far this whole proposition shall be carried.

CHAIRMAN KEARNS: The next speaker on the program is Mr. Albert Curry, Harry Brothers Company of Detroit, Michigan, whom I take pleasure now in introducing to you.

WHAT CAN BE DONE TO PREVENT ACCIDENTS IN THE SMALL PLANT?

Albert Curry, Harry Brothers Company, Detroit, Mich.

One of the first tasks, and sometimes the hardest, is to get the officials or board of directors or both, as the case may be, to interest themselves in safety work, or appliances, for as a rule they are too interested in profits and sales, and do not seem to grasp the idea, either from a humanitarian or financial standpoint. Right here let me say that I am pleased to state the officials of the firm I am associated with are real humanitarians, and mighty interested in safety work.

Little can be expected of foreman or employee when such lack of interest in safety is shown by the officials. In fact, they show their short-sightedness, for when an employee is injured, his services are lost for a short or long period and time and money are lost breaking in someone else to do his work; also machine hours and production are at a decline during this period.

Once this task of getting the officials interested is completed, the next step should be to appoint a safety committee.

In some plants this is done by picking an employee here and there from certain departments, and sometimes this kind of a committee works out all right, but it puts the responsibility onto a few employees, for those who are not on the safety committee feel no responsibility.

So to my mind and experience, the proper plan for a safety committee is to place every foreman or his assistant or both on the committee.

Then you have every department covered, and the proper persons to be held responsible, for when an employee in the department is the safety committee man, and an accident happens, it is very easy to make excuses of being too busy, or didn't think, etc.; and also he has to leave his work in order to investigate safety work, which causes loss of produc-

tion; and if he is a piece worker, you can rest assured he will not give it much time or study.

But when the foreman or his assistant is the committee man, he naturally feels the responsibility, and in most cases, he endeavors not to let any other foreman get ahead of him, by having a clean record.

This can be carried out further, by offering a bonus or prize to the foreman whose department has the least accidents, consistent with the hazards of his department, or some such plan, so as to have some incentive for competition.

The foreman also naturally is the proper person for safety committee man, for he is continually cruising around his department, or at least he should be; he can keep in touch with all conditions at all times, during the working period, which is the danger time; and he can stop wrong doing, or report bad conditions of machines or tools and dies, to the maintenance or tool departments, as the case may be.

The next step is to throw around each point of hazard a safety guard; whether it is a guard around a die in a punch press, or a rail in the rear of a shaper to prevent employees getting bumped by the ram, belts, gears, emery wheels, or anything whereby they can get injured in the slightest way, even to a small cut.

Next in line, and not the least by any means, is the education of the employees. This part of the safety work should not be periodical, but continual; eternal vigilance is, and should be, the daily slogan.

By constant attention to this part of the safety work, I find that after awhile the employee is also helping in the safety slogan of eternal vigilance, and is reporting to the foreman or safety committee man points of danger, or machines and dies that are not working properly or are not guarded. And so this education of the employee helps in a great measure the work of the safety committee and he should be encouraged and given credit for his interest.

Some Employees Are Naurally Insubordinate

Again, you will find some employees who will absolutely disregard rules, and even personal instruction or orders, especially if they are on piece work. They think such rules or guards retard their speed, and so take a chance, even when they haven't a chance, and thereby get injured; and then they have to take time off to get well, which is a loss to their employer and to themselves; and nine times out of ten these are the ones who usually get injured, and add to the troubles of the safety committee, thereby spoiling their record for a clean slate as far as accidents are concerned.

This has been my sad experience; in fact, practically all the serious accidents have happened by the employees deliberately disobeying instructions or orders, which were given them for their own welfare.

When an employee wilfully disobeys rules and instruction given to safeguard him against accidents, that employee should be immediately discharged, as he is better out of danger; and this also has a psychological effect on the other employees in that department.

Further along the line of education of the employee, I would advocate that the superintendent or factory manager on his trips around the plant, keep a lookout for points of danger, and call the foreman's or safety committee's attention to the point unguarded.

Let me enumerate here a few things he should watch out for: namely, strip or sheet steel piled up unevenly, and the corners not properly guarded with a wooden corner piece; steel arranged in the racks so that some of the pieces protrude unevenly, which may cause injury to one passing, such as an eye injured or lost, ankle or leg badly cut, etc.; also in the tool or die department and screw department, little pieces of round steel, such as the ends of rods, or screws, sometimes drop on the floor and cause a badly turned ankle, or possibly a fall, and I remember one employee who lost an eye by striking his head against a machine in this way.

These little pieces on the floor may seem trivial, but I have seen many a bad accident in my day, caused by just such conditions, also badly lacerated hands, by allowing nails to protrude in barrels and boxes in the shipping and packing departments.

Another suggestion is to have all the aisles lined or marked with safety zone white paint, and be kept clear of barrels, trucks, boxes, waste materials, and even rubbish; these aisles should be kept clean also and free from holes.

I have tried to outline what can and should be done to prevent accidents in the small plant without the services of full time safety men, and I have tried to show that the responsibility for the prevention of accidents in the small plant really and rightfully should be placed on the foreman and his assistant.

May I say, in concluding, that I trust I have in some way given some ideas that you may be able to put into practical use, and thereby save some employee from an unfortunate accident?

CHAIRMAN KEARNS: The next speaker on the program is Mr. S. C. Van Wormer, The Wel-Ever Piston Ring Company, Toledo, Ohio, whom I am very pleased to present.

GOOD HOUSEKEEPING PRACTICE IN FACTORIES

S. C. Van Wormer, The Wel-Ever Piston Ring Company, Toledo, Ohio

The first question that entered my mind, after being asked to speak on plant housekeeping at a safety meeting, was just what "Plant Housekeeping" could possibly have to do with safety. Upon investigation, I found that in the city of Toledo 46.6 per cent of fatal accidents in the home happened in only 12 per cent of the area of the city. This area consisted of the colored, Polish and tenement districts, the places where you would naturally find poor housekeeping conditions. This seems to prove the statement that the mind reacts with the body; alertness, cleanliness and

neatness go together. This law is just as true in the factory as it is in the home.

Some of you may say that yours is a small plant and you do not need the methods used by larger factories; but no plant is too small to be kept clean. That is good housekeeping.

When it becomes necessary to consult your banker on financial matters, or see a customer on a big deal, would you go with unpressed and soiled clothes, dirty linen, and unbarbered; or would you be as neat and as perfectly dressed as possible? When the wife invites guests for a bridge party is there usually two weeks' dust on the furniture, are papers scattered all over the floor, and is everything in a state of confusion, or do you find everything as neat and clean as a pin and in perfect order?

These matters are psychological to the extent that they affect both the minds of the individual and others with whom we may come in contact. Just as proper dress and personal neatness eliminate that indescribable embarrassment that comes to us when we have neglected our personal appearance; and in the same way, the host and hostess are in a much better frame of mind to entertain, when they know that their home will create a favorable impression on the minds of their guests, so by the same laws of psychology, good housekeeping practice in the factory affects the minds of the employees in a similar manner and creates a mental attitude that promotes efficiency and safety.

Six Fundamentals of Good Plant Housekeeping

We will assume that guards and protective devices have been provided; that there are the proper number of exits, fire escapes and fire fighting apparatus; and that provisions have been made for the prompt and effective treatment of such injuries as do occur. These are purely safety measures apart from good housekeeping practices.

Good Plant Housekeeping comprises: 1, Arrangement or Layout; 2, Proper Illumination; 3, Proper Heating and Ventilation; 4, Proper Sanitation; 5, Decoration; 6, Neatness.

The first four of these items are technical in character and we will pass over them in a very few words. Your layout problems have probably been taken care of, and your floor space used to the best advantage. It is well known that bright light makes things that are fast seem slower and darkness make slow movements seem faster. You have frequently proved this to yourself by walking through a room under a range of conditions varying from darkness to light. I believe most factories do provide adequate illumination.

Proper heating and ventilation is the method of providing good weather inside even if atmospheric conditions outside are not so good. Good weather promotes good health, good health promotes efficiency, and efficiency promotes production. Proper sanitation is merely keeping the toilets and washrooms as clean as you might wish them to be at home, and in a good state of repair. These are all technical matters and if you have any unsolved problems along these lines, a technical engineer should be consulted.

But the items I have headed "Decoration" and "Neatness" are the ones that I want to tell you about. They are very important and probably the most neglected of all good housekeeping practices. Under the heading that I have called "Decoration" comes the question of painting and general cleanliness. In a great many plants it is not practical to have the entire wall white, and at least the wainscoting must be of some dark color, frequently black. It is well, however, to have the side wall above the window line, and the ceiling in white, as this adds considerably to the efficiency of the lighting system.

Around the base-board should be a white collar extending six to eight inches on the baseboard and four to six inches on the floor. This accomplishes the same general result as a white collar on a man. It gives a dressed up appearance and helps to provide the right mental attitude in the workmen so that they will assist in keeping the room clean. It eliminates the throwing of refuse and waste into dark corners and makes easy the checking of the janitor to see that proper cleanliness is maintained.

Fresh Paint Has a Psychological Effect

All aisles should be plainly marked with white borders about two inches wide and should lead to outside exits. If these aisles should merge into passage halls or stairways, the white lines should broaden into white collars as used around the base-board. This not only assists in the function of cleanliness but is of considerable assistance should anyone find it necessary to pass out of or through the building in the darkness. The white borders are more easily seen in the dark, act as guides to aisles and show turns in stairways.

In order that all machinery may be properly cleaned and kept in repair, it is well that they be painted a suitable color, preferably a battleship grey. All safety devices might well be painted green, the color of safety, and all moving and dangerous parts could be red. This would give a piece of machinery in which the operator will take a certain amount of pride. He will use considerably more effort to keep it clean than if it were black, greasy, and poorly maintained, and will notify the foreman or maintenance department at once if anything is broken, instead of making a temporary repair himself.

The point that I want to make might well be illustrated by the care a man gives his automobile. When it is new, shiny and unmarred, he is always exceptionally careful to keep it free from dust and dirt, and should anyone do anything to mar its beauty he would be up in arms in an instant. But when age dims the luster of the paint and the fenders have been dented a time or two, the owner becomes considerably more careless. Dirt doesn't bother him so much and if he has an accident, he says, "Oh well, the old buggy was looking pretty tough anyway."

It is only human nature to take good care of anything that looks nice, and neglect what does not look so good. You can readily see that it is to your advantage to make your machinery look as attractive as possible.

This part of the housekeeping plan is a paying investment as it prolongs the life of your machinery and tools.

Neatness in the factory means a place for everything and everything in its place. Proper floor space should be marked off for the storage of raw materials and finished parts waiting to be moved to other departments. All tools, dies and other equipment should have a certain place where they will be when not in use. This helps to prevent the misuse and abuse of expensive equipment. In convenient places about the factory there should be metal containers for all refuse and a definite place for scrap.

In a shop where good housekeeping practices have not been in effect it may be necessary to sell the idea to the employees and everyone from the president down to the foreman must assist in the selling process. If one of the executives should be passing through the shop and find a tool on the floor, he might well stop, pick it up and put it in its proper place. The workman whose negligence permitted the tool to lie on the floor could not help but feel ashamed that the president would do what he had failed to do. This little act might sell him more strongly on the idea of good housekeeping than to be disciplined, then and there.

Neatness, cleanliness, and safety are all more or less a matter of habit. Good habits should be formed and bad habits discouraged. This can be largely accomplished through good housekeeping practice and we will find that we have more contented, happier and careful workmen. Habits of carefulness in minor matters, once formed, are easily enlarged to take care of the more important safety element.

To summarize briefly, good plant housekeeping provides: a reduced fire hazard; reduced accident hazard; greater and cheaper production; more contented workers; less interruptions in the day's work, less broken tools and machinery; less spoiled material; and improved morale through the entire plant. You can not help but see the advantage of conducting your factory with the same care that you give your personal appearance or with the care your wife gives your home. You can always remember that good housekeeping, safety and efficiency go hand in hand, and that there is no plant so small but that it can be kept clean.

CHAIRMAN KEARNS: The next speaker on the program is Mr. G. F. Griffin, Director of Education of the American Seating Company, Grand Rapids, Michigan, whom I am now pleased to present to you.

IS A SAFETY COMMITTEE WORTH WHILE?

G. F. Griffin, Director of Education, American Seating Company, Grand Rapids, Mich.

It is a rather dangerous thing, if I may be permitted to say so, to state the subject of a talk in the form of a question. You put yourself in the position of the sergeant who, endeavoring to inspire a little patriotism in some of his men, picked out a sturdy Irishman and said, "Pat, why should a man die for his country?"

Pat scratched his head for a minute and said, "Sergeant, you're right; why should he?"

So, in asking me, Mr. Chairman, "Is a Safety Committee Worth While?" you might be surprised if I said, "I think not." But the program committee knew what they were doing when they came to the American Seating Company and asked us to answer that question, because they know that we do believe a Safety Committee is worth while.

At the same time, I think there is some value in putting my subject in the form of a question, because I believe there is room for reasonable doubt in the minds of many people. I am not so sure but what there is reasonable doubt in the minds of people who have had experience in Safety Committees, because I question whether they have checked up on the thing to find out whether they are worth while.

I am a great believer in the skeptical attitude toward things. I clipped from the *Detroit Press* this morning which many of you have read, an article which, in contrast to many of the editorials and newspaper comments that I have read in various cities about National Safety Congresses, is distinctly conservative, not criticizing the Safety Congress, not saying that it isn't worth while, but simply making the statement that society will judge us by the results that we produce; and I think that is a distinctly healthy frame of mind.

Some Arguments for the Skeptical Minded

So, to you people who have Safety Committees, I will invite you to join with me in considering whether after all the thing is worth while. I hope that there are some here who do not believe in Safety Committees, because I know such people exist, because maybe we can convert them.

I had, a good many years ago, before the Eighteenth Amendment, the experience of going around in college with a bunch of other young fellows about 20 years old and speaking on the subject of prohibition. I happed to attend a denominational college. The peculiar thing about this work was that we were always sent to speak before a meeting of the Ladies' Aid Society or a Sunday evening service in some country church or some similar place. We were always sure of a responsive audience, and everybody sympathized with us. We wanted to go out to convert the hicks, but they wouldn't pay our expenses out there. So I say, there are some people in the crowd who don't believe in Safety Committees and maybe we can save a few souls.

We do believe in Safety Committees, and yet, as I say, the possibility of a doubt exists. Some say, "Why have a Safety Committee; can't the foreman in his department look after the safety of his men without having a group of so-called safety experts running around telling them how to manage it? The foreman looks after everything, and why can't he look after safety?"

Well, I considered that when I agreed to make this talk, and so I decided there were two things I ought to do. I called in, or rather went out to see, several of our foremen and talked to them about Safety

Committees. I am very glad to say that the ideas I am presenting this afternoon were suggested to me very largely by department executives and foremen who are handling the department and who have welcomed the work of Safety Committees.

The other ideas I gathered from the reports of our Safety Committee over quite a long period of time. I couldn't bring all of those reports with me. I brought one along, and I believe it is worth while because some of you are not familiar with the work of Safety Committees. I am going to read some of the items from this report. It is just a report that I picked off my desk by accident. It is not an unusually good or bad one, and probably it is fairly typical of the reports that are issued.

Two Safety Committees Are Steadily Busy

We have at our plant two Safety Committees. One is composed of four, not all foremen, but a small group of foremen. The other is composed of rank and file workers. The one composed of rank and file workers is chosen by the workers themselves, and the one composed of the foremen is chosen by the other foremen. It is somewhat of a democratic organization. I will read some of the things that were recommended by one of our Safety Committees at their last inspection.

"There is a pile of material lying outside of one of the passages which should be cleaned up. The water pipes on the first floor of a certain building, west half of the building, are hanging down and should be suspended by better hangers. The toilets in this same building are all right, but the wash bowls are filthy. (They cover not only violent accidents but also matters of sanitation.) The steam line in a certain building, fourth floor south section at the fire door division, should be supported by more hangers."

These matters were all taken up by the superintendent. When the Safety Committee makes a recommendation, they usually hand it over to the superintendent or foreman and he takes care of it without any question, but they include it in their report to show that they had something to do about it. Others items in this report are:

"In the iron room, the committee is of the opinion that two tumbling mills should be better guarded. The foreman said he would take the matter up with the office and see that it was remedied. The committee saw some things in the steel plant that they didn't like, but were glad to give the supervisor the benefit of the doubt that they were all right.

"Fire Hazards. The committee paid particular attention to this on their inspection, due to the fact that it will soon be time to use the steam lines again. We urgently ask the cooperation of all foremen and their men in trying to keep their respective departments free from oily waste and rags or anything in the line of combustible matter.

"There is an open stairway leading from the second to the third floor of building five, and the committee is of the opinion in view of possible fire hazard that this should be closed. The committee was approached

by some of the employees regarding this matter. They said they were subject to cold on account of the draft."

And so it goes. Perhaps I better not take the time to read any more, but that is the sort of thing the Safety Committee reports on.

I believe a Safety Committee is worth while. We believe a Safety Committee is worth while in the first place, because the foreman does not become aware of all the hazardous conditions in his own department. There are two reasons for that. The first is that the foreman is too close to his own department to see all the hazardous conditions which may exist. You perhaps are too close to your own homes to know there is a hazardous condition in your basement, and you are not aware of the fact until the fire inspector calls in and tells you that you are in danger of burning the house down, and then it is perfectly plain to you. You may think that I imply by that that our foremen are not of such a high standard as they ought to be. I don't mean that. I think the foremen in our plant are about the same as they are in any other plant.

A man said to me the other day: "The foremen in our plant are just about 100 per cent. We don't need a Safety Committee, because our foremen can look after those things. We don't need this and that and the other thing because our foremen are perfectly competent to look after them." While I didn't say it, I thought this: "Well, old man, we have the same kind of foremen that you do, except that we tell the truth about it."

The Problem of Foremanship Enters Committee Work

I dare say that those of you who have had foremen and those of you who have had experience with foremen know that the problem of foremanship is such a big one that we are very likely to overlook some of the hazardous conditions in the plant.

There is another reason why the foreman does not always see the hazards in the plant. Those hazards are almost always apparent to the workmen because of their close contact with a particular machine or particular piece of work. For some reason or other, the rank and file workman will tell those things to a Safety Committee man or some man outside of his department when he wouldn't go to his foreman and tell him about it. We don't like that. We would much rather that our men in every case would take the matter up with their foreman. We do everything possible to encourage it, but either through diffidence or because of some personal feeling toward the foreman, we find that men have things on their chest that they will not take up with the foreman. When the Safety Committee man comes around, they will tell him about it. And while, as I say, we would rather have them tell the foreman, rather than not get it at all, we want them to tell the Safety Committee.

Another reason why we believe in Safety Committees is because safe practices in one department are about the same as they are in another

department. The Safety Committee in going through the plant requires a certain amount of professional expert knowledge about safety which is valuable to them as they go from one department to another. I think of one incident in our plant (and if I tell you everything about our plant, I don't want you to feel that we need a lot of looking after; just remember I am telling the truth) we had an emery wheel go to pieces. It was a pretty bad accident.

We checked up on that accident, and the Safety Committee, in going from one department to another after the accident occurred, found wheels similarly situated in nearly every department of our plant, other wheels which were just as hazardous as the one which caused the accident. Now, if we had not so centralized our work, what would have happened? That foreman would have installed a new wheel and would have seen that it was properly taken care of and guarded, and that would have ended it. But as it was, the one accident which occurred in one department enabled us to guard against a similar accident all over the plant.

One Standard of Plant Housekeeping Throughout

The matter of plant housekeeping is another thing which is standard throughout the plant. Good housekeeping here is good housekeeping over there. The committee in going through will naturally concentrate on things that they have seen in other departments and find places in the department in which they are investigating where a similar condition exists.

Another example that I happen to think of is the remote control of machinery. We had a little accident over at our plant resulting from remote control of machinery. I know what I mean by remote control, but I do not think you do. I mean that the operating part of the machine was here, and over on the wall was the switch that starts and stops the machine. As I say, we had an accident because of that condition. When we investigated, we found conditions of remote control all over the plant, and through the work of the Safety Committee, we were able to check up on those.

There is another reason why we believe in Safety Committees. There are certain places in every plant over which no foreman feels a matter of responsibility, and such places are the passage-ways between two departments. Neither foreman wants to put in an order to have a passage-way kept in good condition and have the work charged to his department. Stairways, often very hazardous things, are in that class.

We had a condition in our plant where (remember I say we look after sanitary conditions as well as safety conditions) a certain toilet and washroom was situated in a room occupied by men from three departments. We had the dickens of a time trying to find out whose responsibility it was to keep the place in good condition. The Safety Committee finally tackled the thing and they said they didn't care whose

responsibility it was, it was to be cleaned up. The place was cleaned up and is in pretty good shape right now.

Another reason why we believe in Safety Committees is because of the idea of conference. I don't need to ask you if you believe in conferences. Some of you have traveled a thousand miles or more to come here. You all agree with me, I think, that two heads or three heads or a dozen heads are better than one. Some illustration of that may not be amiss.

I once owned a Ford. It was an old 1917 Ford. I discovered a place where I could improve it. Do you remember the cock which drains the radiator on the old style Ford automobile? In the cold weather you would break your back trying to get that choke open, and it was very difficult to reach. I was surprised that a man as wise as Henry Ford permitted a thing like that to happen on his car. I thought to myself, why wouldn't it be nice to extend a long pipe below the cock, put the cock on the bottom so that you could reach it with your hand, and let the water drain out? I didn't consult with anybody about that; I just went ahead with it on my own hook. Before I got home with the Ford, the pipe was frozen.

Two Heads Are Usually Better Than One

I would also like to tell you of an instance which occurred in our plant where two heads were better than one. A fellow was doing a little assembly operation in which he put a nut on a part and he did it with a nut setter, a brass nut setter you call it. You put it up against your side and grind it. He developed something or other in his side, a sore. The foreman after some study of the thing decided that what he needed was a heavy pad of some kind to wear on his abdomen so that the sore wouldn't develop again. The Safety Committee came along and it didn't look so good. They studied the thing for a while with the result that they threw the old brass nut setter away and installed an electrical nut setter. That is another example where four or five fellows getting together and working on a thing will bring out something that will be better.

There is another reason why we believe they are worth while, and that is because safety is very largely a matter of education, and I don't know any better means of education than a Safety Committee. We have five men on each of our Safety Committees, 10 men all the time. These committees are rotated every year. That means that these men are constantly taken from the organization and fed back into it. These men for a year give considerable attention to the work of accident prevention and the old adage, "Once a mason, always a mason," holds true in safety work; once a safety man, always a safety man. A fellow can't go around studying hazardous conditions in a plant without having that get into his blood. So, as I say, from an educational standpoint, Safety Committees are decidedly worth while.

There is another reason (I don't think you will disagree with me on this) why Safety Committees are worth while and that is because the workmen in a plant have a right to have one of their representatives check-up on conditions occasionally and find out if they are safe. After all, who has the greatest interest in accident prevention? Certainly the worker has. We pay a little compensation and forget it, but the worker loses more in cash, loses more in suffering, loses more in every respect than the employer does, and it is the worker we are mainly interested in.

I can't swear to the truth of this story, but I have been told that during the War, in plants where gas masks were manufactured, the final inspection of those masks was always done by girls who had very near relatives serving at the front. What is the psychology of the thing? Simply this: that if a girl has a brother or husband or sweetheart at the front, she is not going to pass that mask over without being sure that it is absolutely okeh.

So, as I say, the workmen, who after all have the most at stake, have a right, and it is good policy to give them the right, to serve on Safety Committees.

There is another reason (and this is the last reason, I think) why we believe they are decidedly worth while, and that is, Safety Committees have in many plants proven the forerunner of committees or bodies of one order or another, composed mostly of workmen, who sit with the management and council on problems of mutual interest. I don't claim originality for that statement. I heard it first from Mr. Arthur Young that their system of Works' Council developed from the old Safety Committees.

A Word of Warning About the Safety Committee

In our plant I know that to be true. Our Employees' Congress sits with the management and consults about various matters, and it developed from the old Safety Committees. The psychology of it is simply this: when the management learns and the men learn that they can work together and consult together on matters of mutual interest, such as safety, they gain a respect for one another and immediately see other problems upon which they can consult profitably. That is the last reason why we believe that Safety Committees are worth while.

This isn't exactly an answer to the question. I would like to say just a word or two of warning, to some of you who haven't experimented with Safety Committees, that it is possible to have a Safety Committee that goes all wrong, and, of course, the effect is very bad. In the first place, the management must respect the Safety Committee, and must sympathize with them. I don't mean that the management must be sought, and I don't mean that the management must adopt the questions and policies put forward by the Safety Committee. I simply mean that the management must take an intelligent interest in the work of the Safety Committee. Sometimes the management says, "No, that happens occasionally

in our plant and I suppose in every plant." But when the management says, "No," and gives a reason, the committee is usually satisfied, and then mutual respect exists between them.

Another thing that should be done is never to permit a recommendation of the Safety Committee to just die. It must always be followed up. If you haven't somebody on your staff who can give the time to follow-up the recommendations of the Safety Committee and see that some action is taken on it, or some answer is given, don't start a Safety Committee, because you are simply spoiling your chance of starting one at some future time.

And there is another thing (and this may be a debatable question, but I don't think so), we at the American Seating Company believe that Safety Committees should be at least in a measure democratic. A Safety Committee appointed by the management may do a great deal of good, and some of them probably do, but from the standpoint of the education of the employees, which is very important in securing their cooperation, I think there is nothing quite like having democracy in the selection of the Safety Committee members.

Summarizing the Reasons for Safety Committees

In concluding, then, I would like to summarize some of the things I have said. We believe that Safety Committees are worth while because foremen do not always see the hazards in their own department, and the Safety Committee can call to their attention such matters.

We believe in Safety Committees because Safety Committees learn to detect what are safe practices in one department so that the whole plant can profit by the mistakes of each department.

We believe in Safety Committees because there are some places and some conditions in plants over which no foreman feels the responsibility and some central organization ought to look after those places.

We believe in Safety Committees because they embody the idea of conference.

We believe in them because safety is a matter of education, and the Safety Committees are excellent educators.

We believe in them because we believe that workmen have a right, inasmuch as they have the greatest interest in safety, to be represented on the body which inspects the plant and okehs it.

We believe that Safety Committees are worth while because safety can never exist unless it is a part of a general plan of industrial relations between the management and the men.

Finally, I might submit my evidence at the American Seating Company. We have had them for a number of years, and we have had the Employees' Congress for the last seven years. During that time, our labor turnover has fallen from 180 per cent to 30 per cent; wages are 10 cents an hour higher than they were at the peak following the War (I mean wages to the individual worker), and along with that, our unit

cost has fallen off, simply meaning that the workers have attained greater productivity, and not that we are trying to give any money away. Good will exists throughout the whole plant and that wasn't always true. Accidents have fallen (and I will put this in terms of frequency and severity); frequency of accidents has fallen from 17 accidents per million hours to two per million hours, a decrease of 80 per cent. Severity of accidents has fallen from 79 days lost per thousand hours of work to 16 days lost per thousand hours, also a decrease of about 80 per cent.

With those reasons, ladies and gentlemen, we believe that Safety Committees are decidedly worth while.

Discussion of the Merits of Safety Committees

CHAIRMAN KEARNS: Your chairman feels that if you are not, you should be convinced by this time that Safety Committees are worth while. However, I don't want to make up your mind for you, and if there is anyone in the audience who would like to ask a question of Mr. Griffin, I am sure he will be glad to answer it.

ALBERT CURRY (Harry Brothers Company, Detroit, Mich.): I would like to ask Mr. Griffin if his Safety Committee devote their entire time to this work, or do they take their time periodically during working hours? I understood from his talk that his committee must devote most of their time to that work. In that case, I would say that a Safety Committee outside of the foremen is the only thing. I understood the point at issue was safety work in small shops where the Safety Committee could not put their whole time in on the work. That was the reason I gave that foremen should be the right ones for the committee. I would like to have Mr. Griffin answer that, because if they only give part of their time, why then it puts a different light on my idea, and I may get some ideas on it.

MR. GRIFFIN: I am glad you brought that up. Each of our committes takes about one day each month to make a general inspection of the plant. In addition to that, when there is an unusually severe accident, we call the Safety Committees together and they go out and investigate the accident immediately after it happens. The foremen, of course, are on a salary and lose nothing by the time they put in. During a safety inspection, the workmen are paid their average hourly wage.

They don't put in all their time in our plant on this safety work. It takes them about one full day a month to make this inspection. We employ about 1,000 men in our plant. In a smaller plant, the length of time it would take them to make the round of the plant would be proportionately less, which would automatically make the cost proportionately less and within reach of any plant.

MR. CURRY: That brings out the point at issue. Mr. Griffin speaks about the Safety Committee which is exactly the difference that I have gone through in my previous long experience. I may not look it, but I have been in the manufacturing business from apprentice boy to the

present time, a period of 42 years. I have seen the Safety Committee work done in more than one shop. I have worked in plants from the Atlantic Coast as far as Chicago. I have found that the Safety Committee work has done these very same things that Mr. Griffin has just enumerated.

Don't forget that in my talk I tried to emphasize that eternal vigilance was the slogan, not only today, but every hour in the day. Prevent accidents now and not after they have happened. Please bear in mind that the thing we are trying to do is to prevent accidents. That is why I have argued with every employer I have worked for that the foreman is responsible. You can also have a Safety Committee from the employees, but don't forget eternal vigilance hour after hour, and not once a month when you have your Safety Committee meeting.

DR. WOOD (Frederick Stern): This last address brings up very vividly the difference between an accident and an injury. The last speaker here is saying that we should prevent accidents and not investigate them afterwards. What Mr. Griffin said was that we should do everything possible to prevent accidents, but when an accident happens go and investigate it as a special occasion.

An injury may be caused by neglect on somebody's part. It may be caused by the inefficient installment of machinery or the negligence of a workman or a foreman. An accident in the legal sense of the word, is something which can not be anticipated and for which no one is responsible. Mr. Griffin says that an accident is a thing that can not be anticipated and should be investigated on the spot.

How the Safety Committee May Be Chosen Democratically

MR. COREY: Mr. Griffin has stated that the Safety Committee should be chosen by the employees. I would like to ask him to elucidate just the manner in which the employees go about it to choose this Safety Committee? I would like to know who nominates them and whether they have a sort of election?

MR. GRIFFIN: In our plant (and this may not help you very much, because we have, as I said, an Employees' Congress) the members of this Employees' Congress, which acts not only on safety but matters of mutual interest, mutual to the management and men, is chosen by election, each department or sub department having a representative. The chairman of that body is then elected by the body, and they appoint the Safety Committee every year.

All the foremen sit in at the foreman's meeting, which we choose to call the Senate, and, of course, that is not a democratic organization; they simply hold office because of their position in the firm, and their committee is appointed by the chairman of their body.

CHAIRMAN KEARNS: The next speaker is Mr. William C. Corey, President of the Delaware Leather Company, Wilmington, Delaware. I take pleasure in presenting Mr. Corey.

WHAT WE HAVE LEARNED FROM EXPERIENCE IN A LEATHER WORKING PLANT

William C. Corey, President, Delaware Leather Company, Wilmington, Del.

The first question that came into my mind when I entered this room was, "What is a large and what is a small plant?" Mr. Kearns says 300 men is a small plant; Dr. Hamilton says 50, and I employ 100. Where do I stand?

However, I am going to tell you that we have been teaching safety to our employees for seven years; I have been teaching it myself. We executives at the head of 50 or 100 hands have far better prospects of teaching safety than the head of a corporation who has 1,000 hands. You may not believe me, but my experience will show you before I get through. The reason is this: I know every foreman by his first name, and I know where he lives, and know something about him. I know many of the men personally, and I come into personal contact with many of them, and I am interested in safety myself.

When we have a meeting, a mass meeting which we hold twice a year, I always talk to the men myself. I open that meeting myself and I generally make a few remarks, and then I introduce a speaker who comes to us from an insurance company who supplies the service.

I told my help at one time that I was interested in safety work for two reasons. The first was a selfish reason on my part, which was reducing my insurance rate. The second reason was that I was personally interested in each and every employee and I didn't want to see them get injured. There was my personal contact with my men.

We paint up most of our machinery, and we have most of it painted the battleship gray. We paint the sprinklers red and our cold water pipes green. Our steam and hot water pipes are painted black, and our gas lines yellow. In that way, everybody knows what pipe they are touching and what they are looking at in the factory.

Whether safety comes first, or whether efficiency comes first, I do not know. My argument is that safety is one of the elements of efficiency. If you have a safe plant, you have an efficient plant, and that is true all the time.

I want to back up my few remarks by some comparative figures from our plant, which is a leather working plant, and two of my neighbors or competitors who employ from five to six times as many hands as we employ. This will bear out the statement that the executive of a small plant with his personal contact can have just as good results and oftentimes better results than the executive of a larger plant.

These are some figures that I had the insurance company, which also insures the other companies, make up for me. Our lost time accident frequency per 100 employees per year for the year 1925 was 2.05 per cent. One of our neighbors had a frequency per 100 employees per year of 4.56 per cent, which is more than twice as much, and the other had

a frequency of 2.45 or 20 per cent more than we did for the same year.

Our loss ratio for four years averaged six per cent; our neighbors, 20 per cent and 49 per cent, respectively.

The longest time that either one of our competitors operated without a lost time accident was one year and four months. Some of the different departments in our plant have gone five, six, seven and eight years without a lost time accident. In the last eight years, since the advent of compulsory liability insurance, we have had only 10 lost time accidents, none of which has caused permanent injury of any kind nor the loss of any part of the body.

I think my record shows that the executive at the head of a small plant has just as good an opportunity to teach his employee safety as the man at the head of a big corporation. In order for you to teach the employee safety, it is necessary for the head of the company to get down and do some of the work that is done by paid men who put all their time into it. Those of you who are at the head of these small companies are not handicapped in anyway, because you can make just as good a record and a better one perhaps than the big companies.

Committee Inspections Made During Working Hours

CHAIRMAN KEARNS: A question has been handed in intended for Mr. Griffin. The question reads, "Does your Safety Committee make their trip of inspection during working hours or at such time as the plant is closed down? Do you pay any bonus to foremen's committees?" This question was submitted by Mr. W. F. Spranger, of the Doehler Die Casting Company.

MR. GRIFFIN: The committee makes its inspection during working hours. As I said before, it usually takes all day in our plant. It starts out at 7:00 o'clock and winds up at 5:00 o'clock.

We do not pay any bonus or give any special inducement for service on these committees, other than the payment of their regular wages. There is one exception. The chairman of our committee is usually taken to the National Safety Congress, and he may be around listening to me.

W. D. PRICE (Warner Gear Company, Muncie, Ind.): Does anybody, especially the man from the American Seating Company, have a budget for expenses for a Safety Committee? In other words, how much money can a Safety Committee spend for safety work?

MR. GRIFFIN: It is pretty hard to draw the line on what you mean by safety work. If a committee recommends that a stairway be fixed and that stairway is fixed, that is just plant maintenance, and you wouldn't think of having a stairway that isn't safe. The same is true of machine guards or the cleaning up of a pile of rubbish. That is mainly what the committee finds. The committee just finds things here and there that somebody overlooked which ought to be done, and you can call it safety work or just good plant housekeeping.

Of course, we do have a budget. Our budget for safety work goes into the purchase of posters and membership in the National Safety Council, the care and servicing of our bulletin boards, the trip that some of us fellows make to the National Safety Congress once a year, and the wages of the men who are making safety inspections. Probably everything that results from the findings of the Safety Committee is chargeable to some department as maintenance.

MR. CURRY: If we have anything wrong in our plant, we don't consider the money; we fix it. The cost does not enter our heads; we fix it.

MR. PRICE: I am afraid the gentleman got me wrong. I just wanted to find out if certain organizations had budgets, or if they had a certain sum that they could spend. I appreciate the fact he brings out that we should fix it, and we do. I would like to know how others run their budget. We buy compensation insurance. Should we spend a certain amount of that or an equal amount on the time of safety men?

H. R. WHITNEY (General Industries, Hamilton, Ontario): In our plant, there is an order issued with an order number the same as any other job that goes through the plant. When that order is finished, it goes back to the auditor, where it is paid for.

CHAIRMAN KEARNS: Is that the information you wanted?

MR. PRICE: I would like to know whether there is a budget provided for the Safety Committee and the safety work that is to be done in the plant?

Women Are Active on Some Safety Committees

D. C. FAHY (Du Pont Company): All our safety work is charged up to the job which the Safety Committee recommends. If it is new work, it is taken up with the manager. He in turn appoints that Safety Committee and a master mechanic to investigate the job. If it is a little job to be attended to, it is authorized done, but the department must stand the expense. There is no appropriation of any description made, other than the expense of the Safety Committee to the Safety Congress.

C. MATTHEWS (American Radiator Company, Michigan plant): In regard to these Safety Committees, we have one in our place, and I happen to be the chairman of it. We have five members and we make our inspection every two weeks, generally on a Tuesday. Each man gets his list of things to look for. We have the shop divided into four units, and each man goes to his unit.

MR. WALKER: I would like to ask Mr. Griffin if he has any women representation on the Safety Committee, and if so what the results are? We have about 15 or 20 per cent women employed in our factory.

MR. GRIFFIN: I can't answer that question for our plant. Our nurse is automatically a member of the Safety Committee. She does not make her inspection with them. Unfortunately, she can not get away from her first-aid room. I think she is a very valuable member of the committee. When the Safety Committee gets ready to make an inspection, they go in and sit down with the nurse, and she throws her books open

and shows what has been going on for the preceding month. They check up on the direct causes of accidents and look around for some place that might be hazardous.

In a plant where there is a large proportion of women workers, there should be a woman represented on the Safety Committee. There is a woman representative in our Employees' Congress, but to the best of my knowledge, they never served on the Safety Committee.

MR. DUNDEE (Hamilton, Ont., Canada): I represent the textile men. We probably have two-thirds women, and we have that proportion of women on the Safety Committee. For purposes of inspection we take the men through the plant only. The women only come to the regular Safety Committee meetings every two weeks. The reason we don't take them through, is because they don't understand the mechanical hazards the same as the men. The women work with the men during the day, and they confer and talk their hazards over together, but the men, as I say, conduct the inspections.

The Safety Committee Helps Lower Production Costs

CHAIRMAN KEARNS: Is there any other plant represented here that has women on the Safety Committee and would like to have a word to say on this subject?

MEMBER (Haynes Stellite Company, Kokomo, Ind.): We have one foreman in our company that understands safety. He decided to put this thing over the entire plant a few years ago, regardless of what anyone else thought. I have kept a pretty close record on that department. He works safety with his men. He lets the men work with him instead of for him. In that department they went 21 months without a lost time accident. I have figures also to show that he increased his production 22 per cent, and reduced his costs 16 per cent, and raised the wages of almost every man in his department.

We have another department there where the foreman doesn't seem to think that the Safety Committee is worth while. It takes a good deal of work to keep those men interested in that particular department. I believe that this one man's department has enough evidence to prove beyond a doubt that you can afford to pay what the committee is worth. That is all there is to it. If your committee is not doing the right stuff, it is not organized right or somebody is not doing his duty.

MR. BATTLE (Hollingsworth & Folks, East Fall River, Mass.): Our East Walpole factory has an average of 225 men, and our West Groton, Massachusetts, factory employs 270. Without being personal, I am supposed to look after the safety work, but my regular vocation is traffic management. I find in my work that I secure the best results by actual cooperation with the Safety Council in Chicago. If this will help you, I want you to know it. The Safety Council will help you to get the moving pictures which they have and will send them to you at a nominal cost. If you can get a hall where you can put them on, everything will be fine. I put on a picture every other month from the first of November to the

first of March. I also secure from the Forsythe Dental Institute in Boston health pictures about the care of the teeth. I get the men interested in that way.

At the end of the year we put on an amateur show that is conservative and nice. I have a great deal of pleasure in stating that I have reduced my lost time accidents considerably. I had 71 at one mill, and there were 588 days lost. This year, thank the Lord, I only had 31 and 280 days lost, and I owe it all to sanctified commonsense together with moving pictures.

CHAIRMAN KEARNS: We have on our program a number of subjects for round table discussion. The first one is, Capitalizing personal contact; second, What to do about machinery guards; third, How to keep employees interested in safety; fourth, How to secure and use experience of others; fifth, Value of cooperation with other plants nearby; and sixth, The first-aid problem.

I had intended to call or pick out a few people in the audience to discuss some of these questions, but I have changed my mind. I feel we had better just have a round table discussion and throw the meeting open to anyone who cares to discuss any one of these subjects.

We have National Safety Council question cards here, and we will be glad to pass them out to you; but I would much prefer that you ask your question now and have someone here in the meeting answer it for you.

The General Round Table Discussion

S. C. HUETT (American Lime & Stone Company, Bellefonte, Pa.): Referring to the subjects listed for discussion, I would like to ask about the next to the last one, "Value of cooperation with other plants nearby." I would like to ask especially about the nature of experience that any of the smaller plants have had, especially those not located in the large cities, with the cooperation of other plants in their vicinity, the nature of that cooperation and what the results were?

MR. GLIDDEN (Ohio Public Service Company, Mansfield, Ohio): We started a safety organization in our company a short while ago, and as a starter asked one of the steel mills, not a large one, but one that is actively engaged in safety work, to assist us. The safety director spent a good deal of time and gave talks to our men on the subject and really gave us wonderful assistance. I believe that we would not have been able to start had he not given us that assistance.

MR. WHITNEY: With reference to "What to do about machinery guards," I would like to find out from one of the other men here in what way they keep a record of them and how they keep them in place?

MR. THOMPSON (Detroit Insurance Company): It happens to be my lucky or unlucky duty in life to visit many plants, purely from a service and engineering standpoint. I have the very question that this gentleman is asking now put up almost every week, "What are we going to do about our guards? Here we spent thousands of dollars every year, and

at the end of the year we take our inventory and our thousands of dollars are gone, also the guards."

I tell them there is only one way, and that is to identify a guard with a machine, the same as you tie a can on a dog's tail, you make it conspicuous, and if you will paint the guards a conspicuous color, and have an ironclad rule in your shop that anyone caught with a scrap or a piece of metal painted in that color will be up with the angels, you will have all your tools left in the plant.

I have found that by painting them one color—and why not make it green?—helps tremendously in keeping the tools where they belong. By painting it green, it will lend harmony to the plant, and will also lend to the scheme of things that that piece of metal is a guard. You can paint it any color, it does not make any difference.

Keeping the Machinery Guards in Place

MR. WHITNEY: I started this. I want to explain our method. One of Mr. Kearns' men came up to my place and issued an order to put guards on an oil furnace. About three months after, he wanted to know if they were on, and I told him certainly. He then said to me, "Let's look at them." I felt as big as life. When we got there we found two of them all right, but the third was gone. I didn't think there was any use in asking the foreman or the man that was running the furnace anything about them, but it set me to get out some cards and card every guard that is made and turn it over to the foreman.

Any accident that happens on the machine that has that card record is filed away with that card, with the date the guard was put on and who installed it, who the foreman was, the kind of machine, and the department it is in. I think you will find that all this information will be of great help to you in case an incident like that occurs. I don't think there is any man living that remembers all the guards that are ever put on.

MR. CURRY: We paint all our guards green. We endeavor to build the guard so that the machine is as accessible as possible without removing the whole guard. We put the side of the guard on hinges so that the man can unlock the two buttons and get at the machine without removing the guard.

If we find a guard missing from a machine, I do not lecture the man, I simply ask him who took it off. He may say he does not know, or he does. I then say to him, "What is the guard put there for?" He may look at me and not answer the question. I then tell him the guard is put there to keep you and some of your fellow-workers from getting injured. Put it back and put it back the way you found it so that you or some of your fellow-employees will not get injured.

If you take that course, you will get good results, I am sure, because he feels that you are doing something to help him or his fellow-worker. That is our plan when we find guards removed.

MR. FAHY: Those two questions, "What to do about machinery guards," and "How to keep employees interested in safety" (both of them apply to the same thing), can be answered by the one answer.

We have a method at our plant, whereby if there is a guard to be removed from a machine, it is done by the foreman. If the foreman goes away and leaves it off the machine, he is immediately charged.

I have been chairman of our Safety Committee for three years, and the last two years, I failed on our inspection ever to find a guard off a piece of machinery, and our plant covers in the neighborhood of 200 or 300 acres. We have a paid Safety Committeee. We have to travel once a week all over that entire plant. Any time we find a guard off a piece of machinery, we are duty bound to report it to the management, and the man that removes it is going to suffer. All our machinery is painted the same color as our beltings.

"How to keep the employees interested in safety?" The answer is by keeping your guards on the machinery.

MR. WILSON (Cleveland Safety Council): I would like to go a step forward along that line of guards. I think when we are contemplating a program of guarding, that if we would take into consideration the foreman and the employee on the particular machines that are going to be guarded and get their suggestions and their help, that will solve to a great extent the permanency of that guard.

Keeping the guards on the machines, as a means of keeping up interest, is only solving about 30 per cent of your accidents. In other words, your mechanical protection is around 30 or 35 per cent, and there is still 65 per cent an educational program, entirely foreign to your mechanical protection. I think that involves the coordinated individual effort of each employee in the plant. The painting of individual guards a specific color is fine. It does lend to the safety atmosphere of a plant. I do think, however, if we can invite the foreman and the man using the machine and get their cooperation and aid when we design and construct these guards, that it will aid very materially as a permanency on the part of that machine.

Getting the Cooperation of the Employee

O. J. LEWIS (The Davis & Farley Co., Cleveland): In furtherance of Mr. Wilson's remarks, we had a particular case in our reaming department. I think that Mr. Wilson visited our plant when we went into this department and found practically all the guards on the reamers had been removed. We called together a number of the employees working in that department and talked the matter over. One of the employees suggested a type of guard to replace the old-time guard. The old type we could never keep on. As a result of that employee's suggestion we put on this new guard, and in about six months we did not find one of those guards removed. This was all due to the suggestion and the cooperation which they gave us. I think if we can get the cooperation of the individual fellow that is using the type of machine, we will have

no trouble. He understands more about the workings of the machine than any mechanical engineer you can bring in.

MR LANG: It would seem to me that inasmuch as Mr. Jay Thompson is here, who has a message on first-aid, that the meeting would be incomplete without hearing from him. I would like to suggest to the Chair that he call on Mr. Thompson for a discussion of first-aid in the industry.

CHAIRMAN KEARNS: We would be delighted to hear from Mr. Thompson if he is in the hall.

PRACTICAL DEMONSTRATION OF FIRST AID

Jay E. Thompson, Manager, Toledo Safety Council, Toledo, Ohio

I liked very much that statement the gentleman made about "sanctified commonsense." It applies a lot to first-aid.

Briefly, I want to leave this thought with you in regard to minor injuries: make an examination for the minor injury and a vaccination scratch for smallpox. You don't know where the germs are, and you can't afford to take a chance, and for minor injuries, "sanctified commonsense" is to have them treated with some antiseptic solution.

I am going to ask this man from Cleveland (I came from there originally) to be the victim for a minute. A man gets a cut in the wrist. You put one finger above the cut and one below the cut and you have shut the blood off, and he is not going to bleed to death. If you do that, you have got him in good condition from that time on until the doctor comes. He won't be any worse off when the doctor gets there than he was when you found him. That is the whole secret of first-aid, to keep your patient in as good condition as he was when you found him.

The twin of that trick is in the neck. Place one finger right here, back against the bony structure, one above and one below. In that way, you shut off the blood. A two-year-old boy died in Toledo as a result of a cut he had received in the neck from a broken windshield. Loss of blood was the verdict of the coroner. That grip will stop the blood. It is the same as in the wrist, one above and one below.

For a cut in the lower arm, you have got to put your finger on the arm and use a little pressure. In that way, you stop the flow of blood. You don't need to take an overcoat off to do it. The same thing is true of a cut in the hollow of the knee. Place one hand on one side and the other on the other side and you shut off the blood.

Another pair of grips is used for a cut in the shoulder or in the upper arm. If you have a cut right up here in your shoulder blade, put your finger down there and wiggle it as if you were turning a tape.

The twin to that is for a cut in the center of the groin, and you use the heel of your fist. If a man has a leg caught in a switch, walk up

and throw your fist there in the groin until the doctor finishes the job. It is the layman's job to keep him in as good condition as the man is found.

For a slice in the palm of the hand, fold the meaty portion below the thumb back, close the fist, and hold it back that way and take him in your car to the hospital. He won't bleed to death.

For a cut on the forehead, one finger below and one above closes it up. People have been known to bleed to death because of cold water being dropped into an open cut to make it stop bleeding.

For a cut any place on the body, close the lips of the cut, look at it as a mechanical proposition. On this one, consider the bone as a broomstick with a rubber tube running underneath and a cut in that tube. The tube contains valuable liquid and you want to stop it. Put your fingers up against that rubber tube, and exert a little pressure against the broomstick.

For a cut on the scalp, a belt or a piece of string tied around the forehead will stop the blood, and he is ready for the doctor to come and do his job.

Stopping the Flow of Blood in Puncture Wounds

For puncture wounds like hitting a man in the neck, you have 10 plugs in your fingers, so use them. Don't worry about the fact that they are dirty. Your victim will bleed to death from a serious wound in two, three or seven minutes. That is the remedy. A three-year-old girl in Omaha, so I was told, was saved from death by a girl scout. A plate broke and the girl got a puncture in the neck. The mother screamed. A girl scout came in and put her fingers there the way I told you, and held it for thirty-five minutes until the doctor came.

You can take these things home with you and pass them along and help everybody that you tell them to. I think they are simple enough for anyone. If any of you had fainted while I was talking about this, to bring you back I would just push the head between the knees. He is conscious when that blood gets back.

For a cracked skull, you reverse the process. You want to get blood out of the head. You elevate him, lower the heels, and apply your cold compresses to the top of the head and the back of the neck.

For a broken bone or an arm, you tie the arm to the torso, and then he is ready for transportation. If it is a broken leg, you tie the two legs together, putting the first of four bandages above the break, and then putting one above the knees and one below and one at the ankles and tie the toes together so that the foot of the leg which is broken will not wabble. In doing this, you are just trying in the case of a broken bone to prevent it from becoming a compound fracture and reduce the shock on your patient. A broken shoulder is the same as the arm.

When a person has had the flow of blood stopped and his broken bones taken care of, you have to bring him back to consciousness. One of the methods is the same as for fainting. The other is a question of setting up

a circulation of air again, such as is necessary from an electric shock or being overcome by gas or drowning, and in that case, you have got to set up the circulation. You have got to use resuscitation in setting up that circulation, squeezing the air out of your victim and letting nature push fresh air back in.

In an electric shock, you need a counter shock and that is easily applied by slapping your victim in the face. There is a best way of doing this act of resuscitation and you should all learn it. I don't intend to take your time by going into it now. It is available. All of these things have a practical every-day application in your work.

Too Rigid Discipline of Employees Is Criticized

CHAIRMAN KEARNS: Is there anyone else now who has any questions he would like to ask on any one of these subjects?

MR. GRIFFIN: I have heard repeatedly this afternoon that if an employee doesn't do so-and-so, discharge him. Well, occasionally it is necesary to discharge men. I don't know of any more prolific cause of accidents than labor turnover, and I can prove it to you. Why ruin your labor turnover because a man has violated a safety rule? You make yourself more liable to accidents by getting in green men who are entirely foreign to the organization.

The other thing is, that if you want men to cooperate in safety you have got to gain their good-will and sympathy. Use discharge as a last resort when you can't do anything else.

I would just like to remind you, and call to the attention of those who may not have heard him this morning, that Mr. Clarence Howard spoke in this other room. He is president of the Commonwealth Steel Company. He brought out very strongly that the way to accomplish results is to get the cooperation and friendship and good-will of the employee. He said that the thing to do is to get them interested in helping the organization along. I wish very heartily to second the words of Mr. Howard, in that we should keep our employees wanting to be with us and not make them feel antagonistic by discharging some one of them.

CHAIRMAN KEARNS: Ladies and Gentlemen, I feel, although we have been handicapped to some extent by some restrictions and inconveniences today, that we have had a very profitable meeting. I am sure that all of you have enjoyed the papers and addresses presented by the speakers, as well as the discussion on these papers, and that the knowledge and informaiton gained will prove of material benefit to you in the future.

In closing this conference I want to take this opportunity, personally, and on behalf of the National Safety Council, to thank the speakers who were kind enough to come here this afternoon. I also wish to thank you all very kindly for your time and attention, and to indulge in the hope that we will all meet again next year at a similar conference.

ADJOURNMENT

Health Service Division

Wednesday, October 27, 1926

DR. LOYAL A. SHOUDY, Vice-President for Health
Chief Surgeon, Bethlehem Steel Company, Bethlehem, Pa.

THE meeting of the Health Service Division was called to order in the Grand Ball Room of the Book-Cadillac Hotel at 2:15 o'clock, Dr. C. F. N. Schramm, chief surgeon, Fairbanks, Morse & Company, Beloit, Wisconsin, presiding.

CHAIRMAN SCHRAM: I have a promise to make to you for next year. Those of you who have attended the National Safety Council meetings for the last three or four years have seen only one face in front of you as chairman of the Health Service Division. I am promising you a change for next year. I was elected once and then reappointed year after year but I understand there is a change recommended for the future, so next year you are going to see a new face. I hope you will find the change well worth while.

I am anxious that Dr. Phillips have a big audience this afternoon, so we will wait for a moment until all of those who are standing in the back of the hall are seated.

Three or four years ago our plan of the Health Service Division was a sort of mid-year meeting of the physicians; we had a certain group who came in from the outside, but as a general thing physicians talked to physicians. We had only a small room but that was all we needed.

Then some of the physicians conceived the idea that our real job was to sell health, and so we started out on that basis and placed in various Sections of this Congress physicians to speak on various medical problems, some medical phases of their work, especially applicable to the problems of that Section. If you will glance through this year's program, you will find we have 26 physicians on our program. Some of them you will hear this afternoon, while others have spoken or are to speak in the various Sections.

In medicine, and it applies in industry as in every other place, there is one group who are doing the very best work known. Medicine is not an exact science but the best known methods of treatment, the best known methods of prevention, and the best health outlines are taught

by the men who are practicing from, and who have gone to the regular schools of medicine. I think industry has seen the handwriting on the wall and is calling upon the scientific men to come in and help solve some of the problems of industry.

This afternoon we have the pleasure of listening to the man who holds the highest office in that regular group of physicians who are doing the best known work in health lines. We, the physicians who are here, and we of the National Safety Council are deeply grateful to Dr. Phillips for the message he will bring to us in "The Gospel of Good Health."

THE GOSPEL OF GOOD HEALTH

Dr. Wendell C. Phillips, M. D., President, American Medical Association
New York City

A healthful man is a safe man.

It is fitting that safety movements in the realm of industry should anticipate the hazards incident to modern industrial endeavor, and provide means for the prevention of injuries, occupational diseases, deformities, disabilities and fatalities. Gradually our great industrial organizations have assumed their full responsibility in safeguarding the lives of employees. Furthermore, the history of the National Safety Council, representing 4,200 industries, its proceedings, publications and demonstrations, mark the progress which has been made in the interests of industrial safety. It was inevitable that the experience gained by your great organization in the promotion of the principles involved in all the phases of industrial safety should lead you to enter the far wider domain which you have wisely termed industrial health.

Industrial health is primarily a medical problem and the promotion has only been made possible through the cooperation of trained medical men. It involves the application of exactly the same principles as those encountered in health problems in general. In the promotion of this newer phase of your work your purpose seems to be to safeguard as far as possible the health, sanitation and welfare of your employees. For instance, a trivial accident to a normal healthy individual is less serious than the same accident to an employee whose resistance is undermined as a result of tuberculosis, malnutrition, or chronic ailments.

Your industrial health problem is secondarily an economic one. In one of your publications[1] I note a statement that "A high standard of health has a decidedly favorable influence not only upon output, as to cost, quantity and quality, but also on continuity of service or labor turnover, as well as upon morale, working conditions, etc. It is, therefore, as good business for an employer to keep his men's bodies in good order as it is to keep his machines in good order, and it is as

[1]Memorandum with regard to the formation of a health division of the National Safety Council.

much worth while to sharpen their wits as it is to sharpen their tools. The industrial health movement, with its fringes extending into the social field, has come to be recognized as not only a legitimate but an important part of any industrial enterprise that is organized for getting efficient results." The necessity for your newer health enterprise seems justified by statistics already available which seem to show that the loss from industrial ill health is fully seven times greater than from industrial accidents. In its fulfillment you are making liberal appropriation of funds and you are following the advice and counsel of qualified and devoted industrial physicians and surgeons, and while your health efforts are necessarily somewhat limited in scope you are commendably filling an important niche in the health problems of our country.

Universal Health Education and Health Preservation

A healthful man is one properly educated in the fundamentals of personal and public hygiene.

I venture today to stimulate your vision by defining a still broader field of activity for the promotion of the gospel of good health, by means of a plan of universal health education and health preservation, and to outline a working scheme for its accomplishment. I would make effective good tidings of health in every community, in every home and in the life of every individual from his cradle to his grave. In the accomplishment of this purpose the primary need calls for a broad and comprehensive scheme of personal and community health education, which must be our slogan, and the millennium which is so necessary can only be reached when permanent and continuous preaching of the gospel of good health is maintained in every community, in every home, for every individual of the land.

In the discussion which is to follow I shall give large emphasis to a keen conviction that our object can never be fully reached until the public realizes that the educated physician by tradition, by education and by experience is the only possible person qualified to teach the principles of health, hygiene and sanitation. Furthermore, I shall emphasize a still further conviction that our success must center around personal contact with the individual, and particularly in the family home. I shall also contend that this entire work can best be occomplished through the agency of the properly qualified family physician.

Let us admit that in the consummation of this scheme the physician must prepare to assume new responsibilities as public health teachers. In the field of preventive medicine physicians have already accomplished and are still accomplishing marvelous results.

This address would be incomplete without a brief enumeration of some of the historical events which have marked the progress of preventive medicine. About 1796, Edward Jenner, practitioner of Gloucestershire, in England, boldly transferred cowpox infection from the hand of a young milkmaid in the arm of a young lad named Phipps, and

immediately established the fact that immunity could be produced. As the result of vaccination, smallpox, the dread blemisher of human beauty and destroyer of human life, has become a thing of the past, except with people who foolishly neglect to avail themselves of the protection thus provided. But for Jenner's discovery, the faces of at least 50 per cent of this audience would be marred by pock marks. The decimation of cities and communities from smallpox had continued throughout the centuries. But for this discovery, the continued high death rate from smallpox in foreign countries would have made it impossible for the United States in 1926 to have anything like a population of one hundred and ten million.

In the light of this great discovery and boon to humanity, the proofs of which are positive and unassailable, is it not strange that prejudiced, benighted individuals and believers in cults like the antivivisectionists, the antivaccinationists, the chiropractors and the Christian scientists should presume to question the effectiveness of vaccination and inhumanly attempt by precept, by example, and by propaganda, to prevent its employment? Unfortunately, during the last few years in various parts of our country these forces for evil have succeeded in creating prejudice. Neglect of protective vaccination against smallpox has resulted in more or less alarming outbreaks of the disease. The state of Florida has just furnished and example of this kind[1]. Wherever states have been lax regarding vaccination of school children, smallpox has spread, and yet this disease is an example of contagious disease which we know can be prevented.

Development of the Germ Theory

Louis Pasteur, father of the conception that bacteria (germs) are the direct cause of many diseases, gave to the world the key to the causes of putrid and suppurative diseases. Then came a positive demonstration of a specific germ—Robert Koch's discovery of the bacillus of tuberculosis. Today tuberculosis is well under control.

Surgery adopted the principles first of antisepsis and later of asepsis. Few surgeons had ventured previously to perform major operations on the vital portions of the body, on account of the frightful mortality which

[1]In an editorial published in the American Medical Association Journal, June 6, 1926, it is recorded "that 163 persons are known to have died of smallpox in California during the first quarter of the year. The cases reported numbered nealy 2000. One hundred and thirty-six of these deaths occurred in one of the most enterprising cities of the world, Los Angeles. This heavy toll of human life is not attributable to any local impossibility of securing advantage of the triumphs of modern prevention of smallpox. It was not due to the incompetence of the medical profession. The real cause is to be found in the indifference or even active opposition engendered through the influx of antimedical forces. As truth is the best defender of the faith, no opportunity should be overlooked to make the records of history tell their story to those who may waver in their acceptance of the help of modern medicine or even sneer at its claims. In the Jubilee Volume of the American Public Health Association, Chapin (A Half Century of Public Health, Am. Pub. Health A., 1921, p. 145) significantly records that during the last 50 years only one school child in Providence, R. I., has had smallpox, and that was one of the exceedingly small number of children who, for one reason or another, escaped vaccination. If vaccination were compulsory for all school children, the same record would prevail in all the schools throughout the United States."

resulted from suppuration. Joseph Lister, in 1878, showed how bacterial infection of wounds may be prevented by applying the principles of antisepsis in surgical operations. This momentous discovery revolutionized surgery and greatly lowered the mortality from surgical operations. Today surgeons, applying aseptic principles, do not hesitate to operate on any portion of the body, even the human heart.

In the 50 years since the discoveries that have just been mentioned, chemistry in medicine has made rapid strides, particularly in its relations to studies in physiology and metabolism. Chemical estimation of blood urea, proteins and gastro-intestinal contents and laboratory studies in cardiorenal and blood efficiency enable the physician to estimate the conditions of important organs of the body. Meanwhile, physics, pathology, bacteriology, sanitation and preventive medicine have been developed to a high degree. The discovery of antitoxin for diphtheria has proved a boon to the child. The various animal carriers of disease have been determined and classified.

Further Rapid Strides in Recent Years

The work of Gorgas in making possible the building of the Panama Canal by the application of our knowledge of insect transmission of yellow fever and malaria, and the employment of anti-typhoid and paratyphoid vaccine, together with sanitation of water and food supplies, have practically annihilated these diseases. In the Spanish-American War the typhoid death rate of American troops amounted approximately to 12 per cent. In the World War as a result of the universal anti-typhoid vaccination the death rate from typhoid amounted to less than one-half of one per cent.

The future may bring about the complete eradication of diphtheria, scarlet fever, whooping cough, and possibly all the eruption diseases; while yellow fever, typhus fever and all plagues are falling before the march of preventive medicine, based on bacteriologic discoveries.

The discoveries made on the virtues and the relation of light to rickets represent another real achievement in the advance of science. The toxin-antitoxin prevention of diphtheria has been definitely and positively proven. An intensive anti-diphtheria campaign carried on in the city of Auburn, N. Y., has been so successful that no deaths from diphtheria among those vaccinated have occurred in that city for the past two years. An anti-diphtheria campaign now going on in New York state carries the slogan "No diphtheria in New York state in 1930," and the State Commissioner of Health believes this to be possible. These are representative of the marvelous contributions which the physician has made to the march of human progress. Truly, neither the physician of the present nor the physician of the future need ever blush when contemplating his professional heritage.

We build on the experience of the past. The rapid strides in medical discoveries of the last two generations, together with the more practical employment of sanitation and preventive medicine, have already

effected great changes in the actual duties of the practicing physician. The daily round of our immediate predecessors was made up largely of the treatment of infectious and contagious diseases. The daybook of the family physician usually recorded visits to families for the treatment of measles, scarlet fever, diphtheria, typhoid fever, or malaria only. Formerly his medical education provided more for the treatment of disease than for its prevention.

National, state and municipal departments of health have already become powerful and controlling factors in preventive medicine, sanitation and hygiene. Health and welfare organizations, both national and local, have also invaded the field of preventive medicine. Great industrial organizations have introduced various health measures, believing it to be for their own best interests from an economical viewpoint, as well as for the benefit of the hundreds of thousands of employees. Pay clinics and group practice have made some slight imprint on the modes of practice today. Furthermore, the publicity work of all these agencies together with that of the American Medical Association, has gradually created a demand from the public for more information regarding personal health. The outcome of these measures has led to confusion regarding not only the present but also the future of medical practice.

The Health Trusteeship of the Modern Physician

During the past few years many of our leaders of medical thought, and particularly those clothed with the responsibility of outlining medical policies, have given serious consideration to the subject of public health education. There has been an awakening of the medical conscience as to the trusteeship of physicians as promoters of individual and community health. The pioneers have become alive to the fact that physicans only are qualified by heritage, by education and by experience to propound to the public the basic principles of health preservation, and the protection of life which is afforded by sanitation and the scientific application of all the phases of preventive medicine.

It sounds like a simple thing to do, but the reticence of medical men and the innate fear of publicity, the supposed restriction of ethical limitations, have tended to prevent these great educators from fully covering this proper field for a physician's activity.

The editors of great daily newspapers and magazines, the newspaper syndicates, and university and public school teachers are calling on the medical profession as never before to enter this field. They freely admit that health knowledge is a valuable commodity for which the people are willing to pay. This tendency is leading great newspapers, magazines and newspaper syndicates to realize that the public must be given the true facts regarding individual and community health. This further knowledge in turn is showing its influence by the gradual elimination from these great publications of the publicity which is sought by nostrums, cults, quackery, and other menaces to the public health. This naturally engenders a desire to purvey to their readers

only well-founded information regarding health matters. In the quest for such information they have learned that organized medicine is the only possible source from which correct information can be obtained. Furthermore, they properly contend that the educated physician must remain the source from whence it must come.

The *Saturday Evening Post* recently said that the "science of medicine, as far as laymen are concerned, is the most tongue-tied of all the learned professions." It called attention to the difficulties surrounding the scientific vocabulary of medicine as a means of teaching the public, and the shrinking attitude of the medical profession toward the lay press. Then followed the statement: "The enlightened physician has a great body of news of the highest importance to communicate to non-medical readers. When the medical profession becomes more fully awake to its responsibilities in this field, it is to be hoped that it will perceive the gravity and importance of its problem and attack it in force over a nation-wide front. Some national body, such as the American Medical Association, which has made such a good start along these lines, ought to take up the matter in a big way and work out a comprehensive program which would unify the efforts of the agencies already in the field, and cover the lay press of the whole country."

These friendly criticisms are perhaps well deserved. Our answer is that organized medicine has already entered this field. Considerable progress has been made in overcoming the reticence of medical men when called on to prepare health talks for schools and other audiences, for the radio, or to write articles for lay publications. If the radio had been available during the ministry of the Great Physician, He would have made it hum and thrill while it adroitly advertised His message. The radio likewise should serve the physician and be made by him to illuminate his gospel of health.

Physicians Teach Their Patients Principles of Health

I am proud to state with the greatest emphasis that the medical profession is well able to supply the brains for any and all nation-wide efforts for individual and community health education that the great business publications and the advertising world will undertake to promulgate and finance. This statement is the challenge of organized medicine! Today every licensed physician is being urged to prepare himself to teach his own patients the principles of health. Organized medicine has approved this measure. The house of delegates of the American Medical Association is on record as favoring every measure of public health education, including periodical medical examinations of the supposedly healthy.

Two years ago the board of trustees of the American Medical Association established *Hygeia*, a monthly public health journal, published distinctly for the lay public. *Hygeia*, devoted to individual and community health, has already qualified as the leading public health journal of America. Its columns contain information of the utmost value cover-

ing the whole field of medicine. The lay reader is told what to do and what not to do regarding health affairs, and every issue contains exposures of vicious nostrums and quackery. Clip sheets from every issue of *Hygeia* are furnished to hundreds of newspapers, so that already millions of our people are receiving this direct and valuable health service.

Furthermore, many of our great newspaper syndicates, great daily newspapers and reputable magazines refuse to publish any material pertaining to health except on reliable medical approval. The propaganda of quackery and vicious nostrum advertising are refused by these great publications in the interest of the public health. Indeed, in health matters, many of these publications rely constantly on the advice received from the American Medical Association headquarters. Radio programs of instruction in public health are offered by state and county medical societies.

Periodical Examination of the Apparently Healthy

Periodical examination of the apparently healthy is one of our projects which promises well for the future as an important agency for preservation of individual good health. Our Association is pledged to this measure, and state and county societies are rapidly becoming alive to its importance. Sufficient progress has already been made to demonstrate the fact that many of the illnesses of life are unknown to the patient during the incipient stages. This procedure enables one's physician to detect the first danger signal of any form of disease and to cope with it during its incipient and curable stage.

Physicians believe that whenever this great task shall have been accomplished in any nation, state or community, the average life of the inhabitants involved will be increased at least another seven years over the 20 that have been gained in the last half century.

In his role of personal health administrator the family physician's chief duty and his chief service will be to keep his patients well. Evidently, such services can be made possible only by maintaining intimate, clinical information, well recorded, regarding every man, woman, and child who seeks his service. And every man, woman, and child in every community should have his chart of health recorded in the files of his family physician. Too many of our inhabitants worry through life with only fairly good health and while they accomplish their daily duties, these fairly well persons may never know the exuberance and happiness of perfect health. Hence, one goal of the future practitioner of medicine will be the attainment and maintenance of exuberant health, which is the inherent right of every person. A higher average of overflowing good health means a higher average of happiness, comfort, usefulness, and economic value of the individual. The superman will never materialize without superhealth.

The proposed plan is creating a new contact between patient and physician. Physicians are giving a new significance to the word "pa-

tient," for in the new order of things both the sick and the well must and will be recorded in the lists of their physicians. The family physician should remain the foundation of medical service. His field is great and his opportunity for service boundless. Such service will go far to limit the advent of insurance methods of treatment, state systems, industrial groups, and other socialized principles which the true psychologists and humanists in medicine look on as mechanistic, soulless, and bureaucratic, at the same time discounting the spirit of individual relationship characterized by the better way. Furthermore, such service upon the part of the family physician who is properly prepared educationally, morally, psychologically, and sociologically, will enable him to prevent the unfortunate adoption of so-called state medicine, and to make the painstaking intimate personal contact with his individual patient so effective, outstanding and unassailable that no other form of medical practice will be permitted by the layman himself.

This scheme would need most careful and painstaking card indexing of health records upon the part of the family physician, and these records should be passed down from generation to generation.

Whenever the proposed foregoing plan shall be realized by placing in charge of the family physician all matters of personal and family health records, the expense of which might well largely come from the patient, this form of health activity on the part of corporations and other institutions might well terminate.

Knowledge of the great principles involved in the preservation of health is gradually leading legislators to accept the responsibility of protecting every community from the blandishments of unlicensed quackery, the enmity of antimedical propagandists, and the evils of nostrum medication. Public officials are already beginning to appreciate their responsibility regarding public health measures.

A Governor Urges Conservation of Public Health

In his recent message to the New York state legislature, Hon. Alfred E. Smith, governor of New York, proclaimed that "one of the great functions of government is the preservation of public health." He further said, "I renew my recommendations of a year ago that careful consideration be given to the protection of the people of the state from unlicensed and unqualified persons practicing medicine. The cooperation of the medical profession is an essential factor in the protection of the public health, as well as in the care of the sick. A very large part of modern public health is urging people to get the advice of their physicians before serious and perhaps incurable conditions have developed. Such effort comes to naught if unqualified persons are allowed to hold themselves out as physicians. The subject is a difficult one, but the state of New York should take the lead in establishing high standards of medical practice, and providing a practicable plan for their enforcement. It is a matter of justice to qualified physicians and of protection to the public."

Let us hope that all state governors and legislators will emulate the fine example of humanitarianism set by the governor of the Empire State.

I now come to the question of financing this great project, for it never can meet its full fruition without appropriations of large sums of money, particularly for public health education. Sufficient progress has already been made to prove the necessity for the appropriation of millions annually, especially for the most important program of personal and public health education, and the ratio of progress in the promulgation of this great scheme will depend not only upon the devotion of the medical profession, the good will of industrial and various health organizations, but additional immense sums must be provided from sources yet unknown in order to accomplish this great undertaking.

Millions of dollars are appropriated annually for the care of the physical derelicts of our nation. Asylums, hospitals and all other forms of eleemosynary institutions dot the landscape of every nation and people. Inmates of these institutions suffer largely from the results of preventable diseases, and suffer resultant untold agonies and tortures. I only predict that under a proper scheme of personal and community health education the millions now needed for salvaging humanity may be turned into channels of prevention which in turn will produce infinitely larger returns in health, happiness, and longevity. Let us hope that in the near future some individual or combination of individuals will establish a vast foundation for the single purpose of financing our great scheme of personal and community health education and health preservation.

Conclusions

1. Public health education is the outstanding need of the hour. The gospel of personal and community health is complex. It should be promulgated by health departments and agencies, by lectures, radio and film; but it will never reach its highest efficiency until it includes a maximum of direct personal instruction by properly qualified family physicians.

2. The patient of the future, in view of his perfected health education, may be expected to derive from it a wise judgment which will lead him to seek the continued advice and counsel of his personal physician. Furthermore, in view of our perfected system of individual and community health education, cults and other menaces to public health, all of which are founded on theories, for the most part baseless and futile, will gradually disappear before the rising sun of enlightened public opinion.

3. The family physician of the future by training, by experience, and by expert knowledge of health conservation will in turn possess a potential power which will qualify him to control and direct the health problems of man. Health education and conservation are services of value even greater to the patient than the sums paid for helping the body to repair the ravages of disease.

4. The maintenance of individual practice in the person of the general practitioner, or family physician, is of the utmost importance for the survival and continuation of the family home as the foundation of the nation.

5. "The laborer is worthy of his hire." The National Safety Council and other great organizations should never be unmindful that all their efforts to promote health are utterly dependent upon the services of the educated physician. These physicians expend at least eight of the best years of their lives in preparation for their high calling. This process of education necessarily provides men of culture. Their services should never be exploited, nor should their remuneration be insufficient to enable them to live in like circumstances with the higher officers of the corporations which they represent.

Carry the Vision of a Healthier, Happier World

The family physicians of all communities should likewise receive sufficient financial support to enable them to enjoy for themselves and their families at least the average privileges and advantages of leading citizens of their respective communities. It is true that the material interests of the physician must always remain a secondary consideration and that his emoluments may never be reckoned in terms of finance, but in no sense should his devotion to services in the interests of his fellowmen become an excuse for financially embarrassing him in his personal and family life.

6. In the matter of public health education full appreciation should be recorded for the extensive programs which have been inaugurated by the various industrial organizations and other health agencies.

Finally: let us hope that we shall all become fully conscious of the vastness of the causes which we must advocate and the usefulness of the deeds we must accomplish; that we may have wisdom, poise and capacity of understanding that will breed an extraodinary confidence and esteem; that we may have a vision of a healthier, happier world which will blossom into unheard-of activity. May we hope that to this end we will be constrained to dedicate ourselves through service to all that will advance, maintain, and increase the sum of human happiness.

Every man who looks toward the future is charged with being a dreamer. But the verdict of history has always been that the onward march of science, religion, and civilization has been led by dreamers. I have ventured modestly to tell my dream, knowing that it will find a thousand responsive chords in the hearts of my fellow workers whose ambition and passion are to serve our fellowmen.

CHAIRMAN SCHRAM: The next speaker of the afternoon needs no introduction to this audience. Dr. Mock, who is going to talk to us on the topic "Human Salvage," represents the American Conference on Hospital Service.

HUMAN CONSERVATION AND HUMAN SALVAGE

Harry E. Mock, Senior Surgeon, St. Luke's Hospital, Chicago; Assistant Professor of Surgery, Northwestern University Medical School; Representative of the American Conference on Hospital Service to the National Safety Council

This is the fourth time I have had the honor of addressing one of the sections of the National Safety Council. I have followed the growth of this wonderful organization since the days of its inception, and I am exceedingly proud to be classed as an associate, if not an actual member.

I have always recognized the great service the National Safety Council is rendering to humanity, a service so closely allied to medical prevention that, with others, I have felt deeply that there should be a closer cooperation and working alliance between this great lay organization and the medical profession—two groups striving for the same purposes—viz.—the prevention of disability or death due to accident or disease.

In both groups there is a common ideal, an ideal shared by the safety engineer in the field working in the smallest industry and by the general practitioner of medicine caring for the sick and disabled in his daily visits from cottage to cottage. Both vision the day when our nation shall change from one prodigal of human life to a nation exerting every effort to conserve human life and human energy.

In the medical profession there are a great many different organizations all striving for better preventive measures and better service to the sick and disabled. Seven years ago it was felt that a working alliance between these various groups would further this end, chiefly by a better knowledge of each other's purposes, and therefore less duplication of efforts. As a result of the deliberations of leaders of various medical societies, the American Conference on Hospital Service was organized. This conference is composed of representatives of 16 of the leading medical organizations of the country.

Its efforts thus far have been largely devoted to the importance of hospital service to the sick and disabled. The conference now recognizes that it must extend its efforts into other fields of endeavor, especially the field of prevention which precedes that of hospital service and which should materially reduce the number of individuals needing hospital service; and secondly, the field of human salvage, which follows that of hospital service, and which involves the construction and elaboration of methods giving more complete functional restoration and rehabilitation to the permanently disabled. Thus, it was perfectly natural for the American Conference on Hospital Service, entering upon this broader program, to seek a better understanding and closer affiliation with the National Safety Council, the greatest organization for prevention in the lay world.

Today the participation of the American Conference on Hospital Service in this program and the welcoming of that participation by the National Safety Council, is prophetic of even greater efforts and greater results in the conservation of human life and limb.

There has been a gradual change of styles in sickness, just as there has been a change of styles in modes of dress, amusements, living conditions, etc. Not more than three decades ago typhoid fever and tuberculosis were the great ravagers of our industrial army. Typhoid fever in the majority of the American cities is almost eliminated and tuberculosis is rapidly being conquered. Twenty years ago a whole ward in St. Luke's Hospital in Chicago was filled with typhoid fever cases, whereas during the last year only three cases of this disease have been treated in this large hospital. Similarly, malaria, yellow fever, the plague and other scourges of humanity have been stamped out. There are many diseases still unconquered and on which the best brains of the medical profession are focused, with a view of prevention.

In spite of these great monuments to the preventive efforts of the medical profession, the doctor is not suffering for work. Styles have changed. Today our hospital wards are filled with victims of our industrial life, the victims of our craze for rapid transportation, the victims of the rapid pace at which the American people are today living. The doctor alone can not conquer the present day causes of human disabilities. He must turn for help and collaboration to both industry and labor, to the safety engineers, to the educators and to the churches. Only by firmly re-establishing the principle of "I am my brother's keeper" can the present enormous toll of human life be eliminated.

Credit is Given for Elimination of Accidents

Already great advances have been made in the present day causes of human disabilities. The National Safety Council deserves great credit in the elimination of many accidents. The medical profession has helped solve many of the causes of occupational disease, and has assisted in the elimination of some of these. The most notable advances have been made in certain large industries where careful cooperation between the plant physicians and the safety engineers has resulted in marked reductions in accidents and disease. But the ground has only been raked and fertilized. Greater results must follow greater cooperation of all forces concerned.

The whole question of human conservation involves other considerations than that of prevention alone. In spite of all our preventive efforts and of all our present day medical and surgical skill, there are over a million individuals annually being cast upon the scrap heap and labeled "Permanently disabled." It is upon this group that I desire to focus your attention in this paper on "Human Salvage."

We have developed great hospitals in every community of any size with highly specialized and carefully selected staffs of physicians and surgeons. The sick and injured are skillfully treated until the disease is arrested or the broken body repaired. Sooner or later these cases are discharged to make room for other acute cases. The great majority of these patients return to homes where convalescence can progress normally and eventually they return to their former employment.

But there is a certain percentage of these who, under our present system of wasteful, disconnected efforts, are bound to become derelicts. They are discharged from the hospital as permanently disabled, unfit to return to their former employment and unable to secure employment elsewhere. Sometimes this is due to the fact that they can not pass the physical examination of an applicant for work; sometimes they are rebuffed because they are cripples and only the able-bodied need aply; sometimes their mental attitude has become dwarfed, making them unsuitable for employment. At other times they accept odd jobs, floating from one job to another, constantly sinking to a lower level. Discouragement and mental anguish are now added to their physical disabilities. Finally, in desparation children are taken from school and put to work in an effort to help support the family; the wife must leave the home and go to work or the family becomes dependent upon the associated charities. Thus the effect of a single accident may wreck a whole family—make a loafer out of a man who with proper training and placement could be a producer, rob the home of a mother, deprive the children of equal opportunity for advancement, and lower to a certain extent the man-power of the nation.

The Patient is Often Handicapped in Convalescence

Other cases are discharged from the hospital who must return to homes or environment absolutely unfit for proper convalescence.

The efforts made in the hospital toward curing these cases are soon nullified and shortly they are back in the hospital in worse condition than when first discharged. This is especially true of tuberculosis and of heart disease. There is a period of hospitalization with the disease arrested, a period of rest at home which is often entirely too short because of the necessity of supporting the family, a period of return to work at a job unsuitable for one in their physical condition, a break down and return to the hospital. This wasteful, unsupervised handling of these cases after they leave the environs of the hospital until their re-admittance, not only once but often six, eight or a dozen times, again leads to the road of dependency—dependency of the patient on the county institution and of the family on the charities.

It is frequently stated that 75 per cent of the dependency upon the associated charities is due to disability from sickness and accident.

We have a great prevention program, we have excellent hospital facilities for the acutely ill and injured and we have bountifully supported charities for the dependents. But we have no well organized, unified plan to reduce the number of dependents. Think of these tens of thousands of permanently disabled individuals who have ceased to produce and provide as being thrown upon the human scrap heap. Then think of the great number of ways in which many of these could be reclaimed, retrained and replaced at remunerative employment and you have the very essence of "Human Salvage."

The rehabilitation of the disabled involves all necessary means to

render a disabled person fit to engage in a remunerative occupation, or to return to his or her proper place in society.

The disability may be either a physical or mental defect the result of disease, accident or congenital condition, but, no matter what the handicap, rehabilitation endeavors to restore the person to a position of usefulness and independence.

Rehabilitation is not a charity, but the fulfillment of an obligation of society to its handicapped citizens—an obligation based on medical, educational, industrial, social and humanitarian considerations. Such a program, applied not necessarily to each handicapped individual, but to the whole plan of rehabilitation includes the following lines of endeavor:

(a) Prevention of disabilities.
(b) Adequate medical, surgical, hospital and convalescent care.
(c) Vocational training of the disabled.
(d) Placement at suitable occupations.
(e) Supervision—medical, economic and social, to see that rehabilitation is completed and so remains.
(f) A further step to make rehabilitation possible includes the education of the public and the medical profession.

Thus the work requires the closest co-ordination of effort between medical men, educators, industry (employers and labor) and the social and economic agencies of every community.

A Program For Modern Human Salvage

This is not a new endeavor, for a great many agencies have been attacking some portion of this work for many years. But the innovation here proposed is the co-ordination of all these efforts into a complete, well rounded program for the sole purpose of reducing dependency due to physical and mental disabilities, and substituting therefor opportunities for every handicapped person to become a useful member of society.

The program of human salvage can be divided into three stages, each dovetailing with the other.

(a) The prevention stage.
(b) The hospital and medical and surgical stage.
(c) The rehabilitation stage.

In this atmosphere of prevention where innumerable plans and suggestions are being offered for the elimination of accidents, there is no need of my dwelling upon the first stage. In large industries we have had the best examples of accident prevention, the result of cooperation between the medical departments and the safety departments. If an accident or an occupational disease case presented itself to the plant physician, not only was it his duty to treat the case medically or surgically, but it also was his duty to report the case to the safety department and secure all the information from the injured individual which might help the safety department in preventing a similar accident to a fellow employee. Consider, as an analogous situation, the community as a large industry and consider every physician in that community as working for this large

industry. Further, consider that community as well organized as our best industries are organized for the prevention of accidents and disease. In such a community, whenever an accident or occupational disease was admitted to a hospital or to a physician's care, the same would then be immediately reported to the safety or prevention group of that community. There is no reason why the methods which have been so successful in certain large industries should not be applied to every community as a whole, for the purpose of preventing the almost daily recurrence of similar accidents.

The second stage in this human salvage program represents the adequate hospital, medical and surgical care of all disabled. The majority of our communities have developed hospitals ever ready to receive the sick or injured and to furnish them the necessary medical or surgical treatment which will carry them through to the stage of convalescence compatible with their return to their home. This hospital service has been markedly improved during the last decade, thanks to the group efforts of the American College of Surgeons, the American Hospital Association, the American Nurses' Association, the American Medical Association and other groups, most of them represented in the American Conference on Hospital Service.

A Greater Service to the Disabled Contemplated

This idea of human salvage, however, involves a greater service to the disabled than the majority of hospitals today have considered within their scope of work. The hospital must provide departments of physiotherapy and occupational therapy capable of assisting in the functional restoration of the injured individual as a definite part of his medical and surgical treatment. Physicians must be trained that the immediate saving of the life of the patient is not his sole duty but he must see that the individual is functionally restored as far as is humanly possible. Many patients are far from functionally restored and are far from being able to return to work when discharged from the hospital. Provisions must be made for their continued treatment until this goal of ultimate restoration is secured. Many of these are forced to leave the hospitals for homes absolutely unfit for proper convalescent care. For these an adequate place of convalescence must be provided. Therefore the vision of hospitals and hospital trustees must be extended and must include that development of a proper convalescent center in every community.

Such a convalescent center would provide continued medical supervision of the patients after their discharge from the hospital. A certain small percentage of these cases would develop conditions that necessitated their return to the hospital for further treatment. But because of this daily medical supervision they would be returned earlier than if left to their own devices. The great majority, however, would be carried safely through their convalescent period.

In such a center, properly located, sunlight and skylight, recreation and exercise, physiotherapy and a graduated amount of work would fur-

nish the modus operandi of treatment, leading these patients back to full health, to a more complete functional restoration of their injured parts and to a sense of fitness for re-employment. Many cases who, because of their disability, could not return to their old employment could here receive vocational training for new employment. In these centers many of the problems of the State Industrial Commission, the compensation boards, could be solved. At present when a man is classed as a permanently disabled individual and is awarded compensation or a pension, he must remain a useless dependent citizen in order to continue to receive this compensation. But the purpose of this center would be to remove the stigmata of permanent disability, to refit the individual for an earning power greater than his compensation award and make of him a useful independent citizen.

A Central Rehabilitation Agency in Every Community

In every community there should be a central rehabilitation agency to carry out the third step in this program. This agency should be in close touch with every hospital, dispensary, convalescent center, compensation boards, industry, employment agencies and the charities. Its work should be to register every permanent disability case; to see that all such cases received proper medical, surgical and hospital care until functionally restored as far as was humanly possible; to secure proper retraining for work when this was necessary and finally to secure suitable employment for every handicapped individual.

This is not the dream of an idealist or sentimentalist. Abundant proof of the practicability of such a program has been furnished by many organizations, only a few of which time will permit mentioning here, as follows:

The large clothing industry, developed by the Jewish Aid in New York for the discharged tuberculous patients, has become self-supporting, and has removed thousands of cases from the lists of the Jewish Charities and made them happy, self-supporting individuals.

The workshop established two years ago in Chicago by the Jewish Aid has furnished employment to almost 1,000 disabled Jews, and has saved the Jewish Charities large sums which would have been given outright to these people. The Service League for the Handicapped in Chicago for a period of almost three years found hundreds of disabled individuals, furnished the medical and surgical service necessary to reduce their disabilities and to refit them to carry on, trained many cases in useful lines of work and secured employment for a large number of handicapped persons. The League maintained a little workshop in rooms furnished by the Board of Education and here many who could not work a full day or who were not physically fit to compete with their fellows in regular industry were given employment—individuals who would otherwise have been dependent upon the charities.

The Chicago Association for the Shut-Ins, composed of a group of ladies who have found many permanently disabled persons shut in their homes

unable to go out and seek employment, have taught these people certain lines of work, have furnished them material and have sold their products; this organization has proven that handicaps can be retrained and can be made self-supporting.

In several of our large cities, medical men have organized Associations for the Study and Prevention of Cardiac Disease. These groups are daily demonstrating the value of medical supervision plus selected occupations as the means of reducing dependency due to heart disease. The Spaulding School for Crippled Children in Chicago furnishes the best example of co-ordination of effort between medicine and surgery, convalescent care, education and, finally, placement of these handicapped children in useful walks of life. Any program for crippled and disabled adults copied after the work of this school would almost abolish dependency among our people. Several states have developed fair rehabilitation programs for disabled employees. The first state to pass such an act was New Jersey and this state has, in my judgment, surpassed all others in conserving their man power and in reducing human wastage.

The development of hospitals in almost every community of any size in the United States for the succor of the sick and injured has been one of the greatest humanitarian attainments of our time. It has depended to a large extent upon the generosity of philanthropists and upon donations from the state and community and from religious bodies and other groups to finance such a development. Several of us here represent this great hospital organization.

The development of this National Safety Council with all of its ramifications in the field of prevention and of industrial health has been another one of the greatest humanitarian attainments of our time. It has depended to a large extent upon the generosity of industrial corporations to finance its development. With the field of prevention and the field of hospital, medical and surgical care so well organized it behooves us to co-ordinate our efforts and to seek financial backing from these same sources to the end that we may accomplish "Human Salvage" as another of the greatest humanitarian attainments of our time. Every able-bodied man with a drop of the milk of human kindness in his heart, with a desire of service to mankind in his soul should respond to the unspoken appeal of the disabled in our midst:

"Once more to be useful—to see the pity in the eyes of my friends replaced by commendation—to work, produce, provide—seeking no favors and given none—a man among men in spite of this physical handicap."

CHAIRMAN SCHRAM: Dr. Mock's paper will be discussed by Dr. John M. Dodson, Secretary of Public Health and Instruction, American Medical Association, Chicago.

DISCUSSION OF DR. MOCK'S PAPER BY DR. JOHN M. DODSON

I esteem it a real privilege to appear before you as the second of each of the gentlemen who have preceded me. I am glad indeed to second

Dr. Phillips, the distinguished president of the great American Medical Association, in his pledge of cooperation in this great safety first movement.

As chairman of the directing agency of the public health instruction, I am especially interested in the medical needs, the health education, of the public. I am glad to second what Dr. Mock has said in regard to this work. The American Conference has had a great deal to do with the initiation of this work and in building it up and I believe it is destined to be a very useful organization.

I want to approve Dr. Phillips' remarks about the family doctor. You hear a great deal these days about the passing of the family doctor, about medicine having become so specialized that proper service can be had only at the hands of a large group of trained men assisted by nurses and laboratories, so that the family doctor is no longer needed.

I am reminded in this connection of a little incident that happened 15 or 20 years ago when specializing had got pretty much along on its way. This happened at the annual banquet of the medical school from which I graduated. Dr. B. W. Murphy, of St. Paul, now deceased, was called on to speak to the old graduates and he contrasted his student days with those which then obtained. He referred to the long horseback rides to school and he contrasted that with the swift night rides over railroads now. He told of the crude buildings, the crude equipment, and how the practice of medicine had changed so that everything had become specialties: there was a specialist for the eye, a specialist for the ear, nose and throat; another for the legs, and so on, until there wasn't much left for the family doctors but a little place around the navel.

The "Naval Surgeon" Gave Him an Awful Scare

"Why," he said, "not long ago I had a terrible scare. I was down at Washington to a meeting and I saw a man wearing a button in his lapel and I asked him what it represented. 'Sir,' he said, 'I am a naval surgeon.' I found out afterward that he belonged to one of the ships but for the moment it gave me an awful shock!"

Before speaking on Dr. Mock's paper more specifically, I should like to mention two or three of the accidents which are not remediable as a rule but which we can very readily prevent and to which we should give particular attention. One of the things that has impressed me is the general use of lye, so commonly used about the households and carelessly left where young children can get at it.

Dr. Chevalier-Jackson spoke of this the other day; he has been instrumental in getting the manufacturers to label their cans of lye distinctively, and he has helped to secure some helpful legislation in the way of proper labeling of lye and other substances. It should be said, however, that some of the smaller dealers who handle this material have not been friendly to that movement. I am sure that the members of this National Safety Council everywhere would condemn any such attitude as inhuman.

Fourth of July celebrations are still marked by accidents which can be prevented. For many years the *Journal* assisted in the movement to reduce these accidents and the public press has made an effort to secure a sane celebration on the Fourth, but during three or four years there seems to have been a relaxation on the part of some of these agencies so that this last year and the year before the numbers of accidents and deaths on the Fourth were appalling and not at all creditable to a safety-first nation. I hope you will all join heartily in an effort to suppress this danger.

The next is the serious results of wounds, especially of slight wounds. I should like to make a suggestion here, that all wounds be treated promptly. A neglected wound becomes contaminated from contact with other things and presently serious results are under way. Dr. Mock could tell you, I am sure, a very pleasing story of one of the most striking things in his experience, how he diminished the tremendous loss of time due to hand wounds in a great industrial establishment where he built up a medical department. He has done a great deal toward securing uniform safety-first packets in railroad and industrial work.

Young School Children Trained in First Aid

There is the pocket-size safety-first packet which can be carried anywhere just as conveniently as a lead pencil. I should like to see the children in our schools trained in first aid methods before they leave the grammar schools and educated to carry with them everywhere one of these little packets. They contain a little dressing and are no bigger than a good sized envelope.

In the matter of rehabilitation I can do little more than heartily endorse what Dr. Mock has said of these pitiful cases of men who have been incapacitated for life. The provisions we have so far made for this work have been utterly inadequate. I should like to call attention again to the relations of the family physician to this matter. Many of the smaller communities are not equipped to do these operations. Here is where the family doctor must become active as he never has been before and as Dr. Phillips has emphasized, the family doctor is going to be a larger factor in community life than ever before because his possibilities for usefulness have been so greatly enlarged. It has become his duty to know if his patient needs an oculist and to know the best oculist to whom to send him. It is his duty to know many other specialists, and what are the institutions best suited to the needs of his patients. In this way he can render a larger service. I need not say that he should be thoroughly familiar with the laws regulating public health.

There is coming a change in the attitude of public officials about the medical profession generally; they are seeing their mistakes and realizing their narrow viewpoint. The most encouraging sign of this can be seen in going among the children in our schools. I have had an oppor-

tunity to become rather familiar with this because for 15 years I have been a member of a joint committee on health problems, national as well as local, and I can say to you that within a decade at the outside, the educational world, in reference to health and preventive medicine, has revolutionized its attitude.

Up to about 10 years ago the school curriculum was almost antagonistic to health hygiene, physiology, the whole group of subjects; what physiology was taught was built up around rather absurd notions. Today, wherever you meet a great group of educators, the one thing you will hear is that health is the fundamental in the whole school curriculum. If we don't train our children for health and in health habits we can't expect the best progress. As the superintendent of schools in Pittsburgh has said about Heart, Head, Hand and Health: "Give me education for health and I care not who does the rest." That is the most significant thing about it; it is bearing fruit.

The New Generation's Attitude Toward Health

Two years ago, *Hygeia*, magazine of health, offered prizes to the high school children of this country for posters on health topics and they received the most amazing number of health posters I ever saw. I wish you could have seen them. We have been using them for cover pages for *Hygeia* for two years. It was a most amazing demonstration of the fact that the children are beginning to think in terms of health; they are thinking seriously, logically of building their bodies into more effective machinery for the healthy life.

I predict that this generation of young people who are being prepared to take your places for the next 25 or 30 years, is going to have a totally different attitude to the matter of health and all that pertains to it. They are educated to cooperation, intelligently sustained cooperation, and if they maintain that with the health officers and the physicians we shall reach ideal conditions.

Another movement that needs especial commendation and which I should like to call your attention to, is the work of the American Parent Teachers' Association, a group of over a million teachers. They have been carrying on a campaign for the examination of the pre-school child, to correct his habits and defects.

All these things have a very direct relation to safety first, and I am sure you will be interested in the fact that the great American Medical Association, representing 90,000 doctors, united in state and county, pledges you its hearty support.

CHAIRMAN SCHRAM: The next speaker this afternoon is Dr. G. H. Van Emburgh, Jr., Medical Director, Clark Thread Company, Newark, New Jersey, who will talk to us on the Fundamental Requirements for Successful Industrial Medical Work.

FUNDAMENTALS OF SUCCESSFUL INDUSTRIAL MEDICAL WORK

G. H. Van Emburgh, Jr., B. S., M. D., Medical Director, The Clark Thread Company, Newark, New Jersey

Doctors, the world over, are beginning to realize that the key-note of medical practice for the future is prevention. Those physicians who are working in industry recognize this fact most keenly, and are daily applying the principles of prevention to all of their work. For it is their duty to protect the employer and employee by preventing sickness and accidents, infections, deformities and permanent disabilities, high compensation awards, excessive labor turnover and dissatisfaction with work, due to physical unfitness. In fact, they are concerned with the prevention of all mental and physical states in the employee, which might lead to inefficiency and carelessness. And they are equally concerned if the management is indifferent to or lacks a sympathetic understanding of the worker's problems, and if it is unwilling to improve existing unsafe or unsanitary conditions.

The industrial doctor fills a position of trust and unique responsibility in the company organization. If he makes the most of his opportunities, his will become one of the most strategic positions for interpreting the wishes and desires of both management and worker, and by his knowledge and advice he will often be able to influence their actions into channels which are mutually satisfactory and benefiting.

Whether or not a medical department is a success depends entirely upon the physician in charge. The successful industrial physician must be well-versed in the most modern methods of medicine and surgery, and, in addition, he must have a thorough knowledge of public health problems. He must use the same tact in approach, and the same care and thoroughness of diagnosis and treatment of the individuals of his large group that he would use in private practice.

Our employees do not want to be treated superficially and hastily. They resent any attempt to treat them as a mass. And I would advise any industrial doctor, who wants to avoid utter failure, not to strive too hard to establish a speed record for the number of cases he can pass through the hospital per hour. It is a fatal error to make a snap diagnosis in case after case, and then treat all of them from a few stock remedies. Our employees compare notes and draw conclusions, sometimes correct, and at others incorrect. But it is these opinions that win or lose their confidence. And unless we have their absolute confidence it would be better to close up hospital and go home.

I recall the case of a patient whom I saw in the hospital recently. He had a bad carbuncle on the back of his neck. From his history, I learned that he was working in a plant which employed a physician. I asked him why he had not reported there for early treatment. His reply was illuminating: "Our doctor is a fine fellow, but he's got about a half a dozen different kinds of pills, and no matter what's the matter with

you, you get one of them. We never go to him for anything if we can possibly help it. We call him the 'Pill Doctor'." . It is evident that this doctor's department is a failure.

The industrial physician must learn all of the processes of manufacturing involved in his plant, and he must be thoroughly conversant with all special hazards involved. He must work in the front line trenches, in the factory as well as in the hospital. The doctor who is content to sit in his office and wait for patients to come to him for surgical dressings or simple conditions might better be replaced by a good nurse. His only value is the protection afforded the company by his medical degree.

Companies have come to realize that this type of doctor often does more harm than good. While his salary may be less than that of a competent man, he is far more costly in the end. It is men of this type who will look upon high accident rates without great concern. Infections will be prevalent, compensation claims will mount high, absenteeism will be excessive, and labor turnover great; but he will feel no alarm or concern—he is only the doctor and does not bother with these things.

Fortunately, many of the men who have been attracted to industry in recent years are men of judgment, broad vision, energy, and a keen desire to investigate the problems in their field: the stigma of industrial medical work is passing with the factory doctor. The physician in industry is being looked upon more and more as a specialist.

Industrial Medicine Is a Specialty

This, I believe, is as it should be. Industrial medicine is as much a specialty as any of the other branches of general medicine. It requires years of painstaking study and application to become a successful physician in industry. Medical schools are now beginning to add courses in industrial hygiene and offer opportunities for study in this field; and their instructors are men who have been drawn directly from the successful medical departments of some of our larger industries.

It is really within about the past 15 years that industrial medicine, as such, has come to be known. It was one of the forms of misnamed, but so-called "welfare work" to survive the post-war economies industry found necessary. It had little in common with many of the welfare activities carried on during the war. It is not, and can not, be construed to be an effort to advertise the plant, or to offer the workers something in lieu of an actual wage increase. Those forms of welfare activity are soon discovered by the workers, and fail utterly. Besides, workers do not like either charity or paternalism. If we use as an index the amount of use made of any of these opportunities by the workers and this, I believe, is the only correct index, we will soon see that our employees like to be left alone. As soon as we attempt to "mother them" they begin to drop out. They are reluctant to accept charity because of the comment it may cause among their fellow workers.

The medical department is not looked upon as either charity or an attempt to paternalize. It is an integral part of the plant, maintained for the mutual protection of the workers and employer. And if the department be properly organized, equipped and managed, both executives and workers will accept it as such.

The industrial physician is frequently called upon to play the role of interpreter between company and employee. If he be broad-visioned and have an intelligent understanding of both sides, his advice is worth a great deal. But he must not bias his opinion in favor of the company because he is a salaried employee, or he will forfeit the workers' confidence, and will misguide his superiors into trouble.

A medical department, in order to be a maximum success, must have the unqualified backing of the management. I believe the medical director should be directly responsible only to the higher company executives. To subordinate a physician in charge to the personnel director, employment manager, or a mill superintendent is very undesirable, and often is the cause of having a mediocre department, instead of a wide-awake, up-to-the-minute organization.

Maintenance of a Medical Department Economically Sound

While the maintenance of a medical department is a humanitarian effort, still it is economically sound. Mr. Howell Cheney in his address, "Why Industry Profits by Health Supervision," very ably pointed out the losses to both industry and labor from ill-health, and indicated how this might be influenced by health supervision. Dr. Schram has shown us that industry may add years to the useful working life of its employees as surely as an individual can increase his life span by carefully guarding his health.

But health supervision is only one of the duties of an efficient medical department. While much of the value of our work is difficult to measure in dollars, still we should be able to show a real saving, due to our efforts. No industrial doctor may feel himself above this need.

In fact, the needs and duties of the industrial doctor are many and varied, and to this end he must have the assistance of a specially trained corps.

I shall not attempt to describe the organization of a medical department here, as it differs in each case, according to the nature and size of the industry. Drs. Mock, Clark and others have very ably described in detail such organizations in their books. But there are some duties common to all. I should like to speak briefly of these, and add a few personal experiences.

Of course, one of the medical department's chief duties, (and many people think it is the only important one) is the treatment of mill injuries. During the past three years in our plant, this function has taken about 34 per cent of the time of our department, and has consumed 38 per cent of the cost of our department operation. Thus you can see it is an important function, but not by any means, the only one.

I wish to register a protest here against a habit I have often encountered, that of speaking of this type of treatment as "First Aid." It is no more first aid than the whole of winter is the first cold day. First aid is emergency treatment which is rendered the sick or injured to prevent death and to prevent the development of serious complications. When repeated treatments or treatment beyond the elemental emergency types are given, it is no longer first aid. Real intelligent surgical treatment can not be lightly, carelessly and wrongly referred to as first aid without danger of creating a wrong impression of the work done, and of lessening respect and confidence in the medical department.

I do not mean to minimize the importance of first aid, but it is only the first line trench of defense in traumatic emergencies.

The Doctor Can Get the Confidence of Workers

Another fact is sometimes wrongly understood. I have several times been asked, when showing the records of our work, how I can explain the increase in accidents that seems to follow the organization of a medical department, one of whose chief duties is to prevent accidents. It should not be thought that the organization of a medical department will lessen the number of accident cases reported. If it did, something would be radically wrong.

One of the most important duties of a medical department is to get the confidence of the workers, and educate them to the need of reporting at once all of their injuries, no matter how trivial. It is wise to reinforce this by a company rule. This will, of necessity, bring out a host of cases that would otherwise be neglected unless they became serious. This is exactly what we want to prevent. I have many times told our superintendents that it is not the total number of accidents which will be counted against their departments. It is the serious and preventable ones. This has done much good and in safety work it has not offered any excuse to hide minor accidents to better a departmental record. I would rather have a thousand minor cases than one serious one due to neglect. The only way to prevent serious complications is to get all of the superficial injuries under treatment at once.

Naturally, the harder we work in this direction, the greater will be the probability of having all cases reported. Our own record has been:

1921	3,007	accidents reported.
1922	3,901	" "
1923	3,856	" "
1924	4,188	" "
1925	3,261	" "

Of course, this takes the time of doctor and nurse, and uses surgical supplies in treating cases that many consider trivial and not worthy of care. But as we can not be sure where infection will strike, all cases must be reported in order to be safe. A man may neglect a hundred scratches, but develop severe blood-poisoning from the one hundred and first.

Infections are the dread scourge of the industrial physician. If they occur after treatment, no amount of explanation or camouflage can shift the responsibility from the medical department in the eyes of either worker or management. But these should be very few indeed. Infections developing as the result of failure to report for treatment are one of the greatest problems we have. By means of hard work, we have been able to lessen the number in our own plant, but we still have much to do:

1923	163
1924	93
1925	56
1st 9 mos. 1926	33

I do not believe in a division of the responsibility for the control of the industrially injured. It is a great mistake to send the injured worker to outside doctors or the public wards of a general hospital. The company surgeon should have outside hospital affiliations which will permit him to look after his company's injured from the time of the accident until they are returned to work. Of course, he will need assistance and consultation. But think of the beneficial effect on the injured worker not to be changing doctors, but to have the same doctor, and best of all, his, the company's doctor, caring for him.

This increases the confidence of the workers in their own medical department. Besides, it assures the company that its own best interests will be safeguarded. A physician doing much traumatic work is naturally better qualified to care for the mill injured than the ordinary doctor who may have only an occasional accident case.

The Functional and Economic Possibilities After Repair

The industrial surgeon must keep in mind, not only the anatomical result, but also the functional and economic possibilities after repair. Often the latter are of more importance than the former. The physical reconstruction and rehabilitation of our injured is of the utmost importance, and whenever possible, should be done under the guidance of the company's own medical department. This makes for unity in treatment, and will save much time and money otherwise spent in traveling to and from outside hospitals.

The prompt and proper treatment of accidents is important, but the prevention of accidents is even more important. And still, I have often heard doctors say, "I'm not interested in safety—that's the job of the engineers."

I do not believe this! The medical departmnet holds the key to safety's advancement in its records and the tabulation of the causes and types of accidents. Safety engineers must first know what type and cause of accident is most prevalent before they can take effective steps in preventive work. There should be the closest cooperation between the medical and safety departments. The doctor must be as interested in preventing accidents as he would be in preventing an outbreak of contagious disease. In fact, the health of the worker is so

closely related to accident prevention, that no line can be drawn at the end of one and the beginning of the other.

It is becoming a well-recognized fact that ill-health predisposes to accidents, because it distracts attention from work. The person with stomachache, headache, or pain in the back will not give the same keen constant attention to his work that a well person might. In these periods of distraction or laspes of attention, accidents are very likely to happen.

Besides, it is very often difficult to differentiate between accidents and disease. Many conditions developing during the eight working hours are classified as accidents, which, if they occurred during the other 16 hours of the day, would be called by something quite different.

Relief for Serious But Hidden Ailments Common

I recently saw a woman who claimed she had wrenched her back because she had experienced a pain when she attempted to pick up a spool of thread which had fallen from her machine. Examination showed her to have very bad teeth, and she also gave a history of previous attacks of lumbago. But this time she was sure it was a work-responsible condition.

Another woman claimed she was unable to work because of severe pain in her feet, legs and lower back, due to her work. Her job required the pushing of a very light foot pedal, while seated—no strain at all. But examination showed her to have third degree acquired flat feet.

Bodily disease, of which the victim is often unaware, is many times the exciting cause of accidents, and it is even more often the predisposing or contributing cause. I have seen many such cases.

Falls may often be the result of high blood pressure, heart trouble, kidney trouble, or indigestion. Fingers are many times caught in machines because of defective vision. I have seen some extremes of this in persons with only one eye; they lack bifocal vision, and are therefore not able to judge distance properly. Anaemia and constipation are two conditions which we frequently find that might well be suspected back of many of our accidents classified as careless. Late hours, worry over home troubles, rushing off to work without breakfast, and many similar conditions tend to a disturbed mental or physical state, and thereby make their victims more liable to accident.

I am much opposed to the rather prevalent tendency to classify the majority of accidents as due to carelessness. It obscures the issue and tends to block complete investigation. I believe some of the causes mentioned above really operate to cause many so-called careless actions. I recently saw a girl who had a finger torn off when it was caught in a moving part of her machine. She had worked at that machine seven years, and had never before had a serious accident. The safety

committee reported the responsibility for her accident was her own carelessness. But a quiet intimate talk with her brought out the fact that she had been thinking about her brother who had just been buried.

After every major accident, and every accident whose cause is not perfectly plain, I believe the employee should be carefully examined physically.

The employee who returns to work too soon after an operation is predisposed to trouble. Where he may have performed his duties easily before, he now is an increased hazard. I have known of several accidents which have occurred when supervision was not exercised.

The industrial doctor should also be familiar with department operation, and the actual agents causing injuries. I was rather puzzled until I learned that the mule in the textile mill that causes broken toes is not an animal, but a piece of iron machinery, and the waves are not wet—they are cotton. An intimate knowledge will help the doctor in detecting fraudulent claims.

I have stressed the importance of avoiding accidents, and the part the doctor may play in this work. But this is possible only when physical examinations are made, and dispensary treatment given. Industrial health supervision and treatment is not in any sense a forerunner or entering wedge for state medicine. Industrial doctors will oppose such a system as vigorously as the general practitioners. The industrial physician should be on friendly terms with all of the doctors in his community. He needs their good-will because of their influence with his employees' families. I have found this of great help in keeping the confidence of our workers. For a family doctor who is antagonistic toward a factory physician can do much to undermine a worker's morale and confidence.

Cooperation Between Plant Physician and General Practitioner

It is not difficult to show the general practitioners that we really are helping them. A get-together at the plant hospital, a frank explanation of industry's aims, a demonstration of cases, followed by refreshments, has done much to win the good-will of the 21 doctors in the vicinity of my own plant. I have had many cases in which these doctors have referred our employees, who came to them for help, back to us with a note requesting some special form of physiotherapeutic treatment for which they were not equipped.

All workers should be examined prior to employment, and should be classified according to their physical fitness. They should then be placed at work for which they are suited. This step will do much to prevent accidents, lessen labor turnover, prevent labor interdepartmental transfers, and prevent dissatisfaction. Physical misfits are costly! A man with large relaxed inguinal rings will then not be placed at heavy lifting. There will be less opportunity for hernia or other serious troubles to develop in these cases, for we will know what the employees' weaknesses are and will help them protect themselves against over-

strain. A worker with heart trouble will not be put at work on the fifth floor and made to climp stairs, nor will he be given work that will require undue physical strain. I recall the case of a woman in a cotton mill who was required to reach above her head many hundred times a day during her work as hankwinder. Her work began to fall off, and she was reprimanded by her foreman, and finally threatened with discharge. Examination showed her to be a victim of heart trouble. She was placed at work which relieved her of a strain her heart could not stand, and she is now happy, and one of the best workers in her department.

The physical examination is not used to exclude, but rather to properly place workers. The number of actual rejections is between two and three per cent. Physical examination will detect infectious diseases and existing disabilities, the degree of which should be noted in case of future accident, so that the last employer will not have to pay for all of the trouble. Physical examination will also reveal defects which are remedial, and if measures are instituted to correct these, and a careful follow-up carried out, we will have a factor of greatest good.

Time Loss From Accidents and Sickness Compared

Much has been said about preventing loss of time accidents. But it is even more important to prevent loss of time from sickness, for this toll is about 20 times greater than that for accidents. To industry, time transformed into production is money, and the opportunity for greatest service comes to the medical department which realizes this fact early, and uses every possible means to prevent the existence or development of conditions which would produce or prolong absence from work.

There are degrees of ill-health; not every sick person remains at home. But when they come to work they are predisposed to injury, the quantity and quality of their work will fall below par, and they are in an irritable condition and predisposed to quarrels and dissatisfaction.

Many of these conditions are neglected until serious consequences have occurred. No other class of people are so subject to charlatanism in medicine, to fears and superstitions, to attempts at self-treatment. They easily fall prey to the cults, and are many times treated wrongly or inadequately, while valuable time is lost and the disease progresses.

We industrial physicians have a marvelous opportunity to teach the need and value of health education to our thousands of workers. And, by our careful examinations, our earnest efforts to arrive at a correct diagnosis, and our readiness to use every means of treatment indicated, we not only set an example which would make them hesitate before accepting less at the hands of irregular practitioners or cultists, but we also render a service of greatest value to the company and community, as well as the workers, themselves.

I believe that dispensary treatment for our employees' personal conditions, combined with physical and health examinations, is of more value to industry than the treatment of accidents alone. In our plant,

these duties consume 40 per cent of our medical department's time, as compared with 34 per cent spent on accidents.

No person should be permitted to go home because of illness or return to work after an illness of more than one week without the consent of the medical department. I have seen hundreds of cases of illness in which, if sick leave had been granted by the foreman, the employees would have gone home and suffered under self-treatment or no treatment at all for one to three days. Whereas, when they come to the plant hospital and are treated and permitted to rest, they often recover and are able to resume work. Counted over the year, this service alone saves thousands of working hours to both company and employees.

When our workers are absent because of illness, our nurse should be sent to see that they are receiving medical attention and adequate care. If they are not, she should advise them accordingly. She should also deliver relief or benefit money. By our health program we may definitely expect to lessen absenteeism.

It is in its health service work that I believe a medical department can be of most benefit to its company and workers. By means of physical examinations, careful attempts to arrive at accurate diagnosis, painstaking followup, dispensary treatment of miner and chronic ailments, and health instructions and education, it makes for greater health. A healthy, contented worker on the job every day is one of industry's greatest assets. The ability to bring home a full pay envelope for a week's work under satisfactory conditions is the aim of most workers.

Medical Department Responsible for Sanitation

It is the direct duty of the medical department of any industrial organization to see that the working conditions of its employees are safe, and not detrimental to health. The doctor must have a thorough working knowledge of the effects of temperature, humidity, ventilation, dusts and lighting on the health of the workers and their ability to produce. These physical agents do affect our workers' health in great measure, and where it is necessary that changes be made, the doctor should be ready to recognize the necessity for such changes and should promptly call the matter to the attention of the company officials.

The medical department should also be directly responsible for the cleanliness and sanitary maintenance of the wash-rooms, toilets, dressing rooms, and the mill in general. It should maintain close supervision over the water supply and all food and food handlers.

In addition, the doctor must be thoroughly familiar with industrial poisons and the most modern methods of preventing and combating their manifestations in the industrial employee.

I have frequently heard a foreman or mill superintendent say, "Why, I never knew there was any danger from that." He may not have. That is the doctor's job. I recently had a case of lead poisoning develop in a man who did soldering much of the day. His superintendent told me that in 21 years he had never seen a similar case. It is our duty

to know where the dangers lurk, and to be ever on the guard for them.

In order to be a maximum success, an industrial medical department must be composed of a personnnel of specially trained workers, it must have the whole-hearted backing and support of the company management, it must have the absolute confidence of the mill workers, it must be on friendly terms with the doctors in the vicinity, and it must be imbued with the idea of preventing accidents and disease, rather than simply to apply the most modern methods of medicine and surgery to healing or curing troubles after they have developed.

CHAIRMAN SCHRAM: We had expected to have Dr. Torrey with us this afternoon. In his absence, however, I take pleasure in introducing the president and general manager of the Michigan Mutual Liability Company, Mr. P. W. A. Fitzsimmons, who will read Dr. Torry's paper on "Organizing for the Care of the Industrial Wounded."

ORGANIZING FOR THE CARE OF THE INDUSTRIAL WOUNDED

H. N. Torrey, M. D., Surgical Director, Michigan Mutual Liability Co., Detroit

Before discussing present day standards for the care of the industrial wounded, I wish to call attention to the great improvement over conditions of a few years ago. Today, in general, the industrial worker is receiving competent medical service; the factory doctor of yesterday has developed into an up-to-date industrial surgeon; the best hospital facilities are now available to every injured man; in the factory the dark closet which once served as a first aid room has been replaced by a room which is large, well equipped and in charge of a trained attendant. These changes are most encouraging, yet the situation today is far from ideal and there is still much to be done.

Now to review briefly the most important causes which have led to this beneficial change.

First. The Workmen's Compensation laws of the various states have been of great value to the employer, the employee and to the industrial world in general, conserving, as they do, the nation's greatest resource, its man power.

Second. The present day employer realizes that his most valuable asset is his men and he is keenly interested in any measure which conserves their life and limb. He insists that his workman be protected with the most modern safety devices and that when they are injured they receive the best medical care.

Third. The workman of the present day knows and demands the proper attention when he is injured and he is no longer satisfied with the service as rendered by the old time factory doctor.

Now that the state, the employer and the employee all demand this service, it is up to us who are interested in this conservation work to render it, and only by the proper organization can it be done. I feel that in general the medical and the nursing professions have met these demands and stand ready to make still further advances. Some of the medical schools, realizing that industrial surgery is fast becoming a specialty, have offered special training in industrial work, and many hospitals in our cities have set aside industrial wards and services, these with special equipment and trained personel.

In discussing medical service to the industries, it must be understood that certain requirements are necessary to the proper care of the injured. These requirements in brief are:

1. Competent surgery.
2. Proper hospital facilities.
3. Well equipped first aid stations with trained attendants.
4. Special departments covering social service, physio and occupational therapy, safety work, etc.

This outlay is surely a big order for any one employer and the question is, how can he get this service in a practical and economical way. Of course, it can be done by a large employer, but even then it is much more efficient and certainly cheaper when handled by a group of employers. On the same principle, the average employer would not find it paid him to make all the parts entering into his product. He will get this work done cheaper and better by other manufacturers making a specialty of them.

Buy Surgical Service of the Trained Specialist

Why, then, not buy surgical service of a surgeon or group of surgeons who are trained and equipped for this special line of work?

The next step is a combination of employers employing industrial surgeons with proper hospital affiliations, or better still having their own hospital. It stands to reason that no single employer can hope to compete with the facilities offered by such a combination. This arrangement gives each employer, whether he be large or small, real service at a low cost, and real service means conservation of men, money and time.

In this connection it might be interesting to tell of the development of the surgical service of the company with which I am associated. In 1912 when the Michigan Workmen's Compensation Act became a law, this group of manufacturers numbered 12, today there are over 2,500 Michigan employers in the organization. The medical service has developed from one surgeon to a state wide organization which includes field surgeons in every locality, and consultants in all large centers.

In Detroit, the company owns and maintains its own hospital, especially equipped and manned for industrial work, and with special departments of social service, physio and occupational therapy, safety and claim work. Besides the hospital, there is a corps of surgeons and nurses who handle the first aid work of the various plants. I cite this progress

simply to show what can be done by organization. We have successfully demonstrated that real surgical service can be obtained in an efficient and economical manner for large and for small employers and furthermore such service pays.

We have been considering medical organization in general and now I wish to take it up from the standpoint of the individual employer, under the following headings: the surgeon, hospital facilities and first aid measures.

The selection of the surgeon is the most important step in organizing a medical service. It should be born in mind that there are two classes of injured—the slightly wounded or minor cases and the seriously hurt or major cases. The minor case usually can be handled in the first aid room by a young surgeon, but the major case needs the care of a skilled and experienced surgeon, with hospital facilities and special equipment at his command.

Handling Major Accidents Requires Special Treatment

Naturally, it is difficult to secure such a combination of services from one surgeon except under prohibitive expense. It is much more practical to select a competent, industrial surgeon to handle the situation by appointing an assistant to make calls at the plant and to care for the minor cases, but to be responsible himself for the major cases. It seems needless to say that this surgeon should be selected because of his efficiency and training and not because he is located near the factory or will do the work at cut rates.

Modern methods of handling major accident cases require special treatment and equipment and these can only be obtained in a hospital. Therefore, it is essential that the surgeon have hospital facilities at his command. This is a most important point and one usually overlooked by the employer.

Besides offering the usual surgical services an up-to-date hospital also maintains other special theraputic measures which are necessary to the rapid recovery of the patient. I refer especially to the departments of physio-therapy, occupational therapy, electro-therapy, and thermotherapy which by the use of massage, exercises, electricity and heat do so much in the conservation and reclamation of the injured. It will be interesting in this connection to know that, with the use of these theraputics in our Detroit clinic we have lowered the disability days of our patients by a substantial margin.

The installation of the first aid station in the factory is another important step in the organization of the service. The room, or rooms, should be located in the cleanest and quietest place in the plant and, furthermore, should be large, well ventilated and well lighted. I regret to say that many times the first aid room is one that can not be used for anything else. This is a very short-sighted policy and a careful examination of results will show that such a room costs many times what it is supposed to save.

The space for first aid work naturally depends upon the amount of work done. One room may be used in small plants provided screens are used about treatment stalls, as we have found it necessary to have privacy in the treatment of cases. It has a very bad mental effect upon patients to have them watching dressings done on others. An ideal unit consists of a waiting room with small dressing rooms arranged along a hall.

As to equipment, much depends upon the work to be done. We have always equipped our stations to care for all dressings and minor operative cases which can be done under a local anaesthesia, Major cases and all minors requiring a general anaesthetic are sent to the Hospital. A clever, young surgeon can keep practically all his cases under his care at the factory, which procedure saves the employee's time and the employer's money. Concise records of patients are necessary and the card system seems the most practical. These cards, listed under the patient's name, are simple, easy to handle and have the additional value of keeping all the data upon one card.

The Plant Surgeon Should Have Trained Assistance

The plant surgeon must have well trained assistance, not only to aid at dressings, but to operate the station during the surgeon's absence. An industrial nurse or a trained first aid worker is absolutely essential. In many small plants such an attendant will handle most of the routine cases, while the surgeon visits the factory at stated hours besides being upon call. Furthermore, there is no objection to a first aid worker doing other work, provided it does not interfere with the care of the injured.

The important point of it all is that this worker must be properly trained in first aid measures. A case improperly treated, an infection neglected or a fracture transported without the proper splints—these together with hundreds of other crimes against surgical technique are committed by well meaning but ignorant and inexperienced helpers. The employee and employer pay the penalty in life and limb, let alone the loss of time and money. Any employer can readily see, when this point is brought to his attention, that inexperienced help in this important work is not only bad business but a serious responsibility.

Social service work in its true sense, I feel, is of distinct value to all concerned. I realize that under improper conditions this work may assume a patronizing attitude and as such is repudiated by the deserving employee. However, under a tactful and competent social worker we have found this evidence of the employer's interest is welcomed. Happy home conditions make a more efficient workman and anything the employer can do to promote this condition is good policy.

We have used the social worker to good advantage in our hospital by seeing that the family of the injured patient is not in need during his illness. The fact that all is well at home has a strong stimulating effect upon the patient's convalescence. Following up cases who fail

to report for treatment and promoting closer cooperation between the employer, the foreman and the convalescing patient—all these are important duties of the social service. In small factories the industrial nurse can handle this work besides that of the first aid room.

As I said before, the present day improvement in medical service is most encouraging yet there is much to be done. The improvement as outlined is by no means universal and there are many plants today with almost medieval medical conditions. Yet I must confess that in my experience I have found that practically every employer welcomes constructive criticism and is eager to do his share in this great work of human conservation. Competent medical service in the industries pays—and it pays not only from the humane standpoint of priceless lives and limbs but it is good business and saves time and money. This truth must be sold to every employer and employee in this great land, and we who are the missionaries have a great opportunity before us.

CHAIRMAN SCHRAM: I wish we had time this afternoon for discussion but we simply haven't.

The next paper, which is the last, is on "The Relation of Preventive Health Measures to Labor Stability." It will be presented by Dr. Thomas McElroy, Health Department, Maryland Refining Company, Ponca City, Oklahoma.

RELATION OF PREVENTIVE HEALTH MEASURES TO LABOR STABILITY

Thomas McElroy, M. D., Chief Surgeon, Health Department, Marland Refining Company, Ponca City, Okla.

Modern industry has many noteworthy achievements to its credit, for the reason that it has never been backward in accepting and utilizing scientific discoveries. Once they have been shown to be of real value in increasing output, decreasing cost, or improving the quality of the product, they are quickly adopted and made a part of the industrial program.

The growing importance of the human element in industrial progress and development has received wide recognition among most industrial managers in the past few years. How the human element must be cared for in order to receive its greatest efficiency has been attacked from all angles. Among the many agencies that industry has set in operation for the benefit and improvement of the worker's efficiency, few have brought richer returns than has industrial health service.

This branch of service has been accepted by industrial managers because of the following reasons:

The employer, who theoretically is better informed and more widely experienced than the worker, has a duty to perform in providing a health service for his workers. In justification of the first or the duty motive, it can be readily seen that much good can be derived from any work,

public or private, which provides for surgical treatment, medical care and advice to the worker, particularly to those who are not educated to the modern methods of prevention and the unfortunate ones who are unable to obtain proper advice because of financial reasons. The employer who makes this service easy for the worker to obtain is performing a service of the highest importance.

It is good business to provide these modern facilities as it lessens the expense of illness and injury and is instrumental in keeping the worker up to the maximum of physical efficiency.

From an utilitarian motive, there is no doubt that attention to the health of the worker pays large dividends in increased efficiency. Industry is just beginning to realize somewhat of the staggering loss incident to preventable illness and to lowered capacity for physical and mental work resulting from conditions most of which may be corrected. This loss is of particular concern to industry which pays most of the bills, and anything that can be done to reduce this loss is well worth the effort and money which it costs.

The justification for this service not only lies in the reduction of the time lost on account of illness, but a far more signal service of prolonging the lives and usefulness of the older and more experienced employees.

Health service in industry, it should never be forgotten, has as its foundation the theory that disease is preventable. The value of preventive, as distinguished from curative, medicine, in industry can hardly be emphasized sufficiently. Ordinary medical work has to concentrate on curative processes in family practice merely because the preventive function can not be exercised when people neglect seeing a doctor until they are too sick to move; while an industrial plant, as a unit, is particularly adapted to prevention. The importance of consulting the plant physician at the very beginning or onset of an illness, even for the most trivial cases, which in community life are neglected or often aggravated by patent medicine as a result of friendly counsel or self diagnosis, has been brought out many times both from an economic and restorative factor.

Progress in the Prevention of Infectious Diseases

Great strides have been made in the progress of the prevention of infectious diseases. Typhoid and smallpox are practically exterminated in most all industrial centers. While preventive measures have succeeded in very materially reducing the mortality and morbidity from infectious disease and increasing the length of life, there has, however, been unfortunately an increase in mortality of the middle aged and of the organic diseases of the higher age groups.

The incidence of heart disease, apoplexy, paralysis, Bright's disease and cancer have doubled in the last decade. The diseases which usually attack those from 60 to 70 years of age have been creeping down to the forties and fifties. Fifty-one per cent of the deaths occurring after 40 years of age are due to degenerative diseases and are preventable to a degree. Eighty per cent of the mortality from these organic diseases is

postponable anywhere from a few days to many years by judicious treatment—often a matter of change of diet and of habits rather than medicine. We know it to be a fact that if we live long enough, a large majority of us will ultimately die from diseases of the heart, arteries or kidneys—diseases that usually cause very little or no pain. The individual claims to be in perfect health until too late to remedy the condition.

There is apparently something wrong with the habits of the middle age class, judging from the rapid increase among them of chronic maladies after 40. Multitudes of executives, skilled workers and useful citizens of great constructive value to society are rapidly degenerating in their physical prime and die without any indication of disease. Although robust and cheerful and never really sick, the physical dynamo can not carry the load, the reserve is gone, the strain too great. When useful men are disabled and crumble down and die from 15 to 20 years before their time, it is something more than a great family misfortune, it is an industrial loss—an inestimable loss to society.

Man Should Reach Maximum Power Late in Life

Man was made to come to his maximum of maturity, his maximum power of efficiency, relatively late in life. It is not a part of the Creator's plan that man become decrepit at 40 or 50, when they do not come to full maturity until 30. There is no analogy in the animal or the vegetable kingdom or anywhere in nature to show that anything that takes so long to come to its maturity as a human being should decline so quickly. In fact, outside of men, animals generally live from four to six times the length of their maturing period, and certainly the Creator's grandest work should not begin to touch decrepitude ten years after maturity.

Everywhere we see old men who are filling responsible positions quite as ably as any young man. If a man has not squandered his life forces by vicious living, if he has lived simply and sanely and obeyed the laws of nature, the rightness of his wisdom, the strength of his judgement, the accumulation of his expert knowledge, the broadening of his mind and the enriching of his experience is an industrial asset that can not be purchased in the open market. It is recognized as never before that men who are trained for a certain work are an asset, and that with proper care their lives can be prolonged. The older men are now regarded as the most valuable, they are trained for the work, their habits are steady and their views less inflammable, thus discouraging industrial disturbances. Given the proper attention and means, the average life of the worker can be lengthened at least ten years, and his industrial efficiency will be prolonged in proportion.

If America is to succeed in maintaining her industrial supremacy and continue to pay the laboring man wages proportionate with American mode of living, it must be done by rendering the worker more efficient and longer lived, that he may produce more. There is no question but

this nation has been wasteful of many of her natural resources, but the greatest waste of all has been that of health and human life.

The commonly called organic diseases are all quite fully understood as regards their causation and prevention, and depend less upon the environment of the worker and more upon intelligent individual action and development of positive personal health. While it is both encouraging and refreshing to record and recount the development of modern sanitary science and the achievements of recent efforts along the lines of public health; nevertheless there has been a failure to decrease the disability and death rate from the so-called organic disorders. The great body of important facts dealing with organic disease has developed in the past few years, and there has been as yet no opportunity for this information to find its way into the lives of the industrial population.

The man who is able to work each day gives little thought to his future physical fitness. The present health propoganda, while perhaps not dealing any less with sanitary science and public health measures than in the past, is giving a good deal more attention to personal hygiene. And the proper place to begin education and instruction in health maintainance is in the early grades of the public school, and follow the pupil throughout his educational career. In this way the coming generation will be taught the importance of both periodic dental and medical examinations. No doubt, a considerable amount of this hygienic teaching will be carried home by the pupil, which will afford considerable help to the passing generation.

Build the Health Program Upon Positive Knowledge

The basis of a periodic physical and dental examination in industry is prevention, and the condition of the worker, as disclosed by the results of this examination, is the only sure foundation upon which to build a scheme of health education, which is so necessary a feature in prevention. The employee's complaints and susceptibilities are elicited and every effort made to discover the cause and any predisposing factor in the hope that it may be eliminated and every assistance offered to him in the eradication of these defects.

Advice in the details of diet, dental hygiene, sleeping, exercise, recreation, and the care of the human body must be fitted to the individual like a suit of clothes if it is to be of any use to him. General rules are of little value, especially if presented in printed circulars and in a hasty off-hand way. The rules must be applied, reshaped and modified to suit the individual's needs after these needs have been studied with care. Moreover, since these rules often call for the reform of a tough old habit, one must use every effort to arouse sufficient interest to make the employee put himself to so much trouble. The fear of disease and the physician's authority can accomplish much towards making a man change his habits of diet, of work or of thought, but it is necessary that he is acquainted with the individual and understands his circumstances, his difficulties and his point of view.

The analysis of a detailed record of the employee's sickness experience, coupled with periodic examinations, and his interest and cooperation in following out recommendations, gives a comprehensive insight into the employee's future physical efficiency.

There are a surprisingly large number of employees who have been trained and advanced to where they are holding responsible positions, that have incurred some physical disability, and are unable to give their best services. And in many cases these employees have to be given indefinite leave or retired at the peak of their efficiency.

Most every one should appreciate the value and savings of disease prevention, and this activity must have the hearty support of the men in industry if it is to be successful. Just as 75 per cent of accident prevention depends upon safety organization of the workers, so health is acquired, maintained or lost by the individual. Health is like salvation —no one can secure yours for you. Health education in industry should not be built from the top down—but from the bottom up. The general manager can not limit preventable disease, but the willing cooperation of the worker can do it. The health expert in industry who can interest and organize the men and women of the factory for health betterment both in the shop and community, will accomplish more than a reduction in the morbidity rate. For after all, life is not a matter of the pay envelope, and the more men and women of the industrial class that are interested in the conditions of the home, the conditions of labor, the health and welfare of their families and their fellow-men, the more efficient will be our industries, the more stable our laboring class, and the more intelligent our government.

ADJOURNMENT

General Round Table

October 28, 1926

ISAIAH HALE, Chairman
Safety Superintendent, Atchison, Topeka & Santa Fe Railroad System
Topeka, Kan.

THE General Round Table Session held in the Grand Ball Room of the Book-Cadillac Hotel, Detroit, Michigan, convened at 2:20 o'clock, Mr. Isaiah Hale of the Atchison, Topeka & Santa Fe Railroad, Topeka, Kansas, presiding.

OPENING REMARKS OF CHAIRMAN HALE

There is not a man here who can not take out his memorandum book and fairly note therein that for the opportunity to attend this Congress and enjoy the pleasure of again rubbing elbows with those good fellows met here in former years—for the privilege of spending a half-day at this General Round Table Session tuning in on the comments of some men who may play the safety game a bit better than he does, and absorbing a lot of information which he will turn to his individual and organization profit in the direct ratio of his willingness and ability to absorb it—these are some of the things for which he should feel truly thankful when the last Thursday in November rolls around.

In my second consecutive appearance as "Referee"—or is it not, more properly, as "Timekeeper?"—at this General Round Table Session, my innate, if not ingrowing, modesty actually gets a more jarring jolt than any one jolt felt by either of the two gentlemen who recently featured a largely attended social function at the Sesqui-Centennial stadium, when one, a member of the intelligentsia who has owned a book ever since he hired a press agent, essayed a come-on and the other who has nothing but an alibi and seven hundred thousand dollars, essayed a comeback, when one actually came and the other went, and when, you may recall, 120,000 men were rudely snubbed by Lady Luck and added their tears to the copious and humid offering of Jupiter Pluvius; I say I am the harder hit of the three because I am again wished on you as chairman for no other or better reason than that the Program Committee

had nothing but deaf ears turned to their invitations scattered hither and yon for someone to come on and be the goat.

In the seventh grade of the public school in my old home town, from which, with some misgivings, the Society for the Prevention of Cruelty to the Innocent, sent me out into a cold and unsympathetic world, I was much impressed with that page of the world's history, upon which was recorded the fact that the Romans, Athenians, Carthagenians, or some other of those belligerent peoples of an earlier day, never gave burial to a soldier found on a battle field shot in the back. "Shot in the Back" could never mean but one thing—the shottee was running away; although the markmanship of the chap who took a shot at him is entitled to complimentary mention.

A Resolve Not to be Shot in the Back

My one youthful resolve that has stood the test of time was that if ever I was shot, as I probably might and undoubtedly would be, it would never be in the back. And so, whenever I've felt the urge to run, as run I have, and still can upon occasion, I have carefully ignored the old axiom that a straight line is the shortest distance between two points—"Here" and "There"—and invariably have negotiated a flank movement. The word "flank" is used advisedly, because, if shot, it would be in the flank, a location which admits of some doubt whether it is actually front or back, a doubt which might secure for me an interment commensurate with my carefully concealed valor and my willingness to serve.

So when I was offered this job that no one else wanted, (and even a larger number refused to take), I essayed my usual flank movement, was finally shot, and surrendered only upon the assurance that following the close of this session, as something justly due you, a requiem would be sung over me as chairman of the General Round Table Session.

Since this is to be my valedictory I have felt it not unfair that I take this much of your time to properly horn myself into the permanent records of the Congress.

We pass here to the more serious and important part of the program. Last year we had a wonderful out-pouring of the safety spirit; through cooperation of the right sort we can have just as interesting and profitable a session today; or, reversely, we can have one everything else but.

There are necessarily a few hard and fast rules; the first one is, please do not take the floor unless you have something to say which is pertinent at that particular moment; but having arisen and been recognized by the Chair, you will save annoyance to the reporter and possible embarrassment to yourself and to me if you will preface your remarks with your name, the concern with which you are identified and do it in your most distinct voice.

My injunction at this juncture, last year, still holds; let there be no

lip-reading here today; there is not a man here who can not make himself heard in every corner of the room—if there is, I hope he may not feel the urge to get up, as delighted as we would all be, under other circumstances, to have him.

I have been asked to repeat during the afternoon, under the topic "The Best Safety Kink I Have Known," certain remarks I made before the Round Table Session, Safety Section, American Railway Association, last spring, so if time permits and the public clamor that I do so becomes so riotous as to get beyond the control of the Chair, I shall be glad to oblige.

The first thing on the program is "Getting Men to Wear Goggles." Frankly, I get quite a kick out of this. You will see by referring to the program that Mr. Kuechenmeister, of the Dominion Forge & Stamping Company, Walkerville, Canada, is going to sell, as the safety man, the goggle idea to Mr. J. Taylor of the Ford Motor Company of Canada. It seems to me this sale might have been more of a cinch if they had picked the workman from somewhere in the States, because I have been told that a man from Johnny Walkerville finds it reasonably easy to sell his wares to a man across the river. So it is my very great pleasure to step out of the way momentarily and surrender the stage. I will let them introduce themselves in their own way.

GOGGLES? H——L, YES!

(A Playlet)

G. A. Kuechenmeister, Dominion Forge & Stamping Co., Ltd., Walkerville, Ontario, Canada

Cast of Characters

Miss Lovitt, A Nurse
Bill Tate, Injured Workman
Mr. Nixon, Plant Superintendent
Mr. Billings, Safety Man

Synopsis

The manager of the Meanwell Manufacturing Company, having been convinced that the services of a safety department were needed, has hired a safety man. Although the manager is "sold" on the idea, the shop organization is not. The safety man has discovered that eye injuries make up a large part of the accident records and has started a "goggle campaign." The plant superintendent is not in favor of compelling men to wear goggles and has made an appointment with the safety man to discuss the matter.

(Safety man's office. Flat top desk in center of room. Extra chair beside desk. Paste board box with old goggles on top of desk. To one side of room is typewriter desk with typewriter, etc. Telephone on flat top desk. Safety banners and posters on the wall. Hat rack near door. As the curtain rises the nurse is seen sitting at the desk making out report cards on the machine. A moment later the superintendent enters.)

SUP'T.—Good morning, Miss Lovitt. Where is that safety man?

NURSE—He is out in the shop. You know, we had a serious eye injury the other day and Mr. Billings is out trying to get the other men in the department to wear goggles. Don't you think it would be a fine thing to have all the men wear goggles all the time?

SUP'T.—Huh! Have all the men wear goggles all the time? Good gracious, that safety man is a fast worker. He's got you filled up with that bunk of his already. You are beginning to talk as crazy as he does. Listen, Miss Lovitt, I have worked in shops since I was a kid; I've been through the mill from A to Z—from apprentice boy to boss—and I have seen big changes in the conditions in our shops and many new methods and ideas put across; but there are a few of these new fangled notions that I know will never work. This goggle idea is one of them.

NURSE—But all the men wear goggles at the shop where Mr. Billings came from.

SUP'T.—Yes, they say that all the men wear them over there. I haven't seen them; but, anyway, that shop is different from ours. You can do things in such shops that you can't do in one like ours. Conditions are entirely different.

NURSE—Have you ever worn goggles, Mr. Nixon?

SUP'T.—Have I worn goggles? Say, girlie, I've worn about every kind of a goggle that ever was made. Maybe I shouldn't say that I have worn them—I never could get used to the darn things—but I have tried often enough to know that it can't be done. Look at this junk (*runs hand through box full of old goggles*) it's a crime to ask men to wear stuff like that. I, for one, won't do it and I won't ask any man to do what I won't do myself.

(*Safety Man enters. Hangs hat on rack and takes off goggles.*) (*Exit Nurse*).

SAFETY MAN—Hello, Mr. Nixon. Have you been here very long? I've been out in the radiator department having an argument with the foreman about his men wearing goggles. You know, Bill Tate got both eyes full of hot lead the other day and may never see again. It does seem as though, after a thing like that happens, the men would quit taking chances with their eyes, but if they won't, then there ought to be a rule compelling them to do so.

SUP'T.—Now wait a minute. Don't get too fast with your compelling men to do this, that, and the other thing. I know something about trying to wear goggles, myself. I was just telling Miss Lovitt about it when you came in. Look at this stuff (*points to goggles in box*) how in the world you have nerve enough to ask a man to put such things in front of his eyes, is more than I can understand. I have tried every one of the goggles you have in that box and I want to tell you right now that I wouldn't wear any of them nor ask any man in this plant to wear them.

SAFETY MAN—Neither would I.

SUP'T—What?

SAFETY MAN—Certainly not. The very first thing that has to be done is to provide the proper kind of goggle. That stuff in the box was made to sell—not to wear. The trouble in so many plants is that the purchasing department buys the goggle on "price" and not because the goggle is suitable to the man or the job.

Now take this pair (*picks out pair of goggles*)—a perfectly good goggle to look at—but when it comes to fitting it onto men's faces you soon find that you can only fit about a half dozen types of face. It is not adjustable and unless worn by a man who happens to fit the goggle it is not comfortable.

And unless goggles are comfortable you can not expect men to be enthusiastic about wearing them.

This pair (*picks out wide vision goggles*) fulfills all the claim made for it as far as "wide vision" is concerned but you notice it has a curved lens of such shape that it would be difficult to grind. The result of an unground curved lens is a lot of distortion that will give any man a headache in a hurry. Then, too, the glass is thin —and lots of it. Not a very safe thing to wear in a shop.

Here is an old pet of mine (*picks up pair of cheap leather cup goggles.*) I would not recommend the use of a goggle like this in our plant but I do have a warm spot in my heart for it. The first goggles we bought for the grinders, years ago, were this kind. We paid fifty-nine cents a dozen for them. Even now I always buy each of my boys a pair for use on the Fourth of July.

SUP'T.—You mean that you have your children wear goggles on the Fourth of July?

SAFETY MAN—Sure. Why not? I want the kids to have the fun of shooting off a lot of fire-works but I don't want them to get hurt doing it. My boys are so used to wearing goggles on the Fourth that we look at them as sort of "standard equipment" and buy them at the same time we buy the fire-works. Stepping on sons-of-guns and exploding torpedoes is very likely to produce eye injuries. We would not hear of so many children suffering the loss of eyes if people would put goggles onto the kids on the Fourth.

SUP'T.—I never thought of that. That sounds good to me.

SAFETY MAN—It *is* good. You know, this whole matter of whether *you* wear goggles or whether the men in the shop do or do not wear them, depends entirely upon the way you look at it. If you look at wearing goggles as a most disagreeable, uncomfortable, unnecessary proceeding then you can not get very enthusiastic about it; but when you realize that goggles *do* save eyes and that such saving more than compensates for the slight inconvenience caused by the goggles, then you do become interested.

Workmen are no different from you and me and when they once understand the value of proper eye protection they will not work without them.

SUP'T.—Well, if these goggles are no good, what kind would you provide?

SAFETY MAN—I have several kinds here—

SUP'T—How many different kinds do we have to have? We have had so many goggles in our tool cribs that were no good that I'm fed up on throwing them away at inventory time each year. It seems that every time a salesman gets to the purchasing department we get a new kind of goggle in the tool crib. I'm sick of the whole goggle business.

SAFETY MAN—There are only two types of goggles necessary in any shop. The cup type and the frame goggle. These two types—fitted with the proper lens for the work—clear glass for ordinary work and colored lens for welding and working at furnaces—are all that are needed and will take care of all the men.

These cup type goggles (*shows several kinds of cup type*) are very comfortable and with the annealed lens will give wonderful protection. They should be used at the rougher work such as chipping steel, cutting rivets, working at punch presses and in blacksmith shops and forge departments.

This frame goggle can be worn in the assembly departments and machine shops. The adjustable frame makes it possible to fit any type of face. Let me show you how easily they can be fitted and how comfortable they are. (*Fits goggles to Supt's face.*)

SUP'T.—(*Shaking head and feeling of goggle, etc.*) They do feel pretty good but what would you do if a fellow had to wear glasses?

SAFETY MAN—That's easy. Have a special lens ground and put into that frame. That has to be done more often than you think.

SUP'T.—Well, to get down to business, just what do you want to do?

SAFETY MAN—I want to get every man in this plant to wear goggles all the time.

SUP'T.—It can't be done.

SAFETY MAN—It can. We did it at Wilson's and we can do it here. All that is necessary is for you and the manager and the foremen to get behind it and soon the men won't work without them.

SUP'T.—It that so? I'm telling you we have tried to get men to wear goggles and they won't do it.

SAFETY MAN—They won't do it? Surely you don't mean to say that the men in the shop can do as they please about obeying orders. Did you ever issue an order making it compulsory to wear goggles?

SUP'T.—No, and I don't intend to, either. I don't believe in compulsion.

SAFETY MAN—You don't? That's funny. You make men be on time in the morning; you prohibit smoking; you have signs all over the place warning men that if they get caught running they will be discharged. This whole rule book is full of "you must do this" and "you are forbidden to do that," and then you sit there and tell me you do not believe in compulsion. You make me laugh.

I guess you are like a lot of other old time bosses. Whatever rules you were taught while you were at the bench, you believe in and make a big fuss about enforcing; but when it comes to something new, you either haven't the brains to see the value of it or the "guts" to put it across.

If a man breaks one of your old rules too often you fire him, but you are willing to let the men go right on losing eyes without doing a thing to stop it. You give me a pain.

SUP'T.—We can't fire all the men because they won't wear goggles.

SAFETY MAN—Of course you can't and you don't have to. You don't "fire" all the men for breaking the other rules. Once in a while you have to let one or two go to maintain discipline. The same can be true of the goggle rule. When men realize that they must wear goggles they soon fall in line and you have very little trouble.

SUP'T.—But what's the use of all the men wearing them? The men in the grinding room wear them but I can't see any sense in making all the others do it. I think it is silly.

SAFETY MAN—That shows that you do not know what you are talking about. Here—look at the record of your own plant for the past two years. It is just like the record in all other shops where they think they can tell where and when men should wear goggles.

Here you are:—You haven't had a lost time case from the grinding department for the past two years.

(Opens loose leaf book and reads record of several departments and total for all.)

Machine shop; 8 cases; 41 days lost.

Assembly floor; 14 cases; 48 days lost.

Testing department; 2 cases; 7 days lost.

Power press; 5 cases; 110 days lost; (2 eyes lost).

Wood shop; 1 case; 14 days lost.

All these cost you a little over $12,000.

Goggles have stopped the eye injuries in the grinding room; they will stop them in the other departments. Our record at Wilson's was exactly like yours. For five years our eye cases cost $9,178, an

average of $1,600 per year. We only had a few minor cases from the grinding department because all the men wore goggles. After we put goggles on the men in the other departments our eye costs dropped to a total of $346 for the next four and one-half years, or an average cost of only $88 per year.

SUP'T.—You mean you cut the cost from $1,600 per year to only $88?

SAFETY MAN—Yes, we reduced the cost of eye cases a little over 94 per cent.

SUP'T.—How do you account for that?

SAFETY MAN—I just told you that goggles did the trick. And that wasn't all the saving, either. Men instinctively try to protect their eyes. We used to see them, in the forge shop, throw up their arms every time the hammer struck and in other departments we could see them duck their heads and squint their eyes. Now they can stand right up to the work and lose no time.

But for goggles to be effective they must be over the eyes and not in the locker or on the forehead.

It's just like being prepared for a snake bite. You've got to have the whiskey inside before the snake bites. And you can't ever tell when a snake will bite or something hit you in the eye.

It isn't in places like the grinding room where we have the eye accidents. Everybody knows that goggles must be worn there. It is the unusual accidents that give us most of the trouble.

I know a man who took a Westcott wrench out of his hip pocket to tighten a half-inch cap screw on a punch press. The screw broke and the spring washer shot the head against the goggles so hard that it shattered the lens and bent the frame.

Here is a pair of goggles worn by a man working at a shear. He was pulling pieces out from behind the shear when suddenly—without warning—this piece of shim snapped off and struck his face. It loosened two teeth, cut his nose, broke the lens and knocked him coo-coo. He was dizzy for 20 minutes and then went back to work with a new pair of goggles.

This pair (*shows another pair*) was worn by a boy in the punch press department. A piece of hardened punch flew off and knocked the lens out of the frame but only cut the side of the boy's nose. See how this screen was cut.

The worst eye case we had at Wilson's, the last year I was there, was an injury to a man in the office. He was breaking locker keys by holding them with pliers and hitting the end with a tack hammer.

SUP'T.—Do you mean that an office man should wear goggles?

SAFETY MAN—No, I don't think that an office man should wear goggles all the time. I don't think that is necessary, but that incident proves, to me at least, that whenever a man does any work where there is a possibility of an eye injury he should wear goggles. And I don't care where he is—in the shop, in the office or in his own home.

SUP'T.—That may be true enough. I never had it put up to me like that before. What would it cost to put goggles on all the men? Two thousand men are a lot of men to equip.

SAFETY MAN—It would be kind of high to begin with. It would cost about a dollar and a half per man for goggles and about a dollar each for examination—with special lens for some of them it would bring the cost to pretty close to $6,000.

SUP'T.—That isn't so bad. I thought it might be much more. It must be hell to be blind. Eh? How is Bill Tate getting along? He and I used to work together. Think he will be totally blind?

SAFETY MAN—The doctor does not know yet whether Bill will ever see again. One eye is gone but he may save the other.

SUP'T.—You say goggles will save a lot of eyes in the plant?

SAFETY MAN—Yes.

SUP'T.—If we wanted to make all the men wear them what would we have to do? Do you think we would have a lot of trouble?

SAFETY MAN—There isn't any reason why we should have trouble. Getting men to wear goggles isn't as difficult as you think. In every shop there is a small group of men who are convinced that wearing goggles is the right thing to do. We have them here. What we must do is to get all the men to see it that way.

That means, of course, that we will have to get the foremen to wear them. You can't expect the men to wear them when the foreman does not—and anyway there is just as much danger of the foreman getting hurt as the men.

You will have to set the example for the men. It won't be hard for you to get used to wearing goggles. I can see that right now. Mr. Meanwell will wear them, and while we are at it we may as well make everybody—visitors and all—wear goggles while they are in the plant. It makes the men feel better when everybody wears them.

As I said before, a lot of the fellows will need special lens so we might just as well examine them all as soon as we can and know exactly where we stand. The fact that we are examining eyes will create interest and help us along.

But the big thing, of course, is the order—signed by you and the boss. That is the real beginning. The rest will be merely detail and routine work for my department.

SUP'T.—(*handling some cup type goggles on table.*) Some of these look as though they might be too heavy.

SAFETY MAN—They would feel heavy if they were not properly worn. Your shoes feel awfully heavy when you walk without having them laced. If you wear your goggles like this (*puts on goggles with strap low over the ears*) they are very comfortable.

SUP'T.—A lot of the fellows tell me they can't wear them on account of fogging and steaming. What about that?

SAFETY MAN—Any glass will fog, sweat or steam up when it is exposed to sudden changes of temperature. Your house windows do it, your windshield and car windows do it, and any man who wears glasses will tell you that his glasses do it. That is one good reason for not having glass panels in our radio sets but it isn't serious enough to keep a man from wearing goggles.

Don't let anybody kid you into believing that it is the ordinary condensation on the glass that causes the trouble. That isn't it. It's the perspiration from the forehead running down into the eye that causes the trouble. In the old days the men used to smear heavy oil or grease over their eye brows to keep the sweat out of their eyes. We now provide them with this sweat pad. That makes it possible for the men to wear goggles in hot places.

There are cases though where a man may be up against constantly changing temperatures or a nasty steam condition. In that case a little glycerine soap or liquid glass polish rubbed onto the lens and then wiped off will do the trick.

SUP'T.—Will that stuff do the trick?

SAFETY MAN—It surely will.

SUP'T.—What about the complaint about headaches? One of the fellows in the die room stopped me about two weeks ago and told me that you had asked him to wear goggles and that he had suffered with terrible headaches ever since.

SAFETY MAN—That was two weeks ago. Go talk to him now. When he told me about the headache I took him to Doc. Crouch and had his eyes examined and we fixed him up with the proper lens. He should have been wearing glasses for the last ten years.

Go talk to him now, he is the happiest man in the shop and a darn sight better workman than ever before. Now he can see what he is doing.

The complaint about headaches is a real one. I don't call a tickly feeling across the nose or soreness back of the ears a headache but it is true that some men get headaches when they begin to wear goggles. That isn't caused by the goggle but is due to a defect in the eyes. I have seen any number of cases where men never knew they should be wearing glasses until they began to wear goggles.

When they had the proper lens put into the frame and found they could see better than ever they thanked us for making them do it.

Gee! Nixon, I wish you could see this thing in the right way. I wish you could realize that putting goggles onto men isn't being cruel to them. If you had to take men to the hospital as often as I do and if you could witness the suffering of the man and the agony of suspense endured by the wife you would understand. When I think that all that is needed is just a little firmness on the part of the management—just a little extra effort to get men to protect

their eyes—it makes me feel sick to think of all the needless suffering.

It isn't imposing a hardship on the men—it isn't cruel to make men wear goggles. I can show you hundreds of men who are thankful for the day they were compelled to wear them. They realize what it has meant to them.

Nixon, won't you issue an order making it compulsory to wear goggles in this plant?

SUP'T.—Billings, I think I'm hooked. I think I begin to see what it is all about. I'll think it over and talk to the big boss.

SAFETY MAN—Mr. Meanwell says he thinks it's good stuff.

SUP'T.—No doubt he'd say that. He falls for a lot of your crazy notions. (*Superintendent starts for door still wearing the goggles.*)

SAFETY MAN—Oh, Mr. Nixon, before you go you'd better sign a receipt for those goggles. You might as well keep them. You will want a well fitting pair.

SUP'T.—H—l, have I been wearing these damn things all the time? Guess they are comfortable all right. What do you want me to sign?

SAFETY MAN—This receipt.

(*While Sup't is signing receipt the nurse and Bill Tate enter and stand near door. Tate has bandage over both eyes.*)

(*Sup't turns to leave and sees Tate.*)

SUP'T.—Hello Bill, how are your eyes?

TATE—Not so good. The doctor tells me one is gone and he isn't sure about saving the other one. God! Nixon, this is h—l. It isn't that it is only h—l for me—think of the wife and kids!

SUP'T.—How is the wife taking it?

TATE—She is out in the car now. She won't come in! she says she doesn't ever want to see this shop again or any of the men in it.

SUP'T.—I'd better go out and see her.

TATE—You stay away! She is sore enough to kill you. She says that any outfit that knows how to protect its men and won't do it should be put out of business. God! if we had only listened to that new safety man. He had the right dope. Here I am—past forty—a wife—a couple of kids—and crippled for life.

Guess the wife is right. She says she will go to work as soon as I'm through with the doctors and hospital.

SUP'T.—Listen Bill, you tell your wife that she isn't going to go to work for a long time yet. We'll see you through on this and if your one eye is O.K. you can come back in here.

There is going to be a change here, Bill. . . . Billings you make

out the order you want—I'll see the boss and arrange to have him sign it. Come on to my office, Bill, we want to talk about this. (*Exit Sup't., Tate and nurse.*)

SAFETY MAN—(*Grabs phone.*) Get me Doctor Crouch. Hello—hello, Doc? This is Billings. Say, did you see Bill Tate this morning? You did? Now Doc, listen! I want to know the truth—will he be able to see out of that one eye? What? He will? Thank God! (*Hangs up receiver.*) (*Jumps up and grabs cap off rack.*) I'm going to tell his wife. (*Exits.*)

CHAIRMAN HALE: That was certainly a very interesting and illuminating play, and it ought to sell a lot of goggles.

Getting down to the second subject, "Getting Workers Back to Work." Frankly, I get a back fire out of this. Since all workers do not always work, I take it that what is really meant is "getting workmen back on the job."

This discussion is going to be led by Mr. A. P. Williams of the Chrysler Corporation, Detroit, Michigan. May I stop just long enough to mention the fact that every Santa Fe man feels a pardonable pride in the Chrysler Corporation for the very good reason that Mr. Walter P. Chrysler began his career as a mechanic, as an engine wiper, in a Santa Fe round house in a little city in Kansas?

I have the very great pleasure of introducing Mr. Williams of the Chrysler Corporation.

GETTING THE INJURED WORKER BACK ON THE JOB

A. M. WILLIAMS (Chrysler Corporation, Detroit, Mich.): The psychological angle, so far as the injured employee is concerned, undoubtedly will be well covered by some of the doctors this afternoon. There is one element that we have found that the doctors may not possibly touch upon —the spirit of competition in our intra-plant contests.

If the department is pretty well up towards the top and doesn't want to sink to the very botom of the contest in the performance rating reports, in lost days because of accidents, we find many employees actually begging to come back on the job in order that they may not lower their departmental standing.

Another element that we have found of value in selling the employee, in getting him in the mental attitude where he really wants to come back, is in handling all compensation on our own corporation checks. We settle with the insurance company afterwards, but when that employee is injured, he deals with our own adjusters, and settlement is made with our own compensation checks.

If the young man has ambition to get ahead with the company—the young man in the moulding department where it is important not to develop the habit of malingering—when he gets the first check, it is a corporation check and he feels that some place up the line somebody knows he is a burden, and he wants to get back.

With the hard-boiled, old-timer who has been off on compensation periodically, it wont have any effect, I will admit, but in a great many cases we have found it of extreme value.

The interest that the man loses day by day in his job, in his department, in the schedules, is one of the great losses that we can't measure. If the man is away from his department two days, when he comes back one of the first things he wants to know is, "Where are we at on our schedule?" If he is gone a week, the interest has waned. If he is gone three or four weeks, the interest has vanished entirely and he may have gotten out of step and possibly he may get a hunch, in his contact outside, that may take him to some other plant.

It is a constructive job. We may not be able to put that man back on his regular job. We may not be physically qualified at that time, but if we can bring him back and put him on other work and maintain his interest, make him feel he is independent, that he is not a load, I think we are doing a constructive job with that man mentally and possibly physically.

General Discussion on the Malingerer

CHAIRMAN HALE: I neglected to say that these discussions are limited to three minutes, and following each group you people from the floor are to be given a chance to be heard. We want to hear today from the shrinking violet type, the fellow who doesn't often get up on his hind legs; we want volunteers, not the old guard. Let's hear from you on the subject of "Getting Workers Back to Work," something that concerns every man in room.

F. L. WANZER (Steel Co. of Canada, Ltd., Hamilton, Ont.): Naturally, we have a great many accidents in our plant. It falls upon my department to try and get them back as soon as possible. The ordinary rule is that as long as they are under the doctor's care, he keeps them out and he has to return them to health. As soon as the doctor gives us an order for the man to go back to work, he is called upon by my assistant or by myself and we see that he comes back. We bring him back if it is possible, and we generally succeed in doing so.

The employment agent also is of great assistance in this work. He knows all the men very intimately and he is notified that the doctor has discharged the injured man, and he gets after him to see that he comes back.

Unfortunately every little while, mostly among the foreign element, we have men who delay coming back. With those men we make a point to go to their houses and see them and argue with them, and if our arguments fail and they do not come back, when they do come back, they are not given the job for a week or two, or sometimes three weeks. They are penalized to that extent until they get hungry and they want a job. That is passed on down the line—"If you boys don't come back, you won't get your job." We don't always carry it out, but we let them understand it might be carried out and we find it is a great help in bringing the men back to work.

SIDNEY W. INGHAM (Head, Accident Prevention Division, Ludlow Manufacturing Associates, Ludlow, Mass.): As I conceive the problem of getting the injured worker back on the job, there are two sharply defined classes with whom we have to deal. They may be called high and low mentality cases.

The high mentality cases are usually amendable to reason and can without difficulty be shown the advantage of an early return to work. With them the task is a simple one, demanding a straightforward statement of facts regarding the worker's condition from the viewpoints of the medical, employment and production departments. This case appreciates the intent and application of the compensation law and returns to work satisfied that he has not been imposed upon.

This Man Wants the Limit of Compensation

But the low mentality case is very different and a difficult one to handle. He has two thoughts in mind: first, that he has been injured; second, the law makes somebody pay for the injury. He thinks that where the law is involved in compensation he has entered into a kind of game where his wits must keep him out of employment as long as possible. His only idea is to get the limit of compensation.

He has a misconception of the intent and application of the law, and a lack of confidence in his advisers, at least those who do not advise him to malinger. No one sympathizes with him; he imagines himself up against a conspiracy of the safety man with the insurance company to rob him of his rights. Disability in such cases must be handled by the Industrial Accident Board and compensation should be paid wherever possible in a lump sum, whereupon the case usually makes immediate recovery.

In between these extremes we have cases where the worker suffers from a chronic or progressive disease and associates a disabling condition with some minor injury. He is perhaps honest in this conviction, even when it is evident that the trouble was present before the injury; it may even have been the cause of the injury. Chronic neuritis often precedes an injury and persists long after it has healed. Chronic fibrosis of a joint or a sinusitis that is undoubtedly chronic may suddenly become acute and the claim for compensation and resultant unwillingness to work ensue.

There is also the old employee who may be injured moderately and who decides that the compensation law is a pension law and often gets away with it. The chances are that he could not do much work before the injury and is not any worse after it, but he thinks himself unable to return to work.

Each of these cases is a study in psychology and must be worked out as circumstances direct. The man is either of high or low mentality and this determines the line of approach to the problem. The physician must decide so far as possible whether he is a fakir or not. That determines medical treatment. Finally, the accident prevention department must assimilate the information available, coordinate the factors and reason with those who are amendable to reason.

The production departments should work in harmony with the accident prevention and medical departments in placing partially disabled and fully recovered cases back at work. If it is possible to keep an injured man on the job in some capacity compatible with his condition, so much the better.

President Walter G. King Is Introduced

CHAIRMAN HALE: I am informed our meeting is honored by the new president of the National Safety Council. Some of you gentlemen may not have had the pleasure of seeing him, so I will ask Mr. Walter G. King to arise and give you a chance to give him the once over. (*Applause.*)

PRESIDENT KING: It was regrettable that there was not space enough to accommodate all of us at the banquet last night, but I want to say the party looked very good to me.

E. C. HUNTER (National Cash Register Co.): What do you men do with the fellow who has had an injury, who belongs to two or three benefit organizations and his total wages are more when he doesn't work? How do you get him back?

C. F. MCGUIRE (National Foundry Co., Erie, Pa.): We keep a check on all injuries with the doctor every morning. That is one of the main duties of the nurse—to find out from the doctor the condition of the worker, whether he is able to return to work. If not, can he do any kind of work? Yes. What kind? Anything you like. We then go to that gentleman and tell him, "We want you to report to work tomorrow morning at 7:00 o'clock. Report to the labor foreman. Give him this slip. He will know what to do with you. You are keeping down our accident record. We don't give a continental if you belong to the Sons of Italy; your place is here. We are providing work for you."

For that very particular reason we have what we call the cripple pile, the gaggers straightening department. We have no regular man on that job. That is where I take care of the cripples.

W. H. STUWART (National Carbon Co., Cleveland, Ohio): What is the effect on other employees when these men can't do over 10 per cent of a man's work?

MR. MCQUIRE: We have a mutual benefit association that is run by the men; it is their money; they keep that association going. There is nothing they hate more than to see one of their own fellow workmen trying to take some money out of their pocket, because this pays the death benefit besides. It is their ambition to keep building up that little fund, so that if they have a series of deaths, they won't be taxed or assessed, and they are just as anxious to see that fellow walking around the shop, and not drawing any of their benefit money.

H. D. LIVERS (Southwestern Bell Telephone Co., St. Louis, Mo.): The Bell Telephone Company also has a benefit fund from which all of the employees draw benefits when they are sick or injured; but one of the main things that we believe in is to keep the man out of the hospital, if such a thing is possible, away from the lawyers, so that we are not expos-

ing him to the danger of false representation. Then we try to create a loyal spirit toward the company and toward the department, to get him back on the job.

When we find a man is injured, or he reports that he is injured, whether he can work or can't, his supervisor goes out there immediately to find out something about it. If we know he is injured we go anyhow. He is off the job. We try to induce him to come back and we are usually successful. If he can't do any kind of work at all, we think he can go some place where he can learn a little more about the business; so we have in the larger cities schools where we can send a man when he can do little or no work and make him acquainted with some other branches of the business. We think it is a good thing to do that. It keeps him away from the lawyer sharks and it builds up his mind and his ability to do something more in a different and better work than he is in.

Mr. Williams expressed a very good idea, that instead of letting a man get a check from an insurance company as compensation, to have a company representative pay him with a company check. That is a mighty good idea. We do it, except when he gets into hands of a lawyer shark and we have to come across to the lawyer. Of course, you all know the lawyer gets half of anything that we pay. We thoroughly believe in educating our employees at a school when they can't work. If they can work, so much the better.

The Loyal Man Hates to Break the Safety Record

As an illustration I am going to tell you one thing that happened in our company and maybe some of the Bell Telephone men who are here will jump all over me for this, but I will tell it anyhow.

We had a fellow fall off a pole. His left arm was broken at the elbow. When the doctor was through, that arm was bandaged up. The other hand was broken here (indicating). He was in a department of 250 men in St. Louis, which had had only one accident during that whole year, and when the doctor told him he would have to lay off (I was there myself; I know it), that fellow cried, "My God, am I going to be the first man that breaks that record?" The other had been a fatal accident, no lost time. Here is a man who cried to go back on the job, regardless of the fact that the doctor told him to go to the hospital. We put him in the school.

CHAIRMAN HALE: Because of the uncertainty of the length of this program, we are going to pass this subject only temporarily, I am quite sure, and we will come back to it because it is a mighty important thing.

We now come to the subject, "Effective Use of Accident Statistics." Frankly, I am speechless and find myself in fear and trembling in the presence of one or two or three men who are clever enough to discuss statistics.

I take pleasure in introducing Mr George S. Thompson of the Detroit Insurance Agency, Detroit.

EFFECTIVE USE OF ACCIDENT STATISTICS IN SAFETY WORK

George S. Thompson, Detroit Insurance Agency, Detroit, Mich.

In discussing a subject of this kind, owing to the constant misuse of words of our English language, I feel that it is incumbent upon me to first define the word "statistics." We find that the definition reads something like this:

"Statistics is the art of collecting and combining facts in so far as they relate to any particular subject."

Let us repeat that first sentence again. "Statistics is the art'" and let us stop there for this reason. We can accumulate no end of data and to no particular purpose. Hence, it is quite true that the word "art" should be stressed. In my opinion, statistics is the yardstick with which to measure accomplishment, and if this is so, then the next step is "what kind of statistics shall we use to accomplish the best purpose?" For if we do not use the right methods we are merely carrying on a post mortem examination, and as you know, there isn't much interest in data of this kind.

It has been my experience that all data should take two classes—a visual class and a tabulation in the language of the day. In looking about for something of the first class (that is, visual) I found that anything that appealed to the eye made a lasting impression. So, back in the year 1914 when the nation was in a war frenzy it became necessary to tabulate certain conditions so that in an instant a person could grasp the situation. The result was the adoption of colors that, with very few exceptions, everyone was familiar with. We reduced these colors to a minimum number, allowing each one to represent a situation, and then with the aid of cross section paper and colored crayons we could depict the situation from day to day and maintain a balance by keeping our colors in line.

The results were so gratifying that in 1916 when installing a safety system in a plant, the speaker embodied this method and applied it to the accident frequency condition, with the result that the first month it took nine feet of cross section paper, the second month less than six feet and the third month a three foot sheet was ample. I have operated this system in a number of plants with very gratifying results. In the city of Detroit, a similar chart is being kept by a number of manufacturers, and after a brief explanation of the colors and what they represent, I do not believe there is anyone who could not at a glance instantly locate the kind of accident and where it has taken place.

This is statistics, and in presenting it, I do so with the idea of giving you the thought of visualizing the conditions in your plant. While it may be effective for you to have this on a sheet of paper in the shape of figures, the figures are all the same, and they do not impress one as a solid block of color would.

This is proven by a recent experience of mine. In installing this chart system in a plant recently and calling the foremen together to witness it, one of the foremen noticed that his line on the chart indicated 16 eye accidents. He immediately said, "I did not know that I was having as many cases as this and you can make up your mind that there won't be that many during the next 15 days." The result was that there were only two additional eye cases for the balance of the month. That foreman was sold in less than five minutes and he had the reputation of being hardboiled. This is only one of many instances and again the word "art" is brought into prominence by this fact.

This chart can be overdone and become burdensome—so I suggest that you first show lost time accidents only. Next, after lost time accidents disappear or become less frequent, cases that call for medical aid and redressing should then take their place on the chart; and after these are reduced then report all cases regardless. This would stretch out over a period of possibly a year and the progress can be noted by the engineer in charge.

As we are all at the best grown up children and endeavor to travel along the lines of least resistance, if we are to obtain the desired impression we should make our implement of impression as simple and have it operate with as little brain exertion as possible.

CHAIRMAN HALE: Next we will have Mr. H. G. Hensel, Safety Director, The Youngstown Sheet & Tube Company, Chicago.

ACCIDENT STATISTICS

H. G. Hensel, Safety Director, The Youngstown Sheet & Tube Company, Chicago, Ill.

Accident statistics are the basis of all good safety work. We know from experience that those companies that are not interested in accident prevention do not know how many accidents they are having in their plants, nor do they take the time nor trouble to keep accident records.

On the other hand, every company I have ever heard of that is interested in accident prevention keeps accident records. They can tell you exactly how many accidents they have each year, how much they cost, how much time lost they represent; they analyze these records by causes, by departments.

It is foolish in the short time assigned to me to try to tell you how to compile accident records. There are various standard methods of doing this work and these standard methods are outlined in various Safe Practice Pamphlets and other publications of the National Safety Council.

I would, however, like to take just two minutes to show how these accident records and statistics can be used to the best advantage.

There are four main uses for accident records and statistics.

1. To convince the management that accidents constitute a real prob-

lem in the plant and to secure the support of the management in adopting all reasonable suggestions for preventing accidents.

2. To convince foremen and other supervisors (many of whom are skeptical, hard-boiled individuals) that men under their supervision are injured from time to time and that they (the foremen and supervisors) must be interested in accident prevention if they wish to hold down their jobs.

3. To convince the workmen that accidents are happening in the plant and that in the majority of cases these accidents can be prevented by carefulness on the part of the very men who are injured.

4. To show the safety department where accidents are happening and to enable them to pick out the most important points for immediate correction. A properly devised accident report will enable the plant managers to know just what departments are having the lost-time accidents and, therefore, which department heads he should ask to check up on their accidents and take steps to eliminate them.

CHAIRMAN HALE: I have a very delightful surprise for you. Through the courtesy of Mr. Harry Guilbert, Safety Director of the Pullman Company, we are going to hear their justly famed quartet of porters.

(The Pullman Porters' Quartet sang amid applause.)

CHAIRMAN HALE: I knew you would enjoy them. There is enough harmony in those boys to supply an army of men. I want you to know they are in regular service of the Pullman Company. They are the fellows who give you more comfort and privileges than many of you have in your own homes.

THE EDUCATION OF CARELESS CAL*

A PLAYLET—By Geo. M. Aitken

Reproduced by G. E. Burns, National Safety Council, and A. Berquist, Youngstown Sheet & Tube Co.

CHARACTERS—Safety Sam and Careless Cal

Scene: Bulletin Board near the fireroom showing part of the brick wall.

(*Enter Safety Sam with a bundle of bulletins under his arm, dressed in ragged, greasy overalls.*)

SAM: Well, we sure had a fine meeting last night. I wasn't caring much about going, but the boss asked me to come: so I couldn't very well refuse. And I was glad I did. Got a lot out of it, too. The Safety Engineer from the National Safety Council was there with movies. He also gave us a nice talk on what Safety means to the worker. He said that if every man would learn to be reasonably careful there wouldn't

*Originally played by H. E. Reynolds and Geo. M. Aitken, at the Safety Conference September 8, Portland, Oregon.

be half as many accidents. I wish that bone-head, Cal, had been there. I asked him to come but he said he had a date. Out with that jane of his, I suppose. Well, I guess it is up to me to get a little safety into his system, or he is liable to hurt someone else. The boss made me a member of the safety committee. Also made me wet nurse to the First Aid Kit and bulletin board. I have a little time before my rounds. I think I'll put it to a good use.

(*Holds up a bulletin. Baby's picture—"The Greatest Safety Booster of Them All!"*)

Now that's a humdinger. Ayone with any horse sense at all could see that Safety is meant for him and his family. I'll post that one at the front gate.

(*Picks up another one on ragged clothes.*)

Here's this poor fellow caught on a shaft because he wore loose and ragged clothes. By Gosh, mine ain't any better. Lesson No. 1 for me. Got to practice what I preach, or these guys 'll razz me off the plant. (*EXIT.*)

(*Enter Careless Cal.*)

CAL: I wonder where that doggone oil can is. I left it somewhere around here. Hello, what's this? A new sign board? Lots of signs around this plant. I don't know what good they are. Makes you think we are running a kindergarten instead of a factory. "Safety First!" Well, that's all right for kids and old women, but I am not interested. In fact, if the truth was known, it's a scheme to save money for the boss who gets a simp like Sam to do the boosting. Gee Whiz, but I am tired. That stuff had an awful kick in it. Damn that oil can! (*Sits down and falls asleep.*)

(*Enter Safety Sam with a new suit.*)

SAM: Wake up! This is no place to sleep. Out with that tin Lizzie last night?

CAL (*Still half asleep.*): Lizzie? No, Susie. Red hair. Awful pretty. Some Kid!

SAM: You've got to quit this stepping out late at nights. It ain't safe, Cal.

CAL: What do you mean, safe? What's eatin' you? Been to a revival meeting?

SAM: No, Safety Meeting, last night. Learned a lot about safety, too. You should have been there. You would have got a lot of this hard-boiled stuff out of your head.

CAL: So that's where you got this lecturing bug. All spruced up this mornin', too. Glad rags, face clean, 'n' everything. Got a stand in with the boss, so he gave you a new soft job to put up the bulletins. Did he raise the ante with it? I guess not, it's one of them doing-it-for-love jobs.

SAM: No, I am going to do it for the love of humanity.

CAL: Male or female? Well, I see my oil can. Guess I'll go oil the engine for the love of the dollar.

(Exit Cal.)

(Sam proceeds to post a bulletin on falling objects. A noise is heard.)

(Cal enters with a cut on his head.)

SAM: Hello, Cal, what happened?

(Leads him to a seat and begins to bandage up his head, illustrating proper head bandage.)

CAL: I left a hammer on the ledge above the old engine, and when I started up, the hammer slipped off and hit me on the bean.

SAM: Well, the cut isn't very deep. You're lucky. Better go down to the doctor and have him take care of it.

CAL: All right, Sam, I will tonight.

(Exeunt both. Sam re-enters and posts another bulletin on eyes.)

SAM: Lots of people get their eyes knocked out. The safety man told me the other day that there were 52,000 industrial blind in this country. Not so bad to lose an arm or leg, but with both eyes gone a man is in pretty bad shape.

(Noise is heard. Cal enters with a black and bloodshot eye.)

CAL: By George, that was a narrow one! The damned emery wheel broke and just missed my head. A piece hit me in the eye.

SAM: Did you have the hood over the wheel?

CAL: No.

(Sam proceeds to bandage eye, illustrating proper eye bandage.)

SAM: What's the use of the boss providing safeguards, if you don't use them? It don't cost you anything to wear goggles. I say you're lucky you didn't get an eye knocked out.

CAL: Well, fix me up, and quit your lecturing. I am the one that's hurt; so quit your crabbing.

SAM: I am only giving you a little good advice, you bonehead. Why don't you get wise and use a little safety precaution?

CAL: I'll think it over. Maybe if you keep after me long enough, you'll wear me down.

(Exeunt both. One week elapses.)

(Enter Sam, and posts a bulletin about a man being caught on a shaft.)

(A louder noise is heard.)

(*Cal enters with a broken arm.*)

SAM: Cal, you've got a bad one this time. Likely lay you up for three or four months.

(*Proceeds to bandage Cal up, illustrating proper arm bandage and sling.*)

What were you doing to get into a mess like this?

CAL: Don't just exactly know. Must have been that old jumper of mine that caught first. I put down my hand to get away, the shaft caught my hand and I guess,—well, my arm's broke. Ow! Sam, it hurts like hell!

SAM: Well, Cal, I am not going to say much to you. You will have plenty of time to give this safety business a once over when you're in the hospital.

(*Exeunt Cal and Sam.*)

(*Four months later. Enter Sam.*)

SAM: I have been posting bulletins for a long time around here. Last night we had our Safety Committee meeting. The secretary reported that accidents had been reduced 50 per cent since we took up safety work under the committee system. A new committee was formed and I was elected chairman. I like the work; it's mighty interesting. I haven't seen Cal for some time. He's out of the hospital and should be showing up one of these days. If he hasn't learned his lesson by this time he never will. It's too bad that some people have to get it by experience. They'd save a lot of suffering if they'd get the spirit of caution into their system. I have no hard feeling for Cal, or anyone else, but I don't like them to be hard-boiled about it. Well, I'll be damned! The fatted calf has returned. Let's kill the prodigal.

(*Enter Cal with a new suit of overalls on; and Cal and Sam shake hands.*)

SAM: Well, Cal, I am sure glad to see you, old chap. How are you feeling?

CAL: Fit as a fiddler. I sure had plenty of time to think what a damn fool I was not to fall in with your Safety First ideas. A hospital is all right when you get hurt, but who wants to get hurt? No, sir, no more hospitals for me. I have learned my lesson. Say, when you have another safety meeting I want you to count me in, and give me something to do.

SAM: Well, Cal, I am glad to hear that you are going to be one of us. I have just been made chairman of the committee. I am going to appoint you custodian of the bulletin board and the first aid box. I am sure that you will fill the office with credit to yourself and honor to the company you serve.

CAL: You used to call me Careless Cal. No doubt I deserved the title, but you can call me Careful Cal from now on, because I am going to live up to it.

SAM: Congratulations, Cal! Shake!

(*They shake hands.*)

CHAIRMAN HALE: That, too, was a mighty interesting demonstration. I am wondering how many got from it the thought I did; that is, if accidents and injuries must occur, wouldn't it be a fortunate thing if they were confined to the hard-boiled.

We have come to topic No. 5, really one of the most important, and easily can be made one of the most interesting subjects on the program, "The Best Safety Kink I Have Known."

Mr. Ira V. Kepner, Pennsylvania Salt Manufacturing Company, Philadelphia, Pa., will talk from the standpoint of a chemist, I believe. The salt business, as you know, is an all year round proposition rather than a seasonable one.

"THE BEST 'SAFETY KINK' I HAVE KNOWN"

Ira V. Kepner, Pennsylvania Salt Manufacturing Company, Philadelphia, Pennsylvania

One of the best "Safety Kinks" I have known,—for the prevention of explosions, fires and accidents, in a chemical plant consisted of two discarded "automatic sprinklers" with the heads removed,—connected to a water line and suspended inside a storage bin where sulphur was being dumped from railroad cars, overhead.

The chemical concern I have the honor to represent manufactures heavy industrial chemicals, among this group being sulphuric acid, oil of vitrol, and oleum, all of which are made from sulphur. We receive our sulphur in ships; it is unloaded into drop-bottom railroad cars, which are taken up a trestle to the top of the storage bins and dumped. As the sulphur falls dust arises, causing the ever present possibility of a dust explosion. At one time we had a great many dust explosions from this cause, and many a poor workman had his clothing blown off and was severely burned on account of them. Safe clothing, goggles and respirators were a great help in the protection of the workmen, but we were at a loss to know what caused these frequent explosions and how they could be prevented.

There were several iron rods passing through these bins, and inspectors from the Board of Fire Underwriters, who called frequently to investigate the fires caused by these explosions, were of the opinion that the sulphur, striking the iron rods, caused "static-electricity" which ignited the sulphur dust.

The underwriter inspectors, as well as the state factory, and insurance inspectors and our own chemical and electrical engineers were asked to help solve this problem. They certainly made an honest effort; they

grounded all the bolts, rods and other iron work about the bins and made a number of other experiments; but the explosions of the sulphur dust were just as frequent, and to this day the cause of them is still unknown.

An Idea Gathered From the Round Table Discussion

Now to illustrate how much good can come out of a ROUND TABLE DISCUSSION, such as this: At a Round Table meeting of the Chemical Section of the National Safety Council, held in the City of Wilmington, Delaware, a few years ago, I presented my dust problem. In answer, one of the members informed me that the firm he represented had a similar experience while loading a vessel with sulphur by means of a "clam-shell" bucket. As the discharge of sulphur from the bucket dropped into the 'hatch" an explosion occurred; the vessel took fire and was burned to the water-edge. Before the next ship was loaded some one in the employ of the company conceived the idea of spraying water from a hose on the sulphur as it left the "clam-shell" bucket. They tried the experiment; it worked, and since that time thay have had no more fires or explosions from that cause.

Bringing the thought of that ROUND TABLE discussion back to our own plant, and discussing it with our boss pipe fitter, he hit upon the plan of installing a water line, equipped with two old, discarded automatic sprinklers, minus the heads, inside the sulphur bins. This plan was carried out; we now turn on the water, which sprays the sulphur as it is being dumped. Some two years have passed since we installed the first sprays, and we have not had one single explosion or fire in the sulphur bins since. At this time all our sulphur bins are equipped with sprinklers.

The first installation and cost of this little device was not more than $5, and I estimate it has saved our company hundreds of dollars each year in fire losses and compensation payments alone; and it has saved our employees untold pain and suffering. Truly, Round Table Discussions pay big dividends.

CHAIRMAN HALE: On the subject of round table discussions and their potentialities, there was a gentleman in the Steam Railroad Section this morning who told the story of a bachelor who gave a dinner. One of the choicest morsels offered was watermelon. He gave instructions that the watermelon should be thoroughly saturated with a very choice brand of liquor.

It was noted when this course was finished that the melons had been eaten down to the green of the rind and while no one said anything about it, it was subsequently noted that every gentleman present put the seeds in his pocket and carried them away with him.

It is not constitutionally possible for us to consume all of the melons offered to us at this Congress or at this session, but it is possible for us to put into the pockets of our minds seeds from which we may subsequently grow many useful and constructive thoughts.

I do not believe that Mr. Auel of the Westinghouse Electric & Manufacturing Company is in town. Has anyone Mr. Auel's paper?

W. F. Ditmer (Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.): At the conclusion of this morning's meeting I was handed a special delivery letter advising me that Mr. Auel was ill and unable to attend and for me to take his place. Those of you who know and have heard Mr. Auel know what a difficult job I have.

SAFETY INSPECTION CALENDER

ANNUALLY

CRANE OPERATORS HOOKERS ON — TOOL AND EQUIPMENT INVENTORY — ELEVATOR TANKS

SEMI-ANNUALLY

ELECTRICAL HAZARDS
FOOD HANDLERS
FIRE DRILLS
STRETCHER CABINETS
TRUCKS-ALL TYPES
WINDOW HOOKS
OVERHEAD WALKS
WINDOW CLEANERS BELTS
STAIR TREADS AND RAILINGS
MUSHROOM TOOLS
LADDERS
GAS MASKS
BELT LACING

QUARTERLY

LIGHTS
EMERY WHEELS-WATER TANKS
LEATHER GUARDS
WARNING SIGNS
ACETYLENE & ELECTRIC WELDING OUTFIT
GOGGLES STERILIZING OUTFITS
SHOWER BATHS SOLDER POTS
HIGH PRESSURE AIR LINE
SAFETY BROOMS
STAIRWAYS

MONTHLY

VENT PIPES
FLOOD GATES
SAFETY MEETINGS
PUNCH PRESS -TRIPS

WEEKLY

FIRST AID CABINETS
BULLETIN BOARDS

CONTINUOUS

DIP TANKS-ELEVATORS-CRANES-CRANE SLINGS-VENTILATING FANS
FIRE EQUIPMENT
FIRE EXTINGUISHERS- BUCKETS-DOORS-VALVES-HOSE-SAWDUST BOXES
INDICATOR POSTS AND HYDRANTS
VENTILATORS DUST COLLECTORS

I have a chart on which he proposed to speak and inasmuch as the chart is self-explanatory, it leaves me out very nicely. If I may, I will post this chart and if there are any questions to be asked later, I will be pleased to answer them, and as far as the correctness, or rather in your judgment whether the time allotted for the inspections is correct, that, of course, concerns your own individual departments. This is as we thought best for a safety calendar inspection.

It is easy enough, as you all know, to set out to do something, but the biggest part of the job is to do it, and this is the method we have followed to keep us regularly on the job.

CHAIRMAN HALE: While all of us who know Mr. Auel personally regret his absence, Mr. Ditmer, we are very happy to have had you.

We come now to Mr. R. C. Salisbury, manager, Health and Safety, The Fisk Rubber Company, Cudahy, Wis. I take it there is very little chance that Mr. Salisbury will stretch his time allowance since his company for years has been trying to teach the public when "It is time to retire."

MR. SALISBURY: It might be becoming if I could retire. You will notice on the program that this is "The Best Safety Kink I Have Known." That is just singular, and if you get one idea from what I say, you will be doing well.

Find the Most Careful Man in the Plant

We recently discovered an idea, not original with us in any way, but we put it into service about four weeks ago. The idea met with considerable favorable reaction and we are very well pleased with it.

Recently we made some additions to our buildings which necessitated the purchase of a number of mirrors. Before the mirrors were put into the rest rooms, we mounted four of them on four separate flat trucks. The mirrors were then covered with a canvas and on the canvas we painted—"Lift this canvas and see if the most careful man in the plant is shown." And on the face of the mirror we printed that old familiar slogan—"The best known safety device." We tried to bring out that the best known safety devise is a careful man. The trucks were moved from one part of the plant to another and it met with considerable favorable reaction. A great number of employees looked at themselves and a great number didn't because they were told it wasn't necessary; but it did have a favorable psychological effect.

CHAIRMAN HALE: That was very interesting.

We will pass on to Mr. Dalzell of the Ferro Concrete Construction Company, of Cincinnati.

JOHN W. DALZELL (Ferro Concrete Construction Company, Cincinnati, Ohio): It is a pretty well conceded fact that 80 per cent of our accidents are intellectual hazards and probably 20 per cent are physical hazards. I am not going to try to say very much about the best safety kink I know as far as physical protection is concerned, but I have something very deep in my own mind that I am convinced we missed a bet on.

One of the first things I knew about safety was that if we could get men to think safety, our whole problem would be solved. That has been tried. That is trite and like so many trite sayings, there is a good deal of truth in it. After all, if we can get men to think safety, we have solved our problem.

What we think, we do. On the opposite, it is a tentative psychology that what we want to forget, we forget. Now it seems to me those two diametric theories are worth thinking about in getting men to think safety.

When we present safety as a bugbear to a man, as something he must do or something he must not do, I don't think we will get very far. I

think we have gone too far on the negative idea of safety. We have gone too far on the "thou shalt not" theory when what we need more is the positive theory of accident prevention to put it (as we have heard probably a good many times today) on a productive basis.

Accidents Are Caused Because Men Forget

Accident prevention is part of your production cost or savings and so we need accident prevention on a positive basis. There are a good many agents for putting over the positive theory of accident prevention—house organs, safety meetings, a thousand and one things you know to put over the idea of safety in the minds of men, but the idea, as I see it, must be positive; we must get away from the negative idea of safety.

After all, accidents are caused because men forget. I think maybe it is because we painted accident prevention as something that we force our men to do. Men forget to be safe. Men are not safe minded. You know it doesn't take very much training for a man to form a certain habit, a fellow to become girl-minded, and lots of fellows are religious-minded. That has something to do with the subconscious. We hear a lot about subconsciousness these days. Let's see if we can't through some positive means, not negative, make men safety-minded, and let's get away from the idea that safety is a bugbear. Negative accident prevention is made psychologically. When we tell a man "thou shalt not," it is bad psychologically. If we can lift him up, if we can get the positive idea to him that safety is something productive, that safety is something for his own good and for the good of our plant, I think we are going to get some place.

I believe that is what all of us have to do. Let's get over the positive idea of safety as against the negative idea of accident prevention.

CHAIRMAN HALE: It is to be regretted we did not have more time for you, Mr. Dalzell.

We come to Mr. F. H. Rosebush, Department of Industrial Relations, Nekoosa Edwards Paper Company, Port Edwards, Wis.

MR. ROSEBUSH: The previous speaker has taken the words out of my mouth. The best safety kink that I know is the man in the main office who has time in the 12 or 14 busy hours of the day to sign an order putting safety into the mill on the same basis as he has in his production program. I think the manufacturing and business men of the United States in a large measure are responsible for the success of the safety movement. I think they are entitled to their just returns. I do not minimize at all the humanitarian side of safety and I can not hope to point out that side to you as well as Dr. Wishart did on Monday in our first session; that is admitted; but I do think as the former speaker has said, the time has come, and it is so in our plant where we have told our men that we expect profits from the safety movement and that they expect profits from the safety movement. We tell them there is a direct return to them in money and in things that money can not buy, if they are good safety men. We tell them that the company in putting safety into the

plants expects better production, better men, because our idea is that the same qualities that go to make up good safety men, go to make up good workmen.

We use safety kinks as well as other mills. We believe in them because we think they are necessary to put across the safety idea, but as the speaker before me has stated, eventually we must get to the positive side of it.

Safety Markers Along the Walk to the Plant

The best thing we ever employed in our plant was this: we had a concrete wall running from the employment office to the mill in which there were some 150 concrete blocks, and in order to put this thoroughly into the men's minds, we started at the block nearest the office with the first day in which there was no accident. On every day there was no accident we put the date on that block. At the side of the block we set up a wooden standard also with the date, calling attention to the fact there had been no accidents. The men got interested in that, and as they walked down that way every day, they could pass over the record of the previous days and see what they were doing. That got into everyone's mind in such a way that for five months we did not have a single accident in that mill employing about 440 men.

That was the best safety kink we used.

CHAIRMAN HALE: There is not a man in the room, Mr. Rosebush, who would not willingly and joyously join in singing the chorus of your song.

We come to Mr. W. F. McClellan, safety engineer, Armour & Company, Chicago. If I remember correctly, this is the first time we have ever had one of the largest industries in the country at one of these general round table sessions—the packers.

MR. MCCLELLAN: Gentlemen, I may represent the packers, but I didn't come here today to throw the bull.

I notice that I am the last speaker on this program and I am not going to wait until the chairman tells me I am at a period or comma. I am proud to stand before you today and happy to know that the two speakers who preceded me practically had the same idea of the best safety kink. I don't know whether you want to call it a kink or a kick, but my conception of the best safety kink that I have known is getting out and getting up on a soap box, a truck or a table and getting among the boys with overalls and talking to them. Then for weeks afterwards stand back and note the results of those labors.

Mr. Chairman, that is the best conception I can get of a safety kink. I am not going to take up more of your time, but I want to let the boys hear the discussion of all previous speakers and I will be glad to answer from the floor any of your questions that I can.

CHAIRMAN HALE: We now want to go back and hear from the floor, taking the subjects as they come. Let's hear about getting workers back on the job.

R. B. MOREY (Industrial Accident Prevention Associations, Toronto, Canada): I have listened to this discussion on getting men back to work and

I have set up in my own mind this question. How much do you want to get men back to work? From time to time we hear about people wanting to do things. We have been told today that if men will think, there will be fewer accidents. What I want to say is this: as far as getting men back to work, if you will think and act, they will get back on the job.

CHAIRMAN HALE: You fellows are going to force me to fill out this program by a few minutes unless you come to my rescue, or your own rescue.

Making Effective Use of Accident Statistics

We will go to the next, "The Effective Use of Accident Statistics." Surely someone has something to say on that.

H. D. LIVER (Southwestern Bell Telephone Company, St. Louis, Mo.): I would like to say just one word—good.

CHAIRMAN HALE: If I understood him correctly, he grabbed the short horn of his dilemma there.

MR. MCGUIRE: I believe it is a true saying. The president who has just gone out of office, paid $20 for a memory course in Chicago last week. Of course, he expected to get a large volume of papers. He told me when he got his diploma, the answer to that $20, it contained a little slip of paper, "You can remember 10 times longer what you see with the eye than what you can hear with the ears."

CHAIRMAN HALE: The next is the playlet on posters.

MR. HEWITT (American Lime & Stone Co.): I have heard conversation to the effect that it would be very nice if the two playlets were available for the use of the members.

CHAIRMAN HALE: I have been told by Mr. Kuechenmeister that the manuscript for these playlets can be had by asking the home office of the National Safety Council for it.

MR. KING: When the convention was held in Detroit the last time we witnessed a very interesting play. After we went home, one of my associates and I wrote up a play that was quite successful. I would suggest that perhaps a play of your own can be more effective than somebody else's. I know ours went across big. We took a chance when we asked the general manager to see it, but it went across big.

MR. THOMPSON (Detroit Insurance Agency, Detroit, Mich.): I often think that most of you boys who are wishing for success in a lot of your enterprises do not really wish hard enough, and I want to leave this little story with you.

There is a story told that in the days of old, a youth was looking for knowledge and he naturally drifted to the great Greek god. Finally when he came into the presence of this great Greek teacher, he said, "I would wish knowledge."

The teacher said, "How badly do you want it?"

He said, "I wish it."

"Then follow me," and he took him out into a field and then down into a stream and he walked into the water until they came up to their chins, and the teacher being much taller than the student, pushed him down and

held him down until he ceased to struggle. Then he brought him out and laid him on the bank, and gradually let him come to. As the student came to, he blinked his eyes and began to breathe. And the teacher said, "Do you still wish knowledge?"

He replied, "Yes."

The teacher said, "What did you wish the most for when you were in the water?"

He said, "I wished for air."

The teacher said, "When you wish for knowledge as you wished for air, you will get it."

Must Create the Proper Mental Attitude In Men

ISAIAH GORDON (Bureau of Safety, Chicago): It seems to me that we might rightly cover this entire program by trying to get into the minds of our men the proper mental attitude. It has been touched upon to some extent here this afternoon, but I don't think we go far enough along that line. We must create the mental attitude that was evident in the little boy down South. This little colored fellow was engaged in a baseball game with other boys of his age when one of our men from the North was passing by. Seeing this game of ball, he thought he would be friendly. He went up to one of the fellows and said, "Buddy, what's the score?"

The little colored fellow said, "Let's see; I think it must be along about 88 to nothing now."

The man said, "They must be mopping up with you."

The colored boy said, "How do you get that stuff? Why man, we ain't been to the bat yet."

That is proper mental attitude. That is what we want to get into the minds of our employees.

Recently I went into a shop two hours before I was due for their meeting. They didn't know I was in the shop. I saw the fire flying from the emery wheel. I was anxious to see whether the man had his goggles on, and I was glad to see that he did. That is proper mental attitude.

Just recently we had a contest and we have it now between two large electrical plants. Both of the plants have the same number of lost time accidents. However, one of the plants is just a few more man-hours ahead of the other. In the plant that was ahead, a man using an air hose and holding the nozzle rather loosely was injured when someone turned on the pressure, causing the hose to fly up and hit him in the mouth. He spit out a mouthful of blood and three teeth. He said, "Let me go to the dentist or doctor, but I will be back on the job tomorrow morning. I am not going to cause this contest to be lost on account of my carelessness." Mental attitude—that's what we want to get into our men.

A. R. GRAY (Peoples Gas Co., Pittsburgh): Just a word as to what mental attitude will do. In the year 1924 we had a rate of 13.46 on our accidents, just common accidents. We decided we had to get the proper mental attitude. We succeeded in getting it by personal contact with

the individual men, and I must say we have an average of 1,200 employees. As a result of that, our severity rate for the year of 1925 is .18, and for the first nine months of 1926 it is .10.

CLOSING ADDRESS OF CHAIRMAN ISAIAH HALE

CHAIRMAN HALE: The gentleman gives me the chance I really wanted but as stated, felt a hesitancy in taking. As I said in my opening statement, I have been asked to make a statement here which I can probably do in a few minutes and still let this discussion go on. It fits in. The substance of it was contained in an address I made last spring before the section of the A. R. A. and comes under the head of "The Best Safety Kink I Have Known."

A great many foremen, gentlemen, have as their understanding of their responsibility, that they must not only watch their men, but must stand over them to see they make more than a mere bluff at doing an honest day's work.

I am telling the foremen on our railroad that their principal function, as I see it, is to give their men a right viewpoint on their relationship with the Santa Fe Railroad, to give them higher ideals in life, to teach them not only their own individual responsibilities but to give them a decent appreciation of the rights of other people; to make them realize that their job is the best friend they have in the world, to make them realize that the man who has a job that is paying him, say, $1,800 a year is receiving a six per cent investment on $30,000. This may help make him realize that his job is worth $30,000 to him, and is therefore entitled to be very carefully guarded.

I claim that a right mental attitude towards his job is the one thing that every man must have if he is ever going to become an efficient or safe workman, if he is ever going to get out of the ruts along life's great highway and over to the middle of the road where the way is smoother and where the route to success is now direct and sure providing only you can so change the man's viewpoint on life that he will feel reasonably sure of himself; to make men realize that no man can fairly expect recognition and advancement until he has earned it, but having earned it, recognition is sure to come to every man; to make men realize that the secret of real happiness or success lies not in doing the things we like to do, but liking the things we have to do, regardless of what those things might be; to make them realize the limitation of a man is not what he wants to do and can't, but rather his limitations are the things he ought to do but doesn't do because of indifference or laziness; to make them realize that while it is easy enough for a small man to make a big job shrink, it takes a big man to make a small job bigger; to make them realize that doing only what is necessary to get by is never doing enough.

We should hold up as a motto the man who from a sense of duty does the best he can today and forgets about it, and we should warn against the type of man who when spoken to about his shortcomings, promises to do the best he can tomorrow, and forgets all about it.

I contend that the foreman who undertakes to build locomotives or dig oil wells or make steel or refine salt and who does not at the same time undertake to build character among his men presents a mighty sorry spectacle as a leader of men.

I no longer talk safety in the orthodox way I did 15 years ago. To the limit of my feeble capacity, I am trying to build up the morale of our men. I am trying to increase their loyalty to themselves and to our company.

A Man's Job is the Best Friend He Has

As I said, I am trying to make each man realize that his job is the best friend he has, reminding him that no man has any number of friends who do a fractional part as much for him as his job does for him, and if his job is his best friend, it is only a matter of common decency and fair play for him to treat the job like a friend and be good to it.

One of the problems in industry, with you the same as with us, is the man who knows a lot of things that are not so. My observation on that is that the thing a man is down on is generally something he is not up on, and that opens a very wide and expansive field for whatever educational efforts our supervisors may want to put into effect.

We must have coooperation, of course. The other day I got a new slant on what cooperation meant. I heard of a man who was asked, "What is meant by cooperation?" He thought a moment and said, "As I see it, the first essential toward cooperation between others and myself is for me to make myself so other men can work with me." There is a lot of food for thought in that for the man who finds difficulty in working with other people. The real trouble is that other men not only find it difficult at times but actually impossible to work harmoniously with him, and with him means with you and with me, if you please.

A rather impressive number of summers and an equal number of winters have taught me a lot of things, but unfortunately it has come rather late in life. I have been taught that other people meet me just about as I treat them. Time has taught me that when I go out looking for trouble, I invariably find it. And time has also taught me that the Golden Rule is the sum total of all wisdom for getting on with the world.

Teaching a man to be loyal to his employer will bring about a certain loyalty to himself and a loyalty to his company. This is the best world that any of us have ever lived in, and if you are an American, your home is in the best country in that world; with that much of a start, I claim no American has any right to complain about anything because if he is willing to shoot straight, if he is willing to sweat a bit upon occasion, if he is willing to give a little as he is to grab a lot, his ultimate success will be beyond his dreams.

We hear a lot nowadays about service. Service is only a modern symbol for countless human virtues that have been known since the beginning of time. Service is the mother's solicitude for her children; it is the long hours of toil your father and mine gave to us; it is the promises kept and burdensome debts unrepudiated. It is all of these

and a million other things that only the recording angel will number, but I am trying to make our men realize that service is the one thing that every man must put into his work and life if he ever expects to take anything worthwhile out of either one of them.

John Burrows, the world's great naturalist, said that "a man's life may stagnate as literally as water may stagnate, and just as motion and direction are the remedy for one, so is purpose and activity the remedy for the other."

I never have been able to get very far nor stay long away from the underlying thought in safety work, as I see it, that in an improved viewpoint, in a little fairer mental attitude towards their jobs, in an awakening in workmen of an ambition to be somebody and do something worthwhile, lies the panacea for most all of our troubles; and by the same token I am convinced that a realization of that ambition, that a man's advancement in responsibilities, the acquisition of those things every man wants most in life, the respect of his family and friends, are all absolutely dependent on his mental attitude towards his job.

The average man has no conception whatever of the latent force of his own personality and he hasn't any appreciation of it simply because he has never drawn from it.

Only One Man Out of Fifty Really Thinks

Roger W. Babson made a very illuminating statement not long ago when he said, "Only one man out of 50 thinks, only one in 500 ever originates anything, and at the age of 50 years 53½ per cent of the male population of America are down and out because of indifference or laziness."

I tell you, gentlemen, it is a very sad commentary on our intelligence as a nation when we are told that at 50 years of age, the best years of any man's life, that 53½ per cent of our male population are down and out, because at no time in their lives did they give a damn, and the reason why that is true is because you men and I have failed to function as we properly should. Following that thought, I am daily warning our men, especially young men, against the tendency for giving counterfeit labor in exchange for honest money, trying to make them realize that in time a man will become what they think and act, a counterfeit themselves.

In railroading just as in every activity, catastrophe is only a step or two behind integrity, and if you will look under the hood of any failure on life's highway, you will find there unmistakable evidence of where some fellow has tried to use a substitute for common honesty, when there is no such thing, when there has never been and never will be. Thus many men go cheating through life because of a wrong viewpoint, and again, I remind you that many of them have the wrong viewpoint because of your shortcoming and mine.

I didn't mean to trespass on your time to tell you that, in my humble opinion, in an improvement of the mental attitude of a man lies the best safety kink that I have ever known.

ADJOURNMENT

Annual Banquet

Wednesday, October 27, 1926

CHARLES B. SCOTT, Chairman
President National Safety Council

THE Banquet Session came to order at 8:55 o'clock, President Scott presiding.

PRESIDENT SCOTT: Ladies and Gentlemen: This is our fifteenth birthday party. This is our sesqui-decennial birthday for we are 15 years old today. We are growing. Our parties are getting bigger and bigger. We are becoming more and more interested and we are becoming happier and happier in our work and in our anniversaries. Those who come to see us once always come again. There are new faces here but the old faces are always with us because those who have been associated with us in the past have always remained true to the cause and loyal to our Council.

We welcome you to this birthday party. We hope it will be a happy one for you and we hope that it marks our entrance as a Council into the years of life when we are just beginning to appreciate our responsibility, just beginning to get a vision of the work that is before us in our later years, and at this party tonight we wish you a happy time and a most cordial welcome.

We have some birthday greetings from some of our friends. This is from the International Labor Office of the League of Nations:

FROM INTERNATIONAL LABOR OFFICE, LEAGUE OF NATIONS, GENEVA:

Safety men throughout the world are looking to the Fifteenth Annual Safety Congress to develop new ideas and ideals for universal war on accidents. May your efforts be crowned with success.

(Signed) International Labour Office,
League of Nations.

FROM NATIONAL SAFETY FIRST ASSOCIATION, ENGLAND:

In the name of National "Safety First" Association, I send you hearty greetings for success and utility of your Fifteenth Annual Safety Congress at Detroit.

We are holding our first Public Safety Congress on 26th and 27th of this month, and trust our joint deliberations may prove universally helpful.

The safety of the public is the supreme law. Safety work has no national boundaries. We join with you in one common aim.

(Signed) W. Joynson-Hicks, President,
National Safety First Association, London, England.

FROM ASSOCIATION DES INDUSTRIALS DE FRANCE:

May great results come out of your sessions. Feel sure reports of your congress will inspire us to fresh efforts.

(Signed) Julien Caen, Director,
Association des Industrials de France, Paris, France.

FROM CANADIAN NATIONAL SAFETY LEAGUE:

Best wishes for your greatest meeting in the history of Safety. May your cooperation with all Accident Prevention organizations, including our own, be as limitless as the boundary lines of safety work.

(Signed) Canadian National Safety League.

It now gives me pleasure to report to you the result of the election of your Executive Committee, which was determined at a meeting of your Board of Directors this afternoon.

The following gentlemen will serve as members of your Executive Committee for the ensuing year.

Members of Executive Committee

C. B. Auel, Manager, Employees' Service Department, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pennsylvania.

W. F. Austin, President, W. E. Wood Company, Detroit, Michigan.

Ernest W. Beck, Supervisor of Safety, U. S. Rubber Co., New York City.

T. C. Brabston, Superintendent of Transportation, Birmingham Electric Co., Birmingham, Alabama.

A. D. Brown, Claim Agent, New York State Railways, Syracuse, New York.

W. W. Cloud, President, Yellow Cab Company, Baltimore, Md.

R. W. Campbell, Knapp & Campbell, Chicago, Illinois.

Lewis A. DeBlois, National Bureau of Casualty & Surety Underwriters, New York City.

Marcus A. Dow, Vander Poel, Pausner & Jefferson, New York City.

E. K. Eastham, Safety Director, United Railways of St. Louis, St. Louis, Missouri.

Isaiah Hale, Safety Superintendent, The Atchison, Topeka & Santa Fe Railway Co., Topeka, Kansas.

G. T. Hellmuth, Claims Attorney, Chicago, North Shore & Milwaukee R. R. Co., Chicago, Illinois.

Charles E. Hill, General Safety Agent, New York Central Lines, New York City.

Captain W. P. Kain, Manager, American Steamship Owners' Mutual P. & I. Ass'n., New York City.

Walter G. King, Director, Safety Division, American Optical Company, New York City.

T. H. McKenney, Superintendent Labor and Safety, Illinois Steel Company, South Works, South Chicago, Ill.

Chas. J. Moore, Longmeadow, Springfield, Mass.

Arthur T. Morey, General Manager, Commonwealth Steel Co., Granite City, Illinois.

Homer E. Niesz, Manager Industrial Relations, Commonwealth Edison Co., Chicago, Illinois.

George Opp, Safety Engineer, Detroit Edison Co., Detroit, Michigan.

Lew R. Palmer, Conservation Engineer, The Equitable Life Assurance Society, New York City.

C. E. Pettibone, Vice-President and Manager Engineering Department, American Mutual Liability Insurance Co., Boston, Massachusetts.

W. B. Pettibone, Factory Manager, Willard Storage Battery Co., Cleveland, Ohio.

Henry A. Reninger, Special Representative, Lehigh Portland Cement Co., Allentown, Pennsylvania.

G. E. Sanford, General Electric Company, Schenectady, New York.

Henry W. Schlidt, Employment Manager, Plankinton Packing Co., Milwaukee, Wis.

W. L. Schneider, Safety Director, The B. F. Goodrich Rubber Co., Akron, Ohio.

Charles B. Scott, General Manager, Bureau of Safety, Chicago, Illinois.

Loyal A. Shoudy, Chief Surgeon, Bethlehem Steel Co., Bethlehem, Pa.

C. P. Tolman, New York City.

Harry M. Webber, Superintendent, Department of Claims, Illinois Bell Telephone Co., Chicago, Illinois.

J. D. White, Superintendent of Safety, Illinois Central System, Chicago, Illinois.

S. E. Whiting, Assistant Chief Engineer, Liberty Mutual Insurance Co., Boston, Mass.

A. W. Whitney, Associate General Manager and Actuary, National Bureau of Casualty and Surety Underwriters, New York City.

W. H. Winans, Manager Industrial Relations Department, Union Carbide and Carbon Corp., New York City.

David Van Schaack, Director Bureau of Inspection and Accident Prevention, Aetna Life Insurance Co., Hartford, Conn.

Arthur H. Young, Industrial Relations Counsel, Industrial Relations Counselors, Inc., New York City.

Your new Executive Committee held a session later in the afternoon at which the officers for the ensuing year were elected and as these newly elected officers are announced I will ask the gentlemen to arise as their names are presented so that you may see and know your new officers of the Council.

The Vice-presidents elected by your Executive Committee are as follows:

Vice-Presidents of the Council

Vice-President for Education.....A. W. Whitney
Vice-President for Local Councils.....H. A. Reninger
Vice-President for Public Safety.....C. E. Hill
Vice-President for Engineering.....W. F. Austin
Vice-President for Health.....Dr. L. A. Shoudy
Vice-President for Industrial Safety.....C. E. Pettibone
Vice-President for Public Relations.....H. E. Niesz
Vice-President for Finance and Treasurer.....H. M. Weber

Now I have a surprise for you. This year the Executive Committee gave unusual study and care to the selection of a managing director for the Council (*laughter*), and I am sure you will be greatly surprised to learn the result of that deliberation in which an effort was made to secure the very best managing director in this country. After a great deal of careful study and prayerful thought your Executive Committee has selected as its managing director Mr. W. H. Cameron of Chicago. (*Applause.*)

Now, gentlemen, comes the most pleasant act that I have performed during the year in which I have been president of your Council. The happiest moment that I have had since the time you gave me the honor and the distinction of being your president has arrived. Next to being elected president, the happiest thing that can happen to you is to be relieved of the responsibility and see it placed upon someone else whom you know and love and in whom you have confidence. If the Council had asked me to select my successor I should have chosen the man who has been selected to lead you during the coming year.

He has been associated with us and has been at 13 of our birthday parties and he has been working for us for 13 years. Everybody knows him. Everybody loves him. Everybody will be pleased with the announcement of his election. This man was born in the state of Ohio. Later in life he moved to the state of New York and for many years he has been residing there. He has been our counsellor in times of trouble. He has been our advisor when we needed advice. He has always helped to bear our burdens. He is a friend of our cause. He is a worker in our ranks. He is a friend of man. His heart is in the work, and, as I have said, the greatest pleasure that I have had since the night of my acceptance of election is the announcement that your new president is Walter G. King, of New York. (*Applause.*)

RESPONSE OF PRESIDENT-ELECT WALTER G. KING

Mr. President and my dear friends: I can hardly respond to what you have said. I do love the Council and always have and always expect to.

Charlie has referred to Ohio as my birthplace. Perhaps some of you may recall that it has been said that some men are great and some men are born in Ohio. (*Laughter.*) You see, my native state is running true to form tonight.

I thank you, my dear friends, most sincerely for your confidence and trust in asking me to serve at the head of the table. I can assure you that I will render the best service that is in my power. I am not afraid to work and in our Council we all work together. There will be cooperation and help from those who can be relied upon—men of outstanding ability and experience, a group in which there is loyalty and good-will.

The most inspiring and elevating experience of my life has been the privilege of membership in the National Safety Council and my association and friendship with you. It seems to me in this wonderful gathering here tonight the real spirit of safety finds expression. We have faith and confidence in what the Council stands for—the saving of life and needless suffering, a relentless fight against accident causes.

While the activities of our Council have been developed to a very high degree of efficiency and the influence of the Council is felt throughout the United States, yet we can see the possibility and need for far more and greater service.

Now, more than ever before, there will be an opportunity for all to have a part. We have a record of achievement as a result of our enthusiasm in the safety work of which we have every reason in the world to be proud.

Let me, in closing, quote two lines from Edgar A. Guest for something to think about this coming year:

> "The thing accomplished merely leads the way
> To more and greater deeds."

(*Applause.*)

PRESIDENT SCOTT: I have no more surprises for you. What is to follow is to be expected. (*Laughter.*)

We are advocating continually the careful selection and placement of men in our industry. We believe in selecting that peculiar type of man for that particular job for which he is fitted and we are practicing what we preach. We have brought with us tonight our regular humorist. (*Laughter.*)

He has served us well and loyally since 1916. In all my knowledge of humorists and comedians I have never known of a contract of such length; and I have never known a man to sustain his popularity with the

same audience for ten long years and be so popular that at every occasion on which we want to be happy he continues to be in great demand.

You all know him. He is a funny man. (*Laughter.*) You have all marvelled at his story telling and wondered how in the world he could bring us a new series for each occasion. Tonight I notice that his manuscript is marked No. 6, Group 6. (*Laughter.*) The last time, in Cleveland, it was Group 5. It was especially prepared for advertisers, but it fitted the occasion. (*Laughter.*) I hope the present one fits into the occasion as well.

I just expressed my appreciation of the announcement I made of our election of our new president and this marks the end of my own responsibility as your presiding officer. For that reason and the other reasons I have mentioned, and because of the great number of laughs I have had, I take great pleasure in introducing to you your toastmaster for the evening, our old friend of ten years of service, Mr. James Schermerhorn.

OBSERVATIONS FITTING THE OCCASION

James Schermerhorn, Editor, Writer, Lecturer, Detroit, Mich.

Mr. ex-President, Members with their wives and Members at large: After that presentation I find myself echoing the prayer of another postprandial speaker who said, "O, Lord, from all introducers and traducers deliver us."

You remember he commented upon my ten years of relationship with this wonderful organization and you remember how he expressed it—ten long years. You remember the man who said, "Married life isn't longer than single life, it only seems longer."

I appear before you as the expected. That is different from the colored family who named their children after the characters in the Bible. The last one they called Verilly.

A friend said to Dinah, "Where did you get the name Verilly?"

She said, "Verilly, verilly, I say unto you."

Then she named the last baby Onyx and her friend asked her if that was named after the stones, and she said, "No, I called him Onyx because he was onyx-pected."

I accept the invitation to become a salaried and permanent member of this august group. Its dimensions impress me with the desirability of an official connection. I hope I will not be like Zezee, the acrobat, who was paid in the tent where they paid alphabetically. Sometimes the receipts were not sufficient to take care of Zezee and he was distressed because he needed the money. They were making the contracts for the next season and he went into the manager's office and the manager said, "Good morning, Zezee."

"Zezee, hell! My name's Adolph."

I am glad to see the change of administration take place without accident. (*Laughter.*) It is a fine transition from Great Scott to King William.

I am glad to have you reminded that this is my sixth meeting with you by accident. I don't know of anything that has occurred in the name of accidents so momentous since they organized the hole-in-one club among the golfers.

I see tonight that you have been true to your aspiring and progressive spirit because you have just about given Detroit all it can assume in the way of accommodation. I remember that incident where Adam was walking with the boys past the Garden of Eden and he said, pointing to Paradise, "There is where your mother ate us out of house and home."

Reflecting Glory Upon the Cause

So in numerical strength and in every way you are reflecting great glory upon your cause and its triumphant progress. You appear to be here in such congestion that you remind me of the man who came out of the Pullman compartment and said there was such a jam in there that he found himself washing another man's face.

I am very glad to have this immediate understanding of the sentiments proceeding from this department. There was an American who recently gave this toast at a dinner over in England: "My happiest hours have been passed in the arms of another man's wife, my mother." It was a very fine tribute to motherhood and an Englishman who was there decided he would repeat it when he got home.

He said, "My word, there was a bally American at that dinner who gave a topping toast. I will try to give it to you: My happiest hours have been passed in the arms of another man's wife. My word—I can't remember the lady's name."

So you have come in the name of conservation and safety and your speaker is glad to salute you and to know that your cause goes marching on. Detroit has recognized the signficance of your visits by having more accidents than it has had in long weeks past. It was said the other day that the explorers in Africa had found an animal that had the shell of a tortoise, that could run like a fawn and leap like an ibex. Someone said, "The ideal pedestrian has been discovered at last."

I will say to you it is time you came, you crusaders of the safeguarded life, because the other day a farmer came to town with a load of hay. As he went up the street he heard the hissing of steam and the clanging of the gongs of fire engines; and the traffic officer said, "Get out of the way, the fire department is coming."

The farmer's wagon lumberingly swayed over to one side of the road and let the steam-hissing, gong-clanging machines go past and then he got back into the middle of the road and along came the hook and ladder and rammed him in the rear and killed the horses and upset the hay-

rack. The traffic officer said, "I told you to get out of the way because the fire department was coming."

The farmer said, "I did get out of the way to let the fire department go by but who in hell was looking for a lot of drunken painters coming along?"

So we need you. We need you in all the realms of earthly transition and your spirit goes marching on.

There was a delightful young English lady at Brighton Beach in England and she said one day to the nice old gentleman who came in to gather up towels and bathing suits, "See here, my man, you musn't be so precipitous about coming in here. Some day you will come in here and find that I am not ready for you."

"No danger, lady, I always peeps before I comes in."

Safety and Discretion are Pointed Out

Safety begins at home. You remember the incident where a man heard his friend call his wife Peggy.

He said, "Why do you call her Peggy when her name is Margaret?"

He said, "Come over here a moment and I will tell you confidentially. Peggy is short for Pegasus and Pegasus was an immortal steed and an immortal steed is an everlasting nag."

So discretion is coming into all the realms of life. It has even gotten into the nursery rhymes.

"Rock-a-bye baby, on the tree bow,
We are feeding you milk from a certified cow;
Your fond father and mother,
Before they were wed,
Decided just how you should be fed.

"Rock-a-bye baby on the tree top,
If grandmother should cradle you, make her stop.
Shun the trot horse that grandmother rides,
It's very disturbing to your little insides.

"Rock-a-bye baby, your mother's a scientist;
She knows all the laws,
She kisses her darling through carburized gauze.

"Rock-a-bye baby, don't wiggle and squirm,
There's nothing near you that looks like a germ."

It is the age of scientific presentation and safety. So throughout the various activities of life we are taking to ourselves the philosophy which you are inculcating, beginning with the safety pin and the safety razor.

We have now gotten up to where all of the activities of life are very thoroughly safeguarded. The other day a man was applying for a life insurance and he filled out the application as follows: "Age of father at death—32. Cause of death—Consumption. Age of mother at death—28. Cause of death—cancer." The agent said, "There is no use of going any further on that family record."

Then the man went to another insurance company and filled out the application as follows: "Age of father at death—94. Cause of death—thrown from pony in polo contest. Age of mother at death—92. Cause of death—childbirth." They wrote him for $25,000.

Applying the Principles of Safety

Now, my friends, we are going to apply the principles of safety first and concern for the well-being of humanity in the developments of this festal hour.

You have perhaps seen this mechanism before you, which is the latest invention to safeguard the feelings, to consult the wishes of a large and exhausted audience. This timepiece which, by the way, was a great safety first symbol—is there anything more significant than the chronometer? As the poet says, it is worn out by eating time. You remember the old lines:

> "Somewhat back from the village street
> Stands the old-fashioned country seat.
> Across its antique portico
> And from a station in the hall
> An ancient timepiece says to all,
> 'Forever, never! Never, forever.'"

That is a symbol that carries its warning to all of us. It is like the man coming out of the insane asylum. He had seen so many distressing cases of imbecility that as he went out he pointed to the clock and said, "Is that clock right?"

So this alarm clock is a part of your mechanism for insuring the successful developments of the evening with reference to our three speakers. The alarm clock has its place in life. Two young men didn't want to lose their jobs so they got an alarm clock. After a certain particular Sunday celebration they got up when the alarm went off as usual and reported at the office. They just arrived on time and said, "Johnny on the spot! Just 8 o'clock."

The man at the desk said, "Yes, just 8 o'clock, but where in hell were you Monday and Tuesday?"

This clock will measure the time that has been allotted to each one of our three speakers—splendid speakers, each one speaking out of experience, speaking from a background of observation and of experimentation, of science and all that. Five minutes before the time has expired we

will touch a button which indicates that there is still five minutes remaining for the completion of the discourse. So you can see that ample consideration is had for the physical safety of the speaker.

At the expiration of five minutes this button is touched. Each speaker stands upon a trap door. It is patterned somewhat after the garden variety of gallows and unhappily the speaker disappears, the victim of his own violation of the principles of safety first. He is carried through a chute something like the down-and-out arrangement at Coney Island and a police patrol is to be awaiting him at the end of that chute. This wasn't devised especially for this evening. The idea grew out of the Madison Square Democratic convention in 1924.

It Was a Very Natural Question

It has some relation to the speaker who says, "Now we have been discussing this subject for two hours. We think we have covered it in all of its ramifications but we would be glad to answer a question." And a man in the rear says, "What time is it?"

You exponents of safety first have been the witness of this sad phase of American life. Some one said the other day, "They have cut out all of the speakers for the sake of the popularity of a certain banquet."

The cynical man to whom he was talking said, "Now, if they cut out the banquet it will be a great success."

Chauncey Depew said, "This thing is getting to be a regular nickel-in-the-slot affair. You put down a dinner and a speech comes out."

Then someone said, "Sometimes you put down a speech and a dinner comes up."

Then Depew said, "It is better to have lunched and lost than not to have lunched at all."

Now that you understand the mechanism, and the speakers understand it, we will proceed with the very fruitful use of the time that remains.

First it is my great pleasure to bring before you one who has every qualification to address this representative gathering of industry, of business, of finance, of production. He hailed originally from the classic shades of Harvard. I remember a little boy who asked his father what was the difference between a college bred man and one who was not college bred and the answer was, "It's a four years' loaf."

Then there was the other young man who had finished his educational career. When he arrived at home his father said to him, "Now, my son, you have come back from the halls of learning splendidly equipped to go on with the business. I have borne the heat and the burden of the labor for all these years and never had a vacation. Now that you are ready, I think I will retire."

The young man, fresh from the halls of learning, said, "Dad, why not wait a year and we will both retire?"

That was rather a modern idea. That goes along with the inquiry a

boy made of his father: "Father, what keeps the earth up in space as it whirls and whirls?"

"That is the law of gravitation, son."

"What kept it up before they passed that law?"

So it is a pleasure to revert back to Harvard. Dr. Eliot, who lived his life in fullness and in scholarship and in benefaction, once said it was a renewal of youth to go to Harvard, and that when he went there everybody called him "Old Eliot." Just to show you how the years fall off in the society of the young and the aspiring, he said that some young men were passing him one night as he was coming home from a lecture and he heard one of them say, "wonder where in hell Charlie has been?" From "Old Eliot" to "Charlie" was certainly the renewal of youth.

Not long ago Sir Walter Raleigh, a direct descendant of the original American tobacconist, came to lecture at Harvard in their fine series of introducing the celebrities—a man who had come straight down in lineage from the courteous and chivalrous Sir Walter—and they missed him at the train. The committee went about looking for him and they saw a distinguished man in a top coat and silk hat and they said, "Pardon us, but are you Sir Walter Raleigh?"

"Hell, no. I'm Christopher Columbus. Sir Walter is in the next room playing cards with Queen Elizabeth."

Characteristics of a Modern Executive

Gentlemen, that is enough to give you the setting for our next speaker. Mr. Howard Coonley went directly from Harvard to address himself to challenging opportunity, which indicates that there still resides in our great institutions the power to imbue men with the spirit of America—of achievement, of construction, of tireless activity. He found a business that was in something of the condition of Bridget's husband. When she applied for a job for him to the foreman of a section gang, the foreman said to her, "Is Pat steady?"

Bridget said, "Steady. If he was any steadier he'd be dead."

Here was a languishing institution. Our speaker tonight addressed himself to it in all the splendor of a fine equipment, physical and mental. He raised the business in a few years from sales of something like two and one-half millions a year to twenty millions. Then he went out for new worlds to conquer.

In the state of Illinois he succeeded in taking over a plant that had been used as a pawn in some of the corporate competitions by the great organizations. And he soon set in motion the wheels of another great industry.

But the finest thing I can say about him is that in his relations with his men and in his contacts with financiers he never had exactly that same financial system that they attribute to a certain man who was asked to overlook Paradise with reference to reorganization. He said

he thought it could be done, but he didn't think the Almighty would take the vice-presidency. Nor did he adopt that philosophy in reference to a little girl's definition of a lie—an abomination in the sight of the Lord and an ever-present help in time of trouble.

He is here for several reasons, but particularly because he considered, as Shakespeare says, "Corruption wins not more than honesty."

He made frankness the basis of his appeal to customers, to financiers, to stockholders, and to his great army of laboring people. He has a fine philosophy that you can disarm the other side with entire candor and frankness. If a man has something up his sleeve you don't know how much it is, but generally it is the ashes of blighted opportunities. To such a philosophy as that our friend has subscribed and such a philsophy as that he has enforced.

He was vice-president in charge of administration of the Emergency Fleet Corporation in time of war and Charles Schwab has borne tribute to his organizing and coordinating genius. He said of him particularly, "Our friend, Howard Coonley, is a man who sees things through."

I have great pleasure in introducing him as the head of the Massachusetts Safety Council.

SOME REFLECTIONS UPON BUSINESS PROGRESS

Howard Coonley, President Massachusetts Safety Council, Boston, Mass.

Mr. Toastmaster, Mr. President and Landies and Gentlemen: I know I should feel an uncontrollable nervousness after the early part of this introduction had I not had a great lesson during the war.

As your toastmaster said, I was working under Charlie Schwab, one of the greatest executives as well as one of the greatest philosophers ever known. One day he called me into his office and said, "Howard, someone of us has to go out in the country to try to persuade the people that the Emergency Fleet Corporation is all right. I don't know anybody we can spare as easily as we can you, so you had better go."

I said, "Thank you very much, Mr. Schwab, for that compliment, but I am not a speaker and I grow very nervous when I stand before an audience, and then I suffer."

"Howard," he said, "you have got that thing twisted. You are not the one who is going to suffer. It is your audience that is going to suffer."

So I said, "I bow to you, as I always do." And I went out and in my speeches I wandered around, as I expect I shall wander tonight, because the toastmaster hasn't given me any particular subject; I asked him not to, because I wanted to touch on many high spots, but one in particular.

In spite of all the good stories he told, I am going to tell you just one of Charlie Schwab's that always amused me and is typical of my speaking.

Everything that Charlie has is the best in the world. He has the best company; he has the best organization; and, incidentally, he says he has the best band that was ever created. In those historic days before the Volstead Act the band had had a particularly good year and he decided to give them something to make them happy, so he sent them into New York for a large banquet; at the banquet they had some of the things we did not have tonight which were perfectly lawful in those days.

But something slipped in Mr. Schwab's arrangements because when they started back no private cars were provided and so the tickets had to be spread out among the individuals in the band. They went out on a late afternoon train and as the conductor went through the train he finally came to one big chap who was quietly sleeping in his seat. He shook him by the shoulder and when the man raised his eyes he said, "My friend, I want your ticket."

So this man began wandering through his pockets, one after another, and finally back again. Then he looked up slowly at the conductor and said, "I have lost my ticket."

"Why," the conductor said, "You couldn't have lost your ticket."

He said, "The hell I couldn't. I lost my big bass drum today."

A few weeks ago I was sitting with a group of very interesting men talking on all sorts of problems of life and of the world, and suddenly one of them asked this question: "Has business advanced in science and in ethics during the past generation?" You may imagine that that opened the arteries of talk and we spent most of that night discussing it. I already had my very firm convictions and they were made firmer before we finished.

Some of My Experiences During Twenty-five Years

I want to take that as my theme and just run over with you some of the experiences I have had and that probably all of you have had. It is almost exactly 25 years ago that I started in business. I started as an office boy and soon felt I must try my own wings in my own factory and I remember those early days of struggle when I was factory manager, sales manager, accountant, financier and office boy. I shiver now to think of some of the things that I did, some of the things that were common to most companies in that day.

For instance, we used to sit down to figure our costs and our costs were made up by taking the amount of materials that went into our product, the amount of labor that we could figure was needed for that product, and then we added what we called overhead. And not having any figures for that overhead we made an estimate and I can think back now to three or four of us sitting around a table and deciding what that overhead was. We felt sure it wasn't more than 25 per cent but we wanted to be generous so we called it 35 per cent and on the basis of that overhead we went out to compete in the open market. When we came back at the end of the year we wondered why we hadn't made a

profit. Incidentally, some years afterwards when we discovered some of those overheads we found they ran from 150 to 450 per cent.

Then I remember our methods of paying our men. Most of them were paid by a day rate and some of us then were thinking rather earnestly about piece rates, and so we tried piece work on some unsuspecting workman, and when we found at the first piece rate he could make more money, we cut that rate. Then we would pat him on the back and chuck him under the chin and urge him to use that for a while and he made the same amount of money on that. Then we would cut him again and so the process went on until the man either left or struck.

Then I remember that our method of producing goods was to wait until the orders came in. When the orders came in in these periods of high demand we would call for more men and we would call for more material and we would rush it through our plant at such a high rate of speed that it couldn't be made properly. By the time we had our warehouses full, some 30 to 90 days after the order was received, we would find the market had gone flat and we were left with a high inventory.

Changes in the Ethics of the Old Business

What changes have there been in these 25 years? Today each of us—I assume every one in this room—figures his costs in a way that makes them a fundamental part of his accounting system, and if his accounting is right his costs must be right. We have our factories not partially on piece work but almost entirely on piece work and that rate is arrived at by a careful and long time study and when it is once set we give a guarantee to our men that it will not be changed until the conditions under which they produce are changed.

More recently we have made a more radical departure on our production programs. Many of us today and more tomorrow are figuring on an estimate of sales a year in advance. On the basis of that estimate we lay out a production program which will give our men the maximum amount of work in a year. Knowing, as we can know, the periods at which we will have the peak of demand and the periods at which we will have the low point of demand, we can work to an inventory that will meet the demand when it comes and it will be liquidated when that demand disappears.

There can be no question that the science of business is improved. There happened to be in the group talking that evening the head of the Harvard Business School. He talked very little and when we were through he said, "Do you realize what is happening in your educational system today? I have just made a survey of the schools that give specialized courses in this country and I find that 55 per cent of the boys who ask for special courses ask for business courses."

What does that mean? It means that you and I have to go into a course of education, that we have to work night and day to keep up with this stream of intelligent youngsters that is coming along. It means per-

haps that 10 or 15 years from now a man, to qualify for a high executive job, will have to have a diploma to show that he has had the proper business education. It means that times are moving and if we want to accomplish what we must in this short span of life we must move with them.

What has this to do with safety work? To my mind it has everything to do with it. Safety work is one of the highest types of science. Unless we have our men properly guarded on their machines, they can't produce to the highest efficiency. Unless we keep them well and happy, they won't give us the full amount of work that is in them.

And what of business ethics? I also shiver when I think back to what was done 25 years ago—not done by everybody but winked at by most people. I happened to live in a railroad community and I remember that year after year at Christmas time the buyer of one of the great roads who lived opposite me used to have two and three and four new cars in front of his house—Christmas presents. I remember that it was not an exception at all to hear salesmen say that they had to buy their business. I know it was true that many of our salesmen padded their expense accounts and felt there was something smart about doing it. But those times are gone or nearly gone because today every forward-looking corporation teaches its men that the confidence of its customers is the thing most to be desired. They want good merchandise and they want good service but even more than that they want good business morality.

A Business Man's Advice to a Modern Boy

Just a few weeks ago—I can scarcely believe this—my oldest boy started to work and by his own volition he started to work for me. A few days after he had begun he brought me home a letter from one of my close associates and very dear business friends and the letter read something like this:

"Dear Howard: I am glad you are starting in business with your father. Many people will give you advice and therefore I will spare you, but I want to tell you just one thing. Most people think that the great executive is the one who makes decisions. Nothing could be further from the truth. The great executive is the man who knows how to analyze thoroughly and quickly, and if he can do that the decisions make themselves."

I think that is fundamentally true. I think that is the great change that has come about between the business of today and the business of a generation ago. That is exactly what you are here to do in this convention—to analyze your problems—and if you have properly analyzed them there will be no difficulty about the decision as to what steps you are to take.

I have always been an enthusiast about new things and I think nothing appealed to me more than the first airplane ascension that I read

about. So during the war when the airplanes came into considerable use, I tried several times to get a ride. In my position as vice-president of the Fleet Corporation I thought I could persuade someone to take me up, and so on three different occasions an arrangement was made—once by the army and twice by the navy—and each time I went out to the field to have my first thrill, each time I got out there, something went wrong with the engine and the pilot refused to take me up.

So when the war was over I began to think I was a hoodoo and was never going to have that experience. But some of my friends induced me to take the presidency of the Boston Chamber of Commerce and part of the work that I undertook there was the development of the air port; and the day that the air port was finished some of the flyers, in appreciation of what the Chamber had done, suggested that they would be glad to take any of the members up who wanted to go. So our faithful secretary called me on the telephone and said, "Why don't you take the first ride?"

An Aeroplane Ride Over the City of Boston

It was Friday afternoon and I was just about to leave and I told him to wait a minute. I called up my insurance agent and I said, "Now the company has quite a bit of insurance on my life. What will happen to me if I go up in a plane and get dropped?"

He said, "Just an instant." I held the wire for a minute and he came back to the telephone and he said, "Your insurance has been carried for more than two years. Commit suicide if you want to."

So with that kind suggestion I said to McGibbon, "I will go with you under one condition, and that is that the pilot gets me back in time to see the football game in the afternoon"—because I am a terrible football crank."

So that evening I thought about it and wondered how I was going to like that ride. I am not a very good sailor and I wondered whether I would be ill. I don't think I have any more courage than the law allows and I wondered whether I would be scared. So it was with a good deal of interest in self-analysis that I had a good night's sleep, worked hard the next morning and went out to the field without a qualm. Even when they made me sign a document saying that I didn't care if they killed me, and put on a suit of sewed up pajamas and a night cap because the plane was open, and stepped up behind the pilot, I didn't have an extra heart beat.

As we bumped over the field and rose finally over the water and swung around Winthrop Beach where the waves were breaking and the spray seemed to reach us in the plane and flew directly above the State House, I looked down and thought that if I fell at that particular moment I could arrive safely on the spike of the gilded dome. Then as we swung out over the football field where the enthusiasts were already assembling for the game and finally to where the Walworth plant is situated, the

pilot turned to me and whispered with his lips (you can't hear anything in an open plane) "How would you like to see your plant?" I bowed my head with delight and we swung gradually down until I felt as if I could reach down and pick up one of the big stacks and move it from one place to another (and the Lord knows I would have liked to do that because that plant needs reconstruction).

Then we went up to see the city of Boston. I knew that the white ribbons must be boulevards and that the tiny little carts were trains or trolleys running along the streets and that in between these little specks that looked like ants must be people. From that great height I looked down and thought, "What are those people doing? Some of them are fretting about their work. Some of them are saying that they aren't getting enough pay. Some of them are gossiping about their neighbors. But in among that group there are a few who are constructive ants, who are doing something to better their community and better their country, some who are leaving work behind that will last after they are gone."

So when we settled down comfortably again on the field and I wandered back to my office more thoughtful than I had ever been before, I determined that after all there was only one thing worth while in life and that is to be one of those constructive ants, to do what little you can to make the world better, to make the world safer and to make the world happier, and I think that is what you are doing in this safety work.

Observations Leading to a Man of Science

TOASTMASTER SCHERMERHORN: I know you have all been thrilled by this very direct and surprising example of introducing humanity and the safety-first principle in business. It means so much to have that attitude toward your men, rather than the attitude of that employer who never said "Well done," except when he ordered a T-bone steak. When the news came one day at the plant that he was ill, one of the old employees said, "My God, I hope it isn't anything trivial."

In the cause of humanity and the direct appeal and the shining quality of truth, Mr. Coonley has proven himself a brave man by tackling two such hazardous things as aviation and football in one afternoon. Which reminds me of the man who was asked if his son was on the team. He said, "No, the team is on him."

Now we will come down to the pure ground of science. We are much indebted to Farraday, to Steinmetz and all of those who have added, each in his own period, to this great era of scientific development. Mr. Hoover was right the other day when he said nobody can estimate the contribution of the pure scientist to the scientific law of the present time.

We are honored in Detroit by the presence of one who has delved deeply into science and invention.

Mr. Charles F. Kettering, at the head of the Research Department of the General Motors, is one who has come to Detroit to give to it an

engineering and scientific consciousness such as no other city in the world has possessed. We feel wonderfully pleased by the presence of one who started first in the telephone field and then brought out the Delco system of ignition and lighting, the self-starting appliance which has meant so much to the airplane and contributed so much to the exercise of the pedestrian, dividing our population into the quick or the dead.

There was an ancient people called the Batavians who were so warlike that they never cut their hair or beard until they had slain a man. Just look at the taxi drivers—all clean shaven and short haired. There was a man bowled over by a taxicab and the cab went over him. Then he heard the driver yell, "Look out! Look out!"

He said, "My God, are you coming back?"

The Delco system of ignition and lighting transmission has thrown more light on the farming problem than Mr. Lowden or Mr. Hoover or any other contributors to the agricultural realm and the farmers are greatly indebted to it. I remember they asked one of the rural visitors in New York if he didn't want to buy the Woolworth Building and he said, "All right, young man wrap her up!"

We are tremendously complimented, gentlemen, by the presence of Mr. Charles F. Kettering, one of the great scientists of today, one who has not only put into this great realm the fruit of his own investigations and studies and applications but one who also brings to you a genial and understandable philosophy.

PUTTING NEW VALUES INTO HUMAN LIFE

Charles F. Kettering, Vice-president, General Motors Corporation, Detroit, Mich.

Mr. Toastmaster, Ladies and Gentlemen: I was just wandering, after I listened to the Toastmaster, if that watch shouldn't work both ways because there isn't much time left for the speakers to work on.

Today we are using the terminology such as safety-first and all that sort of thing so frequently that we sometimes forget its meaning. The word "science" is used quite liberally today in a sort of an attitude of respect regarding certain lines of work, but we who work in it, play with it, have come to the conclusion that the only proper definition for something scientific is something you don't understand, because just as soon as you do understand it it isn't scientific any more. But the line of work which we call scientific, which applies to your line the same as any other in the world, is simply exploring and trying to investigate the future possibilities of whatever you are doing.

The greatest science that we have today is that of ourselves, understanding better the fundamental reactions of human nature, and that has been very poorly termed psychology. You people are fundamental

psychologists in that you are trying to study the cause of accidents. The principal cause of accidents is people. If we didn't have any people, we wouldn't have any accidents. The next peculiar thing about accidents is that they are never planned very satisfactorily.

So we have those two factors, the person and the unusual condition, and the fact that we react to normal instincts before our intelligence has a chance to work. So that you are trying to train people to think first and react secondly. We do not realize ordinarily in our great commercial activities one very important thing, and that is that of all of the things that civilization has done in this wonderful development the thing of first importance has been to place reason ahead of instinct. Every time that we make a departure in any line of human activity, it is to try to force reason ahead of instinct.

Human and Animal Reactions Under Stress

If you take an animal of any kind, a cat, for instance, the reaction is just exactly the same under all conditions. I thought a few years ago I was going to try an experiment. I happened to be in a foreign country, way out beyond all the lines of civilization in a little Arabian town, and here was an ordinary cat. I said, "Now this cat hasn't had any of the advantages of an education or anything and we will see how it reacts to certain things." I knew how one of our civilized cats worked and I thought I would try the uncivilized cat and I threw a piece of paper in front of him. He reacted just exactly like the cat at home did. He would hit it with one foot and then the other and run around and play with it. The cat nature has persisted all over the country and therefore a cat reacts a certain way.

I tried it on a dog and I tried it on an Arab kid, and I found that each reacted in just the same way. So there seemed to be then a pretty interesting relationship between those types of animal organisms and I wondered whether or not the grown up Arab would react in the same way as our American people did.

So I went around to the Military Attaché and I said, "Do you have any trouble with these people?"

He said, "Yes, we have quite a little trouble with them. We are being beseiged by petitions and the particular petition which we have now is to make it prohibitive by law for anybody to plow, the reason being that in the last three years we have had very little rain and the crops have very little more than repaid the people for the seed they have sown. So this year they are trying to ask us to make it prohibitive for anybody to plow, based on the assumption, that if no one plows and it is a dry season, no one will have the trouble and the useless work; on the other hand, if they don't make it prohibitory to plow some of them will and some of them won't, and then if it should happen to rain the fellows who did plow and sow the seed will get a big crop and they will sell that to us for our sheep and goats and camels and we will be poorer

and they will be richer. If you don't do that everybody will be on an equality."

If you read our newspapers you will find we all have the same thing garnished up a little more; we have the same general proposition. So we, as people, react, whether we have been trained or not, to certain natural laws. In the accident, in safety work, which I have been very actively interested in for a great many years we have found that you have to treat your individual, not as an intelligent thinking human being, but you have to treat him as a normal, instinctive thing that reacts on impulse, and therefore you have to design your apparatus to meet the thing accordingly. It doesn't make any difference what it is. You know if he thinks, he takes the safety device off when you are not looking; if he doesn't think, he leaves it alone. If you get your piece-work too tight, he will try to break the safety device in order to hurry the thing up. So the thing you are doing is to study how you and I and everybody else reacts normally.

We Have Taught People to Think for Themselves

Sometimes the best thing to produce an accident on the street is to blow your horn at the proper time. You scare the fellow who would have gotten across the street all right if you hadn't blown the horn, because he can't observe, analyze and decide quickly enough.

We don't know how much safety work you have or how efficient it is, but we do know this, that through all lines of industry we have taught people to do some thinking regarding themselves. When the first aid stations were first introduced in the factories, for a period of over 10 years you couldn't get a man inside one of them. After a while we got them going up for first aid whether they were hurt or not, if we had a nice-looking nurse there.

We have safety devices on the machinery. We have things that will make the fellow stop and think. Those are simple devices that we are studying ourselves. If you can get those things which are simple and elementary, that will attract the attention and make the fellow consider first before he reacts, then you have done one of the greatest pieces of safety work.

In our work in research engineering and scientific development we have to deal almost exactly with the same type of thing. The public buys our product on two things: first, on the question of style, and that is a very large factor also in clothing, in dry goods, hats, etc. In automobiles style is an important factor. It used to be that transportation was the important factor but now it is transportation plus the style factor. People normally react to that perfectly definite thing, and if some of you want to read some interesting things go back and get the history of transportation and see how styles in simple elementary horse-drawn vehicles became an important factor in all lines of work.

Our industrial development has been very largely through by-products of other things. By that I do not mean the by-product that would come

from a coke oven but the by-products of fundamental conditions. In the early days of the sailing vessel the power used for that was primarily the wind. The wind was not running on any schedule and therefore boats could not be scheduled and marine transportation was purely a by-product of the winds. Not until we went to work and designed specifically for transportation purposes a power plant which was independent of the winds were we able to meet schedules.

In our land transportation we had the ox, the horse, and we had all of those things which were not primarily designed as transportation apparatus, and not until we cut loose from them and designed steam engines and our automobiles did this tremendous industry develop to the high point at which it is today. It is through the enormous development of transportation that we have one of our greatest hazards and that is one of the problems we are all working today to overcome.

On the question of light, we used the candle and the kerosene lamp but we did not proceed directly in the great development of illumination until the scientist developed the tungsten filament and the incandescent light became the prime illuminant. There is an interesting story about that. When the incandescent lamp was first discovered every large electric light company said, "If you build lamps which will take only one-third of the amount of current now required, you are going to put us all out of business because we can not continue our business with only one-third of the present output."

The minute the element was developed that would produce three times the light for a given unit of current, people used nine times as much current because the unit cost became less and they immediately responded to that.

Confusion Always Follows Radical New Development

Fifteen years ago nobody could have anticipated the automobile transportation we have today because we could not recognize the economic features that would come along with that. So in your safety work no one today can compute or estimate the by-product results that will come out of your work in the production of primary things which perhaps you haven't yet arrived at.

I know that in every new line of analysis the thing always results in confusion for a considerable number of years. I do not know whether you have been studying your subject long enough so it has begun to crystallize into definite practice or whether your analyses have resulted in increased confusion. Don't be discouraged if you are in this confused state, because that always continues up to the point of crystallization, and then the problem unfolds and you wonder why it took so long for you to find that out. That is true in the study of any problem in the world.

In our clothing we are using by-products yet to a very large extent. We are making our products out of wool, cotton and linen, etc. Not a single one of those, outside of wool, was designed primarily as protective

clothing. The sheep used that as protective clothing and we immediately saw the good points of it and took it. The cotton fibers were intended for little parachutes with which to float the seed away to some other locality. The linen was simply a part of the supporting stock of the plant. Only in one case, and that is in the manufacture of rayon, which is the new fabric material made of cellulose which can be had from cotton, wood pulp or anything else, has man built a fiber of his own. And the rayon industry is developing to an extent greater than anybody can imagine. It was called artificial silk and in it they tried to overcome some of the disadvantages of natural silk.

As you know, natural silk is made from the worm eating the leaf of the mulberry tree. The worm eats enough with which to spin a cocoon to stem him over the winter and also enough to provide for nourishment so that he may transform himself from the worm into the moth or butterfly. In winding that cocoon the question of flexibility, durability and all such things connected with our normal silk fabric had nothing whatever to do with the occasion, so our silk is a by-product of a worm.

In our foods we are in exactly the same position today. We are eating ham and eggs. Nobody can tell me that a hen ever had in mind an omelet when she laid an egg. Those are secondary things and as we learn these things we shall be able to build, to make and to construct out of primary materials, foods that will be far superior to anything that we have today.

In that line of work there is no limit. I am simply mentioning those as points of encouragement for you in the analysis of your great job. Every once in a while we are asked by some financial man, what is the economic position of all of this research and development which you are doing? Does it pay or does it not pay? Our answer is simply this: The economic position of research is to study and to develop new things, to improve things.

Research Produces Dissatisfaction with Old Things

The economist says, but when you improve the thing then you depreciate the value of all of the similar product that is on the market. But we do not. We do not in any wise affect the product that is on the market. If we build a new automobile next year we do not change any of the parts in the automobiles that were sold this year. If the customer riding in that new automobile sees in it a value which is greater than the one that he has and buys it, the principal thing we change is his mind, and for that change of mind he is willing to sacrifice on his old automobile and buy the new one, and he pays the price, not for the depreciation of the old automobile, but for an improved state of mind.

So the work of research is to keep you reasonably dissatisfied with what you have got, so that you will mentally advance from year to year and enjoy the great benefits of the new thing. But the economist will say, is that good economy? Is it a good thing to be changing and ad-

vancing all the time? Why don't you stay put and keep things going as they are?

Our answer to that is: that there are no monopolies on any type of thought in the world today, and if you accept the one that the article that you have is entirely satisfactory and you do not desire any further changes, then you must accept the thing that comes along with that. Whenever you standardize or super-standardize any product today you open the doors and invite cut-throat competition and degeneracy of that product. So the minute you standardize you immediately start competition from a price standpoint and that always means depreciation of the product; in other words, you begin to rob out of the product the essentials of its value while by changing and advancing you continually attempt to put new values into it.

Educate the Young People in the Schools

So that is the thing you are trying to do. You are trying to put new values into human life, you are trying to put new thoughts into human life; you are working upon the change of the mental attitude of the people with whom you work.

We do not need to go and study the workman. We can study ourselves, because in reactions we are just exactly like he is. Sometimes in this thing, efficiency and economy and one thing or another, we overlook one very important thing and that is that we must at the same time get something that will change his mental attitude as well as try to safeguard him physically. You can not do that unless he is thinking.

It seems to me one of the greatest things you can do in your safety program is to educate the young people in the schools, because there is a plastic way in which you can meet your issues. I think it is being done.

One of the interesting things about education is that if you will drive down through the country today you will find very few of the old type of chicken running back and forth across the road. I don't know whether by observation and education the younger ones have learned that it is somewhat disastrous to do this or not. We observed a dog in front of the General Motors plant who was watching for a chance to get across. I don't know whether he stopped on signal lights or not but nevertheless the dog was doing some thinking, whereas they used to run out and yap at all of the passing automobiles. You can always tell the percentage of population by the number of dogs barking at the automobiles in traveling through the country. So your safety code is applying out there.

If there is any one thing I can bring to you more than others, it is this: you are working with one of the very difficult problems, which is to get intelligent reaction ahead of instinct, and you are working under one of the most intensely fundamental problems that has to do with the future development of the great centers of population—the factories and every place men work. I saw a man discussing safety so intently today

that he fell down the stairway out here. He was perfectly absorbed in his subject. So you have that thing to guard against.

Whether or not you think you have made progress, do not let anyone discourage you from a continual analysis of the thing because complicated as the problem may seem today, as you work on it, as you get all of the information, with a large number of people, each one with a different experience apparently unrelated, they will bring it up to a focal point and the thing that is extremely complicated will become very simple. We have this motto on the walls of our research laboratory: "This problem when solved will be simple." That has been true of every problem in the world that has been solved, and the only hard problems are the ones that we don't know enough to solve.

Introduction of a Spiritual Leader

TOASTMASTER SCHERMERHORN: Gentlemen and Ladies: We are doing well with our program. We are glad to hear from Mr. Kettering. He ought to be able to solve this matter of the chicken. The chicken is susceptible to experience. Pretty soon the farmers will have the chickens so well educated that when the time comes to take them to market they will find the chickens on the boxes with their legs raised ready to be tied for the semi-annual change of location.

I have a personal satisfaction in saying that there is in store for you a splendid treat, ladies and gentlemen. Our last address is by one who, by reason of scholarship and of looking deeply into the question, can bring you a splendid message on the heart interest in industry, how well we have touched upon humanity in industrial relations and in the relations of corporations with those who support them and those who patronize them.

We have gone into the relation of science to safety first. Now it is our great privilege to hear from one of the spiritual leaders of Detroit. Dr. Edgar Dewitt Jones has gone deeply into scholarship and his poetry, I believe, is not as modern as this verse that I read just recently:

> The shades of night were falling fast,
> When through the crossing gates there passed
> A youth who stepped upon the gas.
> When they opened his head they found
> Excelsior!

Dr. Jones is a product of the South which has furnished the sort of things that the mothers of old prayed for—that their children might speak with the tongues of men and angels. From the South came Grady, that eloquent spokesman of the new South.

Educated in the land of his birth and also in Missouri, he has filled outstanding pulpits in Mississippi, Illinois and Michigan. He has represented various great causes in Edinburgh and in state and national conventions. Not long ago he traveled through Ireland to look more deeply into the question of the present situation there.

Perhaps he came across the very Irishman who was coming back from war with a leg and arm gone and with his eye out. He said to his friend, "Pat, it's a terrible war."

"Yes," said Pat, "but it's better than no war at all."

He may have met the very Irishman who was in the battle at Verdun. When he finally regained consciousness he saw the earth torn up, the buildings demolished and wreckage all around, and he said to the nurse, "Where am I?"

The nurse, hoping to please him, said, "You are back in dear old Ireland."

"Thank God, Home Rule at last."

We bring him to you from that realm where, besides authorship and travel, and besides intimate association with the great figures in our national history he is a man we love because our souls are knit to his as the soul of David was knit to the soul of Jonathan.

He hasn't the fervor of the old southern darky praying for the preacher who said, "We pray, O Lord, that thou wilt give your servant this morning the eyes of the eagle and the purity of the dove. Connect his soul with the central telephone of the skies; illuminate his brow with thy salvation; pour the oil of thy reclamation upon his lips; open his mouth with the sledge hammer of truth; fill him plum full of dynamite and cover him with gasoline of glory and set him on fire."

No wonder we need safety first when we have this element of spiritual exaltation.

HAVE A HEART

Rev. Edgar Dewitt Jones, D. D., Pastor of the Central Christian Church, Detroit, Mich.

Mr. Toastmaster, Ladies and Gentlemen: Do you know the three wonders of Detroit? I will tell you what they are: the Book Tower when it is lit up like a Christmas Tree; the pigeons at Grand Circus Park at feeding time; and James Schermerhorn.

A Scotsman was going down the street when he met a fellow Scot, and he said to him, "Andy, I found a good dentist, a very wonderful dentist. Every time he pulls a tooth he gives me a drink of whiskey."

"Well," said the other Scotsman, "what are you looking so gloomy about. Did he run out of whiskey?"

"No, I've run out of teeth."

James Schermerhorn never runs out of a story. His stories, like the dew are fresh every morning, and like the brook, they go on forever. When I think of my friend's stories I think of one classic utterance that can very aptly be applied to them: "Age does not wither nor custom stale their infinite variety."

I am to speak for a few minutes on the topic, "Have a Heart," and what I shall say is centered around a proverb. There is no more fascinating literary vehicle than the proverb. The proverb contains the concentrated wisdom of the ages. Every nation, tribe and people, have their proverbs. They gleam like jewels on the fingers of time and one of the fascinating things about a proverb is that so much is said in so few words. Their brevity it fascinating.

Consider how much you can say in a few words. In the Pre-Volstead days there was a liquor dealer who lived over his bar-room and there was a speaking tube from the bar-room up to his living quarters. One day the bar tender called up and said, "Is Charlie Stanley good for a drink?"

"Has he got it?"

"He has."

"He is."

It is extraordinary how much you can put in a few words, and the proverb is wondrously attractive because of this fact. Then again it has a law all unto itself. A proverb embodies a truth that admits of general but not universal application. There is scarcely a proverb you can think of that isn't directly challenged by another, and yet both are true, as for instance, this: "Look ere you leap." That is a proverb for this occasion. But then it is possible to look so long before you leap that when you get ready to leap there isn't anything to leap for, so you have the other proverb: "He who hesitates is lost." Yet both are true.

The Witchery of Old Proverbs

I could stand here for an hour talking to you about the witchery of proverbs, but all this is but introductory to one of the proverbs I bring to you tonight: "Keep thy heart with all diligence for out of it are the issues of life."

Here is a proverb that has in epitome the very urge of a great life and a most humanizing career. You have only to stop for a few minutes to think of the heart in the world and you realize its vastness and its potency. Take the realm of letters, for instance, the heart in great books. Out of the past come those characters of Dickens trooping their way—Oliver Twist and Paul Domby and Little Nell, great hearts put into those books by a very great heart—a man who dwelt in the realm of the affections.

My friend Mr. Schermerhorn went over to Munroe, here in Michigan, the other day to speak about Will Carlton, that Michigan poet. Before Will Carlton died he said something like this: "The masses of the people never read the great poets for they haven't the time even where they have the inclination, but with the passing years the masses will more and more turn to the dialect poets, to Riley, to Field, to Stanton, to Ruth MacHenry Stuart, that glorious company." And of course he spoke the truth. For instance there are these lines from Frank L. Stanton entitled,

"His First Day at School." We never start the children off for the first time without some pangs, even when we are proud that they are entering school, because we can not but think of the long way their feet are taking in sturdy sincerity. Here is the poem:

"He's such a little feller
But he minds the teacher's rule,
And takes his books and toddles
On his little feet to school.

"His mammy stand and watch him,
So mannish gwine by;
She hided with her apron
The teardrop in her eye.

"The first time she ever done
Miss his play and song.
'Tain't no ways to the schoolhouse
And yet the road seems long.

"He's gwine in the world today,
But what's the prize to win
If dat sweet little feller
Don't come back home agin?

"He's such a little feller
But he's learning fine today;
Yet his mammy miss him
Cause dat's his mammy's way."

Great poetry? No. But it has in it the power of the heart.

I think of the pulpit. I think of men who occupied pulpit thrones, like Beecher and Brooks, and I remember that while some of these men had cathedral brains and were men of extraordinary mentality it was the greatness of their hearts that made them so potent, so winsome, so successful.

Phillips Brooks Dissipated All His Troubles

Every time I pass through Lawrenceburg, Indiana, I remember that was Beecher's first parish and that his church was composed of 19 women and one man; and the house in which he and Mrs. Beecher began housekeeping was so small that Mrs. Beecher had to go outside the house and make the bed through the open window. I think of that great heart, and I think also of Brooks who, when he passed down Newspaper Row, was observed by a newspaper man, broken in heart and carrying a heavy burden—of Phillips Brooks that reporter wrote these words on a pad:

"Phillips Brooks passed down Newspaper Row today, and all the clouds passed away."

I think of a man who shall be nameless here, whose mind is interesting and whose mentality is arresting, but I think of his heart. I recall his antipathy for tobacco and especially for a pipe. Not all ministers have an antipathy to tobacco but he had and he especially detested a pipe. And it came to pass that by and by his son took to smoking and, by that curious turn of fate, preferred a pipe to any other kind of a smoke and his father adjusted to it in a great way. He said, "No, Baird, if you are bound to smoke, you don't have to go away from home to smoke. You know how I feel about it."

Baird proceeded to fill the house pretty full of smoke. Before the Christmas that came some months after this, the minister said to his daughter who was his housekeeper, "Olive, I am wondering what we will get for Baird for Christmas." You know how it is, after you have gotten gloves and handkerchiefs and neckties for a man you have pretty nearly reached the end. You don't know what else to get. So this minister said, "I have bought everything I can in the way of handkerchiefs, neckties and gloves."

Olive said, "Get him a pipe, Father."

He replied: "You don't think I ought to get him a pipe, do you?"

"Yes, I think you should. The thing he has is getting terrible. He needs a new one."

The Great Love of a Wonderful Man

A strange light came into the eyes of this noble man, this father of the great heart, and when Christmas morning came and they were unwrapping their presents—a little custom they had in this house—Baird was handed his package. Slowly he unwrapped it and when he came to the pipe he was amazed. He looked at the pipe and then he looked at his father and then back again at the pipe, and then again at his father; and when he saw that great face that was lit up with a love that made it shine like the face of Moses when he came down from the fastness of Mount Sinai, the lad gave one leap, threw his arms around his father, and said, "Oh, father, you're simply wonderful."

Why, I say to you men and women gathered here from the four points of the compass that there isn't anything so potent as having a heart, a heart that overflows with good will and tenderness.

I think of the pew as well as the pulpit and I recall the little girl who came home and when asked if she could remember the text, she said, "As near as I can recall, it was this: 'Many were cold but few were frozen.'"

I remember reading somewhere that when Admiral Bob Evans was alive he was in a certain city and attended worship in a strange church, and sat in a strange pew. The owner of the pew, when he came in, looked daggers at Evans, who was in civilian clothes. By and by the pew holder wrote a little note and sent it to Evans. When Evans opened

it here is what he read: "This is my pew. I pay $2,500 a year for it." And Evans simply wrote "You pay too damn much," and sent it back.

I deplore the absence of heart power in many a church and remember the words of Robert Burns:

"Compar'd with this, how poor Religion's pride,
In all the pomp of method, and of art;
When men display to congregations wide
Devotion's every grace, except the heart.
The Power, incens'd, the pageant will desert,
The pompous strain, the sacerdotal stole;
But haply in some cottage far apart,
May hear, well-pleas'd, the language of the soul,
And in His Book of Life the inmates poor enroll."

"Keep thy heart with all diligence for out of it are the issues of life."

Heart power is seen at its best in the home. The other day I read a life of Thomas B. Reed, the famous man from Maine. There was an incident told by his biographer worth repeating, I think. Reed came into his library one evening, and curled up in his favorite chair was a cat, his little girl's pet. It chanced that the little girl was also in the library. She looked up when her father came in and sensed at once the cat's danger, sprang out of her chair, ran across the room and attempted to spill her pet out of the chair. But in her haste, alas, she pulled the chair too far away from her father, and he sat down heavily on the floor. He arose slowly and painfully, his face scarlet, and for a few seconds the air was electric with possibilities. Then he smiled and said to the little girl: "My dear, I should like for you to know that it is much easier to get a new pussy than a new papa."

"Keep thy heart with all diligence for out of it are the issues of life."

The Little Boy Had His Number

Bishop Potter, about whom so many good stories have been told, was dining in the home of a parishioner one evening and of course she asked him to say grace. The Bishop said grace and after it was over his host's little girl spoke up and said, "Why, Bishop, that isn't the way my father says grace."

The Bishop, very suavely and silkily, said, "My dear, tell me how your father says grace."

She said, "He comes home in the evening and sits down at the table and looks around and then says, 'Good Lord, what a supper.'"

"Keep thy heart with all diligence for out of it are the issues of life."

I suppose after all that the finest test of the heart power of a man or woman's life is the attitude toward the child and the child life. Time and time again in the speeches that I have been privileged to hear in some of the sessions of this convention I have heard the wisdom of

beginning with the child. "Train up a child in the way he should go; and when he is old, he will not depart from it." The finest test of our lives is our attitude toward children."

Tomorrow is the sixty-seventh anniversary of Theodore Roosevelt's birth. Great heart; lover of children. The classic that he wrote was not any volume of his winning of the West or any account of his hunting trips in Africa, but the collection of his letters to his children.

Two children were being entertained in the White House while he was President—unexpectedly entertained. They were in his office and before they left his office he said, "Children, I must give you some little token of your visit to me." He looked around and saw nothing that was worth anything but two long stemmed roses in a vase. He took them out of the vase, but before he handed them to the children he stripped the stems of their thorns.

"Keep thy heart with all diligence for out of it are the issues of life."

To be able to smooth the pathway of a child and to understand the heart of a child—that is everything.

Memories of the Incomparable Sarah Bernhardt

I came to Detroit from a long residence in Bloomington, Illinois, and during my residence there the chief waiter in the Illinois Hotel was a colored man by the name of Wright. He was a rather unusual colored man and his wife was a worthy wife of a worthy husband. They had a little girl who was wonderfully gifted in public speech. By and by the various luncheon clubs and the lodges were having her recite for them. She was quite extraordinarily gifted. I did a few things for this man which he called favors. They were not much—just little things that anyone of you would have done. Well, it happened that Madam Sarah Bernhardt made her farewell tour of America and she came to Bloomington for a one-night performance.

About a week before she came I met this colored man on the street and he said to me, "Doctah, I want you to do me one moh favoh."

I inquired, "What is it, Wright?"

He replied: "You know this wonderful French actress is comin' heah—this Madam Bernhardt?"

I said, "Yes, I know she is coming."

"I want you, Doctah, to write her a letter and ask her if she won't heah Nellie recite while she is heah." (Nellie was his daughter's name.)

"Wright," I rejoined, "that is a pretty big order. I rather hesitate to do that. I don't know this famous woman. I never saw her. She doesn't know me. I have no approach to her."

Then, if it is possible for a black man's face to get blacker his did with discouragement; I saw he was very much distressed so I said to him, "Don't take it so hard. I will write the letter."

As near as I can remember I wrote something like this: "Dear Madam Bernhardt: I trust you will not think me presumptuous, an entire

stranger to you, but in behalf of a worthy colored man here in the city and his wife who have a little girl, rather remarkably gifted, I want to ask you if you could find time to hear her read two or three selections. If this should happen to be the case, this worthy colored couple will never forget it. It will be a very kind and gracious act."

I sent the letter care of the manager of the local theater whom I knew very well, and then I left town. I had business in the southern part of the state and I wasn't there when Madam Bernhardt gave her performance in Bloomington. When I came back one of the first men I met was this colored man and his face was all aglow.

He said, "Doctah, have you heard the news?"

"What news?"

"Madam Bernhardt heard Nellie."

"Why, that is interesting. Tell me about it."

"Doctah, it was wonderful, suh. She had my wife and Nellie and myself come to her private cah. Doctah, were you evah in the private cah of Madame Bernhardt?"

"No," I said, "I never was."

He said, "It was a most remarkable cah. It was fixed up like a room, like a parlah, with mirrors and pictures. She had Nellie and me and my wife come there and Doctah, she heard Nellie say three of her pieces, heah me—three of them. Then when Nellie had finished she had her come ovah and she put her hand on her head and spoke. 'Now, Nellie, you's got the gift but be careful how you uses it. Don't let it take you off your feet. Take it from me.' Madam Bernhardt said, 'Take it from me, little girl—from one who has been on the stage a long time—that there is something else besides getting the applause of the people.'

"Then," said the head waiter, "she turned to me and my wife and she said: 'Don' you spoil this little girl. She's got de gift but you mustn' spoil her.' Then, Doctah, she took a rose—one of her own roses, a long stemmed rose—and gave it to Nellie. Then we came away. I never can forget it as long as I live, Doctah. It was wonderful, suh!" And so it was.

A Movement That Enlists the Finest Minds

When our papers were filled with an account of Madam Bernhardt's death, the story of her last hours, and when columns were filled with tributes to her talent and genius; when at last the tall candles were burning about her body, I fell to thinking of that family out in the prairie state and the little colored girl and the gracious hearted woman who took the time from her transcontinental journey with all of its annoyances and distractions to show her woman's heart and to bring a joy into that home and a memory that would last as long as life and beyond it.

"Keep thy heart with all diligence for out of it are the issues of life."

You are bringing into this amazing movement—one of the most tre-

mendous movements of all times—the finest minds in the country, scientifically trained minds, men who are extraordinarily panoplied by nature and by training to lead in so wondrous a movement but who have a heart, yea, must have affections deep and responsive.

"Keep thy heart with all diligence for out of it are the issues of life."

The loosing of the affections, the play of the heart power upon such a problem as this is bound to be a mighty factor in the solution.

I want to close with another verse from Burns. I think perhaps here is the summary of all I have said:

> "If happiness hae' not her seat and center in the breast,
> We may be wise, or rich, or great, but never can be blest.
> Nae treasures nor pleasures could make us happy lang;
> The heart ay's the part ay that makes us right or wrang."

The Samoan Natives Built a "Way of the Heart"

TOASTMASTER SCHERMERHORN: Will you tarry just a moment to let your Toastmaster say to you one thing, that this has been a memorable evening in two respects. One is that these three speakers from the realms of business and science and the spiritual realm have been more than speakers. You have seen the expression of their own souls and their own lives, and that is a tremendously important thing. The other is that this important convocation in which we have had so much joy and fellowship is closing at the unusual hour of 11 o'clock.

I always liked, when I was in London, to go see the Decameron Nights. I like the William H. Cameron nights very much.

When our good comrade, Dr. Jones, was talking about the heart I thought of the man who went to the market for some beefsteak. When the butcher cut it off and put it on the scale he said, "There is a good piece of steak, as soft as a woman's heart."

The man said, "I guess I will take sausage."

All of the speakers have brought you this suggestion of the far sweep of your ministry because with all of your fine education and all of your well organized work, your influence upon this city just coming into full consciousness, in this movement you have been a tremendous blessing to us all in the many-sided operations of this cause.

In conclusion, I remember when Robert Louis Stevenson—to continue the thought that Dr. Jones has imparted to you so beautifully—went to regain his health if he could on the island of Samoa. He had a courage in his work such as Howard Coonley has had in the realm of constructive industry. The natives there loved the poet and they built a roadway that ran from the murmuring sea up to the portico of his home and in their beautiful language they called it the "Way of the Heart"—a beautiful island idiom.

Blessed men and women, in conserving life you are treading the Way of the Heart.

ADJOURNMENT

A B C Session

October 29, 1926

GEORGE HODGE, Chairman
Assistant Manager, Industrial Relations Department, International Harvester Co., Chicago, Ill.

THE opening meeting of the A B C Session held in the Grand Ball Room of the Book-Cadillac Hotel, Detroit, Michigan, convened at 9:50 o'clock, Mr. George Hodge of the International Harvester Company, Chicago, Illinois, presiding.

CHAIRMAN HODGE: In opening the A B C Session, which is primary safety for the junior safety man, I am sure that those of you who have attended this session in previous conferences will agree that instead of its being an A B C Session, it really is an A to Z session.

I am not going to be reckless with the other fellow's time and make a speech this morning. But I am reminded of a story they tell on James Whitcomb Riley, the old Hoosier poet.

In his younger days he was a sign painter for a medical house. In riding down the road, he passed the farm of a religious man on whose fence there appeared this sign: "What shall I do to be saved?"

Seizing the opportunity, he painted one of his signs on the lower board, which then read, "What shall I do to be saved? Take Carter's Little Liver Pills."

A few weeks later he was in the neighborhood, and wondering about the sense of humor of the old fellow, he drove by, and instead of finding the sign he had painted, this is what he read—"What shall I do to be saved? Take Carter's Liver Pills. Then prepare to meet thy God."

Being a lover of art, I went to the Detroit Art Institute, and there standing before a large canvas of "Daniel in the Lion's Den" I found my good friend, Arthur Morey. I wondered what was interesting him, and finally he said, "I was just trying to figure out why Daniel has such a peaceful look on his face." I said, "What are your conclusions?" He replied that he was quite sure Daniel felt there was to be no speech making after the feast.

Last spring I had the oportunity of addressing a meeting in St. Louis, and during the day I was entertained by some good friends at the Commonwealth Steel Mills. I took advantage of the opportunity to go through

their operations. I was struck with the cleanliness of the Commonwealth Steel plant. In our own organization, with its many operations, as we travel from place to place and go into some of our plants, the first thing we notice is the housekeeping because where there is good housekeeping and cleanliness, there we find efficiency and real accident prevention.

It was a real privilege to go through the Commonwealth plant and see something of the high spirit and splendid morale of that organization, and as I inquired into just what brought some of those things about, I found on every hand credit given to the general manager, Mr. Arthur T. Morey.

I think in this morning's session where we are looking at the safety proposition from the standpoint of management (being covered by a manager), and the interest of foremen (which will be discussed by a foreman), and the interest of a worker (which will be discussed by a worker), that we are extremely fortunate in having as a representative of management Mr. Arthur T. Morey of the Commonwealth Steel Company.

MAINTAINING INTEREST OF MANAGEMENT

Arthur T. Morey, General Manager, Commonwealth Steel Company, Granite City, Illinois

You are participants in one of the greatest and most constructive influences that has ever come among men. We are entering into an age when truth is being made more practical and Christianity is becoming more an applied science than a profession.

As Abraham Lincoln wrote the Emancipation Proclamation, freeing America from African slavery, so has the National Safety Council and the safety man written an Emancipation Proclamation covering every man's inalienable right to freedom from accidents as an incident to his right to life, liberty, and the pursuit of happiness. This Proclamation was formally and publicly proclaimed some time back around 1912. The unbelievers have been silenced by the results obtained and you as safety men can be inspired and enthused by that demonstrated fact.

In the olden days they thought the safety man was a sort of crank, that he was going to cause more accidents than he could prevent. You who are beginners are coming into the work when men are more receptive to this demonstrated condition, and you should in proportion accomplish even better results.

Surely he who seeks good, finds many unexpected aids and feels the power of the right hand of Omnipotence behind him.

I would say to you safety men, that your value to your plant is not to be measured by your own individual responsibility for the safety of your plant, but rather by the responsibility you lead others to feel and exercise. You are the light-bearers and way-showers to your men and managements.

It is essential that you get and maintain the interest of your management, for there the greater responsibility rests. I have been asked to address my remarks to that phase of the work. How will we interest management? Well, what is it that interests management?

Whenever we approach a problem, we must first analyze it to see what the problem really is. Then, understanding our problem, we must discern what our relation to that problem actually is and what it ought to be. In management's hands lies the success or failure of business. Management is faced by stern necessities and can not be blamed for shying at anything that savors of mere sentiment or theory—no matter how idealistic its spending of money may appear. Their task is to use money to produce more money and they have not felt it right to divert it away from that object, no matter how much their personal sympathies may pull them. Those stern necessities have caused them to discount sentiment, so-called, and consequently we have dubbed them "hard-boiled." If we, in consequence, consider them as hard-boiled enemies of our safety idea and seek to circumvent or get around or over them, we fall into and make worse the very conditions that we are seeking to overcome and are thus of no aid to our idea, the management, or ourselves.

Help the Man by Removing His Ignorance

The way to aid a man who is wrong is to bring him the truth that removes his wrong concept. To leave him with his wrong concept and try to work around him or in spite of him, raises sometimes disastrous obstacles and may leave an enemy in our rear.

Many are now beginning to see that there is an eternal fitness of things; that there is a Principle governing human affairs and as we understand it more and more, we are astounded at its force and controlling persuasiveness.

Two scientific truths never conflict. If two and two equal four in arithmetic, they are never less and never more in any other department of mathematics and they fit in with all other truthful mathematical statements. If a thing is scientifically right, it is always right and fits in with every other thing that is right. I am referring, of course, to things in the realm of Truth and not to the realm of human opinion and human sense. Men are learning this more and more, and it is making better philosophers of us all.

I therefore state confidently, that if it is not right to injure and kill men, it is never right or necessary to maim or kill them in business—that the observance of this truth can only aid business and never involve prohibitive conditions. Business is right service and the proposition of right service can never include the maiming and killing of men. For business to do it, business is to that extent injured. For business to overcome it, business is to that extent strengthened and helped. That is a statement of a true scientific principle.

Now to return to our so-called hard-boiled manager, immune, as we

thought, to sentiment. He can be shown—and in every man, especially men of the type officering industry, is the desire to be and do right and enjoy its satisfactions. He can be shown that accidents are unnecessary and that their abolition will be an opening up of new conditions, strengths, and resources, that will fertilize and make his industrial plant grow better than he has ever dreamed of in his old experience of things.

It will, for one thing, lead him to find (and you can show him) that in industry his most important factor is his men, and that his plant, equipment, and raw materials are secondary. He will find that instead of just employing men's bodies, he can employ their minds, their good-will, their interest, their inventiveness, and their loyalty.

As I have stated, the men of management have had to be practical men, guided not by rainbow-chasing theories for they are accountable to the stockholders and are under the practical necessity to produce results and dividends. We must, therefore, approach the problem from the standpoint of aiding them to do just these very things and then to see that safety is a constructive force that will aid them in accomplishing those very ends. When they see this, they will be strong for the safety program. Their practical good sense has kept safety sane and result-producing and it has been well that this is so.

As a hungry man can be reached through his stomach, the easiest way to reach an (as yet) unevoluted management on safety is through costs, profits, and efficiency—all of which are constant problems with him, and when safety is shown to be a great help in those things and not an added burden in cost, it gains management's attention, which later ripens into enthusiasm as the humanitarian and good-will fruitages of intelligent safety work are experienced and appreciated. Accident prevention reduces costs in many ways. Directly it cuts down accident expense. My company was paying out 2.16 per cent of payroll for accident insurance under the old accident conditions. Safety work has reduced this item of cost to .3 per cent. On a payroll of five million dollars, this makes a difference of $93,000 a year.

National Safety Council Service Emphasized

The headquarters office of the National Safety Council can furnish you many specific instances of reduced costs of accidents through safety work.

I wonder if we all make use of the information available at the National Safety headquarters. There is much information available there that could be useful to all industries.

Another delightful part of that service is that if the information you seek is not in the files, they can send to 50 or 100 of the best engineers in this country, the best men on the subject involved, and get you the very finest opinion possible that you couldn't get for love nor money otherwise.

Part of management's saving will no doubt be put back into the cost of the safety department. In our own experience, last year we spent about one per cent of payroll on safety and accident prevention work. Adding

the three-tenths per cent compensation cost makes a cost of under one and one-third per cent of payroll for safety conditions and the good-will of the men and the satisfaction of the management in having done the right thing. All of these fine things were accomplished and paid for, and still we saved money, in place of the old far greater costs and wastes of accidents, distress, loss of production, fear, heart-broken families and bad conditions all around. Here you safety men have as ammunition the positive proof for any manager what safety work can do.

Any efficient manager can be easily appealed to when such an elimination of waste is shown to be possible and good feeling and greater efficiency substituted. There is no worse waste in industry than accidents, for through them everybody is the loser. No longer need they be put up with because of the fallacy that they are industrial necessities involved with human fallibilities, once thought to be inevitable. When an intelligent manager sees that accidents are simply a leak of money, time, and production, and that the leak can be stopped, he will be interested purely from a managerial standpoint.

It Is Criminal for Management to Endure Accidents

It seems to me the progress that has been made in this work, the understandings that we have attained, make it criminal for a management in these days to put up with accidents that have been proven by so many other plants to be unnecessary. We have the great force of experience and public opinion behind us now on this question.

But there is even a greater indirect benefit that you can show to management. When a preventable accident is seen to be an inefficiency, and safe practices and efforts begin to deal with the causes of accidents, the elimination of these same causes also will remove careless attitudes that have been wasteful in production lines as well as in accidents. Carelessness in safety matters is indicative of a bad quality of thought that works against success in production lines. The mental attitude that spells safety is the mental attitude that means intelligent and increased production.

Another matter of great interest which you can show your manager is in the matter of labor turnover which safety work reduces, and any manager would rather keep trained men than keep trying out green ones. Also whenever a man is removed from the shop by an accident, it takes the attention and interest of his shop-mates from their work and there is a collateral loss that is more or less intangible but very real. Besides this, a bad morale is caused by conditions that endanger life or limb.

Every manager is interested in effective organization and improved leadership by his superintendents and foremen. Good safety organization work is a great training opportunity toward better leadership, as it requires teamwork, a common ground on which to meet his men, consideration of his men, better influence with his men, better shop discipline, humanitarian considerations, and all of those things that go to make a better foreman and better conditions generally in the shop.

The whole safety program assists in training foremen for their jobs by developing human relationships. The safety program is an inspiration to any shop. The spirit changes the attitude. The whole contact is different. It is a leaven that produces greater opportunity in any shop and leads to better conditions. I don't see how we ever got along without it, and we didn't very well.

It is becoming more and more true that every manager needs the respect of his men and the respect of his community to obtain the cooperative effort that brings success. In these modern days, no manager can expect to have this respect unless he does all in his power to safeguard the lives and limbs of his men; and safety work gains for him the respect of his employees and the public. Safety work is a point of contact that is a great asset for the manager in getting closer to his men; by doing something for them and with them he gains their ready cooperation and support.

As a manager trains his men to think of safety in the shop, he is contributing to the public safety of himself and others out of shop hours. In other words, we are all interested in safety, 24 hours a day, in the streets and in the home as well as in the shop. Our employees are driving cars, and we want them to be safe because we may meet one of them at the next corner. There is a relationship between safety training in the shop and safety training on the highways and in public places.

Safety is a Universal Idea Throughout Civilization

Safety is a single idea and you can't separate it. A man is in the shop only eight hours and is at home or in public places 16 hours. If he is getting at home the training for public safety in the highways, he is getting a general knowledge of safety that is felt in the shop.

For a long time we felt this national safety program was an industrial safety program. We never could see how we could weave it into our lives outside of industry. But when we are doing public safety work, we are training the safety sense that will help us in shop safety as well. They are one and the same.

Safety work has been a leaven to industry—an entering wedge that began to remove the old sense of aloofness between employer and employee which could lead only to disastrous results. With the idea of safety has come better industrial relations that have produced plant publications, benefit associations, employee clubs, foremen's clubs, educational opportunities, civic safety activities, service departments, and other things of mutual interest and helpfulness; all of which have brought the management and men together in better cooperation and understanding; so that safety work has been that leaven that has saved our industrial situation from its sinister labor aspects and has established an understanding and cooperation that is making us all better friends, brother Americans in industry and, in fact, is producing a better America.

I am going to digress here just to tell you of one thing which has come out of our relationship that has been to me very gratifying. Our president, Mr. Howard, was with you here on Monday. When he was a boy, a little fellow fourteen years old, he had to leave home and go to work out in North Platte, Nebraska, in the Union Pacific shops.

One day at noon he asked a mechanic how the steam got from the boiler down into the steam chest and worked the piston; and the fellow said, "Well, kid, what will you pay me to tell you?"

He said, "I haven't any money."

The mechanic replied, "It cost me money to learn that. Pay me, and I will tell you."

That broke the boy's heart. When he got older he said, "I am going to see that no boy will ever lack for opportunity."

Helping the Worker to Rise Through Education

As we got into safety work and these things opened up, the old thought about the school came strong and we had an apprenticeship for many years. During the last year or two we found many boys who have had to leave school to go to work in order to help conditions at home. We said to the authorities, "What difference does it make where the boy learns a thing? Why can't we add to our mechanical drawing department for boys and have a high school teacher come and teach them history, English, physics and anything else they want to know—make a regular high school right at the shop?"

We got the approval of the principal of the local high school as well as that of the Board of Education; the State Department of Education has established credits in the University of Illinois, so we now have an actual high school right in our plant, with 76 boys going to that high school. When they graduate, they get the diploma from the regular high school uptown, which reads the same as other diplomas.

A little while ago some boys said, "We had to quit school when we were in the fifth or sixth grade. Can't you let us get training so we can take high school work?" So we now have about 15 young chaps taking the grade work. That will lead them to high school work and they will get an education.

You can't realize what it has meant to those 90 or 100 boys who had thought they had lost the opportunity to get an education. The kindness and friendship and fellowship that have come out of all this can not help but make a closer, kindlier feeling between the company and the men. It is service. We have to put our lives on the basis of service. Business is service, and no man can succeed now in business without the cooperation of his men, and no man can get the cooperation of his men without friendliness with his men, which is expressed in service.

This whole safety idea has leavened and inspired industry to understand the meaning of service, to get together as friends, Americans and Christians.

In my old school reader, I remember the story of Julius Brandt who

was one of those men called alchemists and who sought the secret of turning base metals like iron into gold. In his experiments, he discovered phosphorous and this led to the important invention of our match.

We are living, gentlemen, in a better day, when men are considered men and when land, buildings, equipment and money are more than mere material things; they are substances which, as men become more helpful and considerate toward each other, are transmuted into something better and finer than Julius Brandt ever sought—they are transformed through service into a fellowship that enriches all.

Arranging the School Hours for the Employee

CHAIRMAN HODGE: I am sure Mr. Morey has given us a splendid address on maintaining the interest of management. The discussion of Mr. Morey's paper was to have been led by Mr. H. W. Mott, of Marx & Bensdorf, Memphis, Tennessee. We have received a telegram from Mr. Mott stating that an emergency in his company has prevented his being present. However, this is such a live subject that I am sure we can well afford to spend a few minutes discussing how some of you are interesting your management in safety.

DR. G. H. WOOD (Frederick-Stearns Co., Detroit, Mich.): We are just starting a little technical school among the employees, and I would like to get a little more information about how this school of Mr. Morey's is arranged as to hours, as compared with the hours of employment. Does it lap over or is part of employment time taken?

MR. MOREY: We send an apprentice half a day to school on company time and he can use as much of his time as he wishes. The high school is conducted from 4:00 to 5:00 in the afternoon. The boys are out from work at 3:30, so they have time from then on. Then we give any educational assistance to anybody in the plant who wants it, blue printing, writing, printing, coaching them in correspondence school work, or anything of that sort, but it does not conflict.

Sometimes some of the evening classes for the adults and for the men not in these apprentice or high school classes interfere, and then I try to get that changed so these men are on the day shift.

A. E. SMITH (Singer Manufacturing Co., Bridgeport, Conn.): I would like to ask Mr. Morey how the teachers for this high school work, which is conducted in the factory, are supplied. Are they supplied by the board of education or by the factory?

MR. MOREY: Our company pays all the expense of instruction and books.

MR. SMITH: Are the teachers supplied by the board of education paid by your company?

MR. MOREY: We have our own educational instructor employed full time, and the assistance he needs is given by high school instructors from the high school in town, but we pay them.

CHAIRMAN HODGE: I have noticed Mr. Cox of the Canadian Industrial

Commission in several sessions. Mr. Cox, you ought to have something from the other side to put a kick into this meeting. We would be glad to hear from you for a moment.

W. H. Cox (Industrial Accident Prevention Associations, Toronto, Canada): In regard to getting the interest of management, we naturally look at it from the humanitarian viewpoint; and then what gives the big kick is the economical factor, and that reasonably comes if you sell your story right. You must sell your proposition the same as any other work or idea. You must show the management that the proposition you are trying to put up to them is worthwhile. It is a matter of showing them that it pays to be safe and it pays to have human interest in mind, and with that comes the economic factor with the reduction of accident cost.

Mr. Wamter (Nebraska Power Co., Omaha, Neb.): we have about 500 employees. We get around the educational proposition this way. We can't afford to put on paid instructors and hire them to devote their entire time to it, so we meet the employees half way with the Y. M. C. A. schools. We find they put on some very good courses. We pay half the tuition and the employees pay the other half, and it is on the employees' own time. Then we make a charge against the employee for absences. We found last year that we paid the half rate, without any expense to employees other than the half tuition, and quite a number of our men dropped out. So this year we adopted the plan of paying half and charging them 15 cents for each absence, and we have reduced the number of absences.

Incidentally, we find we have helped the safety viewpoint by educating these men in the principles of electricity.

Make Other Workers Feel Their Responsibility

Chairman Hodge: Referring to Mr. Morey's paper, I would say to you safety men that your value to your plant is not to be measured by your own individual responsibility for safety, but rather by the responsibility you induce others to accept and fulfill. I think that is a very splendid statement about the relationship of the safety man to the safety problem in the plant. In other words, if you make your foreman feel that he is responsible for safety as well as production, then your safety department becomes a service to the foreman in helping him meet his greatest obligation, that of conservation of human life and limb.

Mr. Morey: I think it is very important for the safety man to take the attitude that he is an assistant to the rest of the shop. As long as a safety department is a collateral department running safety, they will all leave it to that department.

I think the biggest progress we made in our safety work was when safety was made an operating matter, not a matter of collateral safety department off on one side; then safety became part of the foreman's job, safety became an operating matter, and the safety engineer was simply there as an assistant, a news gatherer as to what was doing in

other plants. He put the responsibility right on the foremen and the superintendents and the management.

AL KROES (Employees Mutual Liability Insurance Co., Wausau, Wis.): I had the extreme pleasure a few years ago to speak at the luncheon of the Commonwealth Steel Company by courtesy of Mr. Morey and their safety engineer. I saw their school and it is the last word. It is the most wonderful institution for betterment of education and for stimulating the interest in their company and their work individually that I have ever seen.

I would like to know from Mr. Morey what influence this method has on the apprenticeship for one thing, and on labor turnover. What I mean to say is this, do the men who get the education at your expense stay there more readily than they would otherwise?

MR. MOREY: I think if I got started with this service to men, the gaining of their cooperation and good will, it would be hard to stop me. I will simply say that a great many of our apprentices do stay; some do not. This is to be expected. We want the boys to get positions elsewhere when it is best for them. However, enough stay to compensate us. I wish I had my labor turnover figures here. Our employment officer was in to see me only a few days ago and we had what we think is an incredibly low figure on labor turnover.

Even the Hard Boiled Foreman Can be Changed

CHAIRMAN HODGE: Some time ago in attending a safety conference, quite a bit of time was taken up about how you were going to sell safety to the hard-boiled foreman. In maintaining the interest of management in safety, the foreman is part of the management and it was quite interesting to hear the various methods as to how they were handling what they called the hard-boiled foreman.

I think our experience has been just as I related a few moments ago—where you place responsibility on the foreman and make it his job to prevent accidents, the hard-boiledness evaporates and he is soon coming down to the safety department looking for suggestions and help in meeting his problems.

J. F. H. WYSE (Canadian National Safety League, Toronto, Canada): I want to express my appreciation to Mr. Morey in emphasizing the necessity of the industrial manager using his influence and help in protecting his workmen outside of the factory. Outside of the factory the workman doesn't get any compensation if he is hurt unless he has special insurance. We are looking forward to compulsory automobile insurance, which will take care of his being hurt by traffic or motors, but I think that is one of the most important things that our industrial management should appreciate at the present time; not only from a humanitarian standpoint, but it reduces labor turnover to the industrial plant. If a man is hurt outside of his factory, the management of the plant and the production suffer.

CHAIRMAN HODGE: One of the outstanding things Mr. Morey brought out is that safety work has been a leaven to industries, an entering wedge that began to remove the old sense of aloofness between employer and employee and which only led to disastrous results.

ISAIAH GORDON (Bureau of Safety, Chicago): Mr. Morey tried to get the thought across, and I think he did, that we must reach the public. The way for us to reach the public is through our men in their contact with their fellows.

I wonder if we all realize the scope of the safety work, its breadth? I have always known it was wide and covered a large field, but I never saw it in just the light I did recently while in a hotel in Ohio. As one of your managers said while I was talking at a meeting, he knew I was full of safety, but he didn't know I dream about it.

That night I went to sleep and had this dream, it gave me a new slant on safety and showed me the scope of it.

A Dream That Carried a Fundamental of Safety

It seems the superintendent of one of our electric lines was sitting at a table with three other gentlemen engaged in a card game. I was standing by his side watching the game. All at once he jumped up and went into his hip pocket, pulled out a revolver and pointed it at the man sitting at the opposite side of the table. I didn't have much time to make a safety talk, but I did with just one word. I grabbed him by the forearm and I said, "Think," and his hand dropped. He put his gun in his coat pocket and he turned to me and said, "Mr. Gordon, that one word is all that saved his life."

Then I said, "What would have become of Mrs. So and So and your eight year old daughter had you done the thing you started to do without thinking?"

That word is the basis of our safety work. It is the foundation on which it is built, and I said to myself, is it so wide in its scope that it can actually prevent murder? I believe it is. Let's work along that line—that safety work is health and happiness in the shop and out of the shop and doing everything we do for our own good and the good of our fellow men; and let us do our thinking before we do the thing that plunges us into eternal sorrow. Loeb and Leopold are doing all their thinking now. The time to have done the thinking was before they did the deed that put them in Joliet penitentiary.

CHAIRMAN HODGE: I think that is a good statement to leave this particular subject with.

"Maintaining Interest of Foremen." I am glad I didn't get too far into this discussion of hard-boiled foremen. I don't know that I deserve any credit for thinking before I speak, but here we have a foreman with us who is going to tell us some of the things that maintain interest among foremen.

MAINTAINING INTEREST OF FOREMEN

Matthew A. Kalina, Foreman, A. O. Smith Corporation, Milwaukee, Wis.

I was asked to address this audience on the subject of maintaining interest of foremen in accident prevention. First of all, I want it distinctly understood that I am no orator and have undertaken to perform this duty so this body can get first hand information on what some foremen think about safety.

It must be understood also that what I am about to say has no application to my present employer, the A. O. Smith Corporation. Rather I shall attempt to speak of conditions in general and to reflect the attitude, as I understand it, of foremen employed in industry generally.

When accidents happen, the superintendent, the general manager, and in fact everyone in authority, all preach the same gospel of safety first.

Foremen have heard so much of this safety first business, especially at accident time, that they have become reconciled to a lecture when anything happens. But except for such occasions, one is apt to hear most about production.

Knowing these conditions and what really counts with men in authority, is it any wonder that foremen question the cry of safety first? Of course, we are all for safety from a humanitarian standpoint. We must comply with what our superiors demand, however, and that is production at as low a cost as possible.

We foremen know that accidents cost money. Accidents add cost to the product. Why not begin to interest foremen in the true meaning of safety? All foremen, if they hope to survive in their positions, are interested in cost. Why not make safety a matter of cost, which is a real important thing today? Everybody is looking for the product that is best and costs the least. Every accident that occurs means so much added cost; insurance cost against accidents is naturally in proportion to the nature and severity of these accidents.

Educate your foremen to a point where they will understand that safety is a matter of cost. In that way you have their interest and it becomes a thing vital to them if they hope to maintain the proper cost of production.

I have always felt the way to get results is to be honest and truthful. Why not be honest and truthful on the safety matter? It is an economic problem, a matter of cost to employers and also to employees, as they finally have to foot the bill.

Don't you think that if everybody actually understands that they have to pay a part of the cost of every accident that happens, it will maintain the interest of men and foremen in a way that emphasizing safety first only when an accident happens never has accomplished?

This viewpoint is advanced by a shopman in the hope that the decision afterward will be along this line. When asked, "What does accident

prevention mean economically to the foremen and men in the shop?" the answer should be: "Safety and cost of production go together."

CHAIRMAN HODGE: I think Mr. Kalina has made a statement that is intensely interesting. I am sure that we should have some discussion on the subject. Do you agree with him or do you disagree as to whether or not production comes first and safety second? I don't want to start anything, but that is just a suggestion.

PAUL G. WOODWARD (Viscoise Co., Marcas Hook, Pa.): A foreman or department head has an accident in his department. A man may lose a month or more in a serious accident and incur hospital and medical expense. I should say a very effective way to financially interest that foreman or department head would be to tack that $500 or $1,000 onto the department charge direct and apportion it to his unit cost.

J. M. STEPHENS (Standard Oil Co. of Kansas): I agree with the speaker that the money consideration is a very vital factor in this safety work, in fact it is the first. We may talk of the humanitarian aspect and without a doubt it is taken into consideration in a good many instances. However, I believe that the saving of money is the thing that any management has in mind primarily when they institute and organize safety. I know that in our plant a statement of what accidents are actually costing, not only the management, but the employees themselves, attracts more interest from the great mass of the employees than most any other statement that can be posted on the bulletin board.

E. ROSS FARRA (U. S. Gypsum Cc., Staten Island, N. Y.): It was my pleasure to sit with 15 men in a conference. They reached the conclusion that safety in the industries represented there, would never go across as strong as it would if the men who are directly responsible for safety were understood to be production executives.

I think that bears out that thought—when those of us who are known as safety engineers are recognized in the plant as production engineers, then we will get safety because the foremen will recognize us as part of the organization.

You Can Not Fit All Men to One Pattern

A. J. VAN BRUNT (Public Service Corporation of New Jersey): I heard the definition of the designation of safety engineers some time ago in a manner which I think was illuminating. The question was asked, "What is a safety engineer?" The reply was that it was considerably like a Welsh Rarebit, which was neither Welsh nor rabbit. The safety engineer is not primarily a safety man, nor is he in all cases an engineer. There have been times when I sat in at meetings when I humbly thanked Almighty God that I was not an engineer.

I take issue with the gentleman who addressed us from the platform and with one or two who have followed him. Men, you can not put human nature in one mould. You can not appeal to all of the executives or all of the foremen on the plea of dollars and cents, nor can you appeal to all of them on a humanitarian basis. You have to combine those

things. Objection was made by this speaker, (and I want to compliment him on his speech; it was fine)—attention was called by the speaker to the words "safety first."

I have been in this game for sixteen years. I have heard that slogan criticized severely. I have yet been unable to find any man who could take two words and put them together which would mean as much as those two words.

Now let's look at the other angle just a minute. If you will preach and practice safety first, going at your executives and your hard-boiled or soft-boiled foremen, according to their individual feelings, one for dollars and cents, particularly if he hails from Scotland, the other from the humanitarian standpoint, particularly if he hails from New Jersey and get each man to consider that according to his own personal individuality, you will cut cost and increase safety.

Those thoughts are not antagonistic; they are as close together as Siamese twins and you can't cut them apart without killing one of them. Safety will increase production and it will reduce cost, whether it be in the shape of a mechanical safeguard or mental thought. Don't put men in the same mould. Use each man according to his individual preference, and practice safety first and you will increase production materially and undoubtedly decrease cost.

A Great Deal More Than Just an Economic Problem

R. B. MORLEY (Industrial Accident Prevention Associations, Toronto, Canada): First of all I want to thank Mr. Kalina for what he said. Second, I want to take you all back to the time when you were a boy and heard about Santa Claus. By and by we found out, like the little girl did, that Santa Claus was just your father.

Assuming we have found out there is no Santa Claus, don't we all love Santa Claus?

I agree with Mr. Van Brunt that we have to tie the two propositions together. You can't say to the foreman that it is only an economic problem. The foreman knows deep down in his heart that it does matter whether people are hurt or not. You have got to tie the two together. There are some people who get the dollars and cents idea quicker, so for heaven's sake, men, let's remember that it does matter. I lost part of a foot in a street car accident a few years ago. Does it matter? Of course it does.

A few days ago I talked to a man who had killed a child. If there was ever a man on earth who was miserable, it was that man. These things do matter, but we have to remember both sides of the question. Let's not stress either one too heavily because there is no necessity, and there is a Santa Claus all the time for all of us.

W. H. WINANS (Union Carbide & Carbon Corporation, New York City): May I suggest that we hear from some of the other foremen who are here? It seems to me we ought to hear from other foremen on this particular subject.

CHAIRMAN HODGE: That is a very good suggestion. Will some foreman volunteer.

EVERT PAGE (Haynes-Stellite Co., Kokomo, Ind.): I am another foreman and I can appreciate the position that Mr. Kalina has portrayed to us.

You know managers are very temperamental people and the workmen are also temperamental people, and we foremen are the go-between; we take the shock from both sides.

When my manager comes to me and says, "Now, Page, we are having too many accidents; we have got to take measures to stop these accidents"; I say, "All right. We will take measures right away to correct that. I will have everything looked after and I will get the safety engineer and have him look everything over, and get the committee to go through and inspect everything."

When the Manager Is Likely to Forget About Safety

The next day he comes around with his hair all mussed up. "My God," he says, "did you notice what our cost was last month, and look at your production. Your production was only about 80 per cent of what it ought to have been." Then you immediately forget about your safety program and you begin to try to hustle up production. You go out and boost the men.

I just wonder what per cent of the managers in this country are really enthused about the subject of safety? It seems to me that it is the big problem of this congress to pay more attention to converting the managers than it is the man and the foreman. Practically all the foremen and the men already understand the importance of safe conditions in the plant and also in public places, but it is up to the management of the different institutions to make money.

As Mr. Morey said, the function of the management is to use money to make more money, and it is very easy for management to forget all the little details when they are trying to earn dividends for stockholders.

In the town where I come from until very recently there has not been very much done in a general way through the manufacturing plants to promote safety. They complied with the requirements of the insurance company and that's about all. But I want it to be understood that as far as I have been able to notice, the foremen and the men under the foremen are ready at all times to cooperate with the management when the management will show them that they are earnestly for safety.

E. R. HILL (U. S. Gypsum Co., Chicago): Our management believes in safety first; in fact, they have an operating motto, "Safey always, service, and then cost." When we show them we have saved $200,000 on safety work, they can't wait for the monthly report to see how much we have saved. As a result of that, the management has issued notices that operators are not good operators unless they are safe operators. That amount of money was saved in one year.

M. H. HUNTER (U. S. Gypsum Co., Fort Dodge, Iowa): I am very

heartily in accord with some of the things that have been said here, and especially Mr. Morey's ideas on maintaining the interest of the foreman, because he brought out some ideas along that line.

I think it is foolish to tell a foreman how to conduct and teach his men safety. My idea has always been to help him. The safety man is the servant of the foreman and of the men in the plant. Quite often the foreman will say, "We will never get this job done if we don't take a chance."

I tell him, "Good for you, Bill; go ahead, take a chance; but for God's sake, don't take foolish chances. We have got to be in a hurry, but watch out; don't have accidents. It is all right to hurry, but of course the hazard increases. Get the work through without an accident and I am with you to help increase the production."

J. P. HUDGSON (Phelps-Dodge Corporation, Morenci, Ariz.): I have listened with very much interest this morning to Mr. Morey's paper and later to this gentleman who addressed us as the foreman. I have a great deal of sympathy for any man in this man's position for the reason that I started out as a melter in the mines when I was a kid. I am at present manager of mines, mills and smelters in Arizona.

I think Mr. Morey struck the right key note when he stated that if we are going to succeed with safety, we must make it a part of our operating program, not a minor, but a major part.

The Foreman is Often a Buffer Between Two Forces

The Phelps-Dodge Corporation, with which I am connected and have been connected for the past 14 years, has always been interested in safety. We were interested in safety as long as 14 years ago, but we never got safety down to an operating basis until the last two years when we made it a part of our operating program.

Our safety department is headed by the vice president and general manager of the corporation, and every manager of every branch of the corporation is the head of the safety work of that branch. We have adopted the slogan of "No accidents."

It is true in mining, milling and smelting, that you have hazards. We expect to have them, but in the last two years we have cut our accidents more than half; that is since we adopted that program.

Having been a boss and having been a foreman, this gentleman has my sympathy. I know that the foreman is a buffer between the men and the company. You are looking for production, you are looking for costs and you are also looking for a low accident frequency or ratio, but I want to tell you, my friends, that I have had more than 40 years' experience in mining, milling and smelting, and if you are going to succeed, your success will come first by making your plant a safely operating plant and making safety one of your major, if not the major problem. Teach safety by education through the public schools and through your plants.

CHAIRMAN HODGE: Mr. Morey, have you any further remarks?

MR. MOREY: I think that has been a very helpful discussion. This is a forum for truthful discussion and we can be very grateful to Mr. Kalina for giving the foreman's viewpoint truthfully and splendidly.

Safety work has not been a mercenary thing. Joy is the consciousness of God's approval. I can't define just what joy is. Why is a flower beautiful? There is some indefinable thing of beauty and fragrance in the flower. There is something indefinable in the charm and beautiy of character and nobility of our mothers. It is not a mercenary thing.

I know when we started safety, we thought that we would save money and we would have money to devote to fellowship activities.

I used to be a lawyer, and I think both sides of this motto, "Safety First," are right. Safety can be made first and it can save money. I want to bring you right back to the statement I made in my paper, that when a thing is right in principle, it doesn't conflict with any other right.

The Keynote of Discussion to Make Men Think

It is wrong to injure and kill men. Is there any argument on that? Is there anyone so base as to say that money shall come ahead of life and limb of the workmen in our shops? And yet we must make money to stay in business. We can't have our costs greater than our selling price. We have got to take a business-like attitude on this and see what truth is. Two truths never conflict. It is right to be safe and it is right to have our intelligence so spurred and our ingenuity so developed that we can meet any hazardous condition and improve it in such a way that it will not only protect life, but will improve production costs.

L. J. PARRISH (A. O. Smith Corporation, Milwaukee, Wis.): The key note of the several talks for the last two or three days has been to get men to think and that was the aim of Kalina's talk. The management behind Kalina thinks as much of safety as they do of production and have orders in the shop to every operating executive signed by the president of the company, not yesterday, but several years ago, and reiterated several other times to renew the thought, that every operating executive in our plant is to consider the job, the task that he has to do, on a fifty-fifty basis, if that is possible. In other words, safety should be given as much consideration as production in our organization.

Kalina is not a hard-boiled foreman. There isn't a man in this room or any other plant that has a heart as mellow, at least not any mellower than Kalina's heart, but he is just throwing out a thought, gentlemen.

If you men could get to talk with certain foremen, you would find that many all over this country from one section to the other, have a thought that safety first is the bunk. Of course, it is not. Kalina doesn't believe it is the bunk, but how many times have we seen this situation arise in other places? Let us take the street for example. You know people like dramatic things. If an accident occurs in an unusual manner and it is dramatic, there are a lot of people there looking at the injured man, but if a man is struck by an automobile and just bumped, people pass by and never notice.

Too many managements feel just the way this foreman has described;

instead of constant impounding of safety, talking safety all the time, there is a lull between the periods of accidents.

To go a little further with our foremen, we have monthly meetings with the foremen and we discuss intimately with these foremen the cause of accidents, the cost of accidents and what we can do to prevent a recurrence of those accidents. All the foremen work together. We try to get our foremen to suggest something that can be done in other departments. We try not to be thin-skinned.

I think every manager must know that in business everywhere a large number of men lay great weight on production all the time and only a little weight on safety all the time. They are not in balance every day, and the whole theme of Matt Kalina's talk was simply a thought to get you people to think—"Certainly one way of reducing accident is by stressing cost. Maybe somewhere in my organization there is that sort of thing going on; maybe some general foreman is getting that idea of cost above everything else to a group of sub-foremen, which is not the management's idea at all." That was the idea back of Kalina's talk.

G. A. KUECHENMEISTER (Dominion Forge & Stamping Co., Ltd., Walkerville, Ont.): I was formerly connected with the A. O. Smith Corporation. I have been away from Wisconsin so long that I don't know whether to point to Matt with pride or view him with alarm, but I do want to get up in this truthful testimonial meeting this morning and say that I was on the first foreman's safety committee that was ever appointed in the A. O. Smith Corporation.

A Foreman Who Asked Help in Safety Work

I want to say that Matt Kalina was the only foreman in my recollection who came to the safety committee and said, "Will you come over to my department and help me?" And I want to say that Matt Kalina did not do it from the economic standpoint; he did it from the humanitarian standpoint.

CHAIRMAN HODGE: Having a plant in Milwaukee and knowing conditions, I want to state that the A. O. Smith Corporation is right and that they are doing the things that Mr. Parrish has pointed out. I know that.

We have talked around and about and to Mr. Kalina and I think it is only fair that we let him have one more word.

MR. KALINA: Gentlemen, there seems to be some misunderstanding about the few remarks I made. I did not get the impression from my employer. I consider my employer a model among employers. But I have visited many other plants from time to time and I get in among the foremen and I get to know them. I have questioned them along these lines, and what I spoke about was for foremen in general. Don't get the impression that I meant my employer.

CHAIRMAN HODGE: This discussion has been mighty fine, and it is certainly a source of satisfaction to the chairman to have such a fine discussion of the papers from the floor.

We will pass on to the concluding subject for the morning session,

"Who is Blocking Safety at Your Plant?" by Mr. Howard B. Benjamin, a grinding machine operator and a member of the safety committee of the Haynes Stellite Company, Kokomo, Ind.

WHO IS BLOCKING SAFETY AT YOUR PLANT?

Howard B. Benjamin, Member of Safety Committee, Haynes Stellite Company, Kokomo, Ind.

Before presenting my views, I wish to explain that the conditions I am about to mention are not taken from the plant where I work but from various plants in central Indiana. For years I made it a point to try to find who was blocking safety at the plant where I worked and until I met my present employers, I changed jobs many times.

As all of us know, there was, for many years, a misunderstanding between "capital" and "labor." Because of this condition the managements of some industries and the leaders of labor were each trying to get as much as possible from the other and giving as little as possible in return. As a result, many managers were backing away from the line of prosperity with a feeling of hatred and, on the other side, labor, led by false teaching, was backing away from the same line with the same attitude. They had reached the point where for either to back farther meant the destruction of both and something had to be done.

With these facts to face, studies were made and the personnel department and safety engineer entered industry. It was their responsibility to stand between the management and the working men, analyzing the conditions of both and making suggestions for the betterment of all. This was a difficult position because the attitude of both had to be changed.

I have found that most managers are seeking the truth and are willing to do anything within reason to gain the confidence of their men. No safety man need be afraid to stand for justice and to present the facts.

However, I have heard foremen say that the safety movement was a joke, that they could do the thinking in their departments and that all they asked of the men was to obey orders. Foremen of this type are fast passing from the picture. The management does not want them, because they block harmony, teamwork and cooperation. Managers are asking the safety man to help make those things a reality.

I believe that it is only through education and honest presentation of facts that industry can reach a high stage of efficiency in production or safety. The capitalists and the labor leaders must be willing to yield to reason. Both parties must realize that "capital" really means all resources which can be utilized and developed and that "labor" is the most important resource of all.

The management, to get results, must use and develop the mental resources; and labor, to get results, must use and develop mechanical

and material resources. We must all realize that "capital" and "labor" are parts of the same thing and neither can prosper long to the detriment of the other. And I believe the success of the safety man in the end depends upon his ability to create harmony by showing each group its true relation to the other.

The subject of getting the cooperation of the management and foremen has just been discussed by smarter men than I am, yet I can not resist naming a few selling points of safety that some safety men do not present to the management. I have never found a manager hard to convince when I could get an interview, but when a worker asks for an interview most managers are too busy with important matters to give a worker from the ranks time to discuss industry's highest item of expense.

Mr. Hoover says that the greatest waste in industry is the number of days lost through accidents. Records prove that this can be reduced by almost one-half through safety education.

Investigations by the National Industrial Conference Board show that in the metal working plants it costs about $48 to replace each man who leaves the service, and to maintain a working force of 2,000 men the average cost is around $168,000 per year. Records show that this has been reduced 42 per cent where safety work was properly applied.

Bradstreet's financial report shows that 42 per cent of all industrial failures are due to failure of the managements to properly consider the human element. Acocrding to Dun's Review there were 1,366 industrial failures in the United States during the second quarter of 1926, that is an average of 455 per month. Indiana had 37 of those failures and Michigan had 35.

Production Increased by a Chance Remark

I have figures to prove that in one departmental meeting at our plant, a chance remark resulted in an improvement of method reducing the cost of production more than the cost of the safety meetings for a year. Our Ever Ready plant at Cleveland put on a special safety campaign for one week and said nothing about production. Yet production increased 20 per cent that week. At our plant at Niagara Falls, Joe DeAngelo, a pipe fitter, eliminated one of the worst hazards in the plant and at the same time reduced the time on that job 66 per cent. I believe that such facts, properly presented, will convince any manager that safety is an investment and a necessary part of his program.

Labor is the highest item of expense in American industry today and yet as a rule it is the only item that has no one to look after it but foremen who are educated in production methods only.

I believe that the success or failure of any plant depends very largely upon the intelligence of the workers and how well they understand, and cooperate with, the management's plans. These workers are your mental guards as well as human machines. The foremen and management must remember that they are the only machines on the market

that can work to a blue print, adjust themselves to new conditions, and plan a better way while in motion. With proper handling, these machines should increase in value each year, while a mechanical machine decreases in value.

Back of every machine and back of every plan there must be brains. It is the duty of the foreman to develop these brains and to do so they must be willing to discuss safety, production, costs, or anything that brings the management and the men closer together in friendly relations. The foremen are getting paid, not for their mechanical skill, but for their ability to influence the actions of others in carrying out the plans and policies of the organization. When a foreman admits that he can not promote safety among his men, he admits his inefficiency on the job he holds. Safety is nothing but production efficiency and must be handled as such.

Mr. Safety Man, it is your duty to present these facts to your management and foremen along with a plan of action that will appeal to all. Have you done your duty? If not, who is blocking Safety at your plant?

Mr. Manager, it is your duty to give your Safety Man a hearing and if his plan sounds reasonable to give him authority to put it across without interference by any foremen who may be behind the times. Have you done your duty? If not, then, I ask you, who is blocking Safety at your plant?

Lay Out a Definite Plan for Safety Effort

I have been asked to suggest some plan of presenting safety to the workers in such a way that they will accept it. There has been more propaganda spread about how to get the cooperation of the worker than almost any other subject, and the fact is that deep down in the heart of every worker there is a desire to play fair. They are all willing to support any plan that is fair, providing it has been presented in a way that they understand.

There is no one plan that will work at every plant, as each plant has different conditions to overcome. But any plan will work if everyone in the organization is working for that plan. The best plan will fail, and often does fail, where only a few are working for that plan.

Therefore, I have always insisted on laying out a definite plan and then having safety meetings to make sure that everyone knows that plan. I never cared much what the plan was, if it was fair. I devote all my efforts to getting everyone to back the plan, and the best way I have heard of is, first of all, to have the men help lay out the plan. Get them to make suggestions on the plan they want and then follow their suggestions as far as practicable and so long as they do not conflict with the other plans or policies of your organization. In this way you are sure of cooperation, as no men or group of men are going to allow a plan to fail if they helped make that plan.

There is not a case on record, so far as I have found, where the facts

were properly presented, that the workers failed to cooperate and their judgment has proven good on some of the most difficult problems facing the management. As evidence, I refer you to the National Cash Register Company. Years ago a worker was asked why he did not make suggestions to show his foreman he was worth more money. His answer put the management to thinking and today they have one of the best organized plants in America. Three-fourths of their executives started making suggestions in safety meetings.

Years ago, Wm. Procter asked questions of two workers. Based on their answers, Procter and Gamble are leaders in efficiency. "Golden Rule" Nash made millions because he believed in the integrity and ability of his workers. The Standard Oil Company of Indiana and the International Harvester Company are others who are cashing in on the mental ability of their workers. And, pardon me when I say that our own general organization, the Union Carbide & Carbon Corporation, has learned that enthusiasm for safety can be aroused among the workers only after the foremen become enthused and go after it in real earnest. Our experience seems convincing. Four of our plants had no lost time accidents in 1925, and 12 have had none during the first half of 1926.

The First Step is to Gain Confidence of Workers

The first step in getting the workers' cooperation in Safety is to gain their confidence. To do this, there must be some one they can trust to protect them from the prejudice of jealous foremen. For that reason, if your plant is small your safety man should also be in charge of personnel. He should classify the jobs of each department, know their requirements and rate of pay and then *select* workers instead of *collect* them; instead of one foreman laying off a good man while another hires a new one, that man should be transferred. He should be in charge of considering all suggestions from employees and see that they get credit for their efforts and ideas. He should interview new employees for new ideas and interview men leaving the service to learn the causes. He should give the foremen credit for the development of their men but he should also charge the accidents and labor turnover to the departments where they occur. He should be willing to help the foremen but should not be under their command. He should provide a plan of promotion based on the square deal.

I do not think you need any red tape in safety. Just remember that to lead men you must be a man. Put yourself in the worker's shoes. Anything that would inspire you, will inspire others, if you are a man.

Safety in industry requires the development of the mental guards—the men themselves.

The only rule that always works is the Golden Rule.

Who is blocking safety at your plant? I don't know, but I do know that the worker is only the shadow of the man above him. If there is

a disloyal worker in your plant, there is an incompetent man above him. It is your duty to find that man and show him the path to take.

Through the influence of safety meetings, the workers can be made to feel the company's interest in them and they will become enthused. You can develop the right mental attitude toward their work, their fellow workmen and their responsibilities. You can teach them that reward and efficiency go hand in hand. You can teach them to consider all sides of a question without prejudice. You can teach them to pass their ideas along for the good of all. You can teach them the value of team work, harmony and cooperation. And you can teach them that every man will profit according to his own contribution to the welfare of all.

Of our 29 plants, four have had no lost time accidents during the plant year, nine no lost time accidents during the past nine months, and 17 no lost time accidents in the past six months.

Gentlemen, I hold here in my hand an American flag, the greatest emblem that ever waved over any nation. For every white stripe in this flag, 3,833 human souls were sent into eternity last year because of accidents. For every red stripe, 9,857 American children were made orphans last year. For every star in this flag, 11,979 American workmen lost 30 days or more last year through accidents.

Think this over, then go back home and try to learn who is blocking safety in your plant. I ask it in behalf of those millions of American workers who earn their daily bread by the sweat of their brow, and I myself am one of them.

Blame for Failure Sometimes Lies at Home

CHAIRMAN HODGE: Mr. Benjamin, I am sure that I express the sentiments of the session this morning when I say that your paper was an admirable one and an inspiration, I am sure, to everyone in the room.

Mr. Benjamin's paper is now open for discussion.

MR. FABRA: It occurred to me that if there are other workmen in the room, it might be illuminating to hear from them.

CHAIRMAN HODGE: I think that is a very good suggestion. Are there any workers present this morning who can contribute something toward this subject?

H. M. SHAW (Illinois Power & Light Co., Chicago, Ill.): I just want to contribute a thought in addition to what the speaker has just said by telling a story that occurred in a plant where I was employed.

At one time we had a very valuable man who was interested in safety work and he was about to leave the company's service. The manager called him in and said, "George, you are going to work for these other people. I would just like to know why?"

"Well," he said, "it isn't a very long story because when I get to that other manager and I tell him anything, he is always going to agree with me. Our manager wasn't so inclined."

The thought that I want to put over really is: do we, as safety engineers, often look for a cause to blame the manager or somebody else when it is the lack of our own resourcefulness. I believe many times we expect the other fellow to agree with us and we accept that as a fact and do not assume the responsibility that rests on us.

J. J. COKE (Henry Disston & Sons, Philadelphia, Pa.): In putting together the thought expressed by previous speakers, there has come up in my mind a conflict that possibly has come to the minds of other visitors.

In one of the talks on the subject of maintaining the interest of the foreman, it was said that the management in one plant had made the statement that with the increase in the safety movement, production had been reduced. Some of Mr. Benjamin's remarks have given me the impression that certain safety measures installed in his plant have increased production. I wonder if there are any figures that would lead us one way or the other. Do increased safety measures reduce or increase production? That point has come up many times in my relations with foremen, with superintendents and with the men themselves, and after having had 10 years of safety work in the Disston plant, I haven't been able to arrive definitely at any conclusion on this particular point.

Testimony on Production Gains Through Safety Work

CHAIRMAN HODGE: There is a committee which is making quite a concentrated study of that point. It is the American Engineering Council.

Has anyone anything to contribute to his question? Some of you men who have had considerable experience in punch press work; what do you say about slide feed dies and so forth, making the job 100 per cent safe and its effect on production?

H. W. SMITH (Pullman Car Manufacturing Co., Chicago, Ill.): I believe it is almost universally agreed that safety measures have increased production all the way through, with a very few exceptions where safety work has reduced production. We have found that always in our experience.

H. R. WHITNEY (General Industries, Elyria, Ohio): In 1924 we had nine major accidents in our press room and if I remember correctly, the cost of those accidents was $22,000. In 1925 we commenced building safety into the tools and we had three major accidents to the extent of three failures. In 1926, ending October 1, we hadn't lost even the joint of a finger and we have cut the cost of some of our jobs nearly in half.

CHAIRMAN HODGE: What has been the effect on production?

MR. WHITNEY: It has increased production so we can cut the cost nearly half of those particular parts.

PAUL G. WOODWARD (Viscoise Co., Marcas Hook, Pa.): Some time ago we had an injury to a man resulting from a chemical splash and in an endeavor to prevent the recurrence of this, we hit upon a scheme that

didn't cost us very much which not only prevented the recurrence of that injury but is saving us money, although it is only $5 or $10 a week.

In an endeavor to prevent injury, we found a production loss.

CHAIRMAN HODGE: Gentlemen, I want to thank you very kindly for the splendid attention you have given this morning and I know you couldn't help give it because of the very fine papers and discussions that we have had.

ADJOURNMENT

FRIDAY AFTERNOON SESSION

October 29, 1926

The meeting was called to order at 2:10 o'clock by George Hodge, Chairman.

CHAIRMAN HODGE: I think we were mighty fortunate this morning in having such splendid papers presented, and I was particularly pleased with the very fine, free and frank discussion that we had from the floor, and I know that if we can just keep up the same pace we will have a very profitable afternoon.

In order not to encroach on the time of the speakers, I am going right into the introduction of the first speaker, Mr. Elliott P. Knight, Safety Engineer of the Employers' Liability Assurance Corporation of Boston, Massachusetts. Mr. Knight is leaving on an early train and Captain Fisher very kindly and courteously gave him the opportunity of speaking first. It gives me a great deal of pleasure to present Mr. Knight.

NO-ACCIDENT COMPETITIONS

Elliott B. Knight, Safety Engineer, Employers' Liability Assurance Corporation, Boston, Mass.

It has long been realized by those engaged in accident prevention that their work is successful only when it is possible to obtain widespread publicity. In no other line of endeavor is it so essential that all parties concerned be made fully aware of the nature and scope of what is intended, and that every effort be exerted to enlist the whole hearted cooperation of every member of an organization. Safety work without an incentive is practically useless, for interest among employees soon lags under a regular routine of plant inspections and committee meetings. That this is true is cause for regret to some leaders, but it is the natural outcome of a system that deals principally with personalities.

In searching for ways and means of making safety work more vital, it was natural that ideas of competition should receive first consideration. The desire to do just a bit better than the other fellow is deeply rooted in all of us. We like to be at the top of the heap looking down with some

complacence on those not quite so fortunate or so possessed with the desire to be out in front. This feeling is so evident in sport affairs that its value was too great to be denied. The application of the principle has proven its worth and as a result we find in industrial plants a wide variety of competitive schemes that are daily leading us on to outstanding successes in accident prevention.

It is highly important though, that the individual plant make an exhaustive study of its problems before attempting any campaign designed to compare men or groups of men. Each has its peculiar conditions, at such variance that it is not possible to treat any two in a like manner. The nature of the work is different, the types of workers change and the locations of the plants and their layouts introduce complications so that each contest must be designed that the detail approaches the need. In general, however, there are four principal factors to be considered: 1. what shall be the competing units; 2. what shall be the rules of the contest; 3. methods of deciding winners; and 4. determination of the reward if one is to be given.

Departmental and Foremen Contests Are Good

The choice of competing units is both interesting and important. The more common units selected are individual workers, departments, foremen and different plants belonging to the same company.

The use of individual workers is rather advantageous in a small plant, but in large plants it produces complications and often leads to some expense, especially if individual prizes are to be awarded. Complications arise in the allocation of accident causes and the methods used to record all data.

Inter-departmental contests are excellent in that they use the spirit of team work and departmental pride to a marked degree. It is possible to better the efforts of an individual who might hold his own record in disdain by the feeling of pride of his own co-workers. It does not take an inspired group very long to influence a wayward member to change his attitude or suffer the consequences.

Contests for foremen have also proved very successful. It has been accepted by most safety workers that the foremen are the "key men" in industry and should be held directly responsible for all accidents to men under their supervision. The offering of some incentive to these men will very often sweeten their attitude toward accepting their responsibilities. The principal drawback to this method is the limited distribution of the award. The larger the number of people affected by the award, the more will be interested in the contest. Very often employees will not put their whole heart into their efforts if they realize that the only one to benefit is the man who has supervision over them.

Inter-plant contests have all of the advantages and good points of inter-departmental contests, with the added advantage that a feeling of pride is fostered in the entire plant and is not limited to any one group of men in the plant. Furthermore, the question of record keeping is

much simplified and accident causes are easily chargeable. It is most important, however, that those in charge of the contest so arrange the details of their program that the interest of all employees is kept at a high pitch throughout the life of the contest. With a large number of people under one control it is possible that some individuals may feel that the loss of their efforts might not change the final result and that they may therefore try to "pass the buck."

The choice of contest rules should be thoroughly studied in order that all competing units shall be satisfied and fairly judged. Simple rules should be evolved defining what shall be called an accident, how lost time shall be calculated, giving an explanation of frequency and severity rates, and designating the source of information of exposure.

Chargeable accidents are those causing death, loss of use of any member, or loss of time beyond the day during which the accident occurred. Days lost should be the actual time lost by the man, counting the days between leaving and returning and excluding only Sundays. All such time lost is chargeable to the month in which the accident occurred irrespective of the month in which the man returns to work. Cases of death are chargeable with 6,000 days, as this is the figure agreed upon as a fair penalty for accidental death. Permanent injuries are charged with a certain proportion of the death penalty, depending upon the seriousness of the injury. A table has been prepared and distributed by the National Safety Council giving the time lost to be charged against the most common types of permanent injuries. Accident frequency rate has been defined as the number of lost time accidents per 1,000,000 hours worked and accident severity rate as the number of days lost per 1,000 hours worked. The exposure to accident is usually given in terms of actual hours worked, and this information should be taken from sources that are correct. In determining the exposure for an entire plant, the figures for supervisory, clerical and productive workers should be figured separately on their own correct bases and all combined to give the final result.

Methods of Determining Contest Winners

There are various methods of determining the contest winners which can be studied to find the one most applicable. The winner can be chosen on the basis of fewest lost time accidents or least lost time over a stated period, by percentage reduction in frequency or severity rates, or by combinations of these methods. Countless methods can be devised but the above are among the most common. Perhaps the best rule to follow in determining what shall be the method is to bear in mind the ideals of accident prevention work.

Fundamentally we are all after an actual reduction in accidents, even though such a reduction does not always mean a reduction in cost or lost time. It is possible that with the accident frequency remaining the same the severity will show a marked decrease and if such is the case the controlling factor has been principally good fortune. Consequently we

can not truthfully say that we have made any real progress in our preventive work, even though from a financial standpoint we have met with some success. Such success may be but temporary, for should our accident frequency remain the same during another period, we might be visited by a higher severity rate. Such reasoning leads us to feel that perhaps the best system is to judge our results on the basis of actual accident reduction. However, the problem is one for each plant to work out, as there is a wide variety of opinion on the subject.

The choice of awards for the winner or winners of a contest is dependent to some extent upon the nature of the competitors, whether individual worker, foreman, department or plant. Awards include sums of money, bonuses, certificates, medals, banquets, cups, banners, flags, etc.

It must be borne in mind that any contest is successful only to the degree that cooperation is obtained from every individual from the management down to the humblest worker. Whole hearted effort is required from all and unless obtained contests will prove futile. It is sometimes no easy matter to obtain and maintain this concerted effort, and widespread publicity before, during and after the contest is required. At times, stunts almost bordering on spectacular are required in order to keep interest at fever heat. It is vital that the start be made in an auspicious manner, that contestants be kept informed at all times as to their standing during the contest and that the ceremonies attending the award of prizes be such that a feeling of regret and desire to improve be inculcated in the minds of those that lost. Such publicity will form the nucleus for proper spirit during future contests and will illustrate what lines of attack new contests should follow.

Types of the Prizes Offered in Safety Contests

A few samples of prizes will illustrate some of the countless possibilities.

1. In a large textile finishing plant where contests are inter-departmental, the management gives a pair of theater tickets to each member of the department having the best accident frequency record for the month. This has aroused very keen interest among all employees. A bit of humor is injected each time a winning department attends the theater by having members of the cast of the show make some reference to the reason for the department's attendance.

2. A company operating six cotton mills staged a six months contest based on reduction in lost time, and conducted as a combination foremen's and inter-plant contest. A banner was designed and placed in charge of the department having the best record each month as the contest progressed. As but one banner was used, this meant that each department in each mill had an equal chance to win. At the conclusion of the six months period, the banner became the permanent possession of the department having the best total record. In addition to this, five prizes varying from a gold watch to articles of clothing were given to the foremen whose departments had the best records over the six months

periods. In further addition a banquet was given to all overseers of the one mill having the best combined record. In this way much interest was aroused and a fairly wide distribution of awards made.

3. A number of automobile assembly plants engaged in a nine months inter-plant contest based on reduction in lost time. By frequent meetings, visits of an engineer and much publicity, keen competition was obtained. The winning plant was presented with an engraved silver loving cup with appropriate ceremonies attending the award. The members of the winning plant were so pleased that they mounted the cup on an automobile and drove all around the town, explaining to all the story of their success.

4. A company making candy gives a pound box of chocolates to each employee who goes through a month without an accident of any kind.

5. A company engaged in meat packing and operating a large fleet of trucks offers enough material for one Sunday dinner to each driver who goes through a month without an accident.

6. A steel erection company offers a bonus of $5 each month to the foreman whose crew has the lowest accident frequency and $2.50 to each member of the crew.

When the Hazards in Departments are Quite Varied

CHAIRMAN HODGE: I am sure we are very grateful to Mr. Knight for bringing to us such a broad experience with no-accident competitions. There is time for a short discussion of this subject.

T. R. BICKFORD (Vitco Company, Rockford, N. J.): I would like to ask Mr. Knight in his running of departmental campaigns if he has come across a plant where the hazards of the various departments are quite varied; say he has one department which has been having an accident record of perhaps three accidents a day and perhaps another department which has never had an accident. In some plants like that, they may keep no record of the accidents, so that a campaign can not be based on past experience.

Mr. Knight, what would you do in a case like that in awarding prizes?

MR. KNIGHT: You have brought out one of the thoughts I intended to give you.

There are really two methods—one, practical, the other, theoretical. You have been given the practical one. If any plant comes up against that situation (when you are running a campaign, you very seldom have any two departments having the same chance for accidents), you might place those departments on exposure. You might tell just what has been the number of hours' work, but even that does not give you an exact figure to base what your results are going to be. Some plants which have kept records have gone back over previous years and taken each department in its turn, found out how many accidents there had been, how much lost time was caused by those accidents and then said to them: "In the past, this department has produced so many accidents." The department next to it has produced fewer, so it isn't fair to compare

them when they both employ the same number of men and have had the same number of hours. It is only fair to penalize them on the accidents occurring or the number of hours of lost time coming from the accidents. That is practical, using the past experience and past figures.

The theoretical method is one I learned from the National Safety Council and that is based upon insurance rates. Perhaps you gentlemen know that every single plant is classed as a certain type. Each type has its base rate. For instance, the base rate for foundry work is so much and cotton mills have another rate. In a cotton mill or foundry each department has a different rate, and the rate is determined by getting the total result from the individual ones.

The National Safety Council has brought out a method by which you can use insurance rates in comparing one department with another. For instance, in a foundry there is naturally more hazard out where they are pouring the iron than in the stock room.

Each department has its separate rate, and by using those rates according to rather a nice scheme worked out by the Council, you can get a pretty fair way to compare your groups under the conditions you mention. Does that answer your question?

MR. BICKFORD: Yes.

C. V. PATTERSON (Hercules Powder Co.): Among the prizes you mentioned, you didn't mention extra money prizes. I would like to hear if you have had any experience with money prizes and what luck they have had?

The Question of Money Prizes is Discussed

MR. KNIGHT: I have had experience with just one case and that is a structural steel company in New York City. Structural steel work is always taken, as a rule, as a separate part of your building operations. If they are putting up an office building, there is a certain amount of foundation work and a certain amount of erecting work. The erecting work is structural steel work, that is, picking up the steel members from the ground, taking them to the job and setting them up. The size of any steel job is governed by the number of derrick gangs. There are six or eight men in each derrick gang. That is the source of my information.

We had quite a campaign with the steel erection company. We had eight derrick gangs on the job. We matched derrick gangs against each other, each with the same number of men, the exact kind of work, and working the same number of hours; so it was simple to work out.

We gave to the foreman of the derrick gang who had the best accident record for the month a bonus of $5, and to each member of his gang, or the other seven men, we gave $2.50 each. That is my only experience with giving actual money prizes. I can't think of many other cases where I would like to give a prize of money. Too often you are perhaps going in the wrong direction. It is one thing to give a money prize and another to give a watch fob, but in this particular case we did get good results

and the money was far more interesting to the structural steel men than a watch fob or anything else.

E. R. COMPTON (Ford Motor Co. of Canada): Your foreman is a hard-boiled man, particularly in the automotive industries. When you go to that foreman and say, "Here, your department has had so many lost time accidents, totalling a certain number of days," does it convey to his mind the impression which one would wish to convey? We have found that because of its theoretical application in production work, it does not go across as well as the actual dollar and cents basis; and we have based any competitions of ours on that basis and have given the department rating not in days lost but in compensation costs in that department. We have found that to be a much better method because when you quote dollars and cents to the foreman, you are striking home at his overhead. He is naturally more interested.

I was wondering, Mr. Knight, if you have had experience in using that base?

A Safety Contest in a Light and Power Company

MR. KNIGHT: In a plant in New York state engaged in heavy work, such as the manufacture of air compressors, we didn't run any sort of a campaign except what you have outlined, and that is putting up to the foreman just what it meant in terms of actual money. That company opened a separate ledger account of accident costs and every single month each foreman was given an entire statement of just what his accidents had cost for the month, the medical cost, the compensation cost and all the incidental cost, and believe me, when any certain man's cost was high for the month, he was a worried man. That is about the same as what you outlined and we got good results from that.

I wish I had time to go into more detail concerning a great many campaigns. Perhaps I might preclude the possibility of some of these questions being asked because I have run into quite a few of the different types. Your thought is very good and I found it very good also.

G. M. GLIDDEN (Ohio Public Service Company, Mansfield, Ohio): I would like to ask Mr. Knight if he has had any experience in competition in a light and power company, either in plants or divisions of a company?

MR. KNIGHT: Again I can say, "yes." In this case it was a separate company, rather a large public utility company, engaged in the manufacture of gas and the generation of electricity.

We took the plant crew and outside crew separately. Of course, in the gas house you have really a fixed group of men doing fixed operations, and so in that particular case, we ran the contest on the basis of departments, matching one against the other.

In the case of the outside men such as those men engaged in trench work and erecting poles and repairing wires and so forth, they were divided into gangs. Of course, those gangs varied as to the type of work and amount of work, but we rated them on actual exposure. We gave

no prize. The only prize was that each month the winner of a certain campaign or the campaign for the month was given the privilege of being elected to replace the retiring member's place on the safety committee for the following period. It did work out. There is no reason why you can not work a competitive scheme in a public utility of that sort any more than any other place.

CHAIRMAN HODGE: I want to thank you, Mr. Knight, in behalf of the A B C Session, for your very fine talk on this subject, and we hope that you will be able to make your train.

The next subject, "High Spots in Industrial First Aid," and as the program carries the statement, "a racy talk with demonstrations," is by Captain G. R. C. Fisher. Captain Fisher will be assisted by Miss Capper, a graduate nurse of the Henry Ford Hospital.

It gives me a great deal of pleasure to present Captain Fisher at this time.

HIGH SPOTS OF INDUSTRIAL FIRST AID

Captain G. R. G. Fisher, Department of Educational Safety, Illinois Manufacturers' Mutual Casualty Association, Inc., Chicago, Illinois.

Speaking of the relative value of "Safety" and "First Aid," a Canadian comrade has cleverly phrased it thus—"Safety first is first aid to the uninjured, and first aid is safety first to the injured!"

But it might be well to add that there are degrees even in first aid; and while I am compelled to acknowledge that there are good, better and best in this subject as in everything else, it is the two extremes which one must emphasize; namely First Aid or Worst Aid!

"Big Industry" has long recognized the importance of first aid as a vital part of safety, and as one prominent safety engineer put it: "A man who is well trained in first aid is by far the best safety man because he it is who realizes what accidents mean; and consequently he is ever on the lookout to prevent them; and best of all, if an accident occurs he's Johnnie on the spot: because he knows what to do, and does it!" L. A. DeBlois gives us these figures, which are startling; he tells us that "82 per cent of American industrial concerns employ 100 or less workers!" So then while 18 per cent (which practically represent what we term "Big Industry") are "up and comin'" on first aid, 82 per cent of industry know little or nothing about it.

It positively depresses me when I think of how much this large proportion of our industrial brothers have to risk in wresting a living for themselves and their loved ones. We speak of hazards, but to me the greatest hazard lies in the fact that not one in ten of our smaller shops and factories have anything like adequate provision against accidents: and if that is true of medical supplies its a thousand times worse when it comes to that question of such vital importance—someone who knows how to render first aid—that's where the "worst aid" comes in.

While a member of the British Army Medical Corps, I had an orderly who got hold of some whiskey, properly termed "fix'd bayonets," and possibly something like what we now call "Mule!" That night Charlie was on duty. Among his orders was one to give a patient beef tea and put his feet in mustard and water. Charlie got mixed, he put the man's feet in beef tea and gave him mustard and water to drink!" That was a fine illustration of what I call "Worst Aid!"

But all joking apart, this shocking lack in industry today challenges the National Safety Council and the American Red Cross to do something of a constructive nature along this line; and I am not so sure but that the compensation insurance companies can accomplish wonders to this end by training their inspectors to give shop talks on "what to do in case of accidents!" The company which I represent has been doing this for over three years, and it has not alone helped in preventing accidents, but especially has accomplished wonders in lessening suffering, preventing complications, cutting down lost time and minimizing costs to both the worker, the boss and the insurance company.

Here as the program puts it, I shall give you some "High Spots of Industrial First Aid!" I can only select a few out of many, so then, first of all, a word or two on the triangular bandage and a few demonstrations of its use.

This bandage ought to be kept on hand in every industrial plant, it is the first aid bandage superlative.

Arm Slings and Care of Common Fractures

Permit me to show you 3 arm slings, "the lesser" for support in cases of fractured upper arm, a wound or a burn. (Cap't. Fisher applied it.) "The greater," is for support of a broken forearm or in case of wounds or burns, but never to be applied for fractured collar-bone or shoulder blade; because then it adds to the pain by pressing on the injured parts, (Cap't. Fisher applied it.) And here is the unnamed arm sling, to be used in case of broken collar-bone, shoulder blade or dislocation of the shoulder or severe bruising of same. (Cap't Fisher applied it.)

Now for a few hints on the care of some common fractures, in which we find the greater triangular bandage peculiarly adaptable. By all odds, fractures of the hand, wrist and forearm are the most numerous. A newspaper folded as I now do it, is a splint which can't be beat and for three reasons—you can find them anywhere, they don't need to be padded, and they afford good support.

For the hand or wrist it is best to see that the entire limb is so treated (Cap't. Fisher aplied the folded newspaper, using two small scarves to fasten it on) and over all the great arm sling. Another common fracture is that of the collar-bone, and here again the triangular comes in mighty handy. The signs of a break at this bone are easy to locate. There is always a droop of the shoulder on the injured side, pain and loss of power to use the corresponding arm. Treat in this way—place a soft pad in the armpit on injured side, such as a wad of waste newspaper or a folded

cap, gently press the arm into side, make a broad scarf and apply as I do, but be sure you pull tight enough and tie behind. Then catch part of the scarf and fold it in under palm of hand and this prevents the hand slipping down. The pad under the armpit is a fulcrum, and the arm by the side a lever, and this makes extension on the usually overlapped broken bone; so that when he reaches the doctor he is ready for the permanent application.

A fracture of the ribs is one of the most distressing experiences, and there is no mistaking what the trouble is for this is what you generally see (Cap't. Fisher showed how an injured man acts). The positive sign is that the poor chap can't breathe without showing the signal of distress. Take a broad triangular scarf, place the broad part right over the injured ribs, and be sure you place the lower edge above the hip bone, carry the ends to the opposite side and cross the ends, pulling gently and strongly, watching the victim's face as you do so, and when he can take a reasonably deep breath then secure by safety pins; don't tie a knot as that will hurt. And don't forget to place the arm on injured side in a lesser sling.

Arterial Bleeding and Its Ready Control

Now for what might reasonably be called the most vital thing in first aid. Controlling arterial bleeding! One of the great industrial medical authorities has said that seven out of ten deaths are due to loss of blood, one of which may possibly be from internal bleeding.

Nature has made it mighty easy for anyone who once sees this demonstration to catch on, and to be able anywhere to save a comrade from bleeding to death. Note these two remarkable facts which prove that I've just said that nature has made it easy.

1st. We need only know of five points on either side of the body to check the hemorrhage, and four out of five, though under the clothing, may be checked without removing the ordinary clothes. (There was a time when it was difficult to do this with women employees, but now they wear so little that we can easily handle them as we do the men.)

2nd. Nature has placed every artery against a bone, so that all we have to know is the general locality of these, and make pressure in against the bone and control is obtained.

For a gash on the front side of the neck towards the windpipe the blood coming out in spurts and bright red, is proof that the carotid artery is severed. Pressure must be made immediately below the wound and in against the spinal column. Remember, to control an artery, you always press between the wound and the heart.

Before I go further I must not fail to speak of a wound on the side of the neck, where you may find dark red blood welling out freely; that is proof that it is the *jugular vein* which is cut, and this has to be handled with as much thoroughness as that of the carotid artery. One can easily bleed to death in from ten to fifteen minutes with a severed jugular. In this case pressure is made immediately above the wound

because veins run toward the heart, and pressure is always made on the side of the wound away from the heart. (Cap't. Fisher showed the pressure points in both cases.)

And here let me stress a vital point—never allow an injured person to be laid down who is bleeding severely from the head, nose or neck; keep him in a semi-sitting position.

If the arm is cut up toward the armpit, or crushed in rolls or torn from the socket, make pressure at the sub-clavian artery, at back of the collar-bone and down into the first rib. (The Captain showed the point.)

Stopping the Blood Flow in Difficult Places

For a wound with arterial bleeding, from the hand up to the lower part of the upper arm, pressure must be made at the brachial artery. (The Captain showed the point.) This is not hard to find; it is located at about the upper middle of the limb and right below the biceps muscle and of course in against the bone. Here is the point for the application of the tourniquet, but we'll come back to that.

Now for the lower extremities, I am going to show you a pressure point not mentioned in first aid books, possibly for what is known as being too delicate to demonstrate. Well, I'm Scotch, and since I've known of precious lives lost because of this sort of modesty (?) I want to say to you that there's no time for such prudery when it comes to the question of saving a life!

So then, in case a victim of an accident suffers a severe wound high up on the inside of the thigh, pressure must be made at the iliac artery, which runs over the lip of the pelvis bone in the groin space, (the Captain showed the spot.) But if the wound is anywhere from the sole of the foot up toward the lower middle of the thigh; then pressure is made at the femoral artery! This artery is located at a point known in surgery as "Hunter's Canal," in the upper middle inside front of the limb where a cleft may be found; here pressure is made in against the thigh-bone; and this also is the point for the tourniquet on the lower limbs.

Now a word about tourniquets. Here are three kinds, "The U. S. Field," "the St. Johns Ambulance" and "the Barbrous," (The Captain showed all three.) I wish to say that it is best for the industrial first aid man not to depend on the manufactured kind, but always to improvise one, and the reason is plain; you may lose the former, but you can always find material to make the latter anywhere and at any time Now see how easy it is to improvise one, with a handkerchief and a hard object—as for instance this small bunch of keys; fold the handkerchief crosswise, roll into it the keys, place the hard part over the artery, tie the ends loose on opposite side of limb, put something under knots to protect flesh, as for instance this small Westinghouse notebook, then a pencil to twist it and the trick is done! (All this the Captain did more rapidly than this can be read.)

Now a vital point to keep always in mind, if a tourniquet is applied in the case of a hand torn off, or a badly crushed limb, put it on as tight

as possible because it is a most merciful aid. Not only will it prevent the victim from bleeding to death, but in the case of the amputated limb it helps to lessen the awful twitching caused by the exposed nerves; and if it is a crushed limb, it helps to stop the frightful throbbing. But—and mark this well! If it is a deep incised wound with arterial bleeding, say on the inside of the forearm, and if the doctor is delayed over 25 minutes, raise the limb, have a helper compress the brachial artery, loosen the tourniquet and gently stroke the limb towards the body; and as soon as the redness disappears; retighten the tourniquet. This will prevent strangulation which usually means the loss of the limb. When placing a tourniquet on the brachial artery see that the hard object lies across the artery; but with the femoral artery, the hard object should be larger and run parallel with the artery because it has to sink into the cleft (Hunter's Canal.)

For wounds with arterial bleeding, from finger tips to the wrist, or from the toes to the ankle, use the Flexing Method. If the hand, merely roll up the shirt sleeve and crowd down into the bend of the elbow, a bit more on the inner side of arm; and tie forearm back on arm with scarf, (The Captain showed how.) But if the foot, grab the man's cap, roll it together and crowd into bend of knee and tie back the leg onto the thigh. (This also was demonstrated.)

Now for a few simple but effective methods of lifting and carrying the injured.

Practice in Carrying the Wounded Man

It is well worth while to know these for emergencies in which you have got to get your man up and off and out of danger; and for this reason I only demonstrate one-man methods. These I teach to railway hands, policemen and others to whom such necessity comes.

If it is an injury where it is possible to get a chap upon his feet and if he has a coat on, use this one which I call the "coat carry." Go behind him, grab the tail of the coat, give it a twist or two, turn round, stoop, get the coat over your shoulder and here he is! (This was rapidly demonstrated.) If he has no coat on, stand in front of him, throw your arm over his near shoulder, and get your hand under his opposite armpit, bend sideways, grasp his legs about the knees, bend over—and as you do so draw him onto the small of your back so. (This also was clearly and quickly demonstrated.)

But the carry most necessary, and one which every industrial worker should positively be able to do, is the "fireman's lift;" but not as the fireman does it, unless you have to bring a victim down a ladder; that is, don't put your arm between the legs. I'll prove my point to you in a jiffy. This lift, as you know, is for the injured or helplessly ill victim; or for the unconscious. First, roll him on his face; 2nd, grab under the armpits and lift him to his knees; 3rd, slip the hands around the waist, hug the body and raise to standing position, and as this is done place one of your knees against his to hold the limbs straight; 4th, grab his left

wrist with your right hand, draw him to you and drop your left hand to back of his knees; 5th, pull his body well onto your left shoulder, so that the bend of the body is over your shoulder and lift. Then transfer his gripped wrist to your left hand so that your right hand is free; and if his body is not well balanced on your shoulder give a hitch to bring it there. (The Captain demonstrated this so clearly that no one could miss the method.)

Now you can see that with this method, the entire weight is on the shoulder and can not get loose; in other words, you have much better control than when the arm is between the limbs, because then the bulk of the victim's body is not on your shoulder, but hanging over your back.

Artificial Resuscitation Often Saves a Life

And now I want to emphasize some practical points on "artificial respiration!" And how great is the need! It is a fact that more than one death a day resulted in the state of Illinois last year from asphyxiation alone—i. e. gases and fumes. Unfortunately, I can only touch the merest fringes of this matter, and I sincerely wish I could present every one of my hearers this afternoon with my own little "Manual of Artificial Respiration" but alas, I'm too poor to do that.

Permit me to say this emphatic word, however. What industry needs today along the lines of applied first aid is Standardized Methods! And especially in Methods of Resuscitation!

If this science was taught throughout industry, it is safe to say that seven out of ten deaths, who are victims of "the hot stuff," or gases, etc., could be prevented.

And it ought to be taught, especially in view of the fact that the motive power of industry is almost entirely electrical; to say nothing of the hazards from gases and fumes.

Another thing, we ought to get away from the mechanical methods. "The Encyclopedia Americano" justly and truly says, "they are more lethal than life giving!" While giving a demonstration some years ago at the South Dakota State Fair, in which I had voiced this fact, one of the inspectors of the U. S. Department of Mines came to me, and among other things said, "In my experience the use of the mechanical has been most fatal;" and then he added "out of 25 postmortems which I've attended, and all of these had been worked on with the mechanical apparatus, in every case the lungs were a mass of blood!" Do you get the point? If these hands which God has given us can't revive the "apparently dead," then the mechanical won't.

In the manual method we work *with Nature*, in the mechanical it is a case of mostly *forcing Nature!* The Commission appointed by the U. S. Government in 1914 to examine these so-called resusciatative apparati, brought in. among other vital matters in their report this, "The mechanical apparatus has a tendency to turn inspiration into expiration, through a catch in the bronchial tubes."

That explains why a post-mortem usually shows, as the U. S. Agent of the Department of Mines gave it to me, "the lungs were a mass of blood!"

The Harvard Medical School of Public Health has recently made some experiments which are of vital interest in this connection. Dr. C. K. Drinker says of these. "The heart is known to continue beating from five to eight minutes after asphyxia (breathing stoppage) and it is probable that nervous degeneration of irrevocable nature will not take place for almost an equal period of time following total cessation of the heart beat. While the heart which has ceased beating on account of asphyxia does not readily start again unless attacked very directly, there is always a possibility that well applied artificial respiration may have even this result, and consequently in early cases this measure should never be withheld even though there is no evidence of heart beat!"

What encouragement this is in taking a chance to resuscitate "the apparently dead!"

So then let us go at it and see how this life giving movement should be performed.

Practical Points in Saving the Life

First, (right on the spot where the accident occurred, if out of danger of further trouble), loosen tight clothing, especially at the waist line, for that's the point at which the diaphragm is attached.

Second. Turn the victim over on his chest, grip under the belt-line and jerk up; if a drowning case this will disgorge the water in the stomach; if gas, fumes or smoke, it will help clear the bronchial tubes.

Third. See that the tongue is forward, the mouth free of food, chewing gum, tobacco, loose false teeth, etc., and of all dirt or mucus.

Fourth. Stretch the hands straight out over the head, flex (preferably) the left forearm and lay the head on it with the face towards the right.

Position: the operator's knees should be just above victim's knees, arms rigid, thumbs close in against palm of hand. Place the hands on victim hard above hips, throw weight of body on arms and press down, pressing fingers in on floating ribs as the arms carry weight of the operator's body down. This is "Expiration," and it should only take two slow counts in this way—"one-and-two-and." As the second "and" is spoken the hands should be snapped off the victim. This gives much more reaction, as the suddenly released pressure causes the diaphragm to descend sharply and a consequent immense inrush of air, which is "Inspiration." While the hands are on the ground, the slow count is continued thus—"three-and-four-and-five;" at utterance of which the hands are immediately replaced on the victim and the movement continued.

While the operator is "carrying on," it will help if one kneels at the victim's head holding a cloth with some aromatic spirits of ammonia, which he thrusts close to the mouth and nostrils as the hands are snapped off. These are the steps to be followed in performing artificial respira-

tion, and if done correctly, with patience and perseverance and trust in the help and blessing of God, they will succeed. I know of no act which you or I can render to a fellow man which could mean more.

CHAIRMAN HODGE: I think we owe Captain Fisher a very fine vote of thanks for the splendid, instructive and interesting talk that he has given us.

H. D. LIVERS (Southwestern Bell Telephone Co., St. Louis, Mo.): I would suggest you ask how many in this room know about first aid?

About 100 men raised their hands.

W. RAY (Detroit City Gas Co., Detroit, Mich.): Captain Fisher, you did not mention how long the Schaefer method should be kept up, or is it necessary to open the jaws on carbon monoxide poisoning?

CAPTAIN FISHER: As a rule, if you don't open the jaw, you can't get the tongue forward. I didn't mention that because it is obvious, to bring back a victim, you would keep on until there is no hope; and usually we say when rigor mortis sets in, that is the stiffening of the muscles.

Don't Let Anyone Interfere with Life-Saving

Here is something to keep in mind. The American Red Cross has one record of a lumberjack who fell through a log jam in Northern Minnesota. It was nearly an hour before they got him out from under the water, and they worked four hours and brought him back. That is a record, I think.

PAUL HODSON (East St. Louis Light & Power Co., East St. Louis, Ill.): I would like to ask Captain Fisher the much argued question: what is your opinion when a man is asphyxiated, shocked, drowned, or whatever the case may be, and someone should call an ambulance; what would you do in that case if you were present?

CAPTAIN FISHER: We fought that in the Northwestern Bell Telephone Company. The boys in Des Moines and other towns had been interfered with either by a policeman or doctor who said there was no hope. They said, "What are we going to do about it?"

I said, "Don't swear at the doctor or policeman, because, if you do, that will undo what you are trying to do. Just be a little polite and say this, 'Doctor, can you do any more than I am doing?' and the doctor will say, 'Of course not.' Then say to him, 'As long as you can't do any more than I am doing, let me alone.'"

MR. HODSON: I brought that question to a physician, and he said, "We can do things at the hospital that you can't do," and he explained what he could do at the hospital that we can't do on the job.

CAPTAIN FISHER: A positive table of the cases taken to the hospital and those cases treated on the ground showed that the man who was put in the ambulance was buried in almost every case. If you have to surrender a body to the ambulance to be taken to the hospital, see that you accompany the body and keep the thing going.

Here is something: the Travelers two years ago in their little standard

told this story of a boy working on his father who had been drowned. The ambulance came and the doctor said there was no hope. He put the body in the ambulance and the little fellow with tears running down his face said, "Doctor, I want to go with him," and because it was his father the doctor let him go.

The moment the doors of the ambulance closed, the little fellow went at it and worked, and when they reached the hospital, his father was living.

MR. LIVERS: We have had that question come up numerous times, and early last year we had a man who was electrocuted and our men went to work on him. A neighborhood doctor came in and pronounced the man dead. Our man just wouldn't accept it that way. He went with that man toward the morgue. However, the man was dead; there wasn't any bringing him back, but he stayed with him for over two hours and a half until the body was perfectly stiff.

We instruct our men to stay with them regardless of what the police or anybody else say.

To Standardize the Prone Pressure Method

MR. HODSON: I would like to revert to what Captain Fisher said a moment ago about standardization of a method of resuscitation. The American Red Cross teaches one way, the U. S. Bureau of Mines teaches the same thing slightly changed. The National Electric Light Association teaches just a little differently. The American Gas Association teaches almost the same as the National Electric Light Association. What we need is a standardization. There are things that Captain Fisher does that I don't agree with. There are probably things I would do that he wouldn't agree with. What we should do is get together and agree on one method and have everybody do it in the same manner.

H. BAER (Railroad Mutual Company, Boston, Mass.): I think I can answer the gentleman's question to a certain extent. Dr. Shupper, of the General Electric Company, is a member of a committee which is trying to standardize the Schaefer method right now, and a preliminary report has been issued. I have seen a typewritten copy of it recently. There is a movement on foot now to standardize it.

While I am on my feet, I would like to ask Captain Fisher a question that has been put up to me several times. In the case of a man who is killed and thrown into the water, does any water get into his lungs? I understand that in the case of a man who drowns, there is very little water that gets into his lungs, possibly some gets into the stomach.

Medical examiners on pulling bodies out of the water, when the man has been killed and thrown into the water, make the statement that he was not drowned, he was dead before he entered the water because there was no water in his lungs. If there is no possibility of the water getting into the lungs, how does it get there?

CAPTAIN FISHER: I don't like to be dogmatic, but a man that is really dead before he drops into the water, inasmuch as breathing has ceased

and there is no air in the lung cells, naturally the water goes in; but where a man falls into the water gasping, that explains why it is in the stomach and not so much in the lungs.

J. F. GREEN (Western Cartage Company, East Alton, Ill.): About a year and a half ago I bought an H and H engine to be used for Schaefer resuscitation. Our family doctor is not sold on the fact. He even went so far as to criticize how it should be used.

What I would like to know from somebody who knows more about it than I is, should it be used?

CAPTAIN FISHER: The best thing for you to do is to go to the Bureau of Supplies because there they have it all and know all the facts.

MR. RAY: We have had inhalators in use for both employees and the public at large for the past three years, and I might tell you we have lost only one case in that three year period, not only through the H and H inhalator but also through the Schaefer method. The one case was lost through what they call a wet brain, where the carbon monoxide poisoning had reached the brain and destroyed the brain cells. They had been working on this man for about eight hours and the brain cells had been destroyed. It is quite a common occurrence to use an inhalator and stay on a case anywhere from six to eight hours before we let it go. In fact, we do not move it to the hospital right away. We give our patient a good chance right on the street or right on the job. At times we have worked five or six hours right on the street.

Hours of Effort Often Bring a Delayed Success

To clear up this question of the doctor's interfering, we never yet have had a case where a doctor has tried to butt in on any of our cases. We only had one case of the police department and that policeman was reprimanded for it. We are recognized as a rescue squad in the city and were the first in the city to put in H and H inhalators and the Schaefer method.

I might also state that last year we handled 268 cases of rescue work.

J. F. H. WYSE (Canadian National Safety League, Toronto, Canada): I want to tell you that it is a matter of astonishment to me that more large plants don't understand thoroughly first aid. We are issuing for 1927 a safety calendar and one of the illustrations shows a staff of the Bell Telephone Company of Canada administering first aid and that was inspired by an actual happening at our plant at Sault Ste. Marie on the Canadian side.

A Bell Telephone Company lineman was being shown through that plant by some of the local foremen, and as he was going through a section on the ground floor he noticed a man's body partly covered with a canvas and he said, "What's the matter with that fellow?" The foreman answered, "That fellow fell into a gas tank this morning. This tank had some heavy gas at the bottom and we pulled him out and he is dead."

The Bell Telephone lineman said, "How do you know he is dead"

The foreman answered, "Well, we suppose he is dead. He seems to have stopped breathing and we just covered him."

The lineman said, "Let me get him and see if he is dead," and he took the canvas off the man, turned the victim on his face and started to work on him with a prone pressure method, and in 35 minutes he brought him to and he is living today.

We thought that was of so much importance that we got the photograph of the Bell Telephone Company lineman and this victim and broadcasted the story in the shape of a poster relative to not giving up.

I know of another instance where men were gassed early in the morning some years ago by being ordered into a tank to clean the tank out. There was some heavy gas in the bottom of the tank and one man collapsed as soon as he got down there, and several others sent to get him out collapsed, and they were all brought to within a few hours except one. The gentleman who is president of the Imperial Oil Company of Toronto was then in charge of this plant and he wouldn't give up the victim but followed him finally to his house.

In those days they didn't know much about the Schaefer method, or bringing those fellows to in any scientific way, but he wouldn't let him keep still, he kept the body moving, and after 12 hours he still wasn't satisfied to believe that that man was dead. They had him laid out on a bed in the guest room and he went after him and shook him and finally said, "Bob, it's time for you to wake up," and the fellow come to.

CHAIRMAN HODGE: Throughout the convention we have been considering the prevention of accidents. We all know that through the failure of the human element somewhere along the line, accidents do occur. I think it has been extremely interesting and instructive to close our convention with such a splendid address from Captain Fisher in calling to our attention some of the things that we can do after an accident occurs so as to give us at least another chance to save men from actual death.

Captain Fisher, I am sure everyone appreciates very much your contribution to the work of the congress this year.

ADJOURNMENT

A. S. S. E.-Engineering Section

New Officers of the Section

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U. S. Rubber Co., New York City.
VICE-CHAIRMAN: R. C. STRATTON
The Travelers Insurance Co., Newark, N. J.
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American Safety Device Co., New York City
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U. S. Gypsum Co., Gypsum, Ohio
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Lehigh Valley Railroad Co., Bethlehem, Pa.
ERNEST HARTFORD
American Society of Mechanical Engineers, New York City
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The Travelers Insurance Co., Hartford, Conn.

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Patent Scaffolding Co., Chicago, Ill.
S. V. JAMES
Underwriters' Laboratories, Chicago, Ill.
S. R. JENSEN
Armour and Company, Chicago, Ill.
ALEXANDER LACKEY
Consolidated Expanded Metal Co., Boston, Mass.
M. G. LLOYD
U. S. Bureau of Standards, Washington, D. C.
H. W. MOWERY
American Abrasive Metals Co., New York City
G. A. ORTH
American Car & Foundry Co., New York City
A. D. RISTEEN
The Travelers Insurance Co., Hartford, Conn.
G. E. SANFORD
General Electric Co., Schnectady, N. Y.
E. J. SENNE
Vacuum Oil Co., New York City
F. C. SINGLETON
Standard Oil Co. (Indiana), Chicago, Ill.
CLINTON D. SMITH
Beaver Valley Traction Co., New Brighton, Pa.
THOMAS S. STROBHAR
Wagner-Taylor Co., Philadelphia, Pa.
R. F. THALNER
Buick Motor Company, Flint, Mich.
W. E. WELCH
The Travelers Insurance Co., New York City
S. E. WHITING
Liberty Mutual Insurance Co., Boston, Mass.

October 27, 1926

G. E. SANFORD, Chairman
General Electric Company, Schenectady, N. Y.

THE first session of the American Society of Safety Engineers—Engineering Section, Fifteenth Annual Safety Congress, National Safety Council, held at the Tuller Hotel, Detroit, Michigan, convened at 3:00 o'clock, Mr. G. E. Sanford presiding.

CHAIRMAN SANFORD: The meeting of the A.S.S.E. Section will kindly come to order.

The first item of business is to announce the personnel of the Nominating Committee, which includes Mr. H. W. Mowery, chairman, Mr. A. J. Van Brunt, Mr. L. A. DeBlois, and Mr. H. Walter Foster. This committee will present its report and officers will be elected toward the close of this meeting.

The next topic on the program is assigned to me under the heading of "Past, Present and Future of ASSE—Engineering Section."

I presume that was a polite way of asking your chairman to give a report of the Section's activities. As you probably all know, the engineering section of the National Safety Council was organized eight or nine years ago. The old American Society of Safety Engineers started up somewhere around 1914. These two organizations worked along parallel lines with considerable duplication of membership. Two years ago they got together and combined as the A.S.S.E.—Engineering Section.

As to the present condition, we are working slowly in some directions and more actively in others, particularly on a number of researches which have been approved by the Executive Committee of the National Safety Council. These researches include exhaust systems, electrical hazards, synthetic ammonia, mast hoists, static electricity, elimination of harmful noise, annealing chains, wire rope attachments and connections, steam engine breakdowns, and rotary stresses. In fact, almost every engineering problem that is put up to the National Safety Council is referred to this Section for solution.

The future of this Section depends largely or almost entirely on yourselves, on the interest you display in regional conferences and in the work of the research committees. We are sometimes at a loss for men to serve on our various committees and in several instances we have been forced to go outside our own membership to secure individuals who are willing to give of their time and effort for the safety cause.

Speed is another important factor in work of this kind. Each committee is organized in response to a more or less general demand for detailed information in a certain subject, so this data should become available at the earliest possible moment.

Rather than emphasize this further I will call on Mr. Stratton, our Vice Chairman in charge of Research, Standards and Codes to present the report of his committee.

REPORT OF R. C. STRATTON, CHAIRMAN, STEERING COMMITTEE ON RESEARCH, STANDARDS, AND CODES

The work of your Steering Committee on Research, Standards and Codes, during the past year has been along research lines similar to the work of previous years. This work included: (1) The giving of advice to the executive committee of the National Safety Council upon subjects proposed for codes or research; (2) Appointing of research committees; (3) A general check up of research, standards and code work, which was in process by members or representatives of the A.S.S.E. —Engineering Section.

Ten research committees have functioned during the past year. These committees are as follows:

1. Wire Rope Attachments and Connections—Charles C. Sunderland, Chairman.

2. Accident Hazards in Manufacturing Synthetic Ammonia—F. A. Ernst, Chairman.

3. Static Electricity—F. C. Singleton, Chairman.
4. Mast Hoists—W. C. Muehlstein, Chairman.
5. Electrical Hazards—S. E. Whiting, Chairman.
6. Exhaust Systems—W. J. Graves, Chairman.
7. Elimination of Harmful Noise—H. W. Mowery, Chairman.
8. Annealing Chains—R. F. Thalner, Chairman.
9. Steam Engine Breakdowns—Daniel L. Royer, Chairman.
10. Rotary Stresses—S. V. James, Chairman.

All of the committees should receive special mention for the work which they have done and the reports which will be presented during the sessions of the A.S.S.E.—Engineering Section will establish their effectiveness.

The A.S.S.E.—Engineering Section continues the sponsorship or joint sponsorship of certain major codes already accepted by or being developed under the direction of the American Engineering Standards Committee. Last year it was reported that 15 safety codes had been completed and received the approval of the American Engineering Standards Committee. During the past year three new codes have been accepted, thereby bringing the total to 18. These are Aeronautics, Gas Safety Code, Paper and Pulp Mills.

Sponsor for Fourteen Safety Codes

The A.S.S.E.—Engineering Section is now joint or sole sponsor for 14 safety codes. These are as follows:

1. POWER PRESSES. This code was completed and approved several years ago. During the past year it was revised, and five weeks ago it was turned over to the U. S. Bureau of Labor Statistics for publication as a government document.

2. LADDERS. This code was completed and approved several years ago. The committee is now considering a revision of the code.

3. FORGING. (A.D.F.I.) The code has been completed and submitted to the committee for final letter ballot. It is anticipated that this code will be adopted within a few weeks.

4. CONSTRUCTION. Further action on this code has been delayed pending the development of a comprehensive safety program undertaken by the Associated General Contractors of America.

5. COMPRESSED AIR MACHINERY. (A.S.M.E.) Work on this code has been unusually slow. It is hoped that the first draft will be completed within a few months.

6. IDENTIFICATION OF PIPING SYSTEMS. (A.S.M.E) This code has been completed; it is now being edited by a special editing committee.

7. RUBBER MACHINERY. (I.A.I.A.B. & C.) This code has been completed and it will be approved at this Congress.

8. WALKWAY SURFACES. (A.I.A.) Satisfactory progress is being made in developing this code.

9. TEXTILE. Various sections of the Textile Code are being developed by sub-committees. The first drafts of two sections have been

completed; one on "Cotton Mills," and the other on "Bleaching, Mercerizing, Dyeing, Printing, and Finishing."

10. COLORS FOR TRAFFIC SIGNALS. (A.A.S.H.O.) Further action on this code has been delayed for short time.

11. IDENTIFICATION OF GAS MASK CANISTERS. The committee on this code is being organized.

12. WINDOW WASHING. The committee on this code is being organized.

13. PAPER AND PULP MILLS. This code has been completed and approved by the American Engineering Standards Committee.

14. FLOOR AND WALL OPENINGS, HANDRAILS AND TOE-BOARDS. This is a recent assignment and work has just started.

With one or two exceptions where unavoidable delays have occurred, the work of the code committees is progressing satisfactorily, and the representatives of the A.S.S.E.—Engineering Section on these committees are to be complimented for their efforts.

Representatives on Many Code Committees

The A.S.S.E.—Engineering Section is represented on many other code committees. Our representatives on such code committees are as follows: Abrasive Wheels, W. D. Keefer and G. E. Sanford; Aeronautics, G. E. Peterson and G. A. L. Beaundoin; Auto Brakes; J. H. Truett; Building Exits, S. J. Williams; Colors for Traffic Signals, W. S. Paine, D. Van Schaack and S. J. Williams; Compressed Air Machinery, Dr. A. D. Risteen, C. E. Pettibone and Guy Gregory; Construction Work, W. D. Keefer, Leo D. Woedtke, W. F. Austin, T. J. Whelan, E. W. Bush and F. L. Hurlbutt; Conveyors, R. F. Thalner; Electric Code (National Electric Fire Code) No Council representations; Electrical Power Control, M. C. Goodspeed and J. I. Banash; Electrical Safety Code, G. E. Sanford, S. E. Whiting and R. W. Moore; Elevators and Escalators, G. E. Crippen and W. D. Keefer; Floor and Wall Openings, A. W. Benz and E. B. Tolsted; Forging, J. L. Thompson, W. D. Keefer, C. E. Lehr, Thomas Irving and H. L. Johnson; Foundries, G. E. Sanford and S. E. Hassell; Gas Safety Code, G. O. Smith and E. J. Reeder; Head and Eye Protection, G. E. Sanford and S. J. Williams; Headlights for Motor Vehicles, No Council representation; Ladders, C. N. Young, W. E. Welch, W. Newell, H. B. Gaffers, M. C. Goodspeed, H. G. Wiberg and H. A. Schultz; Laundries, F. F. Beik; Lighting Factories, W. D. Keefer; Lighting School Buildings, William Darlington and G. H. Stickney; Lighting, J. R. Brownell and E. R. Scales; Logging and Sawmill Machinery, S. J. Williams and C. O. Hero; Machine Tools, H. L. Robinson; Mechanical Power Control, No Council representation; Paper and Pulp, Holger Jensen, R. M. Altman, G. E. Williamson, J. M. Sandel and A. P. Costigane; Piping Systems, W. J. Venning, H. P. Weaver and S. H. Kershaw; Plate and Sheet Metal, F. S. Beik and S. J. Williams; Power Presses, S. J. Williams, C. Van Horn, W. D. Keefer, C. B. Auel and A. L. Kaems; Power Transmission, H. E. Somes and H. A. Shultz; Refrigeration, J. I. Banash and H. S. Smith; Rubber Machinery, A. E. Hoener, J. E. Congdon, R. H.

Blanchard, H. A. Dodge and E. W. Beck; Sanitation, C. F. Horan and L. D. Burlingame; Tanneries, No Council representation; Textiles, Ignatius McNulty, Harvey Saul and W. D. Keefer; Ventilation, S. J. Williams and G. E. Sanford; Walkway Surfaces, A. S. Regula and W. F. Sterne; Woodworking, A. S. Regula.

There is in addition one recent appointment, namely, Dr. A. D. Risteen, who is to represent the A. S. S. E.—Engineering Section in service on a committee sponsored by the American Bureau of Welding and the American Society of Mechanical Engineeers covering a research on Welded Pressure Vessels.

The Section also represents the Council on certain mining safety code committees through its members.

Work That Is Difficult and Exacting

It must be remembered that the work of a code committeee is without exception difficult. Many times research committeee members are widely scattered over the entire country and much of the committee work must be done by mail. Meetings of code committees in their entirety are as a result infrequent. However, the importance of the work is realized and the progress of the work under such difficult circumstances behooves us to extend our appreciation to our representatives on these committees. They deserve not only our appreciation but our utmost support. The completion of committee activities on any subject be it research, standards, or codes is a step forward in the prevention of accidents and the protection of human life.

The same thought applies today that was expressed one year ago, and that is that the completion of any code is only half of the necessary work, the remaining half is to secure the use and adoption of the codes by state departments, insurance companies, compensation bureaus, and industrial concerns who may be affected for safety by its use. It is at this point that the responsibility for the completion of this work can be assumed by each individual member of the A. S. S. E.—Engineering Section wherever he may be located and in whatever business he may be engaged.

It was generally agreed, sometime ago, in view of the strategic positions occupied by the International Association of Industrial Accident Boards and Commissions, and several other organizations, including the U. S. Department of Labor, that the National Safety Council would not attempt an active part in the initiation of the direct promotion through state officials for the adoption and use of safety codes. The work, however, in the promotion of or the securing of state adoption and use of codes can be continued by individual members as propaganda work or direct promotional work.

The first can be accomplished by each member, when informed that a code or committee report has been approved by his giving all possible publicity to the report and by bringing the code or report to the attention of the proper authorities in his state and also to the attention of interested associations or organizations. Each member can distribute

copies of the code or report to various trade organizations or periodicals which may represent the industrial activity to which the code applies and urge at the same time that extended publicity be given.

Each member should encourage the presentation and discussion of codes at conventions and conferences.

Each member should urge the manager of any local safety council with whom he may have contact to assist in the acceptance of the code and the promotion of the necessary publicity.

Direct promotional work can be instigated by any member by keeping in close contact with his state department and attend public hearings which may be held when such a state is considering the adoption of new codes or regulations or the revision of existing codes and regulations which apply on some phase of safety that is at present covered or to be given consideration by a safety code. Each member through the attendance at such public hearings or other meetings in his state should be able to assist in securing the adoption of specifications in harmony with the proper safety code.

This individual responsibility should be extended to the promotion of codes or their use by industrial concerns, insurance companies, and rating bureaus. Voluntary individual solicitation by every member in placing the codes before such organizations for adoption or use is to be appreciated and should be expected.

Members Should Influence Adoption of Safety Codes

If every member would assume personal interest in his own state for the promotion and acceptance of safety codes approved by the Engineering Standards Committee or the acceptance of reports of research committees for the betterment of safety conditions, then the burden of intensifying promotional work would be lightened in national council headquarters, and would be that much more effective owing to the personal contact which would be had. Members should welcome the opportunity to speak on safety codes and to attend state public hearings on codes or safety rulings and regulations. Every member should welcome the opportunity to serve on any committee that may be organized at any time and at any point, to consider the production of new safety standards or the adoption of existing safety standards.

In conclusion, your committee would urge every member of the A. S. S. E.—Engineering Section to interest himself in his state to secure the adoption of safety codes and to promote the use of the same. It should be ascertained if any of the completed codes are applicable in the industries in your vicinity. If so, the field is at present open for endeavor and no appointment is necessary.

Your committee would urge that every member volunteer for service on present or proposed committees considering research, standard, or code work. Out of the total membership of the A. S. S. E.—Engineering Section there should not be one member who would fail to give the small amount of his time necessary to produce such reports as will be heard

today or to assist in the promulgation of safety codes. Every member should give the time to influence his own company to adopt the codes and then to influence others to act in a similar manner. If this is done your committee has no fear for the future, in this work. In addition every member should suggest to the Steering Committee on Research, Standards, and Codes any subject which he thinks befitting. The field covered at present is small, the future should prove the reason for our existence.

R. C. STRATTON, Chairman.
DR. M. G. LLOYD,
S. V. JAMES,
W. S. PAINE.

CHAIRMAN SANFORD: Our next report will be presented by our old friend, Mr. Banash, chairman of the Membership Committee.

REPORT OF J. I. BANASH, CHAIRMAN, MEMBERSHIP COMMITTEE

1925 Annual Safety Congress—Members.....450
Associate Members 191

Total members present.....641

Today there are 567 members and 320 associate members. Total, 896
10 Cancellations during the past year.
245 New members during the past year.
19 Applications pending further investigation.

J. I. BANASH, Chairman,
M. C. GOODSPEED,
R. E. PROUTY.
W. F. YEAGER,
E. G. SHEIBLEY,
C. H. SMITH.

MR. BANASH: It might interest you to know that, due to the activity of E. G. Sheibley, we are adding considerably to our membership on the Pacific Coast. The question often arises as to how far we should go in securing new members. We could put on an extensive campaign if the members thought it advisable.

CHAIRMAN SANFORD: I think we ought to boost the Section as much as we can. At the present time quite a number of our members are working on various activities and certainly it is advisable for us to start new projects as rapidly as possible.

A. J. VAN BRUNT: I heartily agree with what the chairman has said relative to increasing the size of the Section, but I also feel that we should continue to maintain our present high standard before accepting

applications for membership. I personally am very proud of the engineering and safety titles which most of us carry and would not care to see the admission of men who, while personally good fellows, are not eligible according to the qualifications.

CHAIRMAN SANFORD: Our next report is on Regional Safety Conferences. Unfortunately, Mr. Walter G. King, chairman of that committee, has been called out this afternoon to attend another session, so this report will be presented by Mr. J. E. Walters.

REPORT OF WALTER G. KING, CHAIRMAN, STEERING COMMITTEE ON REGIONAL SAFETY CONFERENCES

Thanks to the cooperation of various local councils, industrial sections, council members, and outside organizations, your committee has the pleasant privilege of reporting that 22 successful regional safety conferences were organized and held during the past year. This is almost twice the even dozen that were held last year which up to that time was the high water mark.

The Mining Section shared honors with us for two conferences at Iron Wood, Mich., and Hibbing, Minn.; the Marine Section at the November conference in New York City; the Petroleum Section at Taft, Calif.; the Metropolitan Chapter and the four founder engineering societies at New York City; the Paper and Pulp Section and the Wisconsin Industrial Commission for two conferences, one at Green Bay and the other at Appleton, Wis.; the Chicago Safety Council at that midwestern metropolis; the Woodworking Section and the Southern Pine Association at New Orleans; the Western Pennsylvania Safety Council at Pittsburgh; the Erie Safety Council at Erie, Pa.; the Metropolitan Chapter and the safety councils of Newark, Paterson and Jersey City at Newark; the safety councils of Massachusetts, Springfield and Worcester at Boston; the Chemical Section at Niagara Falls; the two societies of Safety Engineers of California and Southern California at San Francisco; the Washington Department of Labor and Industries at Seattle; the Oregon Safety Council at Portland; the Cleveland Safety Council at Cleveland; the Toledo Safety Council and the Quarry Section at Toledo; the Plant Publication Section for two conferences, one at Pittsfield, Mass., and the other at Chicago; and the Cement Section at La Salle, Ill.

Those who attended these regional conferences emphasize the fact that they are thus enabled to give safety ideas and inspiration to their superintendents, foremen, and others more forcibly than in any other way. This is particularly true of the evening dinner meeting to which many companies send their entire supervisory staff.

Our committee has been encouraged to proceed with the tentative plans for other conferences to be held the coming year, and on behalf of your new committee on conferences, I bespeak your full assistance and support. If any of our members want regional conferences in their

communities, a note to your committee will bring an immediate response and an offer of complete cooperation.

W. G. KING, Chairman,
DAVID VAN SCHAACK,
H. B. HARMER,
T. H. MCKENNEY,
A. J. VAN BRUNT,
G. F. PRUSSING,
M. E. ARKILLS,
J. I. BANASH,

J. E. WALTERS: I want to add a personal word vouching for the value of regional safety conferences. We take our superintendents, foremen and safety men to these meetings and we can not too strongly emphasize the fact that the results have been highly satisfactory.

MR. ROSELAND (Newark Safety Council): May I say very briefly that in northern and northeastern New Jersey we are very appreciative of the opportunity of having annual conferences in Newark. We believe they are of very great value in every community and we hope that you will give us the pleasure of continuing our cooperation with you.

CHAIRMAN SANFORD: Our next report is on Chapter Activities. Mr. Ernest Hartford, chairman of that committee, found he was unable to be present and I have asked Mr. Van Brunt to read his report.

REPORT OF ERNEST HARTFORD, CHAIRMAN, COMMITTEE ON CHAPTER ORGANIZATION AND CHAPTER ACTIVITIES

So far there have been organized the Metropolitan (New York City), Boston, and Hartford Chapters and negotiations are pending with the three Societies of Safety Engineers of California, Southern California, and Pennsylvania, and with safety clubs in Kansas City, Portland, Oregon, and Newark, New Jersey.

ERNEST HARTFORD, Chairman,
A. D. RISTEEN,
J. E. WALTERS,
E. W. BECK,
E. W. BULLARD,
J. A. OARTEL,
JOHN BROWNELL.

CHAIRMAN SANFORD: The next article of business is to vote on two suggested amendments to the Constitution which, according to regulations, have been submitted to the secretary in writing, signed by five members and published in the *National Safety News*. I will ask the secretary, Mr. Keefer, to read and explain the suggested changes.

SECRETARY KEEFER: It has been suggested that we amend Sections 1 and 3 of Article 4 of our Constitution as follows:

Section 1. The officers of the society shall be a chairman, two or more vice-chairmen, and a secretary. There shall be an executive committee consisting of the officers, nine committeemen at large, all past-chairmen of the A.S.S.E.-Engineering Section, and one committeeman representing and appointed yearly by each of the industrial sections of the National Safety Council. All such officers and committeemen shall be chosen from the corporate membership.

Section 3. The Executive Committee may elect additional members of the committee or additional vice-chairmen (regional directors) from its own number or from the membership, and may assign any or all of the vice-chairmen to direct the work of the society in specified districts.

The suggested amendment provides for three changes. One will permit the election of two or more vice-chairmen instead of just two.

The second change specifies that all past chairmen of the A.S.S.E.-Engineering Section shall be made members of the executive committee of the Section in succeeding years. This follows in line with the present procedure of the National Safety Council.

The third change permits the executive committee to elect new executive committee members. The suggested amendments were published in the August, 1926, issue of the *News*.

(Upon motion, it was voted to amend the Constitution as specified above.)

CHAIRMAN SANFORD: Our next business is the election of officers for the coming year. I will ask Mr. Mowery, chairman, to read the report of the Nominating Committee.

REPORT OF H. W. MOWERY, CHAIRMAN, NOMINATING COMMITTEE

Your committee respectfully submits the following report:

We recommend the nomination of the following:

Chairman, Ernest W. Beck, United States Rubber Company.

Vice-Chairman, R. C. Stratton, Travelers' Insurance Company.

Vice-Chairman, R. McA. Keown, Industrial Commission of Wisconsin.

Directors for three years: Ernest Hartford, American Society of Mechanical Engineers; F. L. Hurlbutt, Patent Scaffolding Company; C. B. Auel, Westinghouse Electric & Manufacturing Co.

Secretary, W. Dean Keefer.

Assistant Secretary, G. S. Wood.

Signed:

H. W. MOWERY, Chairman,
H. W. FORSTER,
J. A. VAN BRUNT,
L. A. DE BLOIS.

(Upon motion it was voted to accept this report and elect the officers as nominated by the committee.)

CHAIRMAN SANFORD: I am very sorry I can not introduce Mr. Beck, our new chairman, at this time but he is attending another meeting of considerable importance. I am assured he will be with us during our session tomorrow afternoon.

Our next subject is the report of the Committee on Accident Prevention in Engineering Colleges, by Mr. Keown, chairman.

REPORT OF R. McA. KEOWN, CHAIRMAN, COMMITTEE ON ACCIDENT PREVENTION IN ENGINEERING COLLEGES

I have no formal report to present at this time. What I shall give is simply in the nature of a progress report.

In discussing this matter at our meeting last year it was suggested that we ought to make some contact with the student branches of engineering societies in the various engineering colleges and universities, so we secured authorization to expand our committee, under whose direction we are developing a series of illustrated addresses or talks on the following subjects.

1. Brief History of the Safety Movement.
2. Why Student Engineers Must Be Interested in Accident Prevention.
3. A Comprehensive Industrial Safety Program.
4. Safeguards and Engineering Revision.
5. Safety Education.
6. Accident Prevention in Woodworking Shops.
7. Mining Safety.
8. Accident Prevention in Building Construction.
9. Preventing Accidents on Power Presses.
10. Safety in Foundries.
11. Preventing Personal Injuries in Machine Shops.
12. Showing of Motion Picture Film, "Hindsight vs. Foresight."
13. Electrical Accident Hazards and their Elimination.
14. Eliminating Accident Hazards in Industrial Power Plants.
15. Chemical Accidents and Their Prevention.

Securing approval of this list, we included the following statements in letters sent to all members of the committee:

"Many of us realize that the student branches of the professional engineering societies often have difficulty in arranging sufficiently interesting programs to maintain the regular attendance of their members.

"If this suggested plan is approved by our committee, these lectures can be developed in either printed or mimeographed form and brought to the attention of, and made available to various student branch officers. At the same time, we might write to the engineering college Deans asking their cooperation and active support.

"It will, of course, be made clear that it will take from twenty to thirty minutes for the presentation of each lecture and that stereopticon slides will be provided free of charge."

It is taking longer to complete these lectures than we had anticipated, but by next fall we should be ready to push this work with the opening of college.

CHAIRMAN SANFORD: This is one of the committees which has been carrying on excellent work, and Mr. Keown and his colleagues deserve our sincere thanks and continued support.

MR. MULLINS (Toronto): I would like to ask if the committee plans to send these lectures to the student organizations for presentation by students, or whether the addresses will be presented by professors.

MR. KEOWN: The students and professors in each college will determine jointly just who will present each lecture.

MR. VAN BRUNT: I would like to ask Mr. Keown if the list of lecture subjects is complete.

MR. KEOWN: We shall be glad to have suggestions for additions.

MR. VAN BRUNT: There is one matter that has been brought to the attention of all safety men very often of late; that is the matter of resuscitation by the prone pressure method. The American Gas Association is making a motion picture depicting not only the prone pressure method of resuscitation correctly, but also showing the result of this action on the interior mechanism of the human body. I feel sure you can get the A. G. A. to cooperate if, in your wisdom, you decide it is best to add the showing of this film to your list.

SECRETARY KEEFER: We have asked Mr. Whiting, the chairman of our Committee on Electrical Hazards to prepare lecture No. 10 and I think it is contemplated that he will include in this lecture something on this important subject of resuscitation. Nevertheless, we are glad to have this information, Mr. Van Brunt, which I feel sure will be given careful consideration not only by Mr. Whiting, but also by Mr. Keown's committee.

CHAIRMAN SANFORD: The next subject on this afternoon's program is the report of our committee on "Suction Systems" by Mr. Graves, chairman.

REPORT OF W. J. GRAVES, CHAIRMAN, COMMITTEE ON SUCTION SYSTEMS

As your Committee on Suction Systems was organized but recently it will not be possible to make a formal report at this time.

Outlining briefly the objects of the committee's work and its proposed program of activities, we find that a real need exists for more effective installations, better designed hoods, and more extensive use of mechanical ventilation to the end that working conditions in many industries may be materially improved.

We find a willingness on the part of employers to do all that lies within their power to provide healthful working conditions, and that shortcomings in the efficiency of the majority of installations arise from a lack of knowledge of requirements, or from the employer's inability to discover the right source or the right kind of equipment, or to a short-sighted policy of economy, which, if not followed, would result in much more effective systems, giving satisfactory results under all conditions and with but slight additional increase in capital investment.

A real problem exists in thousands of factories located in smaller communities the country over, because competent contractors for blow pipe systems are located only in the large cities and as the problem of dust or fume removal is frequently of minor importance nothing is done about the matter. The committee hopes to promote the design and manufacture of portable unit suction systems, which can be purchased by the isolated factory and installed with the same amount of labor and material (and we hope not the profanity) that accompanies the setting up of a coal stove.

To Promote Extensive Use of Mechanical Ventilation

Your committee will endeavor to promote more extensive use of mechanical ventilation in industry where the conditions are such as to require the removal of noxious fumes or gases or harmful dusts, which would be of decided benefit from the health and labor turn-over standpoints. Many industries are relying upon natural draft, through roof or window ventilators, and where satisfactory results, at all times and under all conditions, can only be secured by substituting the more dependable mechanical method which removes contamination quickly at the source and at the same time provides the only practicable known method of positively controlling these conditions.

The pneumatic conveying of material is worthy of greater attention. It is not only an economical way of handling many kinds of raw material and manufactured product, but is the safest type of conveyor—bar none.

Any members of the Council having difficult problems in removal of fumes, dust, fog, heat, odors, etc., may submit them to this committee, who will gladly cooperate in an endeavor to find the best method and type of equipment needed.

W. J. GRAVES, Chairman,
H. M. NICHOLS,
S. M. TONNESEN,
LEONARD GREENBURG,
R. S. GILCREAST,
W. A. ROWE.

(Mr. Graves then exhibited and commented on a group of stereopticon slides showing new and novel suction systems.)

CHAIRMAN SANFORD: Gentlemen, we have one additional piece of business to bring before the Section at this time, and I will ask Mr. Goodspeed to read the report of the Resolutions Committee.

Resolution Upon Death of Claude Robert Alling

MR. GOODSPEED: "WHEREAS, The American Society of Safety Engineers—Engineering Section of the National Safety Council—has just learned of the death of its valued and greatly beloved member, Claude Robert Alling, vice-president of Underwriters' Laboratories; be it

"RESOLVED, That the deepest heartfelt sympathy of all our members collectively and individually is hereby extended to his family together with our great regret at not being able to be represented at his funeral today. Be it further

"RESOLVED, That our deepest sympathy is also extended to Underwriters' Laboratories, to whom we take this opportunity to express our appreciation of his many years of successful effort in the safety movement and particularly of his own contributions in our councils and deliberations, which, in addition to his genial and well-beloved personality, make him an outstanding figure to us."

(Upon motion this resolution was adopted and the secretary instructed to mail copies to Mrs. Alling and to the Underwriters' Laboratories.)

ADJOURNMENT

THURSDAY AFTERNOON SESSION

October 28, 1926

The Thursday afternoon meeting convened at 2:05 o'clock, Mr. G. E. Sanford, presiding.

CHAIRMAN SANFORD: The first part of this afternoon's session will be devoted to a discussion of low-voltage electrical hazards and I will ask Mr. S. E. Whiting of Liberty Mutual Insurance Co., Boston, and chairman of our Committee on Low-Voltage Electrical Hazards, to lead the discussion.

LOW VOLTAGE ELECTRICAL HAZARDS

A Discussion Led by S. E. Whiting, Liberty Mutual Insurance Company, Boston, Mass.

MR. WHITING: Surely every one of us is interested to know what hazards may develop in the use of low-voltage electricity, both in the industries with which we are connected and, more personally, in our homes, most of which now are utilizing this almost indispensable form of power. It is the hope of your Electrical Committee that the informal discussion we are now to have will both convince you that certain common practices in utilizing electricity are so hazardous as to cause fatalities and provide you with practical methods of prevention.

Let us ask ourselves a few questions regarding this hazard and then see whether or not we can agree on the answer, after considering certain records of cases.

Question A:

Does low-voltage electricity ever cause a fatal shock?

Discussion A:

By "low-voltage" we mean anything from, say, 750 volts down to 110 volts. Nearly all utilization of electricity (disregarding telephony and other forms of communication) comes within this range, the higher values for substantial amounts of power and the lower for small amounts of power and for interior lighting.

The average wireman and the average electrical engineer are firmly convinced that a low-voltage shock can not of itself prove fatal; but let me read you the following tabulation of 10 death cases reported as due to low-voltage shock. Some of this data is confessedly fragmentary and some of the cases may have been actually due to high-voltage leaks. To answer this objection right now, we shall have to state that our tabulations do not include all of the evidence available to your committee. You all know with what care the liability situation

in any death case is examined by medical experts and claim investigators and there are practical reasons for distinguishing between high-voltage and low-voltage electric shocks. We can not include such details here since ours is an educational problem where brevity in our statistics at least is necessary for us to get even a hearing. Anyhow, what does it matter whether our statistical accuracy on this dispute between high-voltage and low-voltage is not 100 per cent, only 70 or 80 per cent? The practical point is that these accidents occurred—these persons were killed—while handling low-voltage equipment, every one of them. Obvious cases of a cross on high-voltage circuits have been thrown out.

(1) Two employees in coal yard. Pushing a coal loader, individually driven through a 250-volt motor fed by portable cable. Shock received from frame of loader as wheel was pushed over the cable. Ground was damp.

(2) Employee in acid-making room of paper mill, June 23, 1924. Shock while taping wire lead to 3-phase 550-volt acid pump motor. Fuses had blown in two phases only and main switch was left in during repair.

(3) Mechanic setting up new machine, shocked by 550-volt wire where splice was not taped.

(4) Electrician of power company testing out a 550-volt line to locate defects. Shock while connecting instrument from fuse box to ground on conduit.

(5) Operator in wood-pulp mill. With hand on water pipe, threw in open-knife switch and made contact with one of the blades. Circuit was either 220 volts or 550 volts d.c.

(6) Employee on construction job. Walking on ground that was wet, fell against open-knife switch on 440-volt circuit.

(7) Near-sighted electrician, not wearing his glasses. Shock from factory motor knife switch in metal box on 440-volt circuit.

(8) Repairman in combustion chamber of boiler. Removing portable electric light, received shock. Cicuit was 220 volts.

(9) Richard Camp, seaman on U. S. "Currituck," July 20, 1925, Norfolk, Va. Found dead with bare feet on metal bunk and neck against radiator. Loose wires (from junction box to lamp) lying on bunk, with bare spot in contact. Circuit was 122 volts from auto transformer with one side permanently grounded o. k.

(10) Woman dish washer at Monroe Terrace Apartment, Richmond, Va. With wet hands, picked up telephone and turned on light by pull-chain socket. Lighting fixture found "dead grounded" on 115-volt a.c. circuit. Old installation with neutral not grounded but test showed no indication of high-voltage leakage. Reported by Inspector Bowry.

Operating Conditions Where Fatal Shocks Occur

Answer A:

Under certain circumstances we say decidedly "Yes."

Question B:

Under what operating conditions does low-voltage electricity cause fatal shocks?

Answer B:

Where the person is well grounded at the time of shock.

Discussion B:

You will note in reviewing our tabulations, there is such a characteristic relation between severity of shock and grounding of the person (standing on a wet floor, working in a boiler, etc.) that we must train our electricians, engineers, and master mechanics to avoid all chances of shock under such conditions. There is nothing new about this idea

for the National Electrical Code has specified porcelain sockets in damp places for many years but we must develop it into an almost instinctive habit if we are to avoid these low-voltage fatalaties.

Ten more items of our tabulation are given below and you will note how repeatedly this idea of the grounded person enters the situation.

(11) Boiler repairman at Richmond Refining Co., Richmond, Va. Inside of boiler with extension light having porcelain key socket and wire cage. Clothing wet from perspiration. Shock from strand of wire projecting between socket parts in contact with lamp cage. Several burns on body and on arm. Circuit 220 volts a. c: Reported by Inspector Bowry.

(12) W. Garnett boiler repairman, on steamer "St. Johns," Washington, D. C., July 31, 1925. Shock from extension lamp inside of boiler. Staggered out of boiler and fell dead. Voltage supposed to be 110 volts.

(13) R. Alleman, Washington, D. C., July 12, 1925. Garage employee holding metal socket of extension lamp, standing on wet concrete. Neutral of three-wire secondary circuit had two driven-pipe grounds. Inspector found 220 volts between outside wire and ground.

(14) M. H. Knott, Elmira, N. Y., Sept. 18, 1925. Demonstrating an electric washing machine at Fair Grounds. Received shock with one hand on washing machine and other hand reaching for connection.

(15) S. Cole, repair man at Embsary Gypsum Plant, Wheatland, N. Y., March 7, 1925. Holding onto frame of plaster conveyor, received shock from brass socket on extension cord light. Socket showed omission of fibre lining and loose strands on one of the cord wires inside of the socket. Voltage not stated.

(16) H. Sprague, electric welder on U. S. Ship "S-47", July 22, 1925. Using electric welder in confined place on top of engine, suddenly died. Voltage of welder 110 volts. Autopsy showed no external or internal causes of death and was therefore reported as electrocution.

(17) Mrs. C. H. Kady, Providence, R. I., Sept. 21, 1925. At home, while washing up floor received shock from unused side of twin socket on extension cord to piano lamp on 250-volt circuit. Ground through water pail against steam radiator. Burns on arm and on thumb (found in socket).

(18) Machinist at Hathaway Machinery plant, New Bedford, Mass., August, 1924. Shock received from drill press individually motor driven from a 550-volt circuit.

(19) Electrican at Wickwire-Spencer Steel plant, Worcester, Mass. Shock followed by fall from ungrounded overhead outdoor conduit on side of building on 550-volt circuit.

(20) Twenty-seven low-voltage fatalities from brief records of Bureau of Standards. Occurred between 1912 and 1919 entirely on lighting circuits. Fourteen cases specify voltage from 110 to 120 volts. Circumstances of shock not given except for five cases in bath tubs and three cases on portable cords.

Shock Current Does Not Depend Solely Upon Voltage of Circuit

Question C:

Why is a low-voltage shock more dangerous in damp or otherwise grounded locations?

Answer C:

Because, for a given voltage, the flow of current through the body is greatly increased by the body being grounded.

Discussion C:

Perhaps it is altogether obvious but it is here worth emphasizing that this shock current does not depend solely upon the voltage of the circuit but every bit as much upon the body resistance, as well. If you stand on a dry, wood floor, and come into contact with 110 volts through one hand, you probably will not feel any shock at all, let alone being killed. If you stand on a wet floor and do the same thing, the resistance through your body to ground has been materially decreased—more current therefore flows through your body and the resulting shock is more severe.

Now this is an application to the particular case of the human body of what has been known for generations about electric circuits; that the current equals the voltage divided by the resistance—what is known as "Ohm's Law." We are justified in further stressing the point since many an electrician stops applying this law when he reaches the low-voltage fatality problem and seeks some mysterious high-voltage explanation or, what is still further beside the point, ascribes the death to a weak heart. It is not a theory but a fact that the resistance of the human body varies widely. The Bureau of Standards and other experimenters have measured the body resistance and have found that it varies from 100,000 ohms or more between dry finger tips down to 1,000 ohms and less between large, firm and wet contacts against the hands, feet or body. Here is a range in resistance over 100 to one. Therefore, those who believe that a man can be killed by even a poor contact on a 2,300-volt circuit (as we all do) must also agree that a man can be killed by a contact only 20 times as good on a 110-volt circuit—or else deny Ohm's Law.

Discussion of the Preventive Problem

We are now through with arguments and can take up the preventive problem. Before doing so you will be interested to read another group of our tabulations, 10 more obituary notices or rather 11, for in one of these accidents on low-voltage equipment two persons were killed simultaneously!

(21) Marguerite Prevot, at home, Green Bay, Wis., Mar. 26, 1926. Using a hair curling iron while sitting in bath tub. 120 volts.

(22) J. Ketch, laborer at Merrimac Chemical plant, Woburn, Mass., Nov. 3, 1918. Shock from defective lamp cord on drop light while replacing lamp. 110 volts.

(23) C. Riddley, laborer at Royster Guano Co., Norfolk, Va., April 5, 1919. Moving electric loader in yard, strain on cables broke wood bushing and charged machine.

(24) C. Hansen, helper at Waterhead Mills, Lowell, Mass., March 16, 1920. Starting elevator motor with compensator starter. Tests showed 550 volts charge on case of starter.

(25) R. Sawyer, millwright at Slater Mills, Webster, Mass., Aug. 21, 1919. Drilling hole in floor of elevator pent house, bit struck controller parts, ground for body through motor frame. Burns on hands and chest. 550 volts.

(26) N. Neilson, Salinas, Cal., 1921. Shock from open-knife switch on lighting circuit at home. Ground through gas stove.

(27) C. Ingraham, Lansing, Mich., 1922. Shock from electric light switch at home. Ground through water pipe.

(28) Beatrice Schwarzler, Bronx, New York, N. Y., 1921. In basement in dripping bathing suit. Shock from lamp socket while screwing bulb into it.

(29) Workman in auto body plant, Detroit, Mich., Oct. 1925. Shock from portable electric drill lying on auto body, not in motion. Ground through metal rod on floor. Burns on palms of both hand and sole of one foot. Test showed 118 volts.

(30) Two men in auto body plant, Philadelphia, Pa., June 5, 1925. Simultaneous shocks from auto body on wooden horses, charged by portable electric grinder having defective insulation. Ground through metal air hose on floor. Test showed 220 volts.

We are fortunate in having several prominent electrical experts at our meeting, some of whom are serving on your Electrical Committee,

and they will now speak on one or another of the practical ways in which these electric shock cases can be prevented. One of our members is Dr. M. G. Lloyd, of the Bureau of Standards at Washington, who is also chairman of the National Electrical Safety Code. He will speak on

Polarized Wiring

DR. LLOYD: Polarized wiring, which is now required by the electrical code, means that a definite polarity is maintained through each and every circuit of the system. This applies to two-wire and three-wire 110-volt systems used principally for lighting and such systems are also permanently grounded on one side. This means that at every outlet on the system only the "outside" or ungrounded wire is "hot" or has any difference of potential between it and ground and this hot wire will be connected to the side of the device that is least exposed. For instance, on an electric lamp socket, the hot wire will be attached to the center contact and the grounded wire to the socket shell contact. This plan has two advantages in avoiding shock. One is that if you get your finger inside the socket, the part you are most likely to touch will be the grounded side of the circuit. The other advantage is that no electric strain is put on the resistance of the little fibre sheet that is provided between the screw shell and the outer brass casing of the socket. Under abuse and exposure to moisture, etc., this fibre is likely to break down where subjected to the full line voltage and cause a charge on the outside of the socket that would be hazardous to life. Polarizing eliminates this hazard.

This polarizing practice is now required for new electrical installations and I think everyone can see that it is a very desirable thing. By having one side of the circuit systematically identified throughout, the hot wire only need be fused and the elimination of a fuse on the grounded side of the circuit insures that the ground connection will be maintained.

When it comes to portable devices, especially if they are connected by the ordinary bayonet plug and receptacle, it is not quite so easy to maintain polarity. Non-reversible plugs and receptacles and identifying colors or other marks on the wires of the extension cable itself will be necessary to maintain the polarized condition right up to the portable device. We should thereby secure a means of grounding the exposed metallic parts of any electric portable device such as the frame of an electric drill, thus guarding against another of the low-voltage hazards. While such polarized plugs and receptacles are already on the market and their use is strongly recommended, the great majority of existing equipment is of the reversible non-polarized type. We have here a large problem that has not yet been solved.

MR. WHITING: Just to remind you again that we are talking about a death hazard, we present another group of 10 fatalities occurring in the

use of low-voltage equipment. Two of these are of the brass-socket-in-a-boiler type where, as the body was taken out of the boiler, it was still holding on to the brass socket in a death grip.

(31) Workman in tank in Winslow Bros. Tannery, Norwood, Mass. Shock from brass extension lamp on 110 volts. Three-wire system with neutral grounded o. k.

(32) Millwright in Albermarle Paper Co., Richmond, Va., Jan. 1925. Shock through heavy wrench used on machine charged by extension cord that was jammed in gears. Standing on water pipe. On 110-220 volts three-wire circuit. Rescuer received shock.

(33) Workman in copper kettle at tobacco extract plant, Richmond, Va. Shock from brass socket on extension cord on 110 volts.

(34) Workman in Merrimac Chemical Plant, Woburn, Mass. Shock from ceiling outlet on open wiring on lighting circuit at 110 volts.

(35) Workman at Waterside Textile Plant, Lowell, Mass. Shock from charged casing of portable electric drill with defective armature insulation.

(36) W. Fisher, electrician, Gilboa, N. Y., Aug. 23, 1925. Dragging portable line over ground at construction job. Circuit 440 volts, ungrounded secondary. Lamps in series. Spliced bared by stretching. Man hung up on circuit 5 minutes or so. Three fingers burned off. Prolonged resuscitation unsuccessful.

(37) A. G. Hamilton, janitor, Cambridge, Mass., Feb. 10, 1925. Inside boiler of apartment house. Shock from brass socket extension lamp. Lamp cord found wet and light still burning. Man still gripping socket when pulled out of boiler dead.

(38) Workmen in tunnel under construction. Bound Brook, New Jersey, 1921. Shock from exposed splice on 220-volt portable lighting circuit.

(39) Employee in Griess Pfleger Tannery, Chicago, April 25, 1925. Shock from socket of extension cord on a wet floor on 110-volt circuit.

(40) Boiler man at Lawrence Gas Co., Lawrence, Mass. Shock from brass socket on extension cord in mud drum of boiler. Victim still gripping brass socket when pulled out of boiler.

One of the members of your committee represents the National Electric Light Association, the members of which generate electric power and distribute it to us for such innumerable and invaluable uses. These power companies distribute electricity at high voltages but on private structures, under ground and over head, to which the general public is not exposed, finally delivering the power to us at low voltage at our service switches. From that point on, the power company has no legal responsibilty; for someone else, an electrical wiring contractor or an individual who does his own wiring, completes the connection from service switch to utilization device.

This N. E. L. A. representative is Mr. E. W. Gorry, Superintendent of Substations of the United Electric Light & Power Company of New York City, the power output of which is so vast they have to use 100,000 volts, not for transmission but merely to distribute it. Mr. Gorry will discuss this low-voltage problem from the

Viewpoint of the Electric Power Company

MR. GORRY: As far as the light and power companies are involved in this question, every possible precaution is taken to the best of our knowledge and belief. It almost goes without saying that we utilize every available method of avoiding any chance of our high-voltage current getting crossed onto, or leaking through transformers into, the low-voltage system on our customer's premises.

In the protection of our own employees, undoubtedly many of you are familiar with the method known as the "hold-off system" and with the devices used for the protection of employees. In New York City we go somewhat further on our distributing system, by placing a protective grounding connection also on the secondary side of transformers to guard against any possible feed back.

The Accident Prevention Committee of the N. E. L. A. has given considerable thought to the question of proper grounding of exposed parts and the safe design and construction of the vast amount of utilization of equipment found in industry and in the home. In my opinion, the adoption of polarization, as Dr. Lloyd has explained, will help a great deal to eliminate some of these hazards that we are here discussing. I suggest that some more of our statistics be entered now in the record.

Additional Cases Where Fatal Shocks Occurred

(41) L. J. James, steam-fitter on Baker Smith contracting job, Perryville, Md., Aug. 18, 1918. Fell against 440-volt open-knife switch on switchboard. Floor wet, wood platform out of place.

(42) A. Ellis, electrician at Sun Shipbuilding plant, Chester, Pa., April 8, 1919. Coming down from overhead work on high-voltage bus, got across 440-volt bus below it.

(43) P. J. Fahy, electric welder at Sun Shipbuilding plant, Chester, Pa., June 11, 1919. Using a.c. welder in tank of Hull No. 11, found dead with electrode in hand and body wet from sweating. Test: 60 volts on welder terminals under load and 110 volts on open circuit. Autopsy: burns on finger and body, aortic regurgitation.

(44) S. Niciewska, repairman at Electric Lamp plant, Danvers, Mass., June 26, 1918. Shock from open-knife switch, reaching for it with other hand on gas pipe.

(45) Man at home, Milwaukee, Wis., June 14, 1924. Shock touching electric washing machine in his basement, on 110-volt circuit. Motor insulation had broken down, charging frame of washing machine.

(46) Moulder in a Milwaukee foundry, Aug. 17, 1924. Shock received from electric sand vibrator on 110 volts a.c.

(47) Night watchman in Milwaukee foundry, Aug. 17, 1924. Shock from brass socket on extension cord taken out of doors in rain. Man found dead still clutching socket.

(48) Employee in Aetna Ball Bearing plant, Chicago, Aug. 10, 1925. Shock from brass socket of extension cord. Man fell into water tank set in floor. Was gripping socket when rescued. Another man shocked, touching him.

(49) Foundry crane operator, Buda Company, Harvey, Ill., March 14, 1925. Shock from 440-volt a.c. trolley wire of crane. Shock and fall. No burns but marked congestion of internal organs.

(50) Employee at DuPont plant, Nov. 28, 1922. Circuit was 550-volt a.c., chemical dirt on floor. Safety switch charged by insulation breakdown in conduit. Protective ground by driven pipes had too high resistance.

Both American Institute of Electrical Engineers and the American Society of Mechanical Engineers are cordially cooperating with us through the appointment of representatives on our Electrical Committee. Colonel John P. Jackson of the New York Edison Company, another very large power company has, for years, been a leader in the safety activities of these organizations. At the present time, due to the illness of one representative, Colonel Jackson is acting in dual capacity for both engineering societies. He will speak on the

Viewpoint of the Engineering Societies

COLONEL JACKSON: My own belief is that there is no problem today which should engage the safety engineer's attention more fully than the one which we are now discussing. In a talk I had yesterday here in Detroit with certain prominent engineers, we all agreed that electrical engineering has been developed probably with more intelligence, so far as the safe utilization of electricity is concerned, than any other branch of engineering. The electrical industry started only a generation ago but with a very high type of young men because it was only such men who could understand the principles of the industry.

Shortly after that the great manufacturing companies began to take large numbers of young and well-educated men into their plants and put them through special courses designed especially to fit them for intensive work in this field. The result today is that, with an amount of power generated enormously greater than is found in any other form for distribution to the general public and of such a nature that you can neither see nor smell it, there have been phenomenally few accidents. Nevertheless, accidents are increasing and why? Because the industry is growing so rapidly and new developments are complicating our problem to such an extent that we can hardly keep up with our own progress. Naturally the engineering profession is very much interested, both from the generating standpoint and from the utilization standpoint, in seeing that the problem of electrical hazards is fully and carefully handled and that the intelligent men of this generation give it more than ordinary attention.

This country is not the only one that has this problem of electrical utilization. Only the other day, Mr. Loeb, General Manager of the New York Edison Company, handed me a report by Mr. G. S. Ram, Electrical Inspector of Factories in England, a man of very high technical ability and long experience. This report discloses very much the same situation we have in this country. The legalized official rules in England require polarizing and grounding but, due to the fact that many existing installations have not been brought up to the new standards, serious accidents are continuing to occur in Great Britain. I am arranging to turn over the most vital part of this English report to your Electrical Committee.

MR. WHITING: Of course insurance companies are represented in this committee work for it is the poor insurance companies that have to pay out large sums for accidental death cases whatever the cause, provided they occur in industry. The cases in the homes, unfortunately, are not insured and the bereaved families do not have even the slight satisfaction of financial recompense. It is an open secret that insurance companies are not the "ultimate consumers" of these costs but anyhow we are indebted to them for many items in our tabulation. The Aetna Life Insurance Company has served on this committee for several years and one of their research engineers, Mr. W. A. Ferguson, will now speak on

Viewpoint of the Insurance Company

MR. FERGUSON: I can say that we are very much in accord with the views already expressed regarding this low-voltage electrical hazard. During the past 18 months four additional cases of this kind have been called to our attention. One of them was from a lamp socket and the other three occurred in connection with the use of portable electric tools or devices. These accidents were all death cases and we feel that the situation is such that it merits considerable study and investigation, particularly in connection with the portable tool problem. Personally I feel that this Engineering Section should dig into the problem to assist in every way in working out an answer to this serious toll of death cases.

MR. WHITING: Just to reinforce Mr. Ferguson's suggestion that every one of you should lend a hand in solving this problem by sending in your suggestions and reporting cases that you personally know about, we present you another group of 10 more low-voltage fatalities. This completes our formal tabulation, although we still have many other records in the rough.

(51) Operator in Erving Paper Mills, Erving, Mass. Shock from handle of starting compensator on 550-volt circuit. Protective ground wire clamp was loose and arcing.

(52) Engineer at Wyman Gordon Forging Plant, Worcester, Mass. Shock from handle of starting compensator on 440-volt circuit. Charged condition found by volt-meter test still existing on the next day. Due to leakage through metallic dust on top of slate terminal block of circuit breaker mounted on same ungrounded hangers that supported the compensator.

(53) Workman at Norton Grinding Wheel Plant, Worcester, Mass. Shock from charged compensator at 550 volts. Charge due to bent pigtail of contactor in switch.

(54) Repair man in boiler at Oswego Falls, N. Y. with extension lamp, 1926. Weatherproof socket broken, exposing live outer screw contact. Fed from 440-volt circuit having four lamps in series.

(55) Mrs. Joseph James, Anderson, Ind., 1926. Electrocuted while operating an electric carpet sweeper at her home. A short circuit caused the fatal shock.

(56) Mrs. Sidney Ragan, New Orleans, La., 1926. Shock from weatherproof lamp socket on a low-voltage grounded-neutral lighting circuit.

(57) Herbert Rought, Chicago, Ill., Mar. 27, 1926. Connecting armoured cable to 110-volt circuit. Shock between live end of wire and grounded cable. Line tested o. k. after accident.

(58) Leslie Woodson, laborer in Lynchburg Foundry, Va., Sept. 20, 1926. Shock from portable motor-driven sand screen charged by wheel cutting cable on wet sand. Circuit 220-volts, three-phase.

(59) John Gerger, Machine Operator at Pittsburg-Desmoines plant, Pittsburg, Pa., Aug. 6, 1926. Shock from 220-volt drop light through metal shade on weatherproof lamp socket.

(60) Cannery employee, Booth Packing Co., Baltimore. Shock from conveyor charged by accidental contact through metal bucket with low-voltage electric switch.

The largest electrical manufacturer in the world itself uses electric drives practically 100 per cent upon its vast quantities of machine tools, large and small, each with its own controlling devices. While the chairman of this session, Mr. Sanford, could tell us much from his own experience about such installations, I am going to call upon another man of similar experience with this company, Mr. J. B. Harnden, Super-

intendent of Tests of the General Electric Company, Schenectady, New York, who will tell us about

Guarding Stationary Electrical Equipment

MR. HARNDEN: Speaking first of the low-voltage hazard in general, I feel a great amount of missionary work must be done before much will be accomplished in this field. I have had close association with large numbers of young college engineers that go through our training course and have been astonished to note repeatedly how generally these men feel that no danger is associated with the lower voltages. The proposal made elsewhere at this Congress to carry safety education into our schools and colleges is certainly a valuable one.

I have made a careful study of all accidents that have happened in our testing department, going back to 1900. We have to handle both high-voltage and low-voltage circuits in this work and, while we have had indeed very few low-voltage fatalities, we have had some and they have almost invariably resulted from the test man feeling that low-voltage shocks were harmless. Certainly voltages below 500 or 600 will not kill everybody, but they might kill anybody under certain circumstances and I attach great importance to this missionary work you are doing.

On the other hand, some cases of deaths in industry may be erroneously charged to electric shock. Thus, I recall over a period of 15 or 20 years three or four low-voltage electrocutions in our plant, but right alongside of these have been 20 or more cases of men dropping dead from heart failure. Because these men were not in proximity to any live electrical parts at the time, no question of electric shock was raised; but if they had been, a false conclusion might have been drawn as to the real cause of death. There is evidence enough that low-voltage will kill but certainly we must use caution in deciding such cases.

The guarding of stationary low-voltage electrical equipment against accidental shock is a simple matter but it is unquestionably important. It consists merely in the enclosure of live terminals, switch blades, fuse cutouts, etc. (unless they are isolated by elevation); the use of dependable insulation on wiring with enclosure in conduit where exposed to mechanical injury; and the permanent grounding of all metallic cases and frames to prevent charge on these dead-metal parts if the internal insulation should fail. It should be obvious, yet the fact is sometimes overlooked, that where you have a machine individually driven by a motor mounted directly thereon, any insulation failure in the motor windings will place a charge on the whole machine. It is our standard practice to permanently ground each and every motor-driven machine tool. In the usual case, the line wires are in conduits and the desired protection is obtained by a short jumper wire screwed to a clean, firm contact on the machine and fastened to the conduit with the usual ground clamp.

MR. WHITING: One organization represented on our Electrical Committee is the Electrical Manufacturers' Council. At this meeting, this organization is represented by Mr. M. C. Goodspeed, Safety Engineer of the Erie Works of the General Electric Company, who will talk to us about

Guarding Portable Electric Tools

MR. GOODSPEED: The portable electric tool or device presents much the same shock problem that the extension cord lamp presents. We recommend polarization of wires for both portable tools and extension lamps wherever possible. The grounded wire of the circuit is then connected to the frame of the tool as it is to the shell side of the socket. With this plan, if the tool insulation breaks down, you simply have an internal short circuit that will clear itself by blowing a fuse but the man is protected.

We must realize that frequently electric tools are used on scaffolds, etc., where even a mild shock to the operator may cause a dangerous fall. We had a case of this kind quite recently and, as a result of it, we decided to remove all of our old type plug attachments and install polarized plugs and receptacles throughout.

Another method of protecting the user of portable tools is to provide three-wire cables and three-pole attachment plugs and receptacles, the third wire being connected between the casing of the tool and a ground contact at the plug outlet. It is even possible on existing equipment to tape a third wire onto the cable of the tool, one end screwed into contact with the tool casing and the other having a spring battery clamp for grounding onto the outlet box or otherwise. The former method is better because it grounds automatically—and not every man will take the trouble to guard himself.

Where polarized wiring and a grounded side to the circuit are not available, this third-wire method is valuable but I distinctly prefer the two-wire polarized feed for portable tools. The third wire may become broken and its protection be lost without warning but with the two-wire feed, any break in either wire puts the tool out of commission and warns the user of the defect.

Referring to this low-voltage hazard in general, I feel that the physical condition of the subject has much to do with the result of the shock. Standing in water has been mentioned as dangerous but if a man is merely perspiring very freely, his resistance may be markedly reduced. The lowest fatal voltage mentioned at this meeting has been 110 volts but even lower voltages may be dangerous. I recall witnessing one man getting hold with both hands of two live metal surfaces and he could not pull himself loose. He was taken off the circuit by others before serious injury developed but if he had not been promptly relieved, we can not be sure the strain on him would not have proven fatal. Subsequent tests showed that this circuit had on it less than 35 volts.

MR. WHITING: The city of Detroit has established a reputation for official enforcement of protective measures against this portable electric tool hazard. We appreciate the attendance at this meeting of the Chief Electrical Inspector of Detroit, Mr. B. W. Clark who will tell us about this pioneer work he has been doing.

Portable Tool Requirements in Detroit

MR. CLARK: A few years ago we had a sort of epidemic of serious and fatal accidents in the use of portable electric tools and investigation showed that something must be done. So in 1921 we adopted a rule that cable used for portable motors must have an extra wire connecting the tool or machine directly to ground. For single-phase or direct-current motors this required three-wire cables and for three-phase motors, four-wire cables. This practice applied not only to the usual small electric drills but also to portable loaders for handling coal, gravel, etc. Concerns with such equipment now have their yards provided with several plugging stations each with a ground connection as well as power feed.

Since the enforcement of these requirements, there has been no general trouble of this sort. We have had only four low-voltage fatalities during these six years; two of which were from direct violation of instructions given the persons and the other two were in tunnel work where the wiring was absolutely hazardous and had been installed without our inspection or approval.

Regarding polarization, we have found it necessary in certain types of installation to require double-pole switches even on two-wire polarized and grounded systems. This is the out-door sign lighting equipment that is becoming so common. In spite of its normally hazardous location overhead, such equipment must be handled frequently for replacement of lamps, etc. We had what might have proven a serious accident when a man up on a ladder on one of these signs got hung up by a shock although he had opened the single-pole switch that had been provided together with polarized wiring. Luckily, his helper was there to free him and knew enough to quickly clear the line at the fuse cutout.

Investigation showed what had happened. A repair man from another concern had cleared up trouble on this same sign the night before. He had found a ground on the live side of it and to quickly restore service had merely transposed the line wires. We thereupon adopted a rule requiring double-pole switches for outdoor signs and building outline illumination. This rule and the one on grounding the frames of portables have, I believe, saved a number of lives.

MR. WHITING: A past president of National Safety Council is with us and he has had, in a former business connection, not only to struggle against the misbehavior of chemicals in the manufacture of dynamite, but against the same low-voltage tricks of electricity we have been discussing—which shows how widely this hazard spreads. Mr. L. A. DeBlois,

Director of Safety Engineering Division of the National Bureau of Casualty and Surety Underwriters will speak on

Dangers from Inadequate Grounding

MR. DEBLOIS: It is quite possible that, under certain conditions, the grounding of non-current-carrying parts of electrical equipment may merely be setting a trap for the unwary by creating a zone of potential difference or voltage in the ground itself. I can make this clear by citing an electric shock fatality in a plant that had its power brought in from outside and transformed down for distribution at 550 volts.

An accidental ground developed between one leg of the low-voltage system and a conduit that was in metallic contact with the switch box and the iron sheathing of a motor house—all these dead-metal parts being connected to a driven-pipe ground. The floor of the house was cement somewhat soiled with nitrate of soda that had been tracked in. A man reached over to throw the switch (without standing on the insulating platform provided) and dropped dead and attempts at resuscitation failed. Investigation disclosed the breakdown on one leg of the circuit to the conduit already mentioned and another similar breakdown to a conduit on another leg of the circuit but located over half a mile away. There was found a difference of potential in the space where the man stood sufficient to cause a fatal shock and, of course, his feet were wet with the chemicals.

In investigating the methods of making electrical grounds, the Bureau of Standards has found that from a driven-pipe ground you may have within a short radius as much as 70 to 80 per cent of the entire line voltage; that is the point. In my opinion there is only one thing to be done. Make your ground connection of such low resistance that when the insulation breakdown occurs enough current will flow to positively blow the fuses in the line or operate the circuit breaker.

The DuPont Company where this accident occurred has now abandoned the driven-pipe or buried-plate grounds that are so commonly used and does all of this protective grounding of equipment directly onto water pipes. In buildings not provided with water supply, a buried copper ground wire is run to the nearest point where there is a water pipe. We now feel that some of the formerly inexplicable shocks or fires that occurred were due to the inadequacy of anything less than a complete metallic ground such as water pipes afford.

MR. WHITING: Safety Council headquarters has for years been helping on this problem and I will ask Mr. W. Dean Keefer, Director of the Industrial Division of the Council to tell you about their special publications relating to electrical hazards; he wrote several of these pamphlets himself.

Pamphlet on Low-Voltage Electrical Equipment

MR. KEEFER: The National Safety Council has published a series of about 85 Safe Practices Pamphlets on special hazards, and the pamphlet relating to the low-voltage electrical hazard is No. 29, now in its second edition. It consists of 16 pages with numerous pictures of a very practical nature illustrating details of electrical equipment of all sorts. It is sold at an average of 10 cents per copy in quantity lots. We strongly recommend that all who are interested in this subject obtain copies not only for their personal use but also for distribution to master mechanics, plant engineers, and members of wiring departments. Thorough familiarity with this pamphlet should assist your plant men materially in correcting the dangerous practices that lead to regrettable electric shock fatalities. We also have Safe Practices Pamphlet No. P. S. 1, on Radio Hazards, and No. 76, on Portable Electric Tools, the latter discussing both the electrical and the mechanical hazards involved.

Safe Extension Lamps

MR. WHITING: In closing this discussion, I want to call your attention to the safe forms of extension lamps that are available for your use. There is the substantial wooden-handled lamp holder with cage to cover the lamp and protection of the cord against bending strains. There is some choice between these holders and those with porcelain or composition sockets are to be preferred: at least you should insist that the brass socket, if used, is thoroughly insulated from the cage with ample creepage clearance. There is the reliable rubber-sheathed cord that you should use in place of ordinary twisted lamp cord. And, if your men will persist in using twisted lamp cord and brass sockets for their extention lamps, there has recently come on the market the special rubber slip-on cover that will help you solve this problem. But don't wait for an accident to force this issue upon you. Make a clean-up of your electrical equipment now, even searching into the lockers of your repair crews—the men who are from Missouri on low-voltage shocks. Of course, you will check up in your own home.

CHAIRMAN SANFORD: This subject is one that might be continued for much of the afternoon, but we are obliged to jam as much as we can into each single session of our three half-days. Therefore we will have to stop this very interesting part of our program.

The next part of the session will be in the field of electrical testing in the factories and will be given by Mr. J. D. Harnden, superintendent of tests for the General Electric Company, Schenectady, N. Y.

SAFETY IN ELECTRICAL TESTING

J. D. Harnden, Superintendent of Testing Department, General Electric Company, Schenectady, N. Y.

It has been my good fortune to be connected with an industrial company which from its early beginning has been actively interested in all phases of "Safety First" activities. Paralleling the growth and development of its business has come extensions and improvements to the system of grappling with this important problem. As a result, we find diligently engaged in this work an organization consisting of a general committee, having local works committees whose representatives extend down through the entire line of organization, with large numbers of workmen on the floors, the whole forming an agency whose influence is felt in every department of the business and through which it appears great progress can be made.

The electrical industry, rapidly taking form as one of the major industries of the world, is made up of many phases, and an essential part of each is electrical testing in one form or another. Wherever manufacture of electrical apparatus or devices is carried on, testing is found usually paralleling and considered an important part of manufacturing and engineering operations. Much testing is necessary to determine that defects of design and manufacture have been eliminated, that guarantees of performance in contracts to customers have been met, and for the taking of sufficient data for the guidance of engineers in making future designs.

While much of this paper applies to all kinds of testing, it deals particularly with electrical testing in the largest manufacturing plant of the General Electric Company at Schenectady. This plant produces in great volume and variety large power apparatus, consisting of direct current motors and generators, synchronous converters, alternating current motors and generators, induction motors, frequency changers, steam turbine driven generator sets, transformers, regulators, rectifiers, with combinations of the above units forming motor generator sets, etc.; and all of the work is performed by engineering graduates—about four hundred are taken in each year from one hundred and thirty-five technical schools and colleges, the testing department being used as a laboratory for the training of young engineers after graduation.

In some places the opinion prevails that such work is naturally extra hazardous and that more accidents than usually occur in other kinds of work must be expected. The writer does not share this view, although as long as electricity is used there will always be a good deal of hazard associated with the physical handling of electrical apparatus and power circuits. But with a full realization of the conditions and an earnest and sincere desire to prevent accidents, operations of this kind can be performed with an accident record no higher than is usually present on other classes of work in shops considered as safe places to work. A low

accident rate, however, can be accomplished only by consistent efforts on the part of all supervisors of testing departments, who must be made to understand that the prevention of accidents is one of their first duties and fully as important as any work performed.

A fact many times overlooked is that electrical testing of rotating apparatus has associated with it all kinds of hazards—both electrical and mechanical. Mechanical hazards include such things as the bursting of rotors or flywheels, armatures, pulleys, belts, rotating exposed shaft projections, couplings and jack shafts. The bursting of rotors or flywheels with disastrous results must be guarded against by the use of speed limiting devices—tested once each week—and other regulating devices, and when testing for over-speed (usually 200 per cent speed), such as is done in case of the rotors of water-wheel driven generators, extra precaution should be taken by placing the rotors in underground pits, specially designed for this class of work.

Great care must be exercised in the selection of men for this kind of work and all must be physically capable. Those with defective vision, hearing, subject to fits or any other ailment which may be the cause of an accident should not be employed. Hence, the need of a physical examination before employment.

Before starting work, a person thoroughly competent with knowledge of all rules and regulations should spend considerable time with each group of new employees.

The Careless Human Factor Must Be Eliminated

Much attention must be given to ascertaining how careful a workman each tester is, and when a careless man is discovered, he should be discharged. There is no one thing which has a more far-reaching effect on other workmen than to follow the above practice. Accidents in electrical testing cannot be entirely eliminated by the usual practice of guarding dangerous places, although it should be used extensively. For the reason that men testing machines are in complete control, connecting, adjusting, taking electrical readings, changing connections, and performing various duties incident to the job, they largely create safe or unsafe conditions as each step of the work progresses, and no amount of general safety rules from headquarters will suffice, except in so far as they educate the men to use careful methods. So we must use guards wherever they will be of value but our main reliance will always be in educational programs and discipline.

Therefore, department heads will find it necessary to pursue a policy of continuous instruction in some form best adapted to meet the needs. The following plan has been found to be effective: Monthly meetings (or oftener if necessary) on the first Friday of each month at 7:30 a. m. of all supervisors on both the day and night shifts of all testing sections. A large part of each meeting is always devoted to safety and each accident is discussed and ways decided upon to prevent a

recurrence; and equally important is some plan that will insure all information and instructions being passed down to the workmen. It is a common fault with supervisors that they sometimes possess information sent out from headquarters but no one else knows about it. To overcome this, and as an agency in foremen's training, each foreman should call his men together for a few minutes whenever necessary to give them full and complete instruction.

Every man should be given a "Safety Manual" embodying all the rules of the department. The manual should be in three parts:

First: all general miscellaneous information bearing on the subject.

Second: a chapter of the most important safety rules, infraction of which justifies the action of discharge.

Third: a detachable sheet to be returned, after not more than one week of service, to the office, certifying that the rules have been read and are understood.

Experience indicates that much good results from this system. A very active suggestion system is in operation through which about 5,000 suggestions are received from the workmen each year, many of which relate to safety methods, and those possessing merit are put into use at once.

Much may be gained by offering prizes each month to the department with the lowest lost time accident record, as a means to arouse interest and keep the subject of "safety first" at all times in the minds of the men.

Summarizing Safety Effort Under Four Heads

The subject may be summarized in the following four statements:

(1) Supervisors to the last man must be trained to think and work safely.

(2) Workmen must also be trained.

(3) Methods of operating all equipment must be in accordance with safe practices.

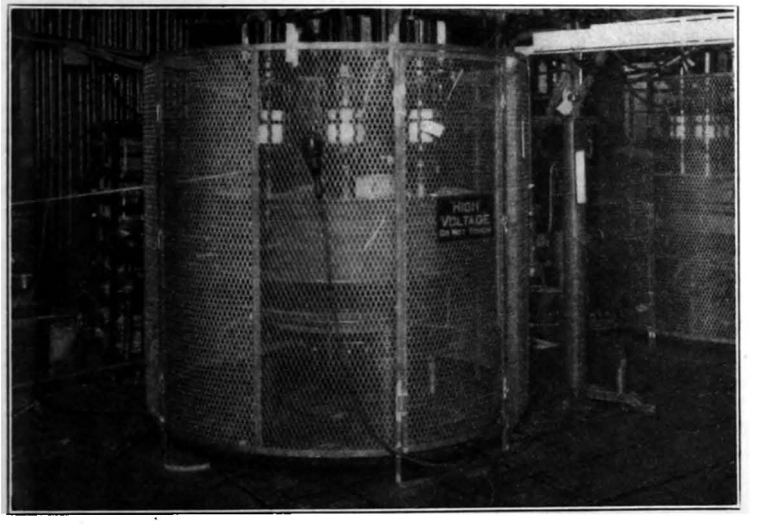
(4) Equipment must be safe and so maintained at all times for the service placed upon it.

Perhaps the most difficult accomplishment is the training of supervisors; they must be made to see that preventing accidents is largely one of education, supervision and discipline. Educational campaigns should never cease and should include everyone in the department. Supervisors must get the spirit of safety and pass it on to the men. Careless workers or supervisors should be discharged in cases of serious infractions of safety rules or regulations.

Adequate illumination is important. Undoubtedly many accident reports, specifying other reasons, should read, "Insufficient illumination."

The equipment, much of which is comparable with modern powerhouse installations, should be designed, installed and maintained with great care. The equipment naturally falls into two classes, permanent and temporary. Since the greatest hazard exists on that part of the

equipment that may be installed in a temporary manner, it follows that the maximum amount should be installed in permanent fashion. In most departments much more is temporary than need be, the excuse being that things are up today and down tomorrow. On small devices a large percentage can be installed in permanent shape, although on large power apparatus, fully 50 per cent of the equipment must be of a temporary nature. Many of the portable parts, such as test tables, circuit breakers, oil switches and other control devices can be designed and constructed in finished form.



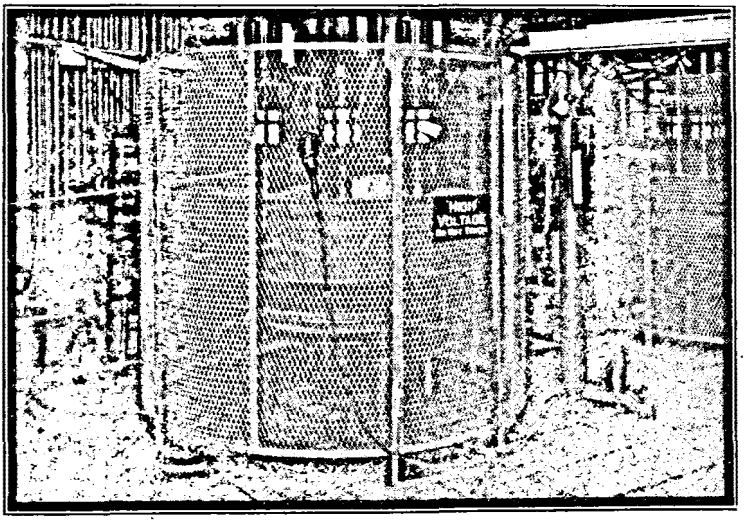
Portable safety enclosure for testing mercury arc rectifiers.

There is a common belief that the only electrical hazard is one of shocks, but there is also always present the chance of electrical burns from short circuits and arcs of all kinds; and where a large quantity of power is involved the results may be quite as serious from burns on low voltage as from shocks on high voltage circuits. The great danger lies both in direct burns from the arc itself and also the secondary effect of burning clothing. Therefore, the greatest care must be exercised constantly to prevent accidental short circuits and power arcs with their destructive effects.

Numerous devices have been developed which play an important part in the prevention of accidents and are used extensively.

Testing tables for various purposes developed along modern lines of switchboard construction (completely enclosed with expanded metal) which contain the main circuits and potential and current transformers;

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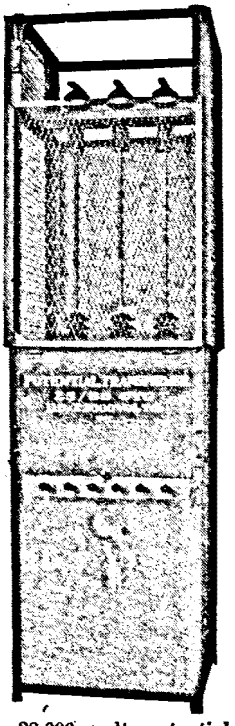
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etc., are used, the front table part of which carries all instruments, isolated from the high voltage.

Rotating shop machines with frames thoroughly grounded are equipped with guard rails for the protection of men and operators when inspecting bearings or other parts.



22,000 *volt potential transformer cage, Schenectady Works.*

The frames of most machinery undergoing test are effectively grounded, as the massive iron floor upon which they are placed is thoroughly and permanently grounded.

Transformers are safeguarded by placing them within fireproof vaults or expanded metal enclosures.

Portable circuit breakers and oil switches are carried in substantially built and completely enclosed structures.

Insulated wooden mats are used in front of switchboards and test tables. Conspicuous signs in large numbers indicate to all the character of the job, and white tape, meaning "High Voltage" to every test man, is strung around the temporary circuits and other parts of a set-up.

The use of rubber gloves, metal lamp guards, metal armored air hose, the wearing of finger rings, wrist watches, metal pencils, long flowing neckties and loose clothing is prohibited.

Much attention is given to instructing the men in the "One Hand Method of Operating" and also that they must never risk their own safety to the insulation on cables or other parts, because in general it is always possible to disconnect the source of power before making changes or adjustments in test work.

The various kinds of general testing work in the factory buildings naturally falls into three classes and the equipment should be designed accordingly.

1st. Tests which can be made within an enclosure or room with gates interlocked with the source of power, thus excluding all persons including the testers. Wire and cable, transformers, insulators, etc., are tested in this way, and all operations performed from the outside of the enclosures.

2nd. Tests which can be made within an enclosure where all persons are excluded, except the testers.

3rd. Tests on large power machinery in the manufacturing shops where it is obviously impossible to construct rooms for each unit, require the greatest care and attention. On this class of work, we are faced with the most difficult problems.

Each unit must be erected in a thoroughly substantial manner on the test floor to avoid shifting or movement in case of accidental short-circuit. Substantial platforms equipped with step and guard rail are necessary around the larger units, also guard rails to prevent a tester from falling or otherwise accidentally coming in contact with high voltage or the rotating parts of a machine. The wiring, even though temporary and used only for a few hours or days, must be well done to prevent the cables from coming in contact with rotating parts, and movement due to magnetic forces, the melting off of terminals, or a number of other reasons, which cause open or short-circuits, grounds or arcs.

A frequent cause of accidents in testing work is the likelihood of misunderstanding between men working together. This can be avoided by training the men never to take the word of another person, but always to look and see for themselves that conditions are safe before proceeding with any work.

The following is a sample of the signed certificate mentioned previously and a part of the "Safety Manual":

This certificate is to be signed by employees of the testing department and must be delivered to the office not later than one week after engagement.

I hereby certify that I have received a copy of the book "Instructions for Testing Electrical Apparatus." I understand all the instructions in the chapter on "Safety First" and appreciate that all my work in the Testing Department must for the safety of myself and others be carried out with extreme caution and thoroughness. I understand that I should consider all circuits and current carrying parts of machines to be "alive" unless I know of *my own knowledge* after careful inspection "that they are dead." When circuits or current carrying parts of a machine are "alive," I shall consider it dangerous to touch or to approach any part of it, even if insulated, closer than the following distances:

750	to	2,500	Volts	1 foot
2,500	to	10,000	Volts	2 feet
10,000	to	50,000	Volts	3 feet
50,000	to	100,000	Volts	5 feet
100,000	to	250,000	Volts	10 feet
250,000	to	500,000	Volts	15 feet

I have had instruction in the "Prone Pressure Method of Resuscitation from Electric Shock" and feel capable of applying the method in case of need.

Signed .....

Date .....

We adopted that certificate at the request of the men themselves. In the second portion of the safety manual is a short list of "don'ts." Each statement has at different times been worded in a good many ways but

etc., are used, the front table part of which carries all instruments, isolated from the high voltage.

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we finally agreed that you often get positive results from negative statements. This list has been compiled from experience. We know the major causes of all our accidents and it is a simple matter to specify the few things which if done by the men will lead to discharge. The men themselves helped to write them, and they were anxious to word each caution as a "don't."

An analysis of the few fatal accidents which have occurred since the year 1900 reveals some strange and interesting facts. Contrary to expectations, it is nearly always the older and more experienced men who meet with accidents, indicating that the old maxim "familiarity breeds contempt" still applies; new, inexperienced men instinctively are more careful. Also, a large percentage of accidents occur on the last half hour of the working shift, indicating that the mind is for a moment on other things—a ball game—clam bake—trip home, or outing of some kind, and at such times the work does not receive full concentrated attention. It would naturally be expected that more accidents occur on the night shift than on the day shift, but again it does not work out that way; on the same basis of man hours worked, the number is approximately the same on both shifts.

In spite of all that can be done, testers will at times receive electrical shocks, hence the necessity for every man in the department being thoroughly trained in the method of resuscitation by the Prone Pressure method, which has in late years proved the most effective. To accomplish this, we have adopted the practice of instructing and demonstrating the method to every man before he is permitted to start work, with a follow-up demonstration every month thereafter. This follow-up system is conducted by the foreman and each man is required actually to go through the motions of performing the method.

In conclusion, therefore, and evident to all, the problem resolves itself into one of creating the safety habit throughout the department. This must be done by every conceivable means, and done so effectively that it will find expression by every man in every act on every job.

(Mr. Harnden then exhibited a group of slides showing methods that have been used to safeguard the equipment in the G. E. Testing Department.)

CHAIRMAN SANFORD: We will now proceed to the subject of static electricity which will be discussed by Mr. Butler of the Standard Oil Company, of Indiana.

STATIC ELECTRICITY

T. W. Butler, Standard Oil Co., (Indiana.)

The Standard Oil Company (Indiana) is interested not only in protection against the hazards due to static electricity, but also against stray currents and lightning.

We protect all of the plants in the marketing division of our company against all of these three hazards. The hazards due to lightning

are taken care of by grounding all storage tanks with a permanent form of ground and the usual precautions of seeing to it that the ground leads are as heavy and strong as possible.

Stray electric currents cause hazards in unloading our tank cars. We have known of cases where relatively high voltages have been encountered. When I say high voltage I mean up as high as 40 or 50 volts of direct current between the rails of the siding and the unloading pipes of our storage systems. It is needless to say what would happen if a spark were drawn between an unloading pipe and the top of a tank car.

Various Precautions Taken Against Static

Briefly, where these hazards are known to exist, and they are usually found by voltmeter tests between the rails and the unloading pipes, we connect the pipe lines to the tracks by means of heavy cables. In doing this we are carrying out the recommendations of the American Railway Association. However, we do not feel that this is necessary in the case of the small station away from the centers of population or away from the known sources of stray electric current. Our friends, the electric railway companies, are usually the worst offenders in furnishing stray currents. Electricity leaks from their rails on to the rails of the steam roads and sets up this difference in potential between our pipe lines and the sidings. Where we find stray currents to exist, we request the railroad companies to install insulated rail joints at the points of the sidings. We spot the clearance point so that at no time do we permit any tank cars or car to be placed across these rail joints to form short circuits.

Static electricity is one of those elusive things about which we hear a lot and about which we know very little. We can understand that static electricity is present on tank trucks. It usually accumulates while the truck is in transit. There are a number of theories as to why that should occur. One of them is the swishing of the gasoline in the tank. Personally I do not subscribe to this one. A second theory is the friction of the tires on the roadway. A third is electrostatic induction from overhead clouds. A fourth, there might be charged particles of air blowing against the metallic body of the vehicle. I have known of cases where a radio aerial became disconnected and positively charged over night with sparks coming from the aerial connection at the time it was attached to the set. This could very readily occur in the case of a vehicle.

Still another theory; we know that a highly insulated plate put in the path of the exhaust of a motor vehicle will become highly charged. This of course leaves the charges of opposite sign still on the vehicle.

Those are just a few of the theories. There are others, which undoubtedly come to your minds.

The next question is what are we going to do to eliminate the static charge on the vehicle? One way is to drag a ground chain. A ground

chain, however, is not an absolutely positive device for it wears or breaks off and is not always replaced as soon as it should be. Something additional is necessary, so we have installed a metal ball on the top of each tank truck. At each platform where gasoline or refined oil is loaded, we have a handle known as a contact handle which hangs out directly over the truck when it is standing at the loading platform. On this handle is a sign, "Ground your trucks before loading." The men are required to attach this handle to the metal ball on the tank truck thus equalizing the potential between the fill pipe and the truck.

Mr. Singleton is the chairman of the Committee on Static Electricity. It is the plan of this committee to gather all available data and then to list all of the possible causes of static generation. We will then attempt to propose a report discussing the various methods that may be employed to stop the generation of static or to eliminate the hazard after it has been generated. Our committee requests every A.S.S.E. member to send us all available data on static; data about accidents or fires that have resulted from static or were thought to have resulted from static. Please address Mr. Singleton, chairman, through the National Safety Council office

CHAIRMAN SANFORD: Gentlemen, I have an announcement to make. Yesterday, at the time of the election of officers, it was impossible for our newly elected chairman to be present, so I am going to call on him now and ask him to preside for the remainder of this session. Mr. Ernest W. Beck, of the U. S. Rubber Company.

Chairman E. W. Beck Is Introduced

CHAIRMAN BECK: Gentlemen, I assure you it is with appreciation that I accept this responsibility. I realize it is a responsibility. As a member of both the old A.S.S.E. and the Engineering Section of the National Safety Council, I had the privilege of participating in the negotiations that led to their amalgamation, so I consider it an unusual honor to be your chairman and I trust that I will be able to do as much as your previous chairmen have done. I number among my best friends the chairmen of the old A.S.S.E. and the Engineering Section. I feel that the Engineering Section is the most important section of the Council with the possible exception of the Education Division. Having spent several years in educational work I consider both sections highly important.

I greatly regret my inability to attend yesterday afternoon's session. Unfortunately, it was necessary for me to meet with the Rubber Machinery Safety Code Committee of which I happen to be secretary. After about four years of hard work we at last have a code for mills and calenders that has been approved unanimously. We now expect to promulgate other sections of the code until we have covered all types of rubber machinery. I believe it is one of a very small number of the codes that have been assigned to sponsors to cover an entire industry.

We have two subjects left on the program to cover. The first is that of "Accident Hazards in Direct Synthetic Ammonia Process." Mr. Ernst, chairman, is absent this afternoon but in his place we will hear from Mr. E. B. Tolsted. It is a pleasure to introduce Mr. E. B. Tolsted of Fonda-Tolsted, Inc., of Chicago, at this time.

MR. TOLSTED: I think we are fortunate this year in having Mr. Ernst as chairman of this committee. Mr. Ernst, as you probably know, is in government service and in a position to know a great deal about this subject. I feel honored in being asked to read his report.

HAZARDS INVOLVED IN THE OPERATION OF THE DIRECT SYNTHETIC AMMONIA PROCESS.

F. A. Ernst, Chief, Engineering Division, Fixed Nitrogen Research Laboratory, U. S. Department of Agriculture, Washington, D. C.

(Preliminary Report of Special Committee of the National Safety Council.*)

Your committee investigating the hazards involved in the operation of the direct synthetic ammonia process reports progress. By progress, the committee does not mean inactivity. This committee has been very active and has secured much material of value. It must be remembered, however, that this is an infant industry and that the committee's report can be but more or less of a preliminary report which might need considerable revision some years hence.

The direct synthetic ammonia process was operated for the first time on an industrial or commercial basis in 1913. This first plant was located at Oppau, Germany. It was not until 1921 that a plant outside of Germany come into operation. This was the plant of the Atmospheric Nitrogen Corporation at Syracuse, N. Y. It can be seen, therefore, that this industry is not yet old enough to afford complete details.

For the benefit of those not familiar with the operation of this process for the fixation of atmospheric nitrogen, there follows a brief description.

The object of the direct synthetic ammonia process is the production of synthetic ammonia directly from its elements, nitrogen and hydrogen. Hydrogen secured by any of the various known methods, is mixed with nitrogen, generally secured from the atmosphere, in the ratio of one part of nitrogen to three parts of hydrogen. This gas mixture is then compressed to what might be called high pressures. The pressures in commercial use at this time are within the range of from 100 atmospheres (1500 lbs.) to 900 atmospheres (13,500 lbs.). This compressed gas mixture is then passed over a material, known as a catalyst, at a relatively high temperature (450-600°C). In passing over this catalyst, a portion of this gas under these conditions is converted to ammonia. On passing out of the catalyst-containing vessel, or ammonia convertor,

*See list of members of this Special Committee appended to this Report.

the ammonia formed is removed from the gas mixture and the remaining gas returned either to the same catalyst bed where sufficient fresh gas has been added to make up for the ammonia removed, or to a subsequent catalyst bed.

What are the operations involved, then, in this industry? First, there is hydrogen production and handling; second, nitrogen production and handling; third, the treatment of these gases for their conversion to ammonia; and fourth, the handling of ammonia. Operations 1, 2, and 4 are not new, but have been carried out for a long time and have been made the subject of previous study, although not in this particular connection. It is, then, operation No. 3 which is practically new. There is a new feature to the operations 1, 2 and 4, however, and that is the production and handling of these materials in the manner and in the quantities necessary for this industry. For this reason, then, serious consideration is being given to all four operations.

Part I—Hydrogen.

Hydogen production and use for industrial purposes is a development of the last two decades or so. Many methods of producing hydrogen have been proposed, and several have been developed and are now in use. Large quantities of hydrogen have been produced for the hydrogenation of oils and for aeronautical purposes as well as for use in the synthetic production of ammonia. Smaller quantities have also been produced as by-products in the electrolytic production of oxygen and caustic soda and have been used in the manufacture of electric lamps, cutting and welding of metals, calcium lights and similar purposes. It will be seen, then, that the production and handling of hydrogen is a technical process in which there has been considerable experience through which the hazards involved have come to be quite well understood.

It is true, however, that for use in the synthesis of ammonia from its elements hydrogen is needed in quantities and degree of purity not frequently required for other purposes, and for ammonia synthesis the economical production of the gas is of prime importance. For these reasons the production of hydrogen for ammonia synthesis has in many cases developed along somewhat different lines than those followed in producing it for the other purposes. So consideration of the hazards involved in producing hydrogen for this purpose naturally leads to some consideration of the production processes employed for this purpose.

Your committee is therefore briefly reviewing some of the more commonly employed methods of making hydrogen for use in the synthetic ammonia industry. There are many such processes and it seems unnecessary at this time to consider the newer processes which are being developed, such as the Bergius process in which iron and water are caused to react at a temperature of something like 300°C and the corresponding vapor pressure of the water (about 1300 pounds per square inch), or the Liljenroth process in which water and phosphorus

react under the influence of a catalyst. Indeed only the most general consideration will be given to some of the more common processes in this report, although the development of the work of your committee very probably later may necessitate much more extended consideration of hydrogen production processes.

At present the primary source of hydrogen is water. There are of course large quantities of combined hydrogen available in the form of hydrocarbons and it is probable that this source will be used to an appreciable extent in the future. In separating the hydrogen from water it is usual to use carbon in the form of coke as a reducing agent, but there are processes in use in which the hydrogen is separated by physical or physico-chemical means, as in the electrolysis of alkaline solutions. We will briefly outline the processes that are being considered in connection with this preliminary survey of production and utilization hazards. They may be designated as follows:

1. The steam-iron process.
2. The water gas catalytic process.
3. The water gas liquefaction process.
4. The electrolytic processes.

In the steam-iron process, steam is caused to react with iron, the iron being oxidized by the oxygen in the steam and substantially pure hydrogen being produced. The reaction is carried out at temperatures ranging between 550° and 800°C, is a reversible reaction and takes place in accordance with the following equation:

$$3Fe + 4H_2O = Fe_3O_4 + 4H_2$$

The magnetic oxide of iron produced in the hydrogen production cycle is then reduced by means of a suitable gas and for this purpose water gas is generally used. The reaction occurs in retorts either of a "multiple unit" type or of the "single unit" type and the reacting mass is a suitable form of iron ore. It is necessary that heat be supplied to maintain the temperature of the iron ore and to heat the incoming steam and water gas to the required temperature. Such heat is supplied either by having the retorts in a furnace or "bench" in which producer gas is burned or by burning, in the retort itself, a mixture of water gas and air.

Hydrogen Sulphide and Carbon Dioxide Removed

The water gas used for reducing the iron ore is produced in water gas generators of standard design. In these a mass of coke is alternately treated with air and steam. During the combustion or "blow" period, the coke is brought to a suitable reacting temperature and during the "steaming" period, blue water gas which may be considered a mixture of substantially equal parts of hydrogen and carbon monoxide is produced. Both the blue water gas used and the hydrogen produced by these processes contain hydrogen sulphide and carbon dioixde in small amounts and these are removed usually by iron oxide and lime

placed on trays in purifiers of the conventional type. Both water gas and hydrogen are also scrubbed with water in scrubbers of conventional type for the preliminary removal of impurities.

In this process of hydrogen manufacture, the hydrogen and water gas are generally stored in "relief" or "floater" holders after they pass from the generators through the "scrubbers." From the relief holder, the blue water gas is moved with a pump or "booster" through the purifiers and the hydrogen retorts. The hydrogen is pumped from the hydrogen relief holder through the purifiers to a storage holder. These parts of the system are mentioned here because they are factors which are important in considering process hazards. They are, however, elements which are exactly similar to those used daily in thousands of gas producing installations and so they present hazards no different in degree or kind from those which have been successfully controlled in a very large number of gas plants.

Intricate Details of the Process

In the water gas catalytic process the water gas used is passed from the "relief" holder through heat interchangers to a converter in which, under the influence of a catalyst, the gas is caused to react with steam at a temperature of about 450°C. The carbon monoxide in the water gas is oxidized to carbon dioxide, reducing the steam to hydrogen. The resulting gas is therefore principally hydrogen and carbon dioxide mixed with steam and containing small amounts of carbon monoxide, methane and nitrogen. The steam is removed by passing the gas mixture through a condenser, which may be of the scrubber or tubular type. The hydrogen-carbon dioxide mixture is then usually compressed to a pressure of the order of 450 pounds per square inch and scrubbed under that pressure with water in order to remove the major portion of the carbon dioxide. Water is then separated and the crude hydrogen stored in a suitable gas holder. The traces of carbon dioxide and sulphur dioxide in the crude hydrogen may be removed by scrubbing with alkalies or lime. The removal of the carbon monoxide in the hydrogen presents some difficulties and various methods of doing this are available. As illustrative of the procedure to be followed, mention may be made of the use of an ammoniacal cuprous salt solution as an absorbent for carbon monoxide, the hydrogen being treated with the absorbent under high pressure before it is introduced into the ammonia synthesis proper.

In the water gas liquefaction process the carbon monoxide in water gas is removed by liquefaction induced by compression and subsequent expansion through a suitable throttle valve or expansion engine or both, the system including suitable heat interchangers to bring about progressive cooling. The carbon monoxide may also be liquefied by means of an external refrigerating system in which liquid air or nitrogen may be used as the refrigerating medium. Previous to the liquefaction process, the hydrogen sulphide and carbon dioxide are

practically entirely removed by means similar to those which have been mentioned with the addional use of refrigeration. Whatever impurities remain are removed in the liquefaction process itself. Hydrogen produced in this way will contain two to four per cent carbon monoxide, which is removed by methods similar to those used in treating hydrogen produced by the water gas catalytic process. The carbon monoxide separated by liquefaction is used in gas engines for the production of power.

By the electrolysis of a solution of sodium or potassium hydroxide, water is decomposed into oxygen and hydrogen. The process has been used to a considerable extent for the production of oxygen. The hydrogen produced is very pure and may be used for ammonia synthesis.

Most of the caustic soda and chlorine marketed today are obtained by the electrolysis of a brine solution. In this process large quantities of hydrogen are produced as a by-product and this gas may easily be purified and utilized for synthetic ammonia production. Both these methods of hydrogen production are carried out in electrolytic cells of more or less standard designs fitted with suitable means of keeping the hydrogen from being contaminated with oxygen or chlorine as the case may be. The small amounts of oxygen or chlorine which may be found in the hydrogen as it leaves the cells can be readily removed, no additional purification being required.

There are many types of cells used for both the electrolysis of sodium hydroxide solutions and brine solutions. They all consist essentially of suitable metallic electrodes and means of keeping separate the products produced. In the case of the oxygen-hydrogen producing cell of modern design, a diaphragm is used in almost all cases for this purpose. In the case of the caustic soda—chlorine—hydrogen cells, a diaphragm is sometimes used and in other cases the desired end is attained by other features of cell design. The many types of cells in common use need not be described here.

Each Process Involves Certain Operating Hazards

In considering the hazards involved in these various processes, it will be seen that each of the processes involves certain operating hazards peculiar to the type of equipment used and certain general hazards which are common to several processes or perhaps all of them. The special hazards which must be guarded against in any particular type of plant need not be considered now. Perhaps the work of this committee will be so developed that such hazards will require consideration, in which case undoubtedly the practical experience of those who have operated the equipment in question will be made available for the use of the committee. It is believed that a thorough consideration of such special hazards must be based on actual practical operating experience. Some of the more general hazards may to advantage be given consideration in this first committee report.

It will be noted that in three of the processes reviewed, water gas is used. The presence of carbon monoxide in water gas makes it highly toxic. For this reason, as well as because the gas is combustible, care must be taken to prevent its escape from the gas system. Cases are on record of at least temporary asphyxiation of those employed in hydrogen producing plants where water gas is used. The dangers of carbon monoxide are recognized generally and adequate protective measures are available as well as adequate measures for treating those who may be overcome by the gas. The handling of the water gas to prevent the formation and ignition of explosive mixtures requires only such precautions as are being taken in thousands of gas plants today and these precautions can readily be codified to apply to hydrogen production plant operation.

The production of the hydrogen itself by either the steam-iron process or the water-gas catalytic process, presents no unusual hazards. Combustible gases are being handled in closed systems and the escape of the gases from the systems or the introduction of air into the systems must be guarded against, but the means of doing this are well known and can be readily prescribed. In some of the purification processes the crude hydrogen is treated with liquids at higher pressures than are usual in such purification processes, and perhaps in such cases some particular care must be bestowed upon the control of operating practices which might result in the introduction of air into the system. But the means of protection to be employed are the same in character as those employed in similar widely used methods operating at lower pressures.

Some Intricate Safety Problems Are Presented

In the water gas liquefaction process of hydrogen production rather unusual safety problems are presented. A combustible gas is compressed to comparatively high pressures and then passed through the liquefaction system. In parts of the system, quantities of liquefied gas, at extremely low temperatures, are collected and at such points there is a potential pressure hazard which must be guarded against. The carbon monoxide separated from the water gas is an extremely toxic gas and in part of the system at least is under pressure. Its escape at any point in the cycle must necessarily be prevented. While these hazards are somewhat unusual they are similar in character to those met in handling other industrial gases and it will become evident in this report that satisfactory methods of control can be developed and applied.

The hazards involved in the production of hydrogen by the electrolytic method result principally from the fact that under certain conditions the hydrogen may be sufficiently contaminated with air, chlorine, or oxygen to be explosive and that such a mixture may be ignited. If an explosion takes place after the gas has been compressed to a high pressure for use in ammonia synthesis, the results are likely to be extremely serious. However, there has been much experience gained in the operation of hydrogen producing cells. The possible causes of impure hydrogen pro-

duction are well known and guarded against. Either frequent tests of the hydrogen are made manually or automatic and practically continuous methods of testing are employed as a check on the safety of the hydrogen as well as for plant control purposes. In the case of the caustic soda cells producing hydrogen, the hazards of course also include those connected with the handling of the caustic liquor.

These particular hazards will not be considered now. It is sufficient to point out that the operation of both electrolytic oxygen-hydrogen plants and caustic soda-chlorine-hydrogen plants has become practically standardized and efficient expert operating management and the employment of intelligent and skilled labor together with the application of well-known protective measures will result in plant operation which is safer than that of many other industries.

In the production of synthetic ammonia, the hydrogen used is compressed to high pressures, higher in some cases than those in general industrial use. The handling of the hydrogen (regardless of the particular process used in its manufacture) is a subject which should be given careful consideration in connection with the work of the committee. In this procedure, however, we may again be guided by practices which have been established in the course of regular operation of hydrogen plants in which large quantities of gas have been compressed to pressures almost, if not quite, as high as those generally used for ammonia synthesis.

Accidents in Handling Hydrogen at High Pressures

Some accidents have occurred in the handling of hydrogen at comparatively high pressures, and they have resulted usually either from explosive mixtures of gases produced in the generating system and then compressed or from explosive mixtures produced in the compression system itself.

When hydrogen is being handled at high pressures, special precautions should undoubtedly be taken to prevent the introduction of air or oxygen into the gas.

In considering the hazards involved in the compression of hydrogen to high pressures, it might be well to mention first that experience has shown that hydrogen containing sufficient air or oxygen to be explosive may ordinarily be compressed to high pressures without ignition taking place. In good compressors of modern design the ignition point of such mixtures is ordinarily not reached. Cases are on record where extremely explosive mixtures of gases have been compressed, being subsequently ignited in the storage vessel with serious results. In order to prevent introduction of air into hydrogen flowing to compressors, precautions are to be taken at all times to keep a positive pressure in the compressor suction line. Usually the maintenance of such positive pressure is insured as nearly as possible by the design and operation of the suction line and its connections. In some cases pressure responsive attachments have been connected to this line and to the compressor motor or other power ele-

ment in such a way that the compressor driving mechanism is stopped in case too low a pressure occurs in the suction line.

In the operation of gas plants of various types, means have been developed for preventing the reduction from normal of the gas holder pressures. These pressures may be reduced either by continuing to draw gas from the holder after the gas holder bell has reached the landed position, or by drawing gas from the holder after the travel of the bell has been stopped through ice accumulations or mechanical conditions which are not normally present. In many plants a mechanism is provided which is actuated by the gas holder bell so that when the bell has reached a predetermined position near its lower limit of travel, the compressor driving mechanism is automatically stopped. Such mechanisms have many times proven their value and in many cases where they have not been used, accidents have occurred.

Control of Hydrogen Compressing Plant Operation Necessary

In the suction lines of hydrogen compressors there are frequently placed drains which are water sealed or manually operated. Operating practice has indicated the means of maintaining such drains at all times in proper operating condition with the thought in mind of preventing the entrance of air into the suction line. The same precautions are, of course, followed in connection with taps in the suction line for obtaining test samples or for purging or similar purposes. The hazards resulting from failure to properly control the parts of the suction system which have been mentioned are important ones but here again operating experience has resulted in recognition of these hazards and in the understanding of suitable means of preventing accidents.

Effective expert control of hydrogen compressing plant operation is, of course, necessary at all times. In the operation of such a plant used in connection with ammonia synthesis and operated by employees who, in all cases, have not had extensive experience in the handling of hydrogen, it would undoubtedly be highly desirable to carefully formulate operating rules covering these particular hazards. There is undoubtedly a tendency among those in charge of operation of hydrogen compressing plants, as well as of similar equipment, to lose sight of some of the hazards involved and authorize practices which have been proven by experience to be dangerous. Hydrogen compressors have sometimes been used intermittently for the compression of air.

There is on record a case in which this was done with disastrous results. The hydrogen compressor suction line was equipped with two globe valves of standard design and manufactured by a reputable manufacturer. These two valves in the suction line were both presumably tightly closed and communication to the atmosphere was then established at a point in the suction line near the compressor. It was found later that in spite of the fact that the two globe valves had been tightly turned down, both of them failed to seat properly, allowing the passage of a quantity of hydrogen. This hydrogen was mixed with the air drawn into the com-

pressor and the explosive mixture resulting was compressed to some 2,000 pounds per square inch and stored in a battery of high pressure containers. The explosive mixture was apparently ignited by friction or static spark which followed the opening of a drain in the storage system. The resulting explosion completely wrecked the storage system as well as other parts of the plant and resulted in loss of life.

Such accidents are, of course, no indication that there are inherent hazards in the handling of hydrogen at high pressure, but they do indicate that careful design and operating control are necessary. The synthetic ammonia industry may find the basis for such careful design and operating practice in the experience which has already been gained in other industries.

On the high pressure side of the compressor system there is little probability of introducing air into the gas and here the problem becomes largely one of preventing the escape of the hydrogen from the system. It may be noted here that hydrogen at high pressure, when escaping from a small orifice may be, and frequently has been, ignited either from friction or by static spark. In the hydrogen compressor plants, precautions are taken to prevent any serious results from hydrogen flames issuing from openings in the high pressure systems. In some cases where such precautions have not been taken, operators in the plants have been seriously burned. As a result of such experience, plants are being designed to eliminate such hazards, as far as possible. Vents (including safety valves) from the high pressure system, are piped outside of buildings, or, when practical, into the suction side of the compression system. In hydrogen compressing plants, leakage of the combustible gas into the room presents a general hazard similar to that met with in any plant where combustible gases are used. This hazard is perhaps a little greater in the hydrogen plant than in many other gas plants because of the fact that hydrogen is invisible and odorless and the pressures employed somewhat higher than usual. The use of vapor proof lighting and other electrical equipment is, therefore, rather common practice in hydrogen plants. Experience has indicated that such precautions, together with precautions against leakage, have given adequate protection against explosions of explosive mixtures formed by escaping hydrogen.

Purge Storage Vessels Before Hydrogen Is Introduced

While it is true that in most of the high pressure system there is little possibility of introducing air into the hydrogen, an exception may be found in the case of pressure storage vessels. Particular attention must be given to the purging of such storage vessels before hydrogen is introduced. In some cases there are also possibilities of introducing air or other gases into the high pressure hydrogen system by means of making improper connections from other systems. Such improper connections have actually been made in service and accidents have followed. As a result, the containers for shipment of hydrogen under high pressure for use in industry are universally equipped with left-hand threads. Left-

hand threads are, however, not generally used in the high pressure hydrogen system in the plants themselves. Connections to such systems, however, such as are used for obtaining test samples and similar purposes, are frequently equipped with left-hand threads and some precautionary measures should be taken to prevent the possibility of making wrong connections to such openings.

As an additional precaution against the utilization of hydrogen containing dangerous quantities of oxygen, it is general practice to regularly test the quality of the hydrogen as it leaves the high pressure system for delivery to the point of consumption. Here again, automatic testing equipment is available by means of which the gas may be analyzed almost continuously and if desired the results recorded automatically.

In this report many of the details of hazards which may be met with in the operating of hydrogen plants have been mentioned together with precautionary measures which are taken and should be taken to prevent accidents. It is believed that in this way it has been clearly indicated that while the production and handling of hydrogen does involve some hazards, these hazards have been recognized and suitable precautionary measures and means are available for use in any particular case where hydrogen is to be produced and handled in connection with the manufacture of synthetic ammonia.

Part 2—Nitrogen.

The nitrogen used in the direct synthetic ammonia process is naturally extracted from the atmosphere. Mention may be made of three methods of separation used: first, the liquefaction and distillation of air; second, the burning of a mixture of air and hydrogen, thus producing a nitrogen-hydrogen mixture and water; third, the production and mixture of producer gas and water gas and the subsequent treatment of the mixture in the same manner as water gas is treated in the water-gas catalytic process.

The securing of nitrogen from the atmosphere by the liquefaction and distillation process is a well-established industrial process. It involves of course, some hazards, but these have been carefully controlled by established industrial process. It involves, of course, some hazards, but these have been carefully controlled by established operating procedure. The liquefaction process is carried out at comparatively high pressures, but these no longer present any particular difficulty. In the liquefaction system itself, liquid gases at very low temperatures accumulate and the potential pressure hazards must be controlled. Some serious accidents have resulted in the operation of liquefaction equipment as a result of the accumulation of liquefied combustible gases taken in through the air compressor intake. In using this process for the manufacture of nitrogen for use in the direct synthetic ammonia process, particular attention might well be given to this hazard. If this is done and good engineering control is maintained, no difficulty should be expected from the operation of the air liquefaction system.

The production of a hydrogen-nitrogen mixture by burning hydrogen in air is a comparatively simple procedure and probably no analysis of the hazards involved need be made at this time.

The hazards incurred in producing a hydrogen-nitrogen mixture by the third process mentioned will be practically identical to those met with in the water-gas catalytic hydrogen production process and these have been reviewed in the preceding section.

It is believed that for the present, this brief review of the few hazards which present themselves in manufacturing nitrogen for use in the direct synthetic ammonia process will be sufficient for the purposes of the committee.

Part III—Ammonia Synthesis.

In 1913, on starting the plant at Oppau, Germany, for the production of synthetic ammonia, an attempt was made to keep the process very secret. The Germans were quite successful in doing this, but it became apparent that this alone was not enough to prevent other countries from entering into this industry. Further, at the conclusion of the war, this German plant was entered and the equipment and operation studied by several allied commissions. It then became apparent that some other tactics must be used by the Germans in their endeavor to hold this industry within their own country. A vigorous propaganda was started advising of the great dangers attendant with the operation of this process. This propaganda was so successful that even today a great majority of the people hold paramount the thought of these advertised dangers. To date the study made by this committee has found that with reasonable care and precaution, the dangers attendant with this process are no greater, and it might even be said are less, than those attendant with many of the so-called safe industries. It is true that the pressures of from 100 to 900 atmospheres are higher than those which are in general industrial use. It is also true that ordinary steel can not withstand subjection to these pressures at the higher temperatures mentioned. As in the case of any other industry, however, these conditions have been taken care of by working up special materials and special design of equipment.

A person seated or standing at a soda fountain normally feels quite safe, and yet probably directly beneath that person is a cylinder containing gas compressed to a pressure greater than the 100 atmospheres mentioned above. Again, a person will enter a steam electric power house, rest his hand on the casing of the steam turbine or perhaps even lean against it, and feel quite safe, and yet the stresses in this casing and the danger of fracture due to failure of the rotor revolving within this casing at a tremendous peripheral speed are much greater than anything which might be expected from any piece of apparatus in a direct synthetic ammonia plant as operated today.

The committee wishes to leave with you then by this preliminary report the thought that while there are hazards attendant with the operation of

this process, these hazards are not of such great magnitude or even appreciably different from the hazards which attend the operation of many processes of everyday and common knowledge and sight.

A brief review of some of the accidents which have occurred may be enlightening.

The one which perhaps comes to thought first is the great Oppau explosion on September 21, 1921. Even today, there is much publicity given to this explosion in an attempt to prove that the operation of the direct synthetic ammonia process is a hazardous operation. This Oppau explosion, however, indicates quite the reverse and shows the comparative safety of this operation.

Details of the Oppau Explosion in Germany

The committee first wishes it understood that this explosion did not occur in any of the operations of the direct synthetic ammonia process or even in any of the buildings housing the equipment for this process. The explosion did occur in a warehouse housing 4,500 tons of a mixed salt, ammonium sulphate-nitrate. In this explosion, 509 people lost their lives and 1,917 were more or less severely injured. Out of approximately 300 buildings, located within a radius of 1,600 feet, 96 or one-third were as good as completely destroyed; 12, located within 2,000 feet, were half destroyed, and 10, located at a distance of over 2,500 feet, were one-tenth destroyed. Yet the equipment and building housing the direct synthetic ammonia process and located within the 1,600 foot radius, suffered no more than a loosening of a pipe line connection, which permitted the leakage of hydrogen, which caught fire and burned a relatively small hole through the roof of the building. By simply closing a valve, this fire was extinguished and no further damage done. An aerial photograph, taken of this plant shortly after the accident by Underwood & Underwood, shows that boiler and power plants ordinarily considered quite safe and located at equal distances and even greater distances from the source of the explosion than was this synthetic ammonia plant, were completely destroyed. It also shows other chemical operations, ordinarily considered relatively safe operations, as having suffered the same fate as these steam plants.

There are in this country at this time six operating plants producing synthetic ammonia. Without naming the individual plants, we can recite briefly a record of accidents.

In drawing off the ammonia from the gases as they come from the ammonia converter, the gases may be chilled by refrigeration, thus liquifying the ammonia and leaving the uncombined gases still in the gaseous form. It is quite customary then to convey this ammonia, together with the remaining gases, to a container in which the liquid ammonia is tapped off and the remaining gases returned for further treatment. This liquid ammonia is then tapped off for further use, either to be loaded into shipping containers or to be conveyed into some ammonia utilization plant. Due to carelessness, a responsible operator in a small and rather experi-

mental, but at the same time industrial plant, attached a shipping cylinder designed for a working pressure of perhaps 300 pounds to this ammonia catch pot, in order to draw off the ammonia. As operation that night had been interrupted, there was not sufficient ammonia in the catch pot to fill the shipping cylinder, so that instead of closing the valve between this high pressure catch pot and the low pressure cylinder, this operator cracked the valve with the thought that as additional liquid ammonia was produced it would be forced over to the shipping cylinder. The operator did not correctly gauge the discharge of liquid ammonia from the high pressure cylinder, and it was not long before all this liquid ammonia had been forced over and the shipping cylinder then receiving the high pressure gas shattered. The operator was killed by this explosion.

Another small commercial plant which was also quite experimental was attended during starting up with an accident. In this case, a pipe joint sprung a leak, with the result that the leaking hydrogen caught fire and quite severely, but not seriously, burned one of the attendant operators.

Three Accidents in a Plant Recently Started

Still another plant which has lately been started into operation was attended with three accidents. The first one was the case of a laborer leaning against a box car eating his lunch. A switch engine came up to remove the box car, with the result that the laborer was quite severely injured. The second accident was the case of a pulley block falling from a crane and striking a man on the shoulder and injuring him quite severely but not seriously. The third was a case more directly connected with the synthetic ammonia plant. A change was to be made in a pipe line. The construction pipe fitters, coming to the job before the operator had arrived, decided to make the change without waiting for the operator. They found that the line was filled with a gas, mostly hydrogen, and decided to pump the gas out of the pipe line. During this pumping operation, air got into the pipe line and an explosion resulted. A piece of the pipe was blown out and struck a man in the leg, but not seriously injuring him.

At U. S. Nitrate Plant No. 1, a plant erected during the war and which was never an operating success and therefore never produced, a single accident resulted from the various starting up trials. In this plant, the gas mixture was preheated by a fuel fire under a pipe nest through which the gas was conveyed. In order to withstand the 100 atmosphere gas pressure at this temperature, the piping specified was to be of chrome-vanadium steel. A similar sized piping, for use in other parts of the plant where the high temperature was not attendant, was specified to be made of straight carbon steel. Through an error of the workmen, a length of this carbon steel pipe was built into the tube nest which was supposed to be of chrome-vanadium steel. The result was that on attempt at starting up, this carbon steel tube gave way, resulting in a hydrogen

fire, which did some small amount of damage to the building housing the equipment, but caused no personal injury.

Other plants which have started up and which are in operation in this country and also in foreign countries, have been entirely free of accident.

American Society of Safety Engineers—Engineering Section, the National Safety Council

Committee "Synthetic Ammonia"

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CHAIRMAN BECK: We have for our next subject that of "Mast Hoists," and Mr. A. C. Rasmussen, of the Insley Manufacturing Company, will discuss that subject at this time.

PROGRESS REPORT OF COMMITTEE ON ACCIDENTS AROUND MAST HOISTS

The Committee on Mast Hoists has been organized but a short time, so that we have only a brief progress report to submit.

The committee proposes to make a study of accidents around mast hoists and prepare a report on their causes and remedy. That there is need for a study of this nature is evidenced by the character of the accidents which occur around mast hoists and the increased usage of this form of equipment.

By mast hoists in this report is meant the device wherein a single strut or mast is used only to support the pulley, cables, brackets, hoppers and booms used to carry building materials or equipment vertically from different levels. Elevators, hoists in shaftways and derricks are not within the scope of this investigation.

Without, at this time, giving the details of accidents and their causes, the following is a general survey of the proven or suspected causes of accidents around mast hoists:

1. Mast failures. Due to improper foundation, over-load, loads not applied in a manner anticipated in the design.

2. Guy-Cable Failures. Due to breaking of cable, because of: (a) overload, (b) use of deteriorated cable, such as worn elevator cables, (c) accidental (sometimes intentional) damage to cable from contact with cutting materials or tools, (d) excessive wear at connections, due to short bends without thimbles or improper anchorage connections, as brought about by using old cable for lashings on deadmen.

3. Suspension Cable Failures. Due to insufficient allowance of sag considering loads and cable strengths. Also due to lack of proper back anchorages for cables carrying loads in such a manner. This also refers to the improper use of a tightly stretched guy wire for carrying loads as a suspension cable, which usage properly requires more or less sag.

4. Failure of Anchorage. Due to: (a) choosing an insecure anchorage, such as an unsound or slender tree, (b) use of inadequate deadmen.

5. Breaking or losing off of parts of equipment, including buckets, platforms, chutes, booms, etc.

Oftentimes the guy lines or support cables are too vertical, so the stress in each cable may be multiplied by two and even as high as three. This decreases the factor of safety considerably and you can see what just a small overload may do. It often means the snapping of that cable or the pulling loose of the anchorage or some accident like that.

Use of Guys for Carrying Loads an Unsafe Practice

Another source of failure is that the guy lines that are used to support the mast are sometimes used to carry loads vertically. A guy that is pretty tightly stretched for guying purposes is not a fit member to hang any loads from because just as you probably remember when you were kids you used to hang from the old wash line, and if it was stretched pretty tight you could easily break it, whereas if it sagged down it carried you all right and you had a nice swing. So the use of guys for carrying chute loads or counter weights is quite an unsafe practice and the thing to do is to use a separate member, a separate cable for that—one that has enough sag so that the stresses in the cable are not piled up so high.

Then other failures are due to choosing insecure anchorage, such as wrapping it around an old dead tree or possibly a tree that is too small to carry the load.

Another thing is not making the dead men large enough to handle the pull of the guy.

Other accidents are caused by the breaking or losing of parts of the equipment—for instance, rollers on the hoist buckets and possibly a loose tube or something like that on the platform that shakes off as the hoist goes up.

6. Incompetence or carelessness in erection of equipment and in the making of connections.

7. Disarrangement of parts, as in the careless moving of chutes, buckets, causing slippage and sometimes failure at some points.

Because of the limited time since this committee has been organized, it has been difficult to secure accident statistics which can be specifically applied to mast hoists. All possible sources of information have not as yet been reached.

However, the majority of accidents which are known have been due to lack of guard rails on the platform elevators used on such masts, and it is therefore felt that immediate results can be obtained by making recommendations for the use of such appliances. This includes the recommendations that guard rails be used on the receiving hoppers on the masts.

It is the intention of the committee to compile available data relating to use and maintenance of mast hoists from the standpoint of safety and to prepare during the next year a comprehensive report covering this equipment.

W. C. MUEHLSTEIN, Chairman
M. E. ARKILLS
J. E. BUSHNELL
GEOFREY A. CAFFAL
R. M. MCKINLEY
A. C. RASMUSSEN
A. T. SCANNELL
A. J. SMITH

ADJOURNMENT

FRIDAY AFTERNOON SESSION

October 29, 1926

The Friday afternoon meeting convened at 2:15 o'clock, Mr. G. E. Sanford, presiding.

CHAIRMAN SANFORD: Mr. T. W. Mowery, chairman, will present the report of the Committee on Elimination of Harmful Noise.

REPORT OF H. W. MOWERY, CHAIRMAN, COMMITTEE ON THE ELIMINATION OF HARMFUL NOISE

Numerous requests from widely different sources asking for aid of the National Safety Council in reducing excess noises originally directed the interest of the Council to this problem. A committee was apointed to make investigations. Nothing was accomplished by the original committee and after two years it was reorganized.

A preliminary survey by the reorganized committee was formulated into a report presented at the annual meeting of the Congress in 1925 and appears in the Proceedings of the Congress of that year. It appeared that the scope of the subject was so large and assumed such importance that the committee was continued with instructions to make a more thorough study and report at the 1926 Congress.

In planning the work of the committee for the year it was determined that the original name of the committee was misleading. The Council was not interested in elimination of excess noises if such noises were not harmful. We were interested in the reduction of noises that were harmful, and therefore the name of the committee was changed to indicate more clearly its activities. It was further decided that an intensive study should be made to cover various phases of this general subject as related to different phases of human activities.

1. The efforts of civic bodies to reduce what might be termed external or public noises were considered. In New York City some years ago Mrs. Isaac L. Rice organized the Noiseless Society which was instrumental in securing the passage of a number of ordinances in New York resulting in considerable noise reduction, the establishment of noiseless areas around hospitals, etc. A concrete instance of some of Mrs. Rice's observations was the blowing of tugboat whistles in one night to the number of 2,635 screeches.

The experiences of the Joint Committee on Noise Nuisance of the Civic Club of Philadelphia are appended hereto as illustrative of how such an organization may function and what it may accomplish.

2. The noises emanating from the operation of electric surface, subway and elevated cars and suggestions for reduction constituted another

phase. Mr. H. S. Williams, chairman of the Noise Reduction Committee of the American Electric Railway Engineering Association has contributed a report which is appended.

3. Significance of noises in power transmission machinery and their reduction were handled jointly by Mr. W. M. Bertram of the Morse Chain Company and Mr. G. O. Small of the General Electric Company, and their report is appended. It is important to note here that noise in power transmission, except in very few instances, is not merely an objectionable sound, but it is the audible manifestation of incorrect or faulty transmission and indicates inefficient performance and excessive maintenance troubles.

4. The isolation of noise from vibrating machines, etc., or its absorption by the use of sound deadners for wall and floor surfaces and fillers and kindred methods of abating industrial noises have become established businesses with specialists in the various fields. Therefore, the technical features of such work are not considered in this report, but a number of interesting and important cases together with the legal aspects of the noise nuisance are included in appended reports by Mr. S. Rosenzweig and Mr. C. Rosenblatt, consulting engineers, respectively, of New York and Philadelphia. Silencing gas pulsations by repeated reflection or by subdivision is a distinct and important phase of industrial noise reduction and is covered by an appended report from Mr. R. B. Bourne of the Maxim Silencer Co.

Definite Information Upon Harmful Noise

5. The most important feature of this year's study was the growing realization of the paramount importance of obtaining definite information of what constitutes a harmful noise. Unless it could be shown that a noise is harmful to the human system it would be futile to pursue this investigation any further. Accordingly the cooperation of the Bell Telephone laboratories was sought and obtained with the result that Mr. H. Clyde Snook, staff engineer, has summarized in the appended report much of the literature pertaining to the physical and auditory aspects of noise. It is unfortunate that his illness for the past several months has prevented completion of his report. Further research to determine the psychological and physical effects of noise is proposed. The Scientific Departments in Columbia, Northwestern and several other prominent institutions have been interested through the combined efforts of Mr. Snook and Mr. E. E. Free, a prominent consulting engineer of New York City, and it is believed that results may be obtained in this direction that will have an important bearing on the final disposition of this whole question.

The foregoing are the important features of the work of the committee for the year but it would appear that this subject is becoming of increasing importance and interest. In 1889 Joseph A. Guthrie, M.D., Lt. Comdr., M. C., U. S. N., at a meeting of the American Medical Association in Denver presented a paper entitled, "Discordant Sounds a

Menace to Nerves." He made the observation that "Noises create a disturbance of the nervous elements to the degree that they are vouched a place in the category of causations of disease." But his theme was undeveloped and he presented largely his personal observations with a request that his paper be considered "merely as an advance guard for a subject worthy of better forces." Under date of April 15, 1926, he writes, "Noise is a shock to the nervous system. We may become used to it but the mind eventually becomes wasted (by noise) as shown in symptoms of irritability."

In a paper presented August 14, 1912, to the Ninth Otological Congress in Boston, Mr. Edward S. Morse, who has campaigned for many years in an effort to suppress noises, stated that there is no doubt whatever of the disastrous effects of noise on the human system and stated specifically that "The emphatic judgment of our most distinguished men in medical science, S. Weir Mitchell, Jacobi, LeConte, and many others, is that noise affects the nerve centers in a disastrous way; leading to neurosthenia and even to insanity, and often marks the beginning of the end of one balanced between death and recovery."

The perplexing part of this whole problem is that with all the general opinions of medical experts and others assuring us that noise is detrimental to the nervous system, there has been no research definitely to prove or disprove it. Therefore, the further work of the committee should be directed to the seeking of definite information along those lines. If such research can definitely show the destructive effects of noise and confirm medical and judicial opinions, definite recommendations for the suppression of those noises that are shown to be harmful then can be made and enforced.

H. W. Mowery, Chairman
W. M. Bertram
E. W. Gorby
W. V. Lovell
S. Rosenzweig
G. O. Small
H. Clyde Snook
C. Van Horn
E. E. Free
Mrs. Imogen B. Oakley
M. C. Rosenblatt
H. S. William
Leo D. Woedtke

We Do Not Know What Noises Are Harmful

In addition to this formal report, gentlemen, I want to make a few extemporaneous remarks. We are all more or less familiar with boiler shops and the type of men who are working in them, many of whom are suffering from affections of hearing. Many of them are partially

or almost totally deaf. But I couldn't say that working in a boiler shop is harmful because I don't know. No one knows whether those men have had their hearing harmed by working in a boiler shop or whether their hearing was defective before they entered that shop. We don't know whether those men have selected that form of employment because they can do it better and with less trouble than other men whose hearing is more acute.

We are absolutely at a loss to know what noises are harmful. You take the city dweller—when he goes out in the woods, accustomed as he is to the noises of the city, he almost goes wild when he hears the katydids and crickets. The poor farmer boy from the country is just like I was. When I first went to New York City I didn't get a wink of sleep for nearly a week on account of the city noises. Yet we become accustomed to various noises. The human body seems to have a certain reserve vitality or resistance which enables it to accommodate itself to these various noises. So what may be irritating and annoying for a day or two or three days, you become accustomed to. It becomes a habit. Is it harmful or not?

I hope the Executive Committee will consider ways and means of establishing a research fellowship in connection with the further promotion of this work.

The following articles, to which I have referred, were written by members of our committee, dealing with specific phases of the subject under consideration, and are therefore appended to our report.

SOME PHYSICAL AND AUDITORY ASPECTS OF NOISE

H. Clyde Snook

The main object of this report is to discuss briefly some of the results obtained by Bell Telephone laboratories in its studies upon the physics of sound and the science of audition. A brief discussion will be made of various reprints of technical articles by engineers of those laboratories.

Noise is considered by the physicist to be sound or a mixture of sounds to which no definite pitch can be assigned. In general, noise is understood to be sound that lacks agreeable musical quality. Since pitch is the quality whereby it can be designated as having a certain frequency of vibration, pitch is the assignment of the sound to a certain position in an accepted series of sounds constituting a musical scale. Their comparatively even flow, their regularity and repetition of wave form are the things that characterize musical sounds. Noises have an irregularity and an absence of repetition in their wave forms.

It is to be noted, however, that this line of demarcation between musical sound and noise can not be sharply drawn, since very few musical sounds are entirely free from attendant noises that, to some extent, modify their smoothness and regularity; and since also musical sounds can be perceived more or less plainly through some noises.

Those sound disturbances that we characterize as noise are propagated in air at a velocity of about 1,100 feet per second. In general, disturbing noises of modern life have little, if any, variation from this velocity. The velocities of noise in the wooden, masonry and steel structures of buildings are very much higher than the velocity of noise in air. It is well known that the velocity of sound in timber is approximately 13,000 feet per second and in ordinary steel about 17,200 feet per second. The velocities of sound in all building materials and all the materials of machinery construction in general are higher than that of sound in air.

This difference in velocity of sound in materials of construction as compared with air may be considered to have as its principal effect upon noise propagation the influence that it exerts in modifying the noise that is radiated. Mechanical structures put noises into the air in forms that are quite different from the wave energy received by them. The radiating surfaces are almost, without exception, themselves mechanical resonators which modify the original sounds received by them. They thus emphasize the frequencies at which they are capable of resonating.

"Automobile Noise Measurement"

In many instances the original mechanical disturbances may be below audition, as may be the case with an automobile engine or as in the case of street vibrations, or rotating machinery. The vibration energy may be transformed into audible energy by the resonating surface that couples with the atmospheric air merely by shifting the frequency spectrum of the noise to a more audible frequency than that of the original disturbance.

The frequency spectrum of a noise may be determined by analyzing it into its various frequency components and by measuring the amount of energy residing in each of them.

An account of noise detecting and analyzing apparatus is given in a paper entitled "Automobile Noise Measurement" presented before the Society of Automotive Engineers in June, 1925. (Bell Telephone Laboratories Reprint B-140-L.) This paper discusses the mechanism and functions of audition. Also it considers the general origin and detection of automobile noise, its reduction and elimination. On page 25 of this reprint, Figure 15, is an illustration of the frequency spectrum of room noise under certain conditions. This may be considered a somewhat typical frequency spectrum of noise. The paper is largely a resume of a series of papers by other authors whose work is reviewed in this report. The "sensation units" and their relation to audition, as developed by Fletcher, are fundamental to the entire series of technical articles that this report considers.

"The Physical Properties of Speech, Music and Noise," which was presented by Fletcher in a paper before a joint meeting of the New York Electric Society and the New York Telephone Society February, 1924, gives the relation of these things to transmission problems. (Bell Telephone Laboratories Reprint B-94-1.) This paper gives an idea of fre-

quency spectra and the wave forms of speech, music and noise. It also describes some relationships of the auditory function.

"The Loudness of a Sound and Its Physical Stimulus" was given by Steinberg before the American Physical Society in December, 1924. (Bell Telephone Laboratories Reprint B-158-L.) The relationship that the loudness of a sound has to its energy frequency spectrum and to its level above the threshold of hearing is developed in this paper, formulated in an algebraic equation. The weight and root factors W and r, respectively, are discussed as functions of the sensation level, which is synonymous with the term loudness as previously used. There is a discussion of the relations between intensities well within the area of audition, and those near the threshold, to the weight factors. It is shown that as the intensity is increased the weight factors give greater weight to the lower frequencies; hence, even though the amplitude of the sound wave be increased without distortion, the ear will perceive both an increase and distortion. This effect is due to the non-linearity of the ear. This paper shows that the observed values of masking are the resultants of two effects, the change in ear sensitivity and the true sensation masking, that is, the inability to distinguish between sensations that are essentially the same.

"Loudness of a Complex Sound"

"Loudness of a Complex Sound" by Fletcher and Steinberg presented before the American Physical Society in December, 1923, gives the results of the study of two complex sounds. (Bell Telephone Laboratories Reprint B-91-1.) One of the complex sounds had a continuous energy frequency spectrum corresponding to connected speech, the other was a test tone having discrete frequency components. By means of filters the energy was removed from all frequencies either above or below a certain frequency, and the resulting decrease in loudness was measured by attenuating the original sound without distortion until equal in loudness to the filtered sound. This decrease in loudness was found to depend upon the absolute values of the loudness. For a loudness of 22 units above the threshold of hearing, each frequency region contributes to loudness in proportion to the energy in that region weighted according to the threshold energy for that frequency.

For a loudness above 30 units, however, this is no longer true because of the non-linear character of the response. By making certain assumptions, values of the total loudness in agreement with observed values are obtained if proper values are taken for the fractional power, decreasing to one-third as the loudness increases to 100 units.

"Audiometric Measurements and Their Uses" by Fletcher is the title of a talk presented before the College of Physicians and Surgeons in Philadelphia, April, 1923. (Bell Telephone Laboratories Reprint B-79-L.) This paper covers the general subject of the measurement of audition by means of methods developed in the Bell Telephone Laboratories. A discussion is made of the auditory sensation area and its relation to the

threshold of audibility and to the threshold of feeling. The method whereby this area of measured audition has been utilized to make a practical form of audiogram available to otologists is quite fully explained.

"Auditory Masking and Dynamics of the Inner Ear" by Wegel and Lane was presented before the American Physical Society in April, 1923. (Bell Telephone Laboratories Reprint B-58-1.) The phenomena of masking and their relation to the dynamics of the inner ear are discussed in detail in this paper. A clear discussion is made of the vibration of the basilar membrane at different distances from the oval window whereby stimulation of different auditory nerves is produced. This stimulation of different portions of the basilar membrane and different nerves, results in a difference in response or sensation of sound of different tones. The masking effect is shown to depend upon this non-linear response of the ear. The excitation of more than one portion of the basilar membrane by a pure tone results in the production of tone sensation other than the exciting tone. The overlapping of the effects in response by the basilar membrane brings about the masking effect and is clearly shown by diagrams and data.

"The Binaural Location of Complex Sounds"

"The Binaural Location of Complex Sounds" by Hartley and Fry is a paper that was published in the Bell System Technical Journal for November, 1922. (Bell Telephone Laboratories Reprint B-31-1.) This paper endeavors to bring the discussion of complex sounds to a stage similar to that which has been reached by the publications of work on pure tones. The experimental studies carried out by Stewart and his students have related to pure tones and have been published in the physical Review and the Physikalische Zeitschrift during recent years. Hartley and Fry assumed that the location of complex sounds by the binaural effect involves three processes: first, the resolution of the sound into its component tones; second, the independent (generally subconscious) location of each separate component; and third, the formation of a conscious judgment of the position of the source, based on the locations of the individual images. They conclude that subconscious corrections for the coincidences of different images bring about a final result depending very considerably on the psychological processes and individual prejudices of the particular observer.

"Binaural Beats" by Lane presented before the American Physical Society in April, 1925, is a most interesting theoretical and experimental discussion of binaural beats. (Bell Telephone Laboratories Reprint B-155-1.) This paper calls attention to the interesting fact that the introduction of a tone of one frequency into one ear and another tone of a higher frequency into the opposite ear, where the frequency difference is less than 5 or 6 cycles, brings about two kinds of binaural beats. One kind is objective and the other is subjective. Provided there is a sufficient difference in amplitude between the two tones the objective binaural

beat may be heard for most frequency values within the audible range. These beats are heard because the louder tone is conducted through the head to the ear receiving the weaker tone and the two tones are there received with about equal loudness. Subjective binaural beats, on the other hand, are heard for frequencies below 800 or 1,000 cycles when the tones of the two ears have about the same amplitude, differing by not more than 25 TU.

The evidence indicates that these beats are not due to cross-conduction in the head between the ears but are of central origin and are the result of the sense of binaural localization of sound by phase. If the beats are slow (less than one per second) they are generally recognized as alternate left and right localizations, though some observers may report one or more intensity maxima during the beat cycle. Fast beats (more than one per second) are generally recognized as an intensity fluctuation. Even with a constant source of sound rotating around the head of a listener, these fast beats are recognized as fluctuations in intensity, apparently since the sound appears louder when the phase relations are such that it is normally best localized in the position toward which the attention is desired.

"An Electrical Frequency Analyzer"

The actual physical analysis of sounds into their components is accomplished in the Bell Telephone Laboratories by means of various forms of frequency analyzers. One form of these analyzers is described in a paper by Wegel and Moore that was presented before the American Institute of Electrical Engineers in February, 1924, under the title of "An Electrical Frequency Analyzer." (Bell Telephone Laboratories Reprint B-86-1.) This apparatus produces a permanent photographic record of the frequency components of an electric current wave. The device has two frequency ranges; 20 to 1,250, and 80 to 5,000 cycles. The amount of power required as sound input does not, in general, exceed 500 microwatts, and the time for making a record is about five minutes. The mechanism of the analyzer is designed so that, to take a record, after starting the amplifier and connecting the apparatus to a 110-volt power source, it is only necessary to attach the conductors from the sound source to be analyzed and to press the starting button. The completed record is then delivered automatically in about five minutes, after which the apparatus returns to its starting condition ready to repeat the operation.

A paper published in the Bell System Technical Journal during July, 1925, by Fletcher upon "Useful Numerical Constants of Speech and Hearing" gives collected in one paper a large amount of exceedingly useful data. (Bell Telephone Laboratories Reprint B-142-1.) The material given in this paper was prepared in a more condensed form and published in the International Critical Tables. The paper, itself, is not so condensed and in some respects is more useful in the study of speech and hearing.

A paper by Crandall in the Bell System Technical Journal for October, 1925, upon "The Sounds of Speech" gives a graphical study of the vowel sounds statistically and by harmonic analysis. (Bell Telephone Laboratories Reprint B-162-1.) It also gives studies of four semi-vowel sounds and 16 consonant sounds. It is believed that this set of faithful graphical records opens a new prospect in the field of speech investigations.

A paper by Crandall and Sacia "A Dynamical Study of the Vowel Sounds" was published in the Bell System Technical Journal for April, 1924. (Bell Telephone Laboratories Reprint B-68-1.) An analysis of spoken vowel sounds based on accurate oscillographic records obtained without appreciable distortion over the frequency range from 100 to 5,000 cycles, was obtained for 13 vowel sounds. The method of analysis was a photo-mechanical one. With it was obtained the results indicated in a series of graphs.

The amount of power that is found in speech sounds was investigated and described by Sacia in a paper published in the Bell System Technical Journal October, 1925, under the title "Speech Power and Energy." (Bell Telephone Laboratories B-163-1.) The engineer in communication must know not only the average power but the maximum power that is involved in speech sounds in order to provide against load distortion. This investigation deals with the magnitudes and forms of speech waves primarily in terms of power. It is interesting to note that this paper estimates the average power in normal speech to be 7.4 microwatts. It is equally interesting to note that this average power had been previously estimated by Crandall and MacKenzie as 12.5 microwatts. (See Bell System Technical Journal, Vol. 1, No. 1.)

"Physical Criterion for Determining Musical Pitch"

"Physical Criterion for Determining Musical Pitch" by Fletcher is the title of a paper presented before the American Physical Society in April, 1923. (Bell Telephone Laboratories Reprint B-61-1.) This paper gives the results of experiments and studies upon the pitch of musical sounds from the human voice, the piano, the violin, the clarinet and the organ. It was found that only the quality and not the pitch of such musical sounds changes when a group of either the low or high frequency components is eliminated. Even when the fundamental and the first seven overtones were eliminated from the vowel "ah" sung at an ordinary pitch for a baritone, the pitch remained the same. It was found that three consecutive component frequencies were sufficient to give a clear musical tone of definite pitch corresponding to 100 cycles per second, and that, in general, when the adjacent components had a constant frequency difference which was a common factor to all components, a single musical tone of pitch equal to this common frequency difference was obtained. These remarkable results are due to the non-linear response of the ear and the production of the so-called "Subjective Tones." The components that are eliminated from the externally impressed musical tone are again introduced as subjective tones.

Inasmuch as the physician's stethoscope is frequently used to study sounds of machinery, there is included here this reference to the electrical stethoscope. There are three papers relating to auscultation that have been published by engineers of the Bell Telephone Laboratories. They are "The Stetophone and Electrical Stethoscope" by Frederick and Dodge (Bell Telephone Laboratories Reprint B-105-1) and "The Stethophone" by Dodge (Bell Telephone Laboratories Reprint B-105-1), and "Frequency Characteristics of Heart and Lung Sounds" by Cabot and Dodge (Bell Telephone Laboratories Reprint B-133-1.) The electrical stethoscope is a development of the Bell Telephone laboratories through its cooperative research extending over a period of more than seven years with prominent physicians and diagnosticians. Among these are Dr. Richard C. Cabot of Harvard University who is co-author with Mr. H. F. Dodge, a Bell Telephone Laboratories engineer, of the paper on "Frequency Characteristics of Heart and Lung Sounds" that was published in the Journal of the American Medical Association for June 13, 1925.

The electrical stethoscope is particularly well adapted to the detection of faint sounds and their graphical recording by the aid of some form of recording apparatus whether it be a galvanometer or a wax disc cutting apparatus for making phonograph records.

List of Publications Bearing Upon the Subject

The following is a list of Bell Telephone Laboratories publications that are out of print but that have some fundamental bearing upon the subject that is being considered.

Reprint No.	Title	Author
B-8-1	The Frequency-Sensitivity of Normal Ears. Phys. Rev. June, 1922, pp. 553-565.	H. Fletcher
B-11-1	The Nature of Speech and Its Interpretation. Franklin Inst., June, 1922, pp. 729-747.	R. L. Wegel Harvey Fletcher
B-12-1	Physical Examination of Hearing. Nat. Acad., July, 1922, pp. 155-160.	R. L. Wegel
B-14-1	Audiometric Methods and Their Applications. Trilog. Soc., 1922, pp. 98-131.	E. P. Fowler, M.D.
B-19-1	The Relative Sensitivity of the Ear. Phys. Rev., Oct., 1922, pp. 331-348.	R. L. Wegel Donald MacKenzie
B-30-1	Physical Characteristics of Audition. Bell System, Nov. 1922, pp. 56-68.	R. L. Wegel
B-43-1	The Nature of Language. El. Comm., July, 1923, pp. 32-45.	R. L. Jones

All of the matter included in this report thus far relates to work that has been done in the Bell Telephone laboratories. Much valuable work in this field has been done elsewhere, but the writer has made no attempt to include a discussion of it in this report.

There is, however, one notable contribution to the literature of noise

that has come to the writer's attention and upon which it might be well to make a brief comment. "The Overcoming of Distraction and Other Resistances" by John J. B. Morgan is the title of a pamphlet published by Columbia University as one of its contributions to Philosophy and Psychology, Volume XXIV, No. 4, as a part of "Archives of Psychology" by R. S. Woodworth No. 35, February, 1916. Professor Morgan undertook a considerable amount of work in the study of noise and its effect upon the human organism. The pamphlet contains 84 pages and is very interesting because of the relatively large number of people who were studied and because of the interesting ways in which Professor Morgan obtained the reaction of his subjects to noise. The reader is referred to the original pamphlet to obtain an account of the apparatus and methods employed in the experiments.

Professor Morgan's conclusions are briefly summarized by him as follows:

Conclusions After Morgan's Study of Noise

A. As to the Effect of Noises on Activity.

1. The initial effect of noise is to retard the speed of work.

2. After this initial retardation there is an increase in speed. In many cases the subject exceeds the speed he had attained before the introduction of the noises.

3. Extra effort is put forth to overcome the noises. This is shown by an increase in the pressure exerted upon the keys in reacting. This extra effort continues pretty uniformly throughout the noisy period.

4. Articulation is used as a means of overcoming the effect of the noises. This articulation is shown by changes in the breathing of the subject. In some cases this help is not used immediately after the introduction of the noises, showing that it is an adjustment that is more deliberate than the extra expenditure of energy.

5. It is by means of these helps that the subject is able to eliminate the influence of noises from his time score and the extent of the use of these is more a measure of the effect of the noises than is the time record.

B. As to Method.

1. Time measurements serve to indicate facts concerning the laws of mental operation, individual differences and class comparisons, but they do not serve to show whether one condition is better or worse than another.

2. In order to know whether a condition is efficient or not we must have evidence of either the constancy or change in effort. To take for granted that it is constant is to make an unwarranted assumption, and destroys the validity of any conclusions as to efficiency.

3. Tests taken without the knowledge of the subject, but directly connected with the work in hand, give the most promise of success as indexes of change in effort expended.

C. As to Time and Energy Relations.

1. In a test where numerical comparisons were possible it was found that energy changes are much more significant than time changes.

2. A person tends to change the amount of energy expended to meet changing situations, and to keep the time constant regardless of variations in conditions.

3. We offer as a statement of the situation that any real or imagined change in the resistance offered to the maintenance of a set causes a change in the output of energy.

THE CIVIC CLUB OF PHILADELPHIA

Mrs. Isaac L. Rice

The Civic Club of Philadelphia organized a committee to prevent unnecessary noise in 1907, when a petition was received from a group of working women asking for assistance in their effort to stop the shouting and yelling of street vendors and pushcart men. These women complained that their husbands could not sleep on account of the disturbances on the streets. Chickens, geese and turkeys, also disturbers of rest, were removed from a poultry yard by a city inspector on request of the committee. The committee has continued its work and has been the recipient of complaints of all kinds.

In 1908 the ordinance forbidding unnecessary noise near hospitals was passed by Council and superintendents given power to post warning signs on all hospitals.

Work was begun in 1909 on ordinances to regulate the cries of street vendors and newsboys as well as the noises of animals and birds; to remove flat wheels from trolley cars, and stop whistles and bells in the early morning; as well as to license hand organs and street pianos.

In 1910 the Joint Committee on a Safe and Sane Fourth of July was organized in the hope of saving life, reducing accidents, and stopping the deafening racket of explosives, all of which were a part of the nation's birthday celebration. It was discovered that no new ordinances were needed as the Acts of Assembly, if enforced, would remove all these objectionable features. These laws were enforced by one of Philadelphia's mayors in 1881-1882-1883 with success. Philadelphia now has a quiet Fourth of July and an accident of any kind is unusual.

In 1913 an ordinance was passed extending the "Zones of Quiet" to the public schools. Principals were given authority like that of the superintendents of hospitals to post notices on their buildings. Under this ordinance the amount of quiet depends largely on each superintendent. The grinding of brakes and the bumping of trolley cars over crossings was discussed with the superintendent of the Rapid Transit Company.

In 1915 the report of the committee states that over 14,000 complaints were received by the police of unnecessary noises in hospital zones.

In the Annual Report of 1916-1917 there is a note that the Joint Committee on the Noise Nuisance, representing the leading organizations of the city including the Automobile Association, the Hotelkeepers' Association, the Bureau of Health, the Bureau of Police, and the Rapid Transit Company, was called together within the year to consider the advisability of an ordinance to restrict the noise of domestic animals because of the protests of citizens. Such an ordinance, however, was found to be unnecessary as a clause in the housing and sanitation law empowered the Bureau of Health to take action against the owners of unduly vocal roosters, dogs, and other animals.

"Soft Pedal Week," following the annual "Clean-Up Week," was inaugurated by this committee and endorsed by the Bureau of Health. At first there was no noticeable diminution of useless noises during that week but nearly 2,000 suffering persons took courage to send complaints to the Bureau of Health. The Civic Club also was the recipient of many complaints which it passed to the Bureau of Police. The newspapers had editorials on the noise nuisance. Daily items concerning useless noises appeared in many of them and papers throughout the country commented on Philadelphia's "Soft Pedal Week." The educational results of such a week were considered sufficient justification for making an effort to have it an annual event.

During the war the chairman of the committee reported significantly the following:

"War is noise and breeds noise, and during a war no attempt to restrict even the most useless noises of a city could have a hearing. Therefore, the Committee on the Noise Nuisance has no report to make.

"IMOGEN B. OAKLEY."

Annual Reports of the Civic Club

The annual report of the club for 1920-1921 calls attention to the protests that had been received regarding noise from motor trucks, etc. The Joint Committee on the Noise Nuisance was called together. The noises from motor trucks were condemned and it was suggested that such traffic be restricted to certain streets. The Bureau of Police had no authority to keep trucks from any streets without special permission of the legislature. The Chamber of Commerce prepared a bill to provide this necessary power and presented it to the State Legislature at Harrisburg. The committee advised action by all the associations to stop the shouting of street vendors, a nuisance which is forbidden throughout the state by Act of Legislature, which is only tolerated because of ignorance of the law.

In 1922 it is recorded that the committee had secured action by the Health and Police departments against many instances of unnecessary noise. Insistent bells were silenced and the director of the Department of Public Health jokingly complained that his inspectors had been kept so busy looking after the dogs and chickens reported by the Civic Club that they had scarcely any time for other cases. A petition to

Council containing many signatures requested the forbidding of heavy, noisy trucks on Spruce Street during the night. Spruce Street is a strictly residential street and it was felt that noisy night traffic should be diverted to a purely business street. The wholly unnecessary yelling of newsboys on the streets came in for consideration. It was agreed that it would be desirable if newsboys as a class were forbidden to shout their extras especially during the quiet peace of Sunday morning. Philadelphians will remember when bells were removed from street car horses on Sunday. An Act of Legislature forbidding all vendors to call their wares under penalty of revocation of licenses if the law was not obeyed was invoked and numbers of offensive vendors were silenced.

In 1924 the Joint Committee on the Noise Nuisance submitted to the Director of Public Safety, General Butler, a plan embracing six ways by which the committee believed the unnecessary noises of the city could be decreased without detriment to any one person and with a vast increase to the public comfort:

Points in the Plan for Reducing Harmful Noise

First: that heavy traffic shall be diverted from residential streets from 8:00 p. m. to 8:00 a. m., with especial consideration of Spruce and Pine streets, which being so near to Chestnut and Walnut streets are afflicted with their heavy traffic overflow.

Second: that one standardized horn shall be required on every motor vehicle, the siren and klaxon to be put under the ban of the law.

Third: that the law against the use of muffler cut-outs be strictly enforced.

Fourth: that drivers who sound their horns uselessly and continuously between intersection and in traffic jams be subject to arrest and fine.

Fifth: that the law forbidding street vendors to call their wares in any part of this commonwealth be strictly enforced. Hotelkeepers make especial complaint against the cries of newsboys which they report as excessively annoying to their guests.

Sixth: the Joint Committee on the Noise Nuisance believes that to add a gong to the proposed traffic control semaphore system would be a useless increase to the already large number of gongs which perplex and bewilder the pedestrian.

In 1926 the protests of the hospitals of the city against unnecessary honking of automobiles caught in jams, etc., together with open muffler cut-outs, etc., claiming that such noises prevented the rest and quiet so necessary in hospitals, and retarded convalescence, brought about action by the committee in the way of representations to Mr. Elliott, the Director of Public Safety, who reported that he had taken steps to reduce this nuisance.

The work of the Civic Club of Philadelphia in endeavoring to lessen the distracting noises in a great city has attracted nation-wide attention, and recently a letter was received from Berkeley, Calif., suggesting that the less noise week be made a national affair.

NOISE REDUCTION BY THE ELECTRIC RAILWAYS

H. S. Williams

Reporting the progress of the noise reduction campaign of the electric railways, the American Electric Railway Engineering Association appointed two committees in 1925 to study and report on the reduction of noise incident to street car operation, one committee represented the rolling stock section while the other represented the tracks section. The reports of these committees will be found in the Proceedings of the A.E.R. Engineering Association, for 1925, on pages 64 and 320.

Briefly summarized the causes of noise were shown to be as follows:

1. Track noise, caused by wheel impact and influenced by:
   - (a) Degree of track maintenance.
   - (b) Type of track and pavement construction.
   - (c) Special work (switches, crossings, etc.)
   - (d) Imperfect rail joints.
   - (e) Broken rails.
   - (f) Corrugated rail.
   - (g) Sand and other foreign matter on rail.
   - (h) Rails loose on ties.
   - (i) Squealing of car wheels on curves.

2. Wheel noise, due to impact with rail and with the following factors influencing the sound:
   - (a) Size and weight of wheel.
   - (b) Material and design of wheel.
   - (c) Condition of wheel as regards maintenance.
   - (d) Flat wheels.
   - (e) Resonant quality.

3. Truck noise due to the following:
   - (a) Weight of truck.
   - (b) Design of truck.
   - (c) State of maintenance, chiefly worn and loose parts.
   - (d) Unsprung weight.

4. Brakes, noise produced because of:
   - (a) Design of brake rigging.
   - (b) Condition of maintenance.
   - (c) Air compressor.
   - (d) Condition of maintenance, loose and worn parts.
   - (e) Brake shoes (design and hardness).

5. Gearing, as influenced by:
   - (a) Design and type of teeth.
   - (b) Resonant quality of gear.
   - (c) State of maintenance, including condition of axle bearings.
   - (d) Lubrication.
   - (e) Muffling action of gear case.

6. Motor noise, caused by:
   (a) Brushes on commutator.
   (b) Motor weight.
   (c) Motor suspension.
   (d) Condition of maintenance.
   (e) Armature unbalance.
   (f) Unsprung weight.

7. Body and Miscellaneous Parts as caused by:
   (a) Weight.
   (b) Design as influencing sounding board effect, sound reflection and sound conduction.
   (c) Door operating mechanism.
   (d) State of repair.
   (e) Window rattle.
   (f) Trolley noise.

All of the above points were discussed in detail and remedies suggested which would tend to cure the trouble. The remedies can be grouped under five general headings as follows:

1. Adoption of higher standards of construction.
2. Adoption of higher standards of maintenance.
3. Improved design.
4. Cushioning.
5. Reduction of unsprung weight.

Two Major Problems in Noise Reduction on Railways

From this it will be seen that there are two problems, one concerning maintenance and the other dealing with design. Much can be accomplished in noise reduction by the enforcing of higher standards of maintenance. Also in the course of maintenance, chiefly at periods of heavy overhauling, minor construction changes may be effected. But the most important factors can be taken care of only when new equipment is being built as this embodies radical departures in design.

In 1926 the A.E.R.E.A. combined the work of the committees into a single unit. The work of this committee has just been completed for the year and its report was submitted to the annual meeting of the association in October, 1926. The work of the committee for this year has taken on the nature of a scientific measure of noise volume by means of radio amplification apparatus. The underlying thought being to test various elements of car and track structure to determine the best construction from a noise standpoint and thus be able to recommend to the industry definite items to improve the quietness of operation.

It is expected that this work will be continued for several years as the subject is a very live one with the electric railways and very great improvement can be expected in street car noises.

NOISE REDUCTION IN POWER TRANSMISSION

G. O. Small and W. M. Bertram

The elimination of noise in power transmission has perhaps been developed further, although perhaps unconsciously, than in many other lines utilizing power.

In the very early days of the use of power in industry, the flow of water was utilized to produce this power; a wheel of some sort being turned by the force of the falling water, and from the shaft on this wheel a belt was used to transmit the power to the machine requiring its use.

The belt has taken many forms; various kinds of rope drive as well as round and flat leather, fabric and rubberized fabric having been used. All of these when run at moderate speed are very quiet in operation. It is only with the advent of greater power and high speeds which have developed in comparatively recent years that these means of transmission have become inadequate.

With the increasing problems in power transmission, due to the above causes, various expedients have been tried to cut down the noise due to high speed and heavy load. Of course the great outstanding advancement in the transmission of power has been in the employment of electricity and the consequent elimination of mechanical means of transmission. In many cases, however, it is still necessary, on account of installation cost or other potent factors, to maintain the mechanical transmission. The flexible belt of leather or fabric is still used successfully, even with its limitation, to transmit power quietly. The limitations of belting, however, are many, and when excessive speeds are encountered, there is the tendency to slip which is hard to overcome, and when great power is to be transmitted it necessitates excessive width or undue thickness, either of which results in serious faults tending to discount their use.

It has been necessary, therefore, in many cases to utilize some other means of mechanical transmission. The two most familiar are gearing and the silent metal chain. Where the distance from center to center of shafting is comparatively small, gearing has been used very extensively. Where the source of power to be applied to a machine must be at some distance and where this distance may vary from one machine to another, the use of the silent metal chain is a very common means of silent power transmission.

In the use of gearing for power transmission a tremendous growth has occurred tending to a greater efficiency and quieter operation. The first gears used for power transmission were simply pegs of metal or wood inserted in a wheel rim engaging similar projections on the wheel to be driven.

Even today in many of the water-wheel drives used for power we find bevel gearing transmitting power from the vertical water-wheel turbine

shaft to the horizontal shaft for the power transmission. This bevel gearing had, in the past, in many cases cast teeth. Such teeth are never accurate and while strong enough they can not be made to run quietly. As an improvement in the use of bevel gears with cast teeth, there has been made a combination consisting of a cast tooth gear on a driven shaft and a wooden insert tooth on the driving shaft. This combination runs with a fair measure of quietness considering the comparatively low speed at which it operates. Such devices, however, are entirely inadequate to take care of the large power units and the high speeds that are encountered today in transmitting power.

It has consequently become necessary to develop a type of gear that would present the strength required and would have a material in its construction that would either eliminate or greatly minimize the noise produced by the rapid meshing of the gear teeth. The first of these materials used successfully was rawhide and this is used today to a great extent; this use being not only in power transmission but in machines themselves where motion is to be transmitted from one part of the machine to another. This material is easily available and within its limitations is very successful. On account of these limitations, however, in many cases it has been necessary to utilize some other material. Consequently, material made from vegetable fibers, especially cotton, either in the form of a fabric or pressed direct from cotton batting has been used with great success. This gearing is used for transmission of power in quantities varying from a fraction of a horsepower to several hundred horsepower. With accurately cut teeth and proper meshing, some types of these non-metallic gears have run successfully at a pitch line velocity of 5,000 feet per minute and without any undue noise.

Vibration Is Often Cause for Much Annoyance

Although progress has been made in the elimination of noise in power transmission, there still remains much missionary work to be done along this line. The fact should be stressed that noise in power transmission, except in relatively few instances, is not merely objectionable sound, but is the audible manifestation of incorrect or faulty transmission.

It is most often due to vibration, the destructive effects of which are well known. There are few noisy transmissions that could not be made quiet, and the elimination or reduction of noise would be but a minor one of the benefits obtained. The various parts of the transmission would have longer life, less repairs would be needed, efficiency would be higher, and in many cases less power required.

This committee is considering the elimination of harmful noise, and it can be shown that most noise in transmission is harmful economically as well as psychologically. The physical results of noise and their cost in dollars and cents for maintenance and upkeep, etc., may have a more definite appeal than the value of the effect of noise elimination as shown by better working conditions and increased efficiency of workers.

Many instances might be given illustrating these points. A rough

cast gear, operating at low speeds may show the effects of its vibration not only in the machine, but all through a train of gearing, and cause trouble which will appear not where it originates in the rough gears, but at some other point which may not in itself be at fault. Too high speed in motors without properly designed gearing will often show up not only in rapid gear wear, but in the breakdown of motor insulation. The vibration of metallic gears may affect the work done where accuracy is important. The use of more flexible connections, such as silent chains or non-metallic gearing, would eliminate such difficulty. Instances may be shown of reversing drives with leather belts where change in size of pulleys and belt width and thickness has done away with sqealing, and shown much longer belt life. As stated above, in all of such cases, the elimination of noise is but the minor benefit.

VIBRATING A COMMUNITY IS A NUISANCE ACCORDING TO IMPORTANT COURT DECISION

S. Rosenzweig

The operation of machinery invariably causes vibrations. Quite frequently they may not be felt in the immediate neighborhood of such machines but appear some distance away in an amplified intensity. When they cause disturbances of such a nature as to materially interfere with the operation of a neighboring plant or to become so annoying that they constitute a nuisance, an action to enjoin the use of the offending machinery may be started and, according to a recent court decision, carried through successfully.

Such a case is discussed by Leslie Childs in the *American Machinist* (New York) from which the following quotations are taken:

"As an example of judicial reasoning on this subject, a recent New Jersey case is well worth a brief review. The plaintiff was engaged in the manufacture of chlorin gas distributing machines, meters, gages, and other scientific devices. He also conducted an experimental laboratory in which delicately adjusted appliances were used, and a drafting room for the drawing of plans incident to his business.

"The plaintiff's plant was located in a factory district about 250 feet from the plant of the defendant. The latter, it appears, operated a high-speed uniflow engine and generator to generate electric power for his plant, which, owing to vibration, seriously interfered with the complainant's business. This vibration, the evidence showed, shook the walls of the plaintiff's mill in such a manner as to affect noticeably the entire building, and thus hampered the department heads and their assistants in their work. In this situation the plaintiff sought to enjoin the defendant from the operation of his generator.

"The defendant, among other things, took the position that the plaintiff had no right to attempt to carry on his business, in view of its character, in a factory district; and that if he attempted to operate in a factory district, he should assume all risk of disturbance."

When the decision was rendered, against the defendant, he appealed to a higher court which, in granting the injunction, also decided in favor of the plaintiff and after a review of the evidence, in part, said:

"The law guards jealously, for all alike, the enjoyment of all private property. The right of enjoyment is surrendered in a factory district only to the extent of the inconvenience incident to the character of the business carried on there, no more.

"The ceaseless pounding of the vibrations from the defendant's engine against the walls of the plaintiff's mill is not incident to the neighborhood. The same annoyance would happen, under the same conditions, if both factories were on a farm. It was not a neighborhood hazard to be anticipated, and is not one to be suffered. Community vibrations must be endured, but vibrating a community is a nuisance."

The lesson to be learned from this case is important and can not be too forcibly impressed upon those executives who are responsible for the installation of machinery. Wherever the health, efficiency and comfort of people may be impaired by the vibrations and noise resulting from the operation of high-powered machinery, satisfactory insurance against such an occurrence must be provided, particularly in buildings in which industrial and commercial enterprises are carried on.

Vibrations May Often Be Carried Long Distances

It is natural that more care has to be exercised when such machinery is operated in crowded and residential districts than in isolated plants. However, it is surprising to the uninitiated how far vibrations may be carried, due either to the construction of buildings in steel and concrete, or on account of the character of the soil upon which the foundations are built. This is especially true of machines of high rotative speeds, as steam turbines; of reciprocating action, as steam and internal combustion engines, or of heavily vibrating character as coal pulverizers, stamping presses and forging hammers.

The suitable isolation of machinery to prevent the transmission of disturbing noises and vibrations, is not a matter of experiments and hit-and-miss methods. We know how it can be accomplished and how satisfactory and far-reaching results can be obtained.

Thousands of successful installations justify this statement. The largest public utility corporations in this country and abroad have taken advantage of these modern methods for the isolation of steam turbines, motor generators, rotary converters, transformers, coal pulverizers, etc., while commercial enterprises and industial concerns have applied them to all types of machinery such as printing presses, dough mixers, pumps, compressors, fans and many others.

The correct application and disposition of these methods to eliminate the transmission of vibrations is plainly the work of specialists and experts in this branch of engineering. In many cases a careful study and survey covering operating conditions of the machinery equipment and construction of building foundations are required. Sensitive and

accurate instruments are available which allow us to determine the character and intensity of vibrations.

The cost of such work and the application of the most suitable equipment is insignificant when compared with the complete cost of the machinery to be installed. If it serves no other purpose it may be considered the best and cheapest insurance against the possible damage caused by vibrations. How important such insurance is, is clearly exemplified by the court decision cited above.

SOME IMPORTANT CASES OF NOISE ELIMINATION WITH LEGAL ASPECTS

M. C. Rosenblatt

Certain instances of mitigation of disturbing noises encountered over a period of several years, some of which contained important legal consideration, are of interest. Considerable money was spent in these several cases to provide barriers against noises flowing to the ears of disturbed neighbors, and since we seem to be prone today to measure in the dollars and cents standard, it may be a useful idea to measure the amount of harm done by distracting and disturbing noises by means of the amount of money spent to ameliorate it.

Further, because in most of these instances were matters appearing in one judicial court or another, the increasing stress laid upon noise nuisance by the courts becomes important. Some years ago, lawyers to win against a claim needed only to set up the defense that the noise was a part of the very industrial processes and that the industry was a necessary part of the community and therefore the noise had to be tolerated as a necessary evil. Today, the lawyer knows that he can not get away with this sort of defense and he finds that the court will not listen but will insist that excess noise is a nuisance and if complaints are made, the noise must be abated.

Several years ago, a large transportation company was hailed into court by neighbors to one of its electric charging plants which operated through the night to prepare their electric trucks for the day's work. The court directed the company to remedy the nuisance, and although this company showed that it would cost over $75,000 to remove the machines and place them elsewhere, the court ordered the company to abate the nuisance by a certain date or be prepared to be held in contempt. This order was in the face of expert testimony by sound and vibration experts that the disturbance was not of a great order. However, testimony by neighbors was taken by the court to refute the experts and the court directed as above.

Night and day work was rushed to isolate the machines before the day of answer to the court. A sound proof enclosure was constructed around the equipment properly prepared for ventilation and removal of machines if necessary, and when finished, no sound could be heard

10 feet away from the enclosure on any side. During the trial, testimony was given to the effect that a woman residing about 150 feet away from the plant was thrown out of bed with resulting injury to her spine due to the vibration. This testimony of course was positively ridiculous, but how could it be refuted. After the work was finished, arrangements were made so that the two judges of the court were present at a test made at 2:00 a. m. The transportation company then wrote as follows: "The sound proof enclosure recently installed has proven entirely satisfactory for the isolation of noise produced by the motor generator sets and I wish to thank you for the very efficient manner and dispatch with which this work was accomplished before the date specified by the court."

One of the largest ice cream manufacturers was accustomed to begin loading and iceing their trucks at 3:00 a. m., in consequence of which neighbors for a distance of three city blocks complained that their sleep was greatly disturbed. These people went into court and got an injunction which ordered the manufacturer to desist from loading until 6:00 a. m., which brought a great hardship upon him. This condition was remedied by the special construction of sound proof enclosures around all of the noisy equipment, such as ice crushers, conveyors and chutes. The neighbors finally agreed that they were no longer disturbed. The cost of this installation, which was quite extensive, was $4,600.

Examples of Harmful Noise Elimination

In another instance an ink manufacturer found that he could better afford to run his equipment continuously without shutting down than to clean the equipment so as to prevent the drying of the ink upon parts of the mechanism. By running during the night the neighbors were disturbed and so expensive were the means necessary to reduce the noise that the manufacturer decided to move his plant to an isolated part of the city rather than risk probable adverse court decision and, possibly, heavy damages.

A fabricator of structural steel was about to install one of the largest metal cutting saws ever built. It would run at high speed. His engineers warned him that the noise was terrific and was disturbing at a distance of over 1,000 feet. A sound suppression housing was built by specialists around this saw at the time it was erected to forestall any complaints from neighboring property owners, and was entirely successful.

Probably one of the most interesting installations was where employees in a factory refused to work in one part of the building, complaining that the noise of an elevator driving apparatus caused headaches, nervousness and other distress. The erection of a sound proof housing around this machinery was difficult because of restrictions by the elevator inspectors and the need for ventilation, which was accomplished in a novel engineering manner. The installation, costing $440, was successful and the machinery absolutely sound proofed.

CHAIRMAN SANFORD: I have an acquaintance who has been in the drop forge business for upwards of 40 years. He is now the superintendent of that department. He is deaf in the ordinary sense of the word. If he were here today he would have to sit in the front row and probably cup both hands back of his ears to get what the speaker was saying. He will get that same distance from a man in a drop forge shop and carry on a conversation in an ordinary tone of voice. He seems to need the continual din of those machines to so tune his ear drums that he can hear properly.

If there are no other remarks we will pass on to the next subject which is the report of the Committee on Annealing Chains by Mr. R. F. Thalner.

REPORT OF COMMITTEE ON ANNEALING CHAINS

MR. THALNER: There was an announcement made in one of the sections that at this time the subject of annealing chains would be thoroughly discussed; unfortunately that announcement was made in error because this is merely a progress report of a committee which has been appointed to go into the question of whether or not some reseach should be conducted to determine the best methods of annealing hoisting chains. We all know that there are many methods now in use. One man will heat his chains into a certain temperature and have a certain method of cooling. Another man will heat his chains to a different temperature and have a still different method of cooling, with the result that none is sure he is annealing chains in the best possible manner.

This committee has been in conference with two universities and it has been discovered that we can have the necessary laboratory work done at very little cost. We have tentatively engaged a man to do the work. He is now preparing a suggested plan of action, and after it has been approved by your committee, we will ask various members of the council to contribute to a fund which will be used to defray the nominal expense.

Several chain manufacturers have signified their willingness to cooperate with us to the extent of supplying the chains that will be needed, so it should not be long before we start active work. At present this undertaking is under the direction of a small steering committee including Messrs. E. F. Blank, W. Dean Keefer, and myself. This committee is being enlarged to include more of our own members as well as representatives from other organizations.

CHAIRMAN SANFORD: At this time, I would like to ask Mr. R. C. Stratton, vice chairman of the Section, to take the chair. Before retiring, however, I wish to thank the Section and the officers for the very strong support that they have given me during the past year and I trust that you will continue to support the incoming officers as well as you have those of the past.

CHAIRMAN STRATTON: The next paper is the report of the committee on Steam Engine Break Downs, which will be presented by Mr. Daniel L. Royer, chairman.

REPORT OF DANIEL L. ROYER, CHAIRMAN, COMMITTEE ON METHODS OF PREVENTING STEAM ENGINE BREAKDOWNS

The causes of steam engine breakdowns have been classified from several viewpoints. The statistical system developed by Insurance Companies lists engine breakdowns by recording the initial broken part and the cause of failure under the headings which follow:

Initial Broken Part

1. Cylinder and piston (including steam chest, combustion chamber of internal combustion engine, piston rings, etc.).
2. Mechanism by which power is transmitted from piston to shaft (including piston-rod, cross-head, connecting rod, crank, bearings, other than main bearings, and other related parts).
3. Shaft.
4. Main bearings.
5. Valve gear, including eccentric rod and all other parts of valve mechanism.
6. Governor parts.
7. Bedplate and frame, including outboard-bearing pedestal.
8. Wheels, pulleys, etc., mounted on main shaft.
9. Undetermined.
10. Miscellaneous, N. O. C.

Cause of Failure

1. Defective material, workmanship or design.
2. Deterioration.
3. External violence.
4. Foreign objects in cylinders.
5. Loosening of nuts or other fastenings.
6. Lubrication, failure of
7. Misalignment.
8. Overheating.
9. Overspeed.
10. Sudden overload or sudden stoppage or sudden loss of load.
11. Pre-Ignition.
12. Settlement of engine or its foundation.
13. Water or other liquid in steam or power cylinder.
14. Undetermined.
15. Miscellaneous, N. O. C.

From the standpoint of the engine builder rather than the insurance statistician, engine failures have been classified as follows:

1. Water in the cylinders.
2. Fatigue of material.
3. Defective material.
4. Failure of safety device. (The above classifications were given by Mr. I. H. Reynolds, manager of the Engine Department of the Allis Chalmers Manufacturing Company to which has been added—)
5. Loose or deranged parts.
6. External violence.
7. Improper care and management, including failure to provide lubrication.

The following analysis of these causes is of interest:

WATER IN CYLINDERS—Preventing water from entering cylinders involves the original plant layout, boiler operation, and engine operation. If the plant is properly designed and operated, no trouble will develop from water in cylinders.

FATIGUE OF MATERIAL—The prevention of this form of deterioration involves original design which will minimize the possibility of fatigue and care and management in maintaining proper alignment.

DEFECTIVE MATERIAL—To minimize the hazard inherent in defective material, inspection and rejection of defective materials at the plant of the manufacturer and subsequent inspection during the life of the unit are necessary.

FAILURE OF SAFETY DEVICE—This accident cause might be assigned to improper care and management, providing the safety device was correctly designed originally.

LOOSE OR DERANGED PARTS—This might be treated under the heading of improper care and management because parts are not permitted to become loose in a properly maintained engine.

EXTERNAL VIOLENCE—This is still another cause of accidents which might be listed under improper care and management.

Safe Practices Pamphlets on Engine Breakdowns

It is evident that the fly wheel of an engine is a part of the engine. Furthermore, fly wheel failures cause many serious engine breakdowns involving loss of life and extensive property damage. However, this committee has not considered fly wheel failures because it is understood that the Council has assigned this investigation to the Committee on Rotary Stresses.

The committee feels that the subject of preventing engine breakdowns has already received careful and satisfactory treatment in the following:

1. Safe Practices Pamphlet No. 9, entitled, "Engine Guarding and Engine Stops" issued by the National Safety Council.
2. The Operating Code Manual formulated by the Prime Movers Committee of the National Electric Light Association.
3. The many papers covering the field of engine and wheel design prepared by members of the American Society of Mechanical Engineers and published by that organization.

4. The report of the Committee on Rotary Stresses which, it is presumed, will cover the safe speed of the various types of wheels and operating features involving wheel safety.

For the information of those who are not familiar with the Operating Code Manual of the Prime Movers Committee of the National Electric Light Association, we quote the following rules covering the starting and stopping of reciprocating engines.

Corliss Engines

STARTING

1. Notify switchboard operator that machine is ready to be warmed up.
2. After receiving affirmative reply, see that all drains from the cylinder are open.
3. See that the drain and trap above the trottle valve are open.
4. See that the main exhaust valve is open.
5. If a compound engine, see that the receiver is drained.
6. See that the wrist plate is unlatched from the eccentric rod hook.
7. See that oil is running to the bearings of the engine.
8. See that the crank and cross head pit drains are open and free.
9. See that the cranks, cross heads, and other movable parts are not obstructed by any foreign material.
10. See that the wrist pins, crankpins, eccentric straps and wrist plate pins are tight.
11. See that the valve gear nuts, etc., are tight.
12. See that the crank is in such a position that the engine will start readily.
13. See that the governor belt, when used, is in good condition and free from oil.
14. Examine all gauges.
15. Oil the governor spindle and see that the dash pot has the necessary amount of oil.
16. Start the circulating, air and hotwell pumps, and get partial vacuum in the condenser.

Note: Regulate hotwell pump so that proper water level is maintained above pump suction.

17. See that the governor is hooked up on a safety pin.
18. Place the bar in the wrist plate of the engine.
19. Open the by-pass valve, or crack the throttle, admitting steam alternately to each end of the cylinder, warming it up and getting all the water out of the valve chest and cylinder.

Note: Shifting of valve gear to permit steam to enter alternate ends of cylinder shall be done with throttle or by-pass valve closed, due to the wear and tear on the crank pins and boxes when this operation is performed under steam pressure.

20. Open the throttle valve further until the engine revolves slowly, then engage the wrist plate with the eccentric rod hook.
21. See that the lubricator and oiling system are in operation.

22. Notify the switchboard operator that the machine is ready for operating speed.

23. After receiving affirmative reply, open throttle slowly and close the by-pass valve, noting that the engine comes up to proper speed.

24. See that the safety pin of the governor is in a correct position to operate, should the governor belt break.

25. Close the drains.

26. Signal "Load" to the switchboard operator.

27. As the load comes on, bring the vacuum up to normal.

SHUTTING DOWN

1. After receiving the signal "Stand By" from the switchboard operator, answer it.

2. After receiving and answering the signal "Stop" from the switchboard operator, close the throttle slowly until the engine comes almost, but not quite, to a stop.

3. Reverse the safety pin of the governor so that the governor will not drop to the lowest point.

4. Place the bar in the wrist plate.

5. Disconnect the wrist plate from the accentric rod.

6. Operate the wrist plate by hand with the bar so that the engine will stop with the crank in starting position.

7. Move the wrist plate to a central position so that the exhaust valves are closed.

8. If the engine has a double eccentric, trip the steam valves by hand when the wrist plate is in a central position so that the steam valves may be closed and lapped.

Note: A test should be made periodically by leaving the governor safety pin in the running position when shutting the throttle valve, to see that the safety device is in working order.

9. Shut down the circulating, air and hotwell pumps.

Note: If jet condenser is used close off injection water just before closing throttle valve and allow air or wet vacuum pump to run until engine stops, thus obviating, to some extent, the possibility of water being forced by atmospheric pressure through air or wet vacuum pump into low pressure cylinder in the event of displaced or defective valves in the pump.

10. Shut off the oiling system.

11. Open the drains.

The Human Element Is Usually Responsible

It has been the experience of manufacturers engaged in building high class engines and of the Companies insuring engines against their breakdown that the standard engines on the market are properly designed, and when installed in an approved manner and operated under loads for which they are designed will become obsolete before they wear out or break down.

The human element, not the engine, is the big accident maker.

The subject of the practical operation of steam engines has been covered by many qualified authorities whose works have been produced throughout the history of engine manufacture. The opinions of these authorities are well known to all qualified stationary engineers—and under the licensing provisions enforced in many of our states and cities, it is practically impossible for an incompetent person to obtain the authority to operate a steam engine. It would appear, therefore, that the selection of the men to operate steam engines is of prime importance in preventing engine accidents. This, of course, is a matter for each individual plant manager to consider.

The committee believes that the danger of employing incompetent men in the engine room should be stressed if engine accidents are to be reduced.

It is also thought that it may be desirable for the Committee on the Prevention of Engine Accidents and the Committee on Rotary Stresses to make the revisions to the Safe Practices Pamphlet No. 9 necessary to bring this work up to date.

DANIEL L. ROYER, CHAIRMAN
A. E. BULLEN
G. H. BARTHOLOMEW
MAX RUESS
I. H. REYNOLDS
J. P. H. DE WINDT
H. J. VANDER EB
B. H. ROMALY

CHAIRMAN STRATTON: We will now proceed then to the fourth and last paper on this afternoon's program, "Rotary Stresses." I would like to introduce Mr. S. V. James of the Underwriters' Laboratories who is chairman of this committee.

MR. JAMES: The Committee on Rotary Stresses has prepared a brief report, the main purpose of which is to summarize the situation to date. It does not include any mathematical or engineering discussion of details but attempts to classify the various types of machine parts in which the rotary stresses are of great importance and likely to lead to accident if not properly considered. It points out briefly typical references to sources of information already available in the engineering literature in which the specific problems of these various classes of parts have been very fully dealt with.

REPORT OF SYDNEY V. JAMES, CHAIRMAN, COMMITTEE ON ROTARY STRESSES

The Committee on Rotary Stresses of the A.S.S.E.—Engineering Section considers its immediate problem to be a review of the status of the design of machinery having rotating parts, such as flywheels, pulleys, turbine discs, rotating members of electrical machines, etc., to determine whether or not there exists an adequate basis for the safe design of such parts.

This scope is an extension of that which guided the former committee, the work of which resulted in a report entitled "Flywheel Explosions and Their Prevention," presented to the Engineering Section at the eleventh Safety Congress by Elmer B. Tolsted. Mr. Tolsted's report outlined very clearly the important items in flywheel design and discussed the various types of flywheel construction commonly employed. It included formulae for computation of these wheels and concluded with a consideration of the causes of flywheel accidents with their remedies. The present committee, therefore, has extended its consideration of the problem to include other equipment which must be designed safely to withstand stresses resulting from rotation.

Machine Parts That Require Particular Care

Certain machine parts require particular care in design and construction on account of rotary stresses. Practically all such parts come within the following classes:

(a) Flywheels, rotating parts for electrical machinery, and pulleys.
(b) Turbine discs.
(c) Centrifugal pumps.
(d) Centrifugal extractors.
(e) Shafting.

Flywheels and pulleys have been very frequently discussed in the technical press. Reference has already been made to the report of the previous Committee on Rotary Stresses by Mr. Tolsted. In an article by William H. Boehm, entitled "Flywheel Explosions," which appeared in the June, 1905, number of *Insurance Engineering*, a very complete account of flywheel accidents and their causes was given and various types of flywheel construction critically compared. A pamphlet published as Machinery Reference Series No. 40—"Flywheels," covers this subject thoroughly. Mention should also be made of Safe Practices Pamphlet No. 9 of the National Safety Council, entitled "Engine Guarding and Engine Stops," in which flywheel design and the causes and remedies of dangerous conditions are adequately reviewed. The National Safety Council library includes a bibliography of flywheels and pulleys which covers not only reference books, but also periodicals.

Reference should be made to Kent's Mechanical Engineer's Handbook, 10th edition, pages 1678 to 1688, on Flywheels. In an article entitled "The Strength and Proportion of Wheels, Wheel Centers, and Hubs," by R. Eksergian, A.S.M.E. Transactions, Vol. 46 (1924), pages 929 to 980, is a complete review of the present-day design methods employed for proportioning flywheels, locomotive drive wheels, rotating field members for electrical machiery, and other machine parts closely allied to the foregoing.

It is believed that the references given will indicate that there is already available a suitable basis for the design and construction of flywheels, rotating members of electrical machines, and pulleys and that causes of accidents and their remedies have been thoroughly recorded.

The second class, turbine discs, involves a more difficult problem which has, nevertheless, been made a matter of record insofar as design and construction are concerned. Reference is made to Kent's Mechanical Engineer's Handbook, 10th edition, pages 1110 and following, in which a detailed review is given of the methods of computing turbine discs. In Kent's discussion, reference is also made to many other sources of information, and it will be seen that reliable information on this subject is now on record available for designers. Closely allied to this matter is the question of stresses in turbine discs due to vibration. A very illuminating article, entitled "The Protection of Steam Turbine Disc Wheels from Axial Vibration," by Wilfred Campbell, appeared in A.S.M.E. Transactions, Vol. 46 (1924), and described at length the elaborate experiments made by the General Electric Company in the determination of the causes, effects, and control of turbine disc vibration. A satisfactory solution of this difficult problem was obtained.

Closely allied to the subject of turbine discs is the design of centrifugal pump impellers and the revolving members of centrifugal extractors. A very complete reference on this subject is the book entitled "Centrifugal Pumps" by Loewenstein and Crissey. Pages 167 and following give a detailed study of impellers including stress computations, and pages 191 and following give a discussion of critical speeds.

The Design of Shafting Presents Many Problems

The design of shafting presents a number of problems which also have been quite well covered by previous investigation and study. An adequate basis of the design for line shafting including the loads and stresses imposed by the weight and belt pull of pulleys is a matter of record and may be found in any standard information handbook, such as Kent's Mechanical Engineer's Handbook and others. The question of critical speed of shafting is also a matter of record in such handbooks and also in the publication above mentioned, "Centrifugal Pumps" by Loewenstein and Crissey, pages 171 and following, in which are given a detailed study of the critical speed of shafts and the design of typical shaft construction to resist the stresses involved. This subject is also critically reviewed in an article entitled "The Calculations of Critical Speed" by K. Baumann in the Proceedings of the Institution of Electrical Engineers (London) 1912. In this publication, a detailed comparison of various rules for calculation of shafting is given and a convenient method of design recommended. Other references might be included but the foregoing are typical and indicate that the subject is covered adequately.

A classification not included in the foregoing covers the stresses due to gyroscopic forces which come in play when the plane of rotation of a flywheel or other rotating body is changed. These stresses are of considerable importance in aeroplane designing and also in the designing of marine machinery. Any standard reference or handbook will be found to embody a very adequate discussion outlining the methods by which such stresses may be determined.

A review of accidents due to rotating machinery indicates that most accidents are caused by defects in material either unknown at the time the machinery was assembled or which developed subsequent to the use of the machinery, or else are due to such uncontrollable conditions of service as overloading, sudden unloading, failure of governor, sudden blocking or jamming of the machinery, and changes in governor setting to allow higher speeds than the parts were designed to withstand. Such causes of accidents may be more generally classified as ignorance either of materials or of proper use of the machines and do not in any way reflect upon the intelligence of the designer nor do they prove that there is not already an adequate basis for design and construction of such equipment.

Manufacturers of large machinery and producers of large forgings and castings fully recognize the danger of using imperfect materials in rotating members. In recent years considerable progress has been made in exploring forgings and castings and in testing materials. From important castings or forgings, which are to be highly stressed, several test samples are taken from a point as near the actual location of the zone of maximum stress as possible, rather than following the older and less drastic practice of testing a specimen made from the same heat but not forming a part of the piece itself.

Considerable testing has been carried on in recent years by several leading manufacturers and laboratories to obtain the "endurance limit" for various materials; also to ascertain the strength of various materials while stressed under temperatures somewhat higher than the ones the materials encounter in actual operating condition.

Highly stressed shafts and rotors often have an axial hole drilled through the full length of the piece to make possible a more thorough examination of the forging for possible flaws or other dangerous imperfections.

Careful Designers Use as Large Radii as Possible

A considerable amount of analytical investigation and testing is also being done to determine to what extent sharp corners in revolving parts weaken the part due to stress concentration. Careful designers use as large radii as possible wherever a change in cross-section of a rotating member occurs. Where only a small radius or no radius is allowable, proper allowance is made in the assumed factor of safety.

It is the sense of this committee that insofar as design and construction of machine parts subject to rotary stresses are concerned, there is already in evidence a fairly comprehensive basis of design and an appreciation of the effects of departures, intentional or unintentional, from this established basis. This opinion is substantiated by data obtained from large manufacturers producing machinery of all classes involving adequate design against failure on account of rotary stresses. The experience of these large manufacturers is typical of the situation throughout

the country and leads your committee to conclude that there is now available sufficient information and experience from which to compute and construct safe rotating equipment.

The committee has not considered its scope to include recommendations with regard to devices or mechanisms intended to prevent dangerous overspeeding or in other ways controlling the speed of rotation of machinery. This field, which would include engine stops, governors, etc., may perhaps be a fit subject for further investigation.

S. V. JAMES, Chairman
DR. A. D. RISTEEN
T. D. BRYSON
IRVING H. REYNOLDS
H. G. REIST
E. MATTMAN
E. B. TOLSTED
CLARENCE C. PERRY

CHAIRMAN STRATTON: During the past year I had the honor of serving as chairman of your Steering Committee on Standards, Research, and Codes.

Section Has a Membership of About Nine Hundred

We have a membership of approximately 900—by far the largest of any of the Sections—but unfortunately a small percentage of our members are serving on active committees. It is impossible for our small Steering Committee to select single handed all of the subjects that should be studied during the coming year. Some are asking every single member of the A.S.S.E. to suggest subjects that should be given research consideration, and at the same time to suggest the names of one or more persons qualified to serve on the research committees if organized.

We must consider the research problems of all industries and of all Sections of the Council. Approximately $5,000 has been spent on the benzol research; considerably more on the spray painting work, and the N.S.C. Executive Committee is now looking to us to recommend the next important subject that should be given serious consideration and upon which it can spend the money it is empowered to spend. Is it to be one of the subjects upon which we have heard papers during the last three sessions? You can and should help us to decide. Simply write either to the chairman, Mr. E. W. Beck, of the United States Rubber Company, to myself as vice-chairman, or to our secretary, Mr. Keefer, at National Safety Council headquarters.

SECRETARY KEEFER: Before we adjourn I would like to ask several questions of the members who are present. At next year's Congress shall we hold three afternoon sessions of the A.S.S.E.—Engineering Section, or shall we hold only one session and then plan to finish the remainder of our work at midyear meetings? We realize that most of our members attend sectional meetings in the mornings, and we wonder if you want

A.S.S.E. meetings in the afternoons or whether you prefer to leave them open so you can attend other sessions. We need your advice.

J. F. CONNER (U. G. I. Contracting Company): I believe the Engineering Section should function at the time of the Congress. Many of us could not afford the time to attend mid-year sessions. The National Safety Council is not the only organization that has conventions which we in the industries have to attend and we find it very inconvenient arranging our daily programs to attend all of the meetings that are scheduled. I think that another reason for having our sessions at the time of the other Sectional meetings is that sometimes a question arises in the Sectional meetings that we could well bring to the attention of the Engineering Section.

Furthermore, I would not object if the Engineering Section were to schedule one or two evening sessions at the Congress.

CHAIRMAN STRATTON: We certainly appreciate your point of view. Mr. Sanford, Mr. Keefer, and other members of the Executive Committee gave considerable thought to the matter of a three-session program particularly with reference to the Congress in Cleveland where everything was crowded into a luncheon and one afternoon meeting. I personally think that a comparison of our experience in these two years shows the desirability of following this year's plan.

Evening Meetings of Section Not Favored

DR. A. D. RISTEEN (Travelers' Insurance Co.): I think we should not be too hasty about having mid-year meetings because while that might be conducive to fuller and freer discussion of our special problems, yet some of us perhaps have a little difficulty in persuading our employers to let us come to the National Safety Council meeting once a year. Perhaps the task of persuading them to let us come to another meeting might be one from which the boldest would shrink. I think we should continue this year's plan.

SECRETARY KEEFER: Mr. Conner raised an interesting point that brings out this question: do our meetings conflict with other meetings you would like to attend? This afternoon there is the A. B. C. session at the Book-Cadillac and I am wondering how many of our members wanted to go to both meetings? Would the evening session solve that problem?

MR. ROYER: The company which I represent frequently brings in as many as 25 men to attend the Congress. Some of us who have attended these meetings for 10, 11 or even 12 years, owe a lot to the National Safety Council. The Congress has been more or less of a developing ground for us where we met men who gave us ideas and who would listen to our side of the story. With that in mind we must try to continue our present policy. The Congress should not be a meeting of eminent experts but a meeting of all those who are interested in safety so that a beginner can hear the more experienced men give their opinions, and so those of us who have been in the game for a little longer can see the problems of the fellows who are coming along. I

think on that common ground we can get together. Speaking for the men who represent my company, I know every time we see a particularly interesting item on the program, we make it a point to attend that session, be it morning, noon, or night.

(A vote indicated preference for day-time sessions.)

SECRETARY KEEFER: The final question is this: shall we continue to have presented at our A.S.S.E. meetings just the reports of technical committees or do you prefer speakers on the more popular phases of general safety?

MR. TOLSTED: I have been trying for several years to get the National Safety Council to take up a certain activity that we have not yet gotten across and that is to have some man attending each Section come to some general session at the end of the Congress and report to that general session the activities of that particular Section. In other words, I would like to see Mr. Conner come from the Public Utilities Section and report to a general session what the Public Utilities high spots were, and have someone else come from the Marine Section and report the high spots of that Section, etc. Then in one afternoon we could get the high spots of the whole Congress. If the A.S.S.E.—Engineering Section would undertake that activity its members would benefit greatly thereby.

CHAIRMAN STRATTON: I think Mr. Tolsted's suggestion is one which Mr. Keefer can carry back to Chicago for future consideration.

(A vote indicated preference for speakers and discussions on more popular phases of general safety.)

A Luncheon Meeting Brought Favorable Comment

MR. CONNER: I have another suggestion—one that came to me very forcibly at this Congress—and that is in reference to the noon-day luncheons. I attended the joint luncheon of the Railway and Public Utilities Sections. True, we had some interesting talks there but in contradistinction to that I also attended the dinner of the Construction Section at the Detroit Athletic Club. That dinner developed into a regular business session before it was completed. We continued until after 11:00 o'clock, discussing various problems. We did far more work at that dinner meeting than was done at any of the sessions held during the day. I always have felt that when you get around the festive board it is comparatively easy to start interesting and valuable discussions. Certainly this experience demonstrated the value of a dinner meeting. From what I have seen I think that the evening dinner meeting is probably the best because then we are not hampered with the thought that we have to get through and get back to an afternoon session.

MR. LAW (Oneida Company): I think we can piece together several of these ideas; hold an evening dinner, present your reports from various Sections, provide a little entertainment and we will all have a good time.

CHAIRMAN STRATTON: That sounds reasonable and no doubt outlines the idea Mr. Keefer will take back to Chicago.

SECRETARY KEEFER: The question is often asked, "Can't we secure

every safety man in the country as a member of the A.S.S.E.—Engineering Section?" The answer is, "We can if every member will boost." Our Membership Committee can not do it all, but with the help of every active member we can easily make our membership list a complete census for our profession.

CHAIRMAN STRATTON: Thank you, Mr. Keefer. The Membership Committee reported during the last year an increase of approximately 250 members. I think that was a good start. With the individual help of everyone in the Section we certainly can make even better progress during the coming year.

In conclusion, I want to extend the thanks of the Section as a whole and particularly of the Executive Committee to the chairmen and committee members who worked on the reports presented at this Congress. I know that they have our heartfelt appreciation of their efforts and also our good wishes for the continuation of their researches in the coming year. We want to do more next year—a lot more than we have done this year and with everybody's help I know we can.

ADJOURNMENT

THE WEDNESDAY LUNCHEON SESSION

October 27, 1926

THE WORLD'S SUPPLY OF BUNK—WILL IT NEVER BE EXHAUSTED?

James E. Bennett, President, Babcock Printing Press Manufacturing Company, New York City

The topic is—"The World's Supply of Bunk."
The question is—Will it never be exhausted?
The answer is—Not as long as human beings are human.

This is a topic that I always use when I speak and in this I probably am not much different from all other people who make public talks, only I come right out in the open and admit it. For a number of years I went about having a different topic for every talk that I made, but I found that in order to have a talk appreciated it must be on some topic with which the audience is perfectly familiar and which appeals to them strongly. A little experimenting proved beyond a shadow of a doubt that of all the topics there was only one which seemed to be common to every audience and that is the one which I have chosen.

It may not be wise or pertinent to make such an announcement before an audience of engineers but I am sure that a little research will disclose that even in an august and well-trained assemblage like this we shall find plenty of evidences of the ravages of bunk. In fact, if it was not for bunk there would be no need of safety engineers, so it may be truthfully said that your entire organization is erected upon a foundation of bunk.

If every man knew when he was safe and did not think he was safe when he wasn't, we would not need you engineers to explain safety, to prepare bulletins, to write letters, to make speeches, and to devise all manner of means to prevent and forestall accidents.

In analyzing the subject as applied to safety, I find that the trouble is with the process that men call, "thinking." For instance, a man has a gun which he thinks is not loaded; he pulls the trigger and kills his wife. A boy playing with a knife thinks that the blade is dull and cuts his finger. A man with a bottle thinks it contains whiskey, but it turns out to be wood alcohol and he dies. The great cause of trouble in families and among nations is that they think a thing is so, and they come to find out there is no foundation of truth.

The other day I was riding in a taxicab. We were on a cross street. When we came to an avenue there was another taxicab crossing our street at right angles. Each driver thought he had the right of way, each man thought the other was going to slow up, with the result that

neither man slowed up and we formed a perfect right angle, which is termed a side collision.

A few days ago an engineer with many years of experience was driving a Pullman train at Bethlehem, Penn., and another experienced engineer was driving another Pullman train. The tracks crossed. Both trains were going slowly and were under control. Each engineer thought the other was going to stop before reaching the crossing; neither man did, with the result that several were killed and many injured.

In all of these things it was a question of thinking instead of knowing or acting. Loose thinking is the basis of most of the alibis, but in many cases it merely is a name and is not actual thought. One time a farmer was asked what he did to spend the long evenings and his answer was, "I go out on the porch and set and think, and sometimes I just set."

Many a man has lost a finger or hand because he thought the buzz saw was not moving. Many another has been injured in making a coupling on a railroad train because he thought there was room between the cars for his body. Many another has been injured by thinking that the speed of the train was less than it really was when he jumped from the step or tried to board the train.

To Be Safe One Must Know All the Facts

Perhaps the hardest thing in the factory in relation to safety is to get the workmen to understand that there is a vast difference in being safe and thinking you are safe. The Holy Bible informs us that by taking thought we can not add a cubit to our stature, and it seems to be true that thinking does not change any fact.

It is also true that most of our theories are probably wrong and the process of time usually proves that theories in relation to philosophical, educational or religious topics are usually wrong. Thinking is only safe when it is based on actual knowledge, but thinking based upon theories is like little Eva crossing the river on loose cakes of ice. It is possible but highly improbable that you will reach the other shore. You are more likely, however, to resemble a man leaping from bog to bog in an impassable and boundless swamp.

To be safe it is necessary for any man, whether he is a workman, a student, a professor or a professional man, first to know the facts before coming to any conclusion or making any move.

As engineers your business is to try to make things safe for the physical bodies of men who are employed in various plants. There is also the larger question of the safety of the intellect, and the still larger safety of the spirit or soul. In these two fields the damage done by bunk is beyond calculation.

It would be interesting to know just how minds of the present generation are being developed. Usually an element grows according to the food that is given it. When I was a boy if I wanted to read a so-called "dime novel" glorifying Nick Carter and other desperadoes it was neces-

sary to sneak behind the barn to do it. Today a boy is openly escorted by his mother and father to a movie palace where he sees stories pictured which, in comparison, reduce Nick Carter and the old-fashioned dime novels to the class of Sunday school stories; and the average boy goes to the movies twice or three times weekly to be thus fed and enlightened. He also has the picture sections and comic sections of the newspapers and then, as great as anything else perhaps, he has the tabloid newspaper, which can hardly be classified higher than mental and moral garbage.

Just how a generation can be protected from things like these is beyond my comprehension, but I believe the problem is much more important than how to protect a man's eyes from steel chips or even his neck from being broken by a chain dangling from an overhead crane.

On this mental side we also have the question generally called education, which is closely related to that of politics, and then we find we are deeper in the bunk than ever. In fact, education has progressed so far that it is practically impossible for anyone to give a concise and clear definition of what education is.

Idiosyncrasies of the Human Mind

A professor of literature considers all men educated who can intelligently discuss literature with him. An engineer thinks a man is educated when that man can discuss engineering problems intelligently; and so on through all the ramifications of learning. A highly educated and specialized engineer would have a miserable time with a highly educated and specialized veterinary surgeon if they were alone on a desert island, each one interested only in talking on his special topic.

From the viewpoint of loose thinking, politics is closely related to education but it is doubtful if there is anything in existence which contains as much bunk to the square inch as politics. This present gathering is a Safety Congress and in the use of the adjective it differs widely from the one which meets in Washington.

I have just been reading of a man who spent a good deal of money to be nominated and elected a Senator because his daughter was in school in Washington and his wife liked the city. This was what he privately told his friends. In his campaign speeches and writings during the campaign he never mentioned these real reasons but spoke very grandly of his desire to serve the public. It is not necessary to explain the bunk in politics because, even while we are sitting in an audience listening to a political oration and lapping it up like a kitten taking cream, we know we are being filled with bunk and we seem to enjoy it.

Just now the most widely discussed question is prohibition. There are many people who think this is a brand new question and forget that it is impossible to make any law which carries a penalty which is not in effect a prohibitive law.

Perhaps the various laws in relation to the automobile and automobile

traffic are the best known prohibition laws in existence. They come in contact with practically everybody and are violated by almost everybody. In fact, I believe that the automobile laws are violated more than any other existing laws and they are being made stricter and stricter all the time in order to stress their importance upon the people. The liquor traffic, however, has a peculiar hold upon the people in general because alcohol is a habit-forming element and a vast number of people would throw aside everything pertaining to safety in order to indulge a personal habit.

Most Dangerous Bunk Relates to Religion

The most dangerous bunk is in relation to religion. Here multitudes of people throw aside and rush through life unheeding any and every warning, because, out of their own minute intellects, they have convinced themselves there is no hereafter and no future; and if there is such a hereafter or future life they think they will be all right and they will be safe because they are—themselves.

Religion is the relationship of God to man, and its terms are fixed by God. There is one true God, and, therefore, one true religion. There are innumerable false gods and innumerable false religions. There can be safety only through the relationship with the true God and the multitude of people who have no proper relationship with one true God are, therefore, in danger of eternal separation from the true God, which separation men call eternal death.

The topic of religion is one which men seldom discuss between themselves and a man who does discuss it is generally put down as a crank or a fanatic or a little soft in his upper story. When the Son of God Himself was on earth He urged men to seek first the Kingdom of God, which would put them in the true relationship; and He advised them that the items of bunk which would keep them out of this Kingdom and relationship to God were, (1) the pleasure of this world, (2) the deceitfulness of riches, and (3) the lust of the flesh. If we turn this over in our minds we find that this is absolutely true; nevertheless the vast majority of the inhabitants of the world are paying no attention to such instructions as to safety. They are taking a chance on the deceitfulness of riches, they are getting all of the pleasures that they can possibly gather, and they are letting the desires of the flesh have almost unbridled rein.

These three things are the greatest dangers facing the world today and constitute a volume of bunk which is beyond calculation.

We are a race of kidders. Recently I read in editorial columns about a "magnificent sporting event" recently held in Philadelphia; and in the same newspaper in the report of the fight it told about the gruesome scene, with the blood spurting and one man pounding another until he could get him into such a weakened physical condition that he hoped to be able to give him one hard sock which would knock him unconscious; and the reports said that one man got $700,000 and the other

$200,000. There were no elements of sport in it but they had to kid themselves and the public.

The great trouble in this question of safety and also the question of bunk is that most all men and women feel quite sufficient in themselves. In other words, they feel independent. They feel they are entitled to greater freedom and they should not be interfered with in their personal habits, desires and efforts.

This feeling, I believe, is one that you have to contend with most in order to get your safety programs over—the right of independence (so-called) of the individual. In fact, it is the continual standing up for one's rights which is such a big hunk of bunk.

As a matter of fact you and I have no real rights, but on the other hand we have great responsibilities. Our business is to live up to our responsibilities. If we do this we will not have to worry about our rights. We will get them when we deserve them, and anyway we will be so busy living up to our responsibilities that we will have no time to think of our rights.

Any machine is an evidence of this. Every part of the machine does its own job without worrying about its neighbor. It lives up to its own responsibilities. It claims no rights except the right to carry out its responsibility. Any ordinary machine is an excellent example for a human being, and any machine is usually far superior in producing results than the ordinary human being, because it and all of its parts mind strictly their own business.

It is not necessary for me to finish this talk because you can all finish it for yourselves, if you will just be honest with yourselves. To achieve safety in anything, the first requisite is a thorough process of *debunkation*. Prove all things, hold fast that which is good.

ADJOURNMENT

Automotive Section

New Officers of the Section

CHAIRMAN: A. F. DUNNEBACKE
General Motors Corporation, Detroit, Mich.
VICE-CHAIRMAN: A. M. WILLIAMS
Chrysler Corporation, Detroit, Mich.
SECRETARY: E. H. COTCHER
Murray Body Corporation, Detroit, Mich.

Committees

POSTER: J. B. GIBSON, Chairman
Western Electric Co., New York City.
MEMBERSHIP: G. H. CHAPMAN, Chairman
Briggs Manufacturing Co., Detroit, Mich.
STATISTICAL: G. S. THOMPSON, Chairman
Detroit Insurance Agency, Detroit, Mich.
ENGINEERING REPRESENTATIVE: R. F. THALNER
Buick Motor Company, Flint, Mich.
EXECUTIVE COMMITTEE (The Officers and)
G. A. KUECHENMEISTER
Dominion Forge & Stamping Co., Ltd., Walkerville, Ont., Canada.
L. E. AVERILL
Packard Motor Car Co., Detroit, Mich.
R. A. SHAW
Detroit, Mich.
L. L. JUDGES
Ford Motor Co. of Canada, Ltd., Ford, Ont., Canada.
D. C. HUNTER
National Cash Register Co., Dayton, O.

October 26, 1926

G. A. KUECHENMEISTER, Chairman
Personnel Manager, Dominion Forge and Stamping Co.
Walkerville, Ontario, Canada

THE first session of the Automotive Section of the Fifteenth Annual Safety Congress, National Safety Council, held in the Ball Room of the Tuller Hotel, Detroit, Michigan, convened at 9:50 o'clock, Mr. G. A. Kuechenmeister, presiding.

CHAIRMAN KUECHENMEISTER: For the past two years we have condensed all of the reports of the officers into one. In opening the meeting I will ask our secretary to read the report of the officers.

SECRETARY WILLIAMS: Mr. Chairman and Gentlemen: We are getting a rather late start. The activities of your officers for this past year and all of the trials and tribulations they have met with and the conditions they have bumped up against have all gone over the dam and we won't rehearse them. But you will find the results on pages 22 and 23 of the program, and I believe when this program is completed you will agree that we have been very fortunate in securing a splendid staff of speakers.

CHAIRMAN KUECHENMEISTER: That report was decidedly shorter than I thought it would be.

Next will be the appointment of a Nominating Committee. We have appointed Mr. R. F. Thalner, Mr. E. O. Austin and Mr. D. C. Hunter. These gentlemen will make up a slate of officers for the coming year and we will take it up tomorrow morning.

I am glad I don't have to make a report as chairman of the Section for the past year. My year's activities as chairman were just about minus. However, that puts me in an advantageous position this morning because I can boast about the program that has been arranged—I had absolutely nothing to do with it. I want to say it is the best program that has ever been arranged for this Section. It is a well thought out and well developed program. It is supposed to take this matter of safety from the beginning right through to the end.

Inspirational Start of the Sessions

We start with the inspiration, and none of you have ever done any safety work in your plant without inspiration. Then we take the material as it comes into the plant, dispose of it safely and move it to the machine departments and process it. Then we take up plant maintenance and go on to the assembly hazards and finally the education of the workmen.

I think your committee has done splendid work and if you follow all of the sessions of this Section this week you will get the complete picture of what safety in a plant really means.

Last Saturday morning the chairman of the Program Committee called me on the telephone and said that owing to the death of Mr. H. H. Bassett of the Buick Motor Company, Mr. Kettering would be unable to be with us this morning, and the chairman was quite worried. It didn't bother me at all. I simply told him to get busy and wire New York and if a certain man from New York was going to be here today he would talk.

Most of us, if we were given a 48-hour assignment to address any meeting, would become worried. The man we have in Mr. Kettering's place doesn't need 48 hours' notice. I remember he told me a few years ago about an instance which occurred in Toronto. One night he went to a lecture and I think he actually paid his way into the hall, although I am not sure of that. While he was sitting there one of the men in charge

of the lecture saw him and rushed up and said, "Our lecturer is going to be about 45 minutes late and we would like to have you come up on the platform and keep the crowd interested until our lecturer gets here."

The speaker we have this morning filled that assignment and the one thing that stands out in what he told me about it was the fact that he wasn't worried about getting up and talking but he was worried for fear he hadn't had his shoes shined that day.

It is a great privilege to me to introduce, and I know it will be a pleasure to you to hear, Dr. R. M. Little, Chief of the Bureau of Rehabilitation of the State of New York.

THE SPIRIT THAT MOVES IN PROGRESS

Dr. R. M. Little, Chief of the Bureau of Rehabilitation of the State of New York

Gentlemen, I am glad to greet you. I did not pay to get in and I did not want to speak nor have I had much more than time to have my shoes shined. I was on the golf grounds last Saturday afternoon when a peremptory message came to my wife to telephone me quickly that Will Cameron wanted to reach me and I knew that some point in the program of the National Safety Congress had gone wrong and that he was calling on me to be a pinch hitter, which I have to be from time to time.

My good friend, the chairman of your Section, has put me before you in a rather embarrassing position by saying that I can talk on any subject without any notice. I know enough about safety work to talk about it but you know enough about it to practice it. There is a great difference in knowing enough about a subject to talk about it and knowing enough about it to put it across. Therefore, I rise with a feeling somewhat of embarrassment because you men are practicing safety in the automotive industry in the plants throughout our country. It would have been exceedingly fitting if Mr. Kettering could have been here—a leading manufacturer in your industry—to give you the proper start, the inspiration and encouragement which we all need in the comradeship for safety. But as he is not here I recognize my fellowship with you and I am very much pleased to bring you a word of greeting and also, if I may, a word of encouragement in the development of safety in your industry and out in the country.

It has been my opportunity from time to time to visit a number of the automobile plants here in Detroit and Cleveland and Buffalo, etc., and I presume there is no other industry putting forth a more consistent and intelligent and effective effort year by year than your industry to make the plants safe and healthful and attractive for both the management and the men and not only to prevent accidents but to build up morale. You have a high-grade industry and therefore a fine opportunity to continue this crusade for the saving of life and limb.

I am quite sure also that your intelligence and sympathy follows your

industry out into its use in the public life of your country and that there is not one of you but was distressed by the intelligence that in the month of September 2,100 people in our country were killed by automobiles and trucks, and, of course, for every one killed perhaps there were from 25 to 40 who were injured. Therefore, the product of your plants, one of the most useful articles man has ever developed, one of the most enjoyable, one that has brought a great deal of happiness and delight into life, has also brought with it a great hazard and it is exacting that toll day by day. As men who love our fellow men, who are concerned for the well being and economic development of our country as touched by the poignancy of human suffering, quite naturally we wish that the public life of our country might also be saved and accomplished at a great reduction in the public accidents which are occurring from day to day.

All of us Americans perhaps do not realize the tremendous strides which we are making in this country industrially and in some other respects, but particularly as an industrial nation we are the wonder of the world at the present time. Many of you younger men do not realize the conditions in our country 25 or 30 years ago. You were born and grew up and commenced your work in life in the midst of an urge for organization and efficiency in industry, the like of which no nation has ever known. While we in the midst of it do not recognize the tremendous things which are happening, we are attracting the attention of all keen thinkers of the other nations of the world.

To Learn the Secrets of American Success

You will remember quite well the English engineers who visited Detroit, Cleveland and all of the other great industrial centers to study your industry along with other industries to find out the secrets of the marvelous industrial success which is characterizing our life at the present time. Then you will remember that delegation of skilled workmen which the *Daily Mail* sent to America and that spent three or four months here last year and visited the plants, talked with the workers, watched the processes and felt the atmosphere of an industrial life where goods are being made plentiful and men are being made dear, where wages are high and goods are multiplied and the market increased by the well-being of the life of all the people, with the recognition of the fact that these two principles can go together. They are not only practicable, they are just and they are fine and we in America have brought that to pass practically in the last 20 years.

I remember during the war hearing Mr. John Calder, whom many of you have listened to, talk about workmanship and training and he said that we wished, in our industry, to make men dear and goods plentiful. His thought was high wages and goods multiplied by large units of production and fine distribution at low cost in order that all people might have the manufactured product for the use and pleasure of life. He was aiming at it and talking about it and the people were working

to bring it to pass, and it has been brought to pass in a very remarkable degree in our country. That was held out to us 30 years ago as an ideal. We are moving today into something of its accomplishment.

I do not know, Mr. Chairman, whether or not the delegation of industrial students from Australia has reached the states, but they have been appointed and they likewise are coming to study our industrial life and to discover, if they may, the secrets of our wonderful success. Naturally those keen-eyed brownies from the far east have been here and have come and gone in their silent way to discover why and how America can do this wonderful thing.

We Want to Recognize Workers as Fellowmen

But I come to you this morning as gentlemen who are not only interested in making goods plentiful, in mass production and in splendid organization of industry that accumulates wealth, but also as a group of men who represent practical efficiency in the plants and who also have the human touch; who recognize that with all of the development of our industrial life in making goods plentiful and paying high wages, it profits little at last if we maim and bruise and kill a large number of those who are engaged in the industry; who hold that the great aim of life after all and the ideal of our lives should not be merely the multiplication of things perhaps to the impoverishment of the mind and the spirit, but that in the development of our industrial life as well as in our home or civic life, our political, educational and religious life, in these great economic units where we serve day by day, we want something of the touch of kinship with those with whom we work.

We want to recognize them as our fellow men and we want to recognize that they have like spirits with our own, like ambitions and desires, and that they are entitled to all of the justice and liberty and aspirations and development of life that any of the rest of us enjoy. That brings into the work-a-day life the spirit of comradeship and of good will and lets us find ourselves down deep in the things that you can neither touch, taste, nor handle, but which belong distinctly to the spiritual nature of man, which Dr. Wishart so splendidly dwelt upon yesterday morning in the general session.

So as I speak to you this morning I would not attempt at all to mention anything of the practical organization and operation of your safety work, although I am somewhat familiar with it. I have been through the plant out here with Mr. Shaw. I have asked him to point out to me things which Mr. Wallace was thinking of yesterday afternoon, the relationship of safety to production. I have been endeavoring for years to gather up points and suggestions upon that very interesting phase of the subject. But not upon that do I wish to speak at all but rather this: as a comrade with you and as one who looks upon the whole movement in perspective. What is it about, this safety movement after all that brings to us so much pleasure, joy and satisfaction?

I have been running along with the movement nearly since its incep-

tion in one form or another. I have observed the Council grow from a handful of young men with ideals and visions into these great Congresses, and I have watched the coming and going of the delegates to the different conferences as they have been held—national and also state and city conferences across our country for a number of years. There is actually nothing which has happened in my lifetime in America that has been quite so intriguing to my imagination, so pleasing to my spirit and so encouraging to my hope as this industrial safety movement of our country.

I am interested in many things and get pleasure out of many things, but in some way or another this organized industrial safety movement that has gone through and established itself in the better industries of our land has in it a spirit, a feeling, a comradeship, a practicality with ideals that I can't just find any place else in life. It rests upon this underlying assumption that you can't have a sound economic system that is not grounded in morality. Philosophers and economists have been crying that out for ages.

Sound Economics and Morality Lie Side By Side

There are a large number of people who believe you can have sound economics without bothering about morality. It is the fatal heresy of the economic determinism of Marx upon which the Russian nation is trying to operate and can't. You simply can not confine human life merely to economic interests and you can't develop a sound and enduring economic system apart from morality. Why? Because, after all, our economic systems are the creations and service of man and man is more than a beast. He has something in him that is immortal and that cries out to the eternal, that searches for truth and wants to feel reality and know the power of the urge that runs through the whole universe of which he is a part.

Therefore to me this safety movement has much of its power, its practicality, its urge, its fine fellowship and its onward sweep because it has rooted itself in the things which are deep and true along with the things which are practical and daily urgent to be accomplished—the coupling together of the ideal and the practical with a method wrought out from the anvil of experience You have tested it out in your plants your shops and your groups and you have found out that when you have really reduced your accident frequency and brought about that finer workmanship within your plants, you have blended together a great many things which you could see with a great many other powers that you didn't see.

You have worked with faith and hope and love. You have accomplished things by the power of perseverance and cooperation and you brought them to pass because there was working in your mind, your conscience, your will, a great inner power, that is the creative power of the whole universe of which we are a part.

That may be a little high-flown but it is absolutely true. Let me say this to you: when we approach new people on the subject of safety, public

or industrial, and go and talk to the employers who do not get sold on the idea, as we say, they think of safety as something to be wished upon them, added to from the outside, magically accomplished. That is what they wish it might be but they don't think it can be done. Is that not the view that the ordinary, uninitiated employer has upon this subject of organized safety and its practicality? I have met with it in scores of places across our country.

But go to the same man five or 10 years after. He has moved from the periphery of the subject into the center of it, from the outer obvious into the inner and further removed from the center, and see him working through it practically with his mind and his method and his power to accomplish it. Then we discover a man who has awakened to the fact that here are great hidden secret possibilities which may be touched and brought into play; and that it has not only brought about the reduction of accident frequency and a saving in loss of workers' time and sometimes the loss of workers' lives and the wastage of material, but it has made a contribution to that which every plant manager or owner wants above everything else—a spirit of morale that stimulated the whole plant and the entire works.

This great industrial advance which we are making in America today has a hundred and one causes and reasons but my own honest feeling about it is this: that among all of the various thoughts, movements and activities that are bringing America up to one of her unparalleled positions in industrial accomplishments, the organized safety movement is one of the finest, most stimulating and influential.

I know big industries of our country that I used to visit 30 years ago. I have watched them entirely transformed. I have sat with men who have been in those industries for those years and many more, who knew the old days and who know the present days, and while they can't demonstrate it, it is also their judgment that it is the safety movement that transformed the industry.

Leading Automobile Companies All Represented

CHAIRMAN KUECHENMEISTER: If there was any doubt in the minds of any of you about the ability of Dr. Little to pinch hit and give us an inspirational talk, I know it has been dissipated. Judging from the applause I take it that you will agree with me that we extend to Dr. Little a unanimous vote of thanks for not only pinch hitting but for giving us the wonderful talk he has.

This year we tried out a new idea in regard to our sectional meetings and addressed letters to the presidents of all of the member companies in the Section, and I am pleased to say that the presidents of all of the automobile companies, large and small, thought well enough of it to reply, most of them in person, to these letters. All but one assured us that although he himself couldn't be here he would have at least one representative.

To any of you who get an inspiration to begin to do safety work in your plant or to continue to do safety work after you have the inspiration, if you want to know what to do and how to do it, I would advise you to do what I did about 10 years ago—go out to the Ford Motor Company and see Bob Shaw. We can't all go out this morning to see and talk to him, so we asked Mr. Shaw to come down here and tell us what they do in regard to the hazards of receiving and storing and transferring.

HAZARDS OF RECEIVING, STORING AND TRANSFERRING MATERIALS

R. A. Shaw, Ford Motor Company, Detroit, Mich.

I have no intention this morning of entering upon a long discourse about my subject, no matter how important and interesting this subject undoubtedly is. I want to be brief, both because I do not like to write formal papers, and because I would much rather just talk these things over with you in a friendly way. A kind of Round Table discussion would, I think, bring out the many points in which we are all interested much better and more completely than if I were to attempt to write about them.

So that is what, for the most part, I mean to do, get you to talking with me, instead of me trying to talk to you. However, I have sketched out in some detail, under the various heads of Receiving, Storing and Transferring, the high spots which appeal to me in the handling of materials. Safety in these matters depends upon a correct attitude toward innumerable details, a proper understanding that little things always count, and an effort upon the part of management cooperating with the men in seeing that all the details of safe practice are carefully observed.

(1) Under the head of Receiving Materials, I have noted the following:

Have whistle men on all end cars.

See that cars are up to bumpers.

Have brakemen wear white caps at night.

Be sure that all material and objects along track have a clearance of six feet minimum.

Have crane chains regularly inspected, annealed and butt welded.

Employ whistle men to precede cranes. Use horns on cranes serving more than one floor.

Have "hookers" or whistle men step into clear before lift begins, and allow no one under load.

Fit slings to the stock to be moved.

Protect the corners of sheet metal stock with wooden guards, and have men piling stock wear gloves.

Specify open cars for bar stock.

Unload next to forging department.

Cut bar stock as it enters the shop.

Pile bundles of bar stock from four to five feet high, with layers of timber between.

(2) Storing Materials:

Have stock delivered only as needed, allowing a small emergency supply.

Send small parts over conveyors to operations.

Store small parts in metal boxes, four by four feet by 12 inches. Pile one upon another, and handle with trucks and cranes.

Allow only a limited amount of stock to be stored at machines, keeping the vicinity of machines free of barrels and boxes.

Arrange that operators secure stock sufficient to their needs direct from the conveyor, taking small supply at fairly frequent intervals.

(3) Transferring Materials:

Install guards under overhead conveyors.

Use light wire guards on ordinary small parts of overhead conveyors; use solid guards under conveyors carrying large parts; in some instances it may be found necessary to make a guard strong enough to hold up the conveyor.

Equip conveyors with pull cords by means of which conveyors may be instantly stopped.

Place steps across floor conveyors, or cover them so that they may be crossed without hazard.

Gravity transfer chutes involve the use of head and hand pads.

Inclose all gears, belts and sprockets, and provide protected foot walks wherever necessary.

A Rapid Fire of Round Table Discussion

CHAIRMAN KUECHENMEISTER: Five or six years ago we had a safety school and we had Mr. Shaw come over and give us a talk. I will never forget that night. About 50 men walked in and took seats in the front of the hall and we wondered what they were up to. They came in in a formal sort of way, all single file, and they sat there. After Mr. Shaw got through we found out what they came for. Those 50 fellows just started to ask questions and they razzed Bob and they bawled him out and it took the combined efforts of all of us to save Bob's head, but I wish you would do that same thing this morning. I would like to have you go right after Shaw and ask him all the questions you want.

MR. THOMPSON (Detroit Insurance Agency): May I ask Mr. Shaw how he handles sheet material eliminating the truck?

MR. SHAW: You have to have the cooperation of the steel company. Our company has requested that the steel company load their sheet metal with wooden strips of possibly four inches between sections and to have a little truck put under there. After they reach their destination we have these special little trucks put under there. We lift that up and pull the sheet steel out on the dock with special little trucks and all the steel company has to do is to leave a sufficient space by putting those timbers in while loading. We are making up little roller bearing trucks at the

Ford plants. If any one would be interested in this he could write to the General Stock Superintendent of the Ford Motor Company. We have gotten at least eight or 10 of the steel companies to load steel with that method. That eliminates he old way of taking the truck in.

R. F. THALNER (Buick Motor Company): I was rather interested in Bob's statement about putting white caps on his brakemen. I think standard railroad practice calls for the brakemen to use a lantern at night. Don't you consider that is 100 per cent safety, that that will designate where the man is? Do you think that the white cap on the brakeman will make him stand out in the darkness as well as a lantern, or does he carry both?

MR. SHAW: He has both. Absolutely he must carry a lantern, Mr. Thalner. I might say that with blue flags they must have a lantern also. That is the railroad requirement after sundown. But these caps designate those fellows as railroad men and in a little while the men in your plant are more inclined to listen to them if they ask them to move something away, and it breeds better cooperation. I believe it is an additional safety factor to wear a white cap at night.

The Method Used in Annealing Chains

M. J. MCCARTHY (Fisher Body Corp., Detroit): May I ask Mr. Shaw to explain the method he uses in inspection of chains?

MR. SHAW: When we first began to anneal chains we put them in the oven and heated them up to possibly 1,000 degrees and covered them with this fish scale, but after a few years we found that we weren't inspecting those chains thoroughly. So now they are sent to the heat treating department to a sort of acid tank, a caustic soda tank, and that chain is thoroughly cleaned and then inspected and you would be surprised to see the broken spots in the chains which are discovered by washing and looking over them first. Then they are sent to the big furnace and put in there and heated to 1,000 degrees. You can generally let them cool overnight in that furnace. That is better than throwing them out in the air where they might crysallize.

I would say with chains after two years it is good to bring back the life of the steel, to heat it up to 1,400, 1,500, 1,600 or 1,700 degrees and let it cool and then anneal it again.

MR. MCCARTHY: The point I want to make is, do you inspect the chains at different intervals while they are in use at your plant?

MR. SHAW: Twice a year we have a chain inspection and every one is marked.

MR. MCCARTHY: How do you mark them?

MR. SHAW: There is an O. K. We might say, for instance 2/6. We divide the year in two and then the 6 is for 1926. You can stamp that on the big hook.

MR. THALNER: Mr. Shaw brought up a very interesting point. He said he heated the chain to 1,000 degrees or thereabouts. We have been conducting a little research in the annealing of chains and from all we can

learn you take a chain and heat it to 950 degrees, I think it is, that is a chain which has been stressed almost to the elastic limit, and a certain theory enters in known as Stead's Brittleness. If that chain is then heated, after it has been stressed, to 950 degrees through an annealing process and is taken out on the job, there is a liability that that chain will rupture or break, due to the brittleness factor which enters in on account of heating it to this particular degree.

It is a very touchy subject and I wonder how many of us are heating our chains to 1,000 degrees or around that particular point where Stead's brittleness factor enters into it? We anneal our chains to 1,700 degrees or 1,650 and air cool them, and I didn't discover this until we got into the proposition of annealing chains and talked with our metallurgical engineer.

MR. SHAW: Our good friend Thalner is highly educated and you have to give him credit. I am sure he has looked into this thing thoroughly. I agree with Mr. Thalner that if your chain is stretched, that is why you have your inspection first before you anneal it, you will cut out the sections of the chain. It is not all of the links generally but some of the links with a great overload. But if it is only a few links then that is the time to cut your links and butt weld new links and go ahead with your annealing. Also, every weld that you put in there in a chain should be annealed afterwards, but I would leave that for your future study.

As I said before, the steel men do not agree on annealing chain, but I am absolutely convinced that we have a very good method. After you have made this investigation next year, I am thinking maybe Mr. Thalner will come and change this a little and I am willing to find out if there is anything better. It certainly is serious and important.

Testing the Chains After Annealing

E. C. JACOBS (American Mutual, New York): After those chains have been inspected and annealed, if they are tested how do you test them?

Then another question with respect to handling materials as they come into your shop. I am wondering how you go about the prevention of the cuts and scratches that certainly do arise when we handle so much metal?

Another thing: what do you do with respect to the piling of material? What is the height, for instance? Do you have a shop rule there? How do you select your men that handle these materials? Do you have the cooperation of the employment department? Who selects them?

Further, what methods do you employ in your plant to teach men how to lift and handle material?

MR. SHAW: If you talk to our employment manager, I imagine he will tell you he is hiring the best men in the country. Before I answer your questions, I think I ought to eliminate the discussion on chains. I hadn't noticed that Mr. Thalner, of the Buick Company, is leading the discussion on chains.

Answering the first question about testing of chains. Years ago we

were going to put a testing machine out. I have been to Buffalo and places where they weld chains and I have watched them. They will break a certain section of a chain just for a breaking test, but they only do that in one place out of so many thousands of feet of chain. They do give all of the chains a certain test, but the safety factor is very small. We discontinued that proposition and we eliminated the testing of chain by any kind of test. I don't know whether you will hear more about testing chains this afternoon. We do not pull chain. We eliminate that.

The next question was as to how to handle the steel without scratches? There is greater discussion on that. The steel companies load the sheet steel so that it moves and if it is scratched too much our men pick this steel out and naturally have to reject it. The inspectors are at our cars where the material is unloaded.

MR. JACOBS: That wasn't my question—I meant the cutting and scratching of hands while handling this steel.

Handling and Piling Sheet Steel

MR. SHAW: I beg your pardon. The question is as to how to protect the hands. Our salvage department has made pads which the men use. Some of the men wear gloves in addition to these pads.

MR. JACOBS: Is that a shop rule?

MR. SHAW: They are in the tool crib. You know how the men are. One will have a calloused hand and another will wear gloves. It seems funny to see a blacksmith wear gloves, but occasionally they do. Some of the steel men wear pads and some of them do not. That is left to the man's own discretion.

MR. JACOBS: The next question was on the piling of materials—the height.

MR. SHAW: I am sorry to say that our sheet steel plant is not quite regulated. We have quite a pile of sheet steel and that is piled about from six to seven feet high. If it is very narrow, it is not piled as high as that.

MR. JACOBS: Do you have a shop rule that that material must not go above a certain height?

MR. SHAW: No, we do not.

MR. JACOBS: That is left to the men's own judgment?

MR. SHAW: We have an understanding that the height is to be seven feet on sheet metal. The safety men patrol the plant and naturally pass the word along. I don't know whether that is written up in the rules or not. It is the same way with hauling trailers through the shop. If there are over six lined up, they will take one off.

MR. JACOBS: The other question was as to the selection of the man who handles the material.

MR. SHAW: That is left to the foreman. If he gets a man who is not satisfactory he will send him back and they will send him another man. He will do that until he gets a man he is satisfied with.

J. E. WALTERS (General Electric, West Lynn): Might I ask a question

on the piling of sheet metal? Are you talking of handling polished metal or do you handle sheet metal in the rough? You say you only pile it seven feet high?

MR. SHAW: The sheet metal must be two and one-half to three feet and the length must be six or seven feet.

MR. WALTERS: Do you pile it on skids or simply with boards between?

MR. SHAW: In some cases you have to tie timber between at each end. Possibly they do that on certain piles of three or four feet. I believe that is to keep it from going over. Some piles have no timbers. If you are going through the pressed steel room, for instance, and you see a pile that looks dangerous, it is removed. You may have a system of piling that is absolutely safe.

MR. WALTERS: I don't think it is. That is what I am trying to find out. What is the material you use in your pads? That is one big trouble I guess we all have—cuts in the handling of material. We have tried about everything.

MR. SHAW: The salvage department has used old leather cut off of leggings and cleaned and cut up and also the leather material that we put on the side of the car. Then in some cases they used steel grip leather.

MR. WALTERS: Have you had any definite results from any of this material or is it simply left to the individual choice of the men?

MR. SHAW: No, it is left to the individual's choice, but if we have a few cuts or an infection the safety man will find out why they aren't wearing this stuff. For instance, in the glass foundry we had a man who lost an arm and now they have to have their arms protected all of the way up, but we haven't gone that far with the steel yet.

Thirty Per Cent of Lost Time Accidents Were Infections

MR. WALTERS: Last year we were running on a basis of 1.6 for lost time accidents for 100 employees, and of that possibly 30 per cent were infections; 1.6 doesn't look very large, but it bothered me and one of my troubles has been infection.

MR. SHAW: Do you have a strict rule that no man can bind up his own wound?

MR. WALTERS: Yes. We have a first aid station in every room and the dispensary, at the farthest point, is not over 2,000 feet.

MR. SHAW: I know that at one time we had our bacteriologist analyze the grease that is put on the steel, but I don't remember what was done.

MR. WALTERS: We don't have anything like that. We don't have polished material.

MR. SHAW: I don't know what rust would do. I really couldn't answer your question.

J. N. BROWN (Durant Motor Company, Elizabeth, N. J.): There is in the east a cream called "Boon." After the hands are thoroughly washed that cream is applied and rubbed in and it leaves the hands dry and doesn't make any hazard for slipping and it is a strong antiseptic. I know that in the east it has eliminated and reduced infection.

CHAIRMAN KUECHENMEISTER: I want to say that the American Rolling Mill, in Middletown, Ohio, has done a wonderful work in eliminating accidents from the handling of sheet steel and I am sure that if any of you care to write to Mr. R. Adair at that plant he will be glad to tell you what they have done.

W. S. BASORE (American Radiator Company, Buffalo): In separating steel after it is taken from the car, how do you eliminate the scratches? What becomes of the material? Do you find that the leather pad you use for unloading is better than any other?

MR. SHAW: Answering your first question, you mean the metal that is scratched?

MR. BASORE: Yes.

MR. SHAW: As I said, the inspectors reject any metal and that is sent back.

MR. BASORE: In unloading steel you spoke of putting 4 x 4's under the piles. Has the Ford Motor Company ever tried using conveyors for sheet steel in the cars?

MR. SHAW: No, we have never used them for that.

Problem of the Grease Used on Sheet Steel

MR. BASORE: In answering this gentleman's question in regard to the height of the pile, the American Radiator Company has limited the pile to six feet. The material, as it comes from the rolling mills, is covered with a sort of grease to protect the sheet. We have found through analysis that this grease becomes rancid. It may be a good idea to treat the hands with something before unloading the steel. We find that the greatest quantity of small cuts comes from unloading material and through that infection sets in. Our greatest percentage of accidents, while they are not lost time accidents, are cuts and scratches from unloading of material due to the corners and sharp edges.

I wanted to ask you a question. How big are the piles in the cars when you receive them in order for you to get the truck, and what is the weight of the car?

MR. SHAW: I believe I will refer you to our stock superintendent. This is under way now. I don't know whether it is piled three feet or not. That makes a carload. You have the capacity weight for your car and that sheet steel is very heavy.

MR. BASORE: A small car would consist of not less than 20 tons, which could be piled in four five-ton cars—I mean by that two in each end of the car properly braced and protected. Do you think it is good practice for a truck with one five-ton load to be taken out on the platform on these electric trucks or whatever you use?

MR. SHAW: We use these trucks to handle it now.

MR. BASORE: We use a small electric truck that will lift 6,000 pounds six inches from the ground. What I mean by that is that the platform is six inches from the ground. We use no hand trucks and cars.

In piling your material at the Ford plant, I heard you say you don't

limit it to any height. As you pile it, do you put spacers between it so that your crane comes along and takes off a certain amount—for instance, one ton or two tons?

MR. SHAW: I think we do.

MR. BASORE: How do you know how many there are in between, for instance, if you are using 2 x 4 pieces, 32 inches wide and 72 inches long?

MR. SHAW: I can answer that question. No man will lift over the capacity of any crane. There is a strict rule on that and we do not bother with 100 or 1,000 pounds in those bundles. All we are figuring on is the capacity of our crane which in most cases is five or 10 tons and no superintendent will lift anything over the capacity of the crane. That has to be O. K.'d by the general superintendent and many times we hold up production due to that. If those bundles are not within the capacity of the crane that is where the safety man would step on him or if the piles are dangerously high. But as to the detail of the stock, how many piles, and so on, I will say we don't bother with it unless there are accidents involved.

E. R. COMPLIN (Ford Motor Company, Canada): We have been investigating this from our own standpoint apart from the American plant and I would refer the gentleman to our foreman, Mr. Carey, who is in charge of the loading.

Unloading Materials From the Cars

J. E. WALTERS (General Electric): Has anybody developed a skid for piling sheet metal?

MR. BASORE: I will say yes and no to the question. We use a standard skid made by the Steuben Company of Cincinnati. It is a skid stop made out of hard wood and the bottom is made out of iron which fits our standard electric trucks. We limit the load of skids to 6,000 pounds. We have many of those skids around our plant and rush orders are left on those skids until the time when they are to be used.

MR. WALTERS: I am talking about the plant unloading of two or three cars.

MR. BASORE: Our stuff is piled inside in piles limited to six feet in height. It is separated and counted and comes down from the cars on a roller conveyor. It takes four men to unload the car. Our fastest time on 21 tons has been two hours and 20 minutes. Those sheets are counted and inspected as they go on the pile individually and separately. Those that are bad are laid aside and they are put into what we call a 50-bundle lot. There is a steel tag with 50 marked on it that is set in between the steel. We also pile it, as I said before, with 2 x 4's in between so that our crane comes along and delivers it to the sheet department.

J. MURPHY (Hudson): I would like to ask Mr. Shaw if they have ever used spark-proof trousers?

MR. SHAW: You mean for pouring metal? The only thing we have tried is the apron. We have never bothered with trousers although they may be very good.

MR. DUNNEBACKE: Two years ago a man unloaded a couple of carloads of some finished product that was covered with some sort of a compound to protect the material. Then he did some work on an emery wheel and the sparks flew on his clothes which were saturated with this solution and he was burned to death. I think we ought to analyze the substances that are used to protect our materials to see that they are not inflammable and may not result in accident.

MR. SHAW: My answer is that we do not have spark-proof trousers, but I would rather have an apron that could be removed quickly if it caught fire rather than a pair of trousers.

MR. DUNNEBACKE: In this case the man had a burlap apron on. When he went to work on the emery wheel a spark struck the apron and it burst into flames and he died.

G. A. SCHENKLE (Heintz Mfg. Co., Philadelphia): I happen to know of two metal companies who send out body parts that are protected with an oil that contains some acid. It contains an acid which remains in there with sulphuric acid and is used for treating oil and also is very dirty. I don't believe the average oil we will get for protection purposes will be highly inflammable. It may be, but it will be very infectious and it is something you might well look into.

How Small Trimmings Are Handled

I would like to get Mr. Shaw's answer to a question on the handling of small trimmings. We have two kinds of trimmings—those which can be handled and those which can't be handled with a shovel because they are about like French friend potatoes on a spoon and we can't use a magnet very well. Do you have any such condition and how would you handle small trimmings?

MR. SHAW: If you have an individual press you have a problem there and you have to collect that any way you can and transfer it, but in the regular department your conveyor is back of your machine and takes it down to a large conveyor and from there into a large boiler. They have started that in the pressed steel department.

In regard to some of those trimmings, the salvage department has found that in many cases the trimmings on the heavier work can be used on the smaller jobs and instead of transferring it to the other departments it is brought direct to the job.

MR. SCHENKLE: In this particular case we have boxes where they are supposed to throw these small ends, but about 30 per cent of them don't get them in the boxes because they are working on a piece work basis and speed is necessary. Somebody has to clean that up. We try to get the man to wear gloves on that work because he can get very badly cut doing it. Have you developed anything to eliminate those lacerations and cuts from handling those trimmings?

MR. SHAW: I think a man handling any kind of metal is running a risk where there are sharp edges. I think all of that should be done with an additional tool—a wooden or metal puller or something like that. A

man has to take a metal puller or he will certainly cut his hands when he tries to pull that stuff out. We try to make a rule that a man will never pull any kind of scrap with his hand.

R. H. LUCKENBACH (E. G. Budd Mfg. Co., Philadelphia): I would like to return again for a moment to the matter of the burlap bag used for an apron. We have been very unfortunate in four years to have two men burned to death on account of the use of burlap bags for aprons. I don't believe it is on account of the oil or the inflammability of the solution covering the material or the oil used for preventing rust, but I believe it can be blamed more on the fuzzy material in the burlap bags. It seems to me it is very similar to a lamp wick.

I think we ought to eliminate the burlap bag entirely for an apron, substituting canvas or some other material. We have tested a material of this texture and have been unable to ignite it.

The Hazard of Overhead Hooks Used on Conveyors

M. A. KROGER (Muskegon, Mich.): I would like to ask Mr. Shaw the methods they use for eliminating the hazard of overhead hooks used on conveyors?

MR. SHAW: I consider that a very important subject and I doubt whether anything has been considered on it before. We had one instance where one of these hooks came along and picked a man up and carried him through an open spot into another building. He didn't die, but he was very badly crushed. Since that, wherever our conveyors come down we are putting a rail around that place.

MR. KROGER: For instance, on rotary conveyors in transporting crank shafts and such things from one department to another, in using the hooks what do you do to keep the stock from dropping?

MR. SHAW: That hook has to be designed to retain it. We are constantly changing hooks, special heat-treated hooks. I believe you will find that one of the causes of droppage is that a man will weld a piece there instead of forging the hook and those things drop off. We can make those hooks to retain the parts.

MR. KROGER: I had an opportunity to run into that situation while I was in the employ of the Continental Motors in Muskegon. Our method of eliminating that hazard was to use acetylene welding wire over the drop pin. In other words, it was the drop pin that caused the trouble. That passed up and down allowing your material to come out and go in. We put an acetylene wire right across the mouth of the hook, thereby eliminating the possibility of our pin coming in and out.

MR. SHAW: Was that used on a certain job?

MR. KROGER: It is used in one building extensively. I believe I figured there were 27 hooks, to be exact, and every hook was prepared by millwrights in acetylene welding wire to protect the drop pin from leaving the hook and allowing the material to drop on heads.

MR. SHAW: You don't put a guard on that?

MR. KROGER: We had to drop the guard approximately one to three feet which meant a basket guard and additional expense whereas by simply using a piece of wire plus the workman's labor of perhaps a quarter of an hour, each one of those hooks was put out, which meant an additional saving and an elimination of the hazard.

MR. SHAW: That seems like a good idea. I don't know whether I would want that without a guard. I know that if a hook should ever break or this thing should drop or your conveyor chain should break and slide back, a guard would be a mighty good thing.

MR. KROGER: We have never found an instance of a hook's breaking.

MR. SHAW: I think a lip on the hook to retain the parts is well worth while.

E. C. JACOBS: During the course of your paper you mentioned the question of hernias. Just what do you do in your plant? I assume you examine your employees. What do you do in your plant if some men get in that are inclined to hernias? Do you take some of them in or do you reject all of them.

Discussion on the Question of Contracted Hernia

MR SHAW: When the man is being hired he is not turned down because he has a hernia. He is hired if we need men and he looks strong enough to do the work. That is put on the record card. If anything develops in the future due to that hernia of course that is on the record card and goes against him naturally in a way. But if he is inclined to want an operation, our company is trying to get them taken care of as much as possible. I don't know whether they pay half or what. I think the Buick plant is trying to take care of all its men with hernia. Is that right, Mr. Thalner?

MR. THALNER: If a man develops a hernia, we try to take care of him and we have taken care of a great many of them during the year, our surgeon performing the operation at no cost to the man. We merely ask the man to stand the expense of his hospital bill.

MR. SHAW: Answering your other question, if a foreman thought he had a man on a job, like handling steel, that was too heavy for him and the man claimed he had a hernia, he would be transferred if possible to lighter work. While a foreman can turn down a man he can't lay a man off.

MR. JACOBS: Would the foreman in that department know anything about the physical examination of that man?

MR. SHAW: I don't think he would, not unless he was interested to the extent of calling up the medical department. If he did, he could easily find out.

MR. JACOBS: You wouldn't know that man was susceptible to hernia until after he was ruptured. This foreman would take him even though he showed a slight inclination to hernia when hired. There is no checkup on that system.

MR. SHAW: There is a possibility of that man's getting on that job but it is a slight possibility. If you could go out there and talk to the employment manager, he could show you the system he has of placing men on various jobs. There is a slight possibility of a man's getting on a job handling steel with a slight hernia. If you were to turn down all the physical misfits you wouldn't be able to run any of your plants.

MR. JACOBS: You said that was put on the record card and that might go against the man if anything should happen.

MR. SHAW: If a man wants a job and he has a hernia and our company should tell him that we didn't hire men with hernias, that would be an injustice to mankind. We will give that man a job and do our best. No man is turned down unless he is so terribly sick he can't walk. That doesn't mean we are taking all men physically ill into the plants but we are taking in thousands of them.

MR. JACOBS: I don't think you get my question. Supposing the examination revealed that the rings were enlarged and that man is handling material or doing some other job and he is ruptured. You say that those findings would go against the man. What would you do in that case?

MR. SHAW: I think that would be our responsibility. If we have a man on the job and he had adhesions or probably a weakness and we put him on that job and he has a rupture, of course we would be entirely responsible for that.

Liability in the Event of a Developed Hernia

MR. KROGER: In referring to the employment in your plant of a man with enlargement of the rings on either the right or left side, what he means is that in the event you employ such a man with enlargement of the rings, (which does not necessarily mean that the man is at present ruptured but when the rings are such he is apt to be ruptured), would you be made liable by accepting that man and putting him in your employment?

MR. SHAW: Sure we would. I answered that.

MR. JACOBS: That isn't my question. We are talking about preventing accidents.

A. M. WILLIAMS (Chrysler Corporation, Detroit): Might I attempt to answer that question?

We have dealt with this in hundreds of cases. It so happens that during the past year at the Chrysler Corporation we have been making physical examinations for the first time. We have found hundreds of cases of hernia, potential hernia, weakened and enlarged rings, and we realize that over five per cent of our workmen in the country have this weakness. We realize the fact that a man with an existing hernia and with a potential hernia is not 100 per cent efficient. He is handicapped and the corporation loses and the man loses.

I believe that this job of rehabilitating this five per cent of our men in industry is one we should all get behind and I admire the spirit of the Ford Motor Company in accepting these men and putting them on. We

are accepting them and putting them on but in every case they are accepted only after we have had a very close heart-to-heart talk with them. There are a great many of them we don't accept but we will take a case of potential hernia or an existing hernia and go over the matter with the man in detail, not in the employment office but in the safety department. Whether or not he goes to work depends upon his attitude and the thing is put to him in this way:

"Look here, Bill, you are handicapped. We are interested in rehabilitation. We are interested in taking care of the handicapped man. We have an allotment here and we can accept a few men with hernia. To have this thing taken care of means that you have to have maybe $125 or $150. Have you the money? Can you have this taken care of?"

"No, I haven't the money."

"Then you can't have it done, can you?"

"No."

"That means that you are barred from a job with the Chrysler Corporation. You have to have this money. Will the job help you get it?"

"Heavens, yes. I have got to have a job before I can get this money."

"Well, then, if we give you the job, will you have it taken care of and will you have it taken care of as soon as you are in a position financially to have it done?"

"Sure I will."

"All right. How long do you think it will take you?"

"It will be three or four months before I can get it done.",

"All right, just as a matter of good faith on your part—I might not be here then—will you give us that in the form of a letter?"

A Letter from the Employee Clears Responsibility

And the fellow gives it to us in the form of a letter. We may get hooked on some of these cases but if we lay our cards on the table before the Industrial Commission of Michigan or any other state and show them we are actually getting behind our employees and trying to get them to take care of these defects and to rehabilitate themselves, I don't think we are going to get hooked on many of them. We are not taking a waiver. You all know what that would mean or wouldn't mean. But we are putting forth an honest effort to get these fellows to do the thing for themselves that they should.

In addition to that, we are trying to make the cost as light as we can and out of a good-cheer fund we have we are loaning the money if the case is too bad to wait to have it taken care of.

MR. JACOBS: I want to congratulate our good brother there on that system. However, there is one thing still unanswered. That is the real question we should discuss: what do you do with that man? Are you going to give him the job—which is a fine thing? We don't want to put men out of work but we are misplacing so many of them. Somebody somewhere should know that man has that trouble and he should be placed in a position for which he is fitted. If you are going to do humani-

tarian work, and certainly this work is that, why not see that that man is placed in the job he can do without producing a hernia even though his examination shows that he is probably a candidate for such a thing after a while?

I assume that represented here this morning are many large corporations. You can not forget the little fellow, that was the reason this question was brought up, and it is going to be brought out some more in the meetings that are to follow. We don't have physical examinations and it is quite difficult to place men as well perhaps as you might be able to place them. Certainly we know that the question of hernia has given every safety man something to think about. It has perhaps built up plant accident records more than any other one specific accident today if we include the strain cases and other injuries that come because of handling materials. We are not going to put a man out of a job but we want to place him right. How are we going to place that man in the position where he isn't going to get hurt?

If we accept a man in our plant and the medical examination shows that he has a potential hernia case, and if we place a man on the job where he is going to handle heavy material, we are going to have an accident chalked up against that case, and that is what we are trying to eliminate. We are trying to stop these accidents.

The Man With a Potential Hernia

CHAIRMAN KUECHENMEISTER: I am going to give Mr. Williams about a minute to answer that question and then I am going to ask you gentlemen to confine your discussion to the Hazards of Receiving, Storing and Transferring Materials from Receipt to the Shop Machine. Then if we have time we can discuss hernia and other things.

MR. WILLIAMS: To go back to the man with potential hernia. You will find that sooner or later that man is going to develop that condition and the sooner he has the operation and has it taken care of the better.

Twelve years ago I had my first experience in the safety end in dealing with physical examinations on men who had been turned down because of physical examinations. That was in one of the largest corporations in the country with a record of about 150,000 employees—that is the Bell System—and during all of our experience there we found it utterly impossible to fit a man vocationally for that hernia and we gave it up. We drew the line sharply and kept the man out at first. Now I don't believe we can do it in a small plant, I don't believe we can do it in a big plant, I don't believe we can do it in any plant. As soon as this fellow gets inside of his plant he is going to chum with some foreman who is going to put him on a job for which he is not fitted or maybe when he goes to sit down at his bench he will find a crate of material there and he will start to move it and a hernia will develop. It is going to come on him sooner or later. But if you will take that man in and have an understanding with him, maybe he will hook you—maybe five per cent out of 100 per cent will hook you.

MR. THALNER: I would like to have a minute and I think I can answer that. We do that very thing in our plant. We have the slip made out in the employment department when a man is hired telling him any irregularities such as varicose veins, bad eyesight or hernia must be corrected. That slip is sent to us and a copy of it is sent to the foreman. The foreman knows the condition of the man and the safety inspector takes it out and checks up on it.

We hire men with poor vision. We hire men with vision probably 20-30 in one eye and 20-70 in the other eye on the condition that man will go out and fit himself with a pair of glasses, and the man is checked up on the job to see that he does it. We also hire men with varicose veins on the condition that they will wear a rubber stocking. It is just a matter of checking up through the employment and safety divisions and we are doing that very thing at the present time.

CHAIRMAN KUECHENMEISTER: Gentlemen, I don't want to appear arbitrary and if you want to discuss this question it is all right as far as I am concerned but if you want to get back to the subject of the morning let us have some more questions on hazards of receiving and transferring materials.

We will take a vote on this. All those who want to talk on the question of hernia will raise their hands.

(No hands were raised.)

CHAIRMAN KUECHENMEISTER: We will stop that discussion right here.

Are there any other questions on the hazards of receiving, storing and transferring materials?

MR. REAMER (Cadillac, Detroit): I am glad to say that we have Mr. Weber, our superintendent of receiving, here and he might be able to give you some good ideas on receiving material in carload lots.

A Study of Material Received in Car Load Lots

MR. WEBER (Cadillac, Detroit): I have been making a special study on material received in carload lots. In our receiving room we have nails and band iron and excelsior and everything laying around and it has caused many accidents and in the last year we have given considerable study to the matter. When the materials come in in casks and barrels and different things, up to about a year ago they were all covered and each had from 75 to 100 nails. We have asked that many of these be shipped in carloads without covers. Many objected to that but we have succeeded in getting about 75 per cent of them to do it. All of the bearings and castings and forgings and different articles are coming in open boxes, which I find is wonderfully effective in preventing accidents.

Then we find that many concerns use band iron. After they have 100 nails in the box they deliberately put an iron band around the bottom, and the first thing a receiving room men has to do is take a pair of pliers and cut the band and nine time out of 10 that band will come back and hit him in the face.

In sending castings and forgings many shippers put them in old barrels, greased barrels, and barrels with nails put in around the head. You know that the men will go down in those barrels to get something and many times they will get a large rip in their arms. That has also been a special study.

I have been interested in listening to the discussion on sheet steel. We have a lifter that is far superior to a chain. We lift about four or five tons and it is very effective and successful. We just put it on in piles and it works on a brake lever. We are very much interested in this truck you are speaking of. We are anxious to see that demonstrated. I think in the Cadillac Motor Company we have been doing our share along that line in the past year.

G. S. MITCHELL (Chrysler): I would like to know how you handle the frames of the cars, how you get the chassis out of box cars?

Getting the Chassis Out of the Car

MR. WEBER: Our chassis frames are all bought here in the city. We have a rack. The Midland Steel sends them over on the truck and we just take our crane and let them down on the floor in the racks. We don't have carloads of frames.

CHAIRMAN KUECHENMEISTER: Has anybody here got an answer to that question of handling frames and getting them out of the car?

MR. THALNER: We handle them through hand labor and, of course, that brings in your supervision on the job. If you have a foremen in charge of half a dozen men and if he doesn't govern the accidents of those five or six men he is not a foreman.

MR. MITCHELL: What was the lift you were talking about?

MR. WEBER: We use the large sheet steel lifter and we have our men get four or five tons of sheet metal out of cars on to the truck. It is the full length of the sheet steel and they work a lever. Then your crane lifts it to any pile you want. We have only had that in the last year or so. We have had the same chain system that Mr. Shaw speaks of. I have seen many of them break. From my experience in the factory I don't believe any chain could outstand these lifts. This is a wonderful lift.

MR. REAMER: That lift works on the same principle as a clam shell. When you get your tension on your cable it closes on the bottom.

MR. JACOBS: In many cases in receiving materials, either barrels, boxes, kegs or other containers are used and they are received sometimes at what might be termed a distributing station, especially in large organizations. Frequently they are opened for inspection and in some cases some of the materials are removed. In the case of opening kegs, the head is usually driven in and the nails are allowed to protrude. Some of the materials are taken out or they are examined and the keg is sent out with the nails in it. That same thing is true with respect to boxes, barrels or other containers and it represents a hazard to the man who must remove those materials. It is a good rule to have those nails removed by the men who open the container.

We have found many cases like that and that barrel is sent from place to place and those nails are still left in. I think we can stop a lot of the small cuts and scratches that come from causes like that if we have a definite rule that everybody must either push over the nails or draw them out so they won't present a hazard to those men who must use them afterwards.

MR. SHAW: That is one thing I really had forgotten in receiving. Eliminating tops on boxes is a new idea. I had never thought of that.

No box goes through our receiving department unless all of the nails are removed; no kegs goes through unless every nail is taken out. If any of you gentlemen go through our plant and find nails in the boxes I will give you a dollar for each one.

V. P. SINNOTT (American Radiator, Buffalo): I would like to ask Mr. Shaw how he controls the weights on chain falls?

MR. SHAW: When I was speaking of chains I should have excluded chain falls. As you know, the chain fall is a heat treated chain. What we are speaking of mostly is the logging chain. With the chain fall it is impossible to do anything, and if you write to the manufacturers they will advise you to lift three-quarters of its capacity.

A New Type of Metal Head for Barrel Shipments

MR. SINNOTT: What do you do when your foreman and superintendent are caught lifting a six ton load on a three ton chain?

MR. SHAW: They are subject to discipline. That is a violation of our rules.

MR. BASORE: In talking about those barrels and nails in the kegs, I would suggest that you go through our plant and go to the receiving department and see the new type of sprung heads in the barrels. We are trying to get that type of barrels for our use now. What I mean by sprung heads is a metal head sprung in a groove eliminating all of the nails. It can be put back in at any time. It eliminates all of the nails in the boxes. While it is a mighty fine idea not to have tops on boxes and that might be all right for short hauls on trucks or something like that, it is not good for long runs. There are boxes used now by a great many shippers with cleats on them. When you lift the cleat which is nailed at the top of the box the top comes off and it not only saves time but there are no nails there.

MR. WEBER: I would like to say a few words about the kegs. I suppose you are referring to barb-bolts and rivets coming in kegs in large quantities. I noticed many of those. They have the ridges in there and you say the heads are pressed in by machinery. But if you will notice, every vendor still puts in 25 or 30 nails into that small keg.

MR. BASORE: Not in the new type of barrel. The new type of barrel is sprung with two hooks close to the top protecting this inverted ridge.

MR. WEBER: How long have they been on the market?

MR. BASORE: I guess about a year particularly in the United States Nail Outfit.

These can be used for other things when they are emptied. I think

Mr. Shaw's idea of using metal boxes is very good. They are good not only from the safety standpoint but because of their long life.

MR. WEBER: What I am concerned about is that the management puts down orders for the receiving clerk to live up to those rules and you go around and you say to John or Jim not to leave those nails in the boxes, and you send them out in the shop, and the minute your back is turned John and Jim are doing just the opposite to what you told them to do. It is quite a problem in the receiving room.

We receive about 40 or 50 carloads every day and about half of those are of material that has to be shipped in boxes. A lot of firms object to shipping bearings in open boxes. They claim the dust might get in them. The bearings are put in wax paper in individual cartons and packed in nice wooden boxes. I can't see the necessity of putting 100 nails in that particular small box but they all do it.

I know that a nail puller is a hazard. I have been through the mill and I know the accidents that occur through the use of nail pullers. We ought to be able to show the vendor that he would save by not using so many nails and we certainly would save.

MR. MURPHY: Mr. Shaw brought up something that I believe we have found the solution of in our plant. He spoke about a man running into a conveyor chain and hook. We have that same condition in our plant. In one place in particular we have a way of lifting a Hudson motor off of the block test and carrying it across an aisle past a blind corner and on to another conveyor. Because most of our material handling from one department to another is handled on electric trucks the drivers of these trucks stand at a height of 12 or 14 inches above the floor, which would make them seem like very tall men walking around.

Methods of Safeguarding the Overhead Conveyor

In this particular place the first thing we put in was an overhead wooden beam with some ropes dangling down so that the man would hit those in the same way a man riding on the top of a train will before coming to a bridge. In addition to that we had a gong on the train but that didn't seem to answer. So I decided I was going to put something quite elaborate on there. So we got a bell which is hooked up with the circuit of this portable electric hoist. At the time the power is on and the load is moving from one side to the other this bell rings continuously. We still had some fellows who pay no attention to that and so in order to make it more fool-proof we have a bank of red electric lights on each side and these red lights flash on and off at the time the load is moving. In other words, when the load is moving we have the bell and the lights and a rope, and so far nobody has gotten hit.

R. W. BAKER (American Mutual Liability Insurance Company, Indianapolis): This discussion has recalled to me an accident that might possibly be of interest. In this particular case the oil was forced under

air pressure to a reservoir and there fed by gravity for the purpose of annealing. No safety device of any kind was on the line. A commercial drum having been used there was a blowout and the man was killed. The manufacturers during the investigation stated that such a process was recommended by the Standard Oil Company. We made an investigation and found it was not true.

I am calling your attention to the incident to see whether or not this system might be in use elsewhere.

G. A. SHENKLE (Heintz, Philadelphia): That process of unloading drums by compressed air is not permitted in the Heintz Company plants. We had an accident possibly eight months ago at Philadelphia. We bought several drums of oil and in applying pressure blew up one of the drums. Fortunately for us, or unfortunately for us, the tug captain knocked off the running lights and broke off the flag staff and the oil went out into the middle of the river. That is what a drum will do. I would say it is wise not to apply air pressure to any drum. Some are good and some are bad and there is no way of telling about them.

CHAIRMAN KUECHENMEISTER: What would you recommend?

MR. SHENKLE: That is all according to the condition. Usually it is possible to unload by gravity or by transfer. Usually you can, by gravity, raise the drum to the point where you want to in order to store it. Usually in the case of these tugs they are trying to save all the money they can because the captain is out for food or something else and he is using the quickest and cheapest way regardless of safety.

ADJOURNMENT

WEDNESDAY MORNING SESSION

October 27, 1926

The Wednesday morning meeting convened at 9:20 o'clock, Chairman Kuechenmeister presiding.

CHAIRMAN KUECHENMEISTER: Before continuing with our discussion of industrial safety, we want to take a few minutes this morning to elect the officers for the coming year.

MR. THALNER: Your Nominating Committe met yesterday and in accordance with past procedure have advanced the regular officers in line. There have been just one or two minor changes, but the following is submitted for the approval of this body:

Chairman of the Section for the ensuing year, Arthur F. Dunnebacke, representing the General Motors Corporation; Vice-Chairman, Arthur M. Williams of the Chrysler Corporation.

You all remember, I think it was two years ago, that one of the hard-working members of the Automotive Section left us and went down to Chattanooga, Tennessee. At that time I believe he was the vice-chairman of the Automotive Section. Due to his hard work and earnest efforts the Nominating Committee asked him if he would consider taking up the secretaryship of the Automotive Section this year, because we thought we should have a man familiar with the work and Mr. E. H. Cotcher, of the Murray Body Company, has kindly consented to have his name presented as a nominee for Secretary of the Automotive Section.

Your Nominating Committee has offered, by way of suggestion, a little new procedure this year. We want to have elected at this meeting, if it is your pleasure, two men, one of whom, at the end of next year's work, may be put in as a nominee for the secretaryship of this Section. Any of you men who have had anything to do with work of this kind know that a new man coming into an organization is somewhat at a loss as to what his duties are. We feel that by having two men at large, by their contact with the Executive Committee during the year they can learn the processes, and then, if their work has been up to standard during the year, they can be considered as nominees for the office of secretary. Those two men, who will be purely on the Executive Committee at large this year, are Mr. Judges, of the Ford Motor Company of Canada, and Mr. Hunter, of the National Cash Register Company, of Dayton, Ohio.

In addition to that, we also feel that all past chairmen should be elected to office to serve on the Executive Committee of the Automotive Section, and we therefore submit the following slate:

A. F. Dunnebacke, Chairman; A. M. Williams, Vice-Chairman; E. H. Cotcher, Secretary, and your Executive Committee, consisting of those

officers and your retiring Chairman, Mr. Kuechenmeister, myself, Mr. L. E. Averill, Mr. R. A. Shaw, Mr. L. L. Judges and Mr. D. C. Hunter.

E. F. CLARKE (Ternsted Manufacturing Co., Detroit): I will make a motion that the report of the Nominating Committee be accepted.

(The motion was seconded and carried.)

CHAIRMAN KUECHENMEISTER: I declare these officers elected.

Gentlemen, I think you have been very wise in the selection of your officers for the ensuing year. Mr. Dunnebacke has had charge of the work for the past year. I will be frank to say that I didn't do a thing. He will be able to carry on the work far better this coming year.

Mr. Williams has not only been the secretary of the Section but he has been a member of the Executive Committee of the National Council. He is well qualified to carry on the work.

Mr. Cotcher has had much experience in industrial safety work and in the local Safety Council. He has been an officer of the Section. He will make an ideal secretary.

Those three officers, backed up by such men as Thalner, Averill and Shaw, give you a set of officers that are A No. 1, and you can all look forward to a very successful year.

I am going to turn this meeting over to your new chairman and let him carry on the work from this morning on.

It gives me great pleasure, gentlemen, to call on Mr. Dunnebacke to preside at these meetings.

Chairman Dunnebacke Assumes the Section Reins

CHAIRMAN DUNNEBACKE: Let us all laugh to ourselves in public. This is as good a joke as I have had in years. I opened up the paper and there I saw that I was elected Chairman of the Section before we had election. It is unusual. But I appreciate the honor you have shown me and I am especially grateful and I am very fortunate in the other men who have been elected officers. I think they are a very capable set of men. As I look forward to next year it is with no degree of hesitancy because I feel we are going to have a successful year.

The Automotive Section has always been one of the largest and most important sections and I am sure I not only speak for myself but for others here when I say that next year we will try to make it still larger and more important.

There is just a word I want to say in explanation. You may not know that Mr. Kuechenmeister has not been quite himself physically and that he has only recently completely convalesced from illness; under advice of his physician he could not do much active work. So last year when the Executive Committee met he tendered his resignation as chairman of the Section. We all know what Mr. Kuechenmeister has meant to the Automotive Section and the many years of hard work he has given to Safety Council work, and so your Executive Committee and officers decided we would not accept his resignation. We told him we wanted

him to continue through the year as chairman; in fact, we insisted on that.

I appreciate the opportunity of conducting this meeting and tomorrow morning I am going to give you a chance to see your vice-chairman and will have Mr. Williams conduct the meeting. I think it is wise for us to become acquainted with the fellows who are to be our officers for the next year.

I am going to reverse the order you find on your program. Your program has the hazards of plant maintenance first but I am going to take up the hazards of transforming material first because it follows in line with our picture of the program. To handle that paper dealing with the hazards of material in process we have a gentleman with us who, more than any man I know, has had a long, intimate experience with shop management, shop materials and shop processes.

I knew him 20 years ago when he was running a great big planer, machining up a flywheel, and through all of these years I know he has had intimate connection with men and processes. He knows every form of manufacturing process. He has his heart and soul in the safety work in his plant. It gives me pleasure to call on Mr. A. A. Lauzun, the general factory superintendent of the Reo Motor Company of Lansing, Michigan.

TRANSFORMATION OF MATERIAL—MACHINE PROCESSES

A. A. Lauzun, General Superintendent, Reo Motor Car Co., Lansing, Mich.

In order to get an idea of the size and importance of our job let us review a few statistics. During the World War, the U. S. casualties, including deaths from all causes, were 126,949 killed and 234,300 wounded; and during the same period there were, approximately, 126,000 men, women and children killed by accident in this country, representing a cost of $1,600,000.

Think of it! Almost as many killed while peacefully engaged in the daily pursuits of life as were killed in the most sanguinary war of all time.

And then, that $1,600,000 cost of these accidents; who pays that? You and I pay indirectly for every accident that occurs in the land. If a manufacturer is required, through compensation laws, to carry insurance to cover his employees, he adds it to the price of the article he produces and we pay for the insurance. In other words, if Bill loses a finger, you and I pay for that finger in the price of bread and butter.

So you see, that from a purely selfish view-point, we should go after this safety program for our own financial gain. But I am pleased to state that it would be hard to find a company or an individual who considers primarily the financial end. We are all looking after the welfare of the employee, for, after all, what is money as compared to the head of a family killed or totally disabled, with the wife and kiddies thrown on the world?

The reduction of accidents and the conservation of human life is our problem, and, judging from that enormous toll of 126,000 taken through accidents during the war, we have some job on our hands.

Now, how are we going to meet this problem? By a continued educational safety program, in the home, on the street, in the car, and in the factory.

In the NATIONAL SAFETY NEWS of August, 1926, we read: "Safety work in the U. S. has resulted in a saving of more than 100,000 lives during the period from 1913 to 1924 inclusive. * * * If the deaths from automobile accidents were not considered * * * a saving of 221,000 lives would be shown as a result of safety work in industries, homes and public places." This is proof to me, gentlemen, that you represent an organization that is Uncle Sam's greatest asset, and statistics show that you are doing your work well.

Guarding the Factory Hazards Is Not Enough

It is not enough to guard the factory so as to make it "fool-proof." Because the fool will seek some way around the guard. Let us eliminate the fool. Let us so educate him that he will be brought to think "Safety" at all times. If you cannot sell the idea of "Safety" to the men, all your efforts to guard the employee will go for naught.

There are some men who continually take chances and seem to get by. They are bad examples to the rest. There are some who are safeguarded against what they consider a great hazard and yet lose their lives by a most natural accident. For example: Bobby Leach, famous thrill seeker, and death defier, who startled the world in 1911 by going over Niagara Falls in a specially constructed barrel, lost his life 15 years later as a result of a broken leg caused by slipping on an orange peel. The great hazards seem to get more consideration than the small ones. We should be continually on our guard against infection from the small sliver in the finger, an abrasion of the skin, the foreign particle in the eye, the scratch of the nail, or any of the numerous other slight injuries that happen to men in their daily work. Go to the first-aid station for everything; it pays.

We hear some of the old heads say that this modern safety idea is all bunk, that years ago they did not hear of as many accidents as they do now. Gentlemen, previous to 1913 there were no means of getting accident data. Now we have free access to the wonderful data gotten out by the National Safety Council.

The slightest injury should be taken care of by the proper persons assigned to that duty. One might know his own physical condition but he does not know how some of the things he comes in contact with are contaminated.

Our modern Coolant systems, whether individual or centrally located, supplying a single machine or a group, bear constant watching. If one of the operators has a skin disease he will infect the entire system. Think of the danger to other employees if one should be suffering with

a venereal disease. It does not take long to contaminate a system with syphilis germs.

I will be asked, "How can we eliminate venereal disease from the factory?" It might seem a difficult problem, but you can educate your men in the dangers to themselves and their families of working alongside of a man so diseased, and they will soon single out those affected and report them to the proper factory authorities, who having once spotted such a person, should never rehire him until he shows a clean bill of health from the factory physician.

One of the curses of our factory life is "goosing." We have all witnessed the comedy of some nervous fellow being "goosed" from behind by a fellow workman. But think of the seriousness of this thing and stamp it out. "Horse-play" of any kind is dangerous and should be severly dealt with, even to the discharge of the guilty ones. You might consider these matters as rather delicate to handle through the medium of posters placed in the factory. Let us lay aside this false modesty and hit "straight from the shoulder." Posters appeal to the workmen, and the seriousness of the theme will strike home and give a lasting impression on the mind.

The Great Danger Lurking in the Air Hose

Did you ever think seriously of the great danger that lurks in the air hose? Yet, this cannot be guarded mechanically. In the use of air to blow out dirt from jigs and fixtures, men are not careful enough in protecting fellow workmen. They blow toward their co-workers, getting dirt into their eyes and causing injuries that are likely to be serious. They blow the dust off their own clothes with 80 lbs. pressure, little realizing that the air might enter the body and cause serious injury or death. Even though it does not enter the body, the sudden cooling of the body might result fatally. There should be more poster propaganda through the factories as to the danger of compressed air. We read of three workmen in one of our factories, holding a young lad and applying the nozzle of the air-hose to his body in such manner as to burst his intestines. The boy died. The men got jail sentences. Would this have happened if these men had been impressed with the danger of compressed air? We might guard every dangerous part of a machine tool, we might take every mechanical means towards safety, but we have lost all effort if we fail to impress the mind.

We, as safety men, are unfair at times to the operator. Under pressure of the modern piece-work system, the workman is after every possible piece that can be gotten in the day's run. If a guard interferes with production, he is liable to remove it when no one is looking. Of course if he is found out, he should be severely reprimanded, but we should find out why the guard was removed. Our guards should be such as not to hamper production. In short, we do not do enough careful engineering on our safety devices. We must not only consider the safety of the operator but also endeavor to get out as many pieces as possible with safety.

I am going to quote from a pamphlet entitled "Industrial Anxiety," by Glen Gardiner, relative to accident anxiety: "Every worker who works at a hazardous job sets up certain fortifications to guard against injury. It is when these fortifications sink too far into the sub-conscious that accidents occur. The fear that he may be injured constitutes a man's accident anxiety. The ever present realization that a slip may result in a serious injury keeps the workman keyed up to a nervous tension. The more responsibility for safety that can be taken off the shoulders of the man by the installation of mechanical safeguards and fool-proof equipment, the less accident anxiety he will feel.

"Safety is a habit, or at least by a great deal of educational work we try to make safe practices habitual. By getting a man habitually to work safely, we reduce the load of accident anxiety which he must carry.

The Accident Anxiety of Workers a Real Handicap

"Knowledge that the company has taken preventive measures to insure his safety is a source of great relief to the worker. It takes the pressure from his mind. It relieves that portion of his mind which he has to set aside for constant precautionary ideas, so that he can put his whole mind to constructive work. Instead of having part of his mind constantly saying to his hands, 'Be careful! Don't do it that way. Wait; not yet,' he can throw his whole mind into the doing of his job.

"There can be no question but that the accident anxiety which goes along with the hazardous job is a tremendous drain upon the worker's productive ability. This one fact alone is justification enough for the expenditure of money that is made to promote safe working conditions in a plant."

There is another phase of factory life that you perhaps will feel does not come under the jurisdiction of a safety inspector. That is, the attitude of the foreman and even the superintendent toward the men. Men can not work safely under a supervisor who is unfair. A boss who is a habitual grouch is a hindrance to safety and production. A supervisor who does not deal on the square with his men should be removed as soon as found out. Men like to see "all the cards on the table," and they will work better and safer under the boss who in all his dealings is just. We should feel it our duty to analyze the attitude of the boss toward his men and take a personal part in the correction of all unfairness, even though it means recommending the removal of some, because worry caused by the attitude of a misfit boss spells accident.

If you doubt the psychology of safety, look over the records of one of your "Safety Weeks." You will notice a substantial decrease in accidents, due to the "mass mind" working toward one ideal. Or recall how the different departments vie with each other for a position on the honor roll. Or notice the satisfaction of the foreman whose department has had a month without a lost time accident.

If we can create such a mind during "Safety Week," why not carry on toward a "Safety Year?" Or better still, why not all strive harder toward the consummation of the ideal of "Safety Always?"

CHAIRMAN DUNNEBACKE: Gentlemen, I am sure Mr. Lauzun has covered the field of shop safety in a pretty good way and I know you all join me in extending to him a vote of thanks from the Section.

The big value of these papers, of course, lies in the discussion and I am sure that Mr. Lauzun will consent now, in so far as he is able, to answer any question that you wish to bring up. I want to throw this paper open for discussion.

I want every man in the room to feel at liberty to ask questions on any subject, except accidents on punch presses, because they will be handled Friday morning in the punch press meeting.

MR. SANE (Delco Light): Mr. Lauzun spoke of the hazard of using the air hose. I would like to ask what remedy he offers for that condition, whether he has any arrangement made whereby he can cut down the air pressure where it is not needed to a lower pressure and still have the same line for high pressure.

MR. LAUZUN: Of course in the factories you will have to maintain an air pressure that works through the different tools using that air. Eighty pounds is about an average pressure, I should think, that would carry on air chuck work, riveting work and things of that nature, but as I stated, the air hose, the air nozzle, can not be mechanically guarded, as I see it. It is merely a matter of education. There are some things that you can not really guard and those are the things which you must go after in another way. You have to educate the man who is in danger. A poster, for instance, showing a man with his eye inflamed, caused by a careless workman blowing dirt toward this man; a poster showing the alimentary canal, for instance, and stating the pounds of pressure that the intestine will stand, and along the side of that an air hose showing the pressure that that will stand; would show the men so forcefully that I don't think there would be a repetition of any accidents along that line.

Eliminating Eye Accidents From the Air Hose

MR. BOYD (Paige Motor Car Company): I might add something to that. About two years ago in the Paige machine shop we had a good deal of the same trouble with regard to air hose. We had air all through the shop with 80 pounds pressure for the riveting work, as mentioned, and we were having a large number of eye cases in our first-aid room. We made up our minds that we would put a stop to that if we could, and we have eliminated, in about nine months' time, a great many of the eye cases caused by this practice of blowing the chips into the air.

We did it in this way: we first of all tried to educate the men not to use the air too liberally. We tried to educate them to be careful in the way they used it. But probably the thing which helped us most was going around and applying to each machine a chip pan on the table of the machine or under the table or close by where the chips could be put. We then furnished the man with a brush so he could brush the chips into that pan.

These pans, in addition to being located where they are handy, are

provided with a spout and are put over at one side of the machine. The sweeper comes along with a receptacle on wheels, locates it under the spout, and with his own brush or the brush on the machine shoves the chips through the spout into the receptacle and wheels it out of doors. That accomplishes three things. It keeps the machines clean, it keeps the chips off of the floor and it does away with a large part of the chip blowing.

J. E. WALTERS (General Electric, West Lynn): On the question of discipline, under the compensation laws of the state of Massachusetts contributory negligence is a limiting factor—that is deliberate negligence. The use of air hose enters into this problem. We had an accident of a similar nature and the question shot back at us was, what discipline did you use? The man had been warned but there was nothing doing on that.

"Did you fire him?"

"We did not."

"Then he had not been disciplined."

I wonder how many of us have run up against that problem. Had you fired anybody in a similar case before when you had this trouble or were you simply satisfied to say, "If this happens again, out you go"? The Board in Massachusetts has ruled that the only discipline is the actual discharge. That is pretty tough but I wonder how many more of us are up against that?

Eighty Pounds of Air Not Necessary in Hose

CHAIRMAN DUNNEBACKE: The general trend of court decisions is that way. Regardless of the number of posters you have around and regardless of the amount of instruction and definite absolute commands you give a man not to do a thing, the courts have held, and are more and more holding this way, that unless you can actually show the court you were making a determined effort to prevent the things you are trying to prevent through your signs, they will not relieve you from your responsibility. In other words, although you have all kinds of signs saying "don't do that," unless you can show the court that through repeated suspensions and firing you are making a determined effort to stop the practice you wouldn't get anywhere.

Before we leave the compressed air question, I want to offer one suggestion. In the majority of cases where you have air, I doubt if you need more than from eight to 12 pounds, yet these lines are carrying 80 or more. If you have reducing valves it would be very costly and the possibilities are that the minute your back is turned the man is going to get up and turn the valve, regardless of how you have it set.

In one company they got very good results in this way: just below each valve they put in a three-eighths union and between the two parts of that union they put a disc of 16 gauge metal and bored a sixteenth inch hole in it. What was the result? The workman shoots his air nozzle and he gets a blast of air sufficient to do the work he wants it to do to clean a certain jig or fixture, but that air pressure quickly dies down to eight pounds. He thinks he can fix that and he turns the air valve

but still he can't get more than eight or 10 pounds pressure, which is all that is necessary to do that work.

This has got to be done at night or on Sunday or some time when the men don't know it, because if the men know it the first thing you know, they are going to put larger holes in there. Then if it comes down to that it is a question of discipline.

MR. JONES (Motor Wheel Company): On this air proposition, it seems to me that eight or 10 pounds would not do the work required. We find that we need 80 pounds for every job. We tried to reduce the amount of pressure but we found it wouldn't give us the air required.

CHAIRMAN DUNNEBACKE: It may not on your chucks and other operations but on a good many of the cleaning operations I feel that from eight to 12 pounds would be just as effective.

Is There a Substitute for Air in Cleaning Off Dust?

MR. JONES: That leads me to ask another question. What is a substitute for air when you want to clean off dust from wheels or something of that sort when the air doesn't remove the dirt from the product? Is there some good substitute that can be used similar to rubbing it with a cloth which I know is pretty expensive?

MR. LAUZUN: There is a place for air and there are conditions under which air must be used if you want to accomplish certain results. In removing dust from wheels, you have either got to wipe it off with a cloth, which is an expensive proposition, or you have to blow it off with air of sufficient pressure. It would seem as though if you had a row of wheels in operation and the men were working on a certain detail of this wheel, in that particular line you could put a reducing valve on the entire line so as to give the nozzle of the hose where each operator is at work the proper pressure to carry on that particular operation. But air is the most effective way of cleaning things. It is very quick and when you come right down to analyze the cost it is about the cheapest way you can get at the proposition.

There are ways of taking care of the situation by putting deflectors on the pipe. For instance, if you are cleaning out cap holes, if you have a long slender pipe, you take about three-sixteenths inch brass pipe and solder that to the end of the air nozzle and then just above the depth of the hole you have a deflector. Now when you turn on the air the air goes into the hole the chips come up and pass on to the top of the work and they can be very easily wiped off.

Then, again, on your machines, if a man has to blow off his chips toward a workman you would blow a deflector that would catch it.

This little idea Mr. Dunnebacke advances in regard to the little disc, I don't think he means to suggest for anything other than the cleaning of fixtures and it appeals to me as a very good thing if it is put far enough away from the air nozzle so as to get a chamber between this disc and the air nozzle. By so doing you have slowed up the 80 pounds of pressure in this nozzle and you will get a good force and then it will be gone and

you will have to close the nozzle again; otherwise, he will get the pressure going through the small hole and it will dissipate its pressure in the large pipe.

E. C. JACOBS (American Mutual, New York City): I was in a plant recently where they have a number of air lines that are used in the engineering plant where they had taken a connection similar to that used on the drop lights and fastened those to the end of the hose. I think that serves to keep that air from entering the body in the event of horse play and it also serves to keep that nozzle away from the parts we are going to blow and allows a better spread of air. As a matter of fact, the best thing to do of course is to have a definite shop rule. In some plants the hose is used for cleaning clothing and to stop that practice I have seen some concerns provide whisk brooms in the departments where the hose is located.

I really think the connection we use on the electric light sockets today, especially the drop lights, will serve to stop a good many of the accidents that come from horse play because it is rather difficult for the air to enter the body unless that nozzle is brought close to the body; I think we might try that.

A Suction System Devised to Clean Away Dust

MR. THALNER: We had a job where we were drilling wrist pin holes in pistons and we couldn't use the air to blow the dust off of the jig continuously because in addition to causing a very dusty and unhealthy condition in the shop the machine bearings were constantly wearing out, so a suction system was devised whereby a pipe was brought down and run into each side of the piston. This was a multiple drilling job with three pistons laid one ahead of the other, and by putting in the suction system and making the aperture real small that job has been kept clean ever since because there is never any circulation to draw out any dust and chips which might accumulate and in addition you localize or confine your dust to a cyclone instead of blowing it through the entire department.

CHAIRMAN DUNNEBACKE: In order to carry on our machine processes, our shop processes, we must have a factory and we must have equipment; we must have heat and light and power and air. The installation, the maintenance and the upkeep of these various portions of industrial plants usually come under the plant engineer or the maintenance engineer. The maintenance engineer really has some job. Many times that work is emergency work.

Shops go through a process of reconditioning. Many whole plants are moved between Saturday and Monday. Then the plant engineer comes in and works night and day and overtime and Sunday to get the work done and there are many problems in connection with plant maintenance and plant engineering that are serious to us safety engineers. So many problems have arisen that we deemed it serious enough to bring it before the Section in the form of a paper. We have with us the Maintenance Engi-

neer of the Fairbanks Morse Company of Beloit, Wisconsin, Mr. L. H. Pease, who is going to talk to us on the hazards of plant maintenance.

HAZARDS OF PLANT MAINTENANCE—MECHANICAL JOBS

L. A. Pease, General Maintenance Engineer, Fairbanks, Morse & Company, Manufacturing Division, Beloit, Wis.

While we have been very much concerned in past years with reducing hazards in all of the other departments of an industrial organization, we have given little thought to the hazards of maintenance work and how they could be overcome.

It is the purpose of this paper to treat in a preliminary way of the many hazards ordinarily encountered in the work of the maintenance department in a large typical manufacturing industry, and to show what has been done by the company with which I am connected to reduce these hazards to a minimum.

The scope of work of this department is as varied as there are types of plants, and the hazards vary accordingly. The fact that this department operates in every other department of the plant, and usually with the hazard of unusual working conditions, will show that the hazards encountered are especially prevalent.

Our chief products are oil engines, both of the Diesel and spark ignition type varying in size from the two horsepower kerosense engine to 720 horsepower Diesel oil engine; electrical generators and motors up to 600 kilowatts; pumps of all types, including centrifugal pumps up to 60 million gallons per day; domestic water plants, windmills and light plants, and railway equipment of many types. So you can see that our products are not only varied but cover quite completely in their production most of the maintenance problems encountered in a large manufacturing plant. Practically all of the production work is done progressively, involving a considerable number of conveyor systems.

Our buildings and equipment vary in age from 40 year old buildings to our new modern six acre foundry. The type of equipment used varies from full line shaft, a little of which remains, to purely automatic direct motor driven equipment and conveyors. Besides machine, erection and test shops, we have large forge shops, pattern shops, tin shops, iron foundries, brass foundries and many other departments, employing in all between 5,000 and 6,000 men.

It is within the scope of the maintenance department to install all productive machinery such as lathes, milling machines, boring mills, boring bars, hammer presses, shears, etc.; as well as to install and maintain the non-productive equipment such as conveyor systems, cranes, hoists, oil, air, water, steam and gas distribution systems, line shafts, motors, furnaces, test and power plant equipment. This department also has charge of the maintenance of buildings, railroad tracks, power house, transportation and yards.

The maintenance department operates through the following seven crews: (1) The electricians who install and maintain all electric equipment and distribution systems. (2) The millwrights who care for the setting and repairing of machines, conveyors, shafting, etc. (3) The crane crew who operate and repair all cranes and hoisting equipment including bridge cranes, gantry cranes, hoists, elevators and locomotive cranes. (4) The carpenters and painters who maintain and change all buildings and structures. (5) The pipe fitters who attend to all piping for the distribution systems. (6) The plant operating crew who operate power plants and equipment. (7) The safety crew who inspect for hazards, and design, install and maintain all guards and other safety equipment.

The department functions in a manner similar to that of a normal staff organization, each foreman having equal authority and responsibility for his crew. It is usually necessary for several of the foremen to work together as well as with the superintendent of the shops.

Foremen Held Personally Responsible for Men's Safety

All foremen are held personally responsible for the safety of their men. Safety educational activities have from the first stressed this responsibility until at the present time every foreman realizes and feels it his duty to exercise every precaution toward the prevention of accidents. The foreman, his superintendent and the safety inspector are the safety committee of the maintenance department. There are no regular scheduled meetings of this committee. The discussion of general hazards encountered in the department are made in meetings held from time to time as necessity requires.

Where projects are of more extensive nature requiring the cooperation of several of the crews, a meeting of the committee is usually held in the office of the shop superintendent. At this meeting a program is laid out, hazards discussed, and responsibility assigned to each of the foremen. This allows a program to be arranged with no interference between the various crews and permits every precaution to be exercised against accident.

On projects requiring but a small amount of work on the part of several of the crews, the work is carried on in the same manner as normal maintenance. In this case, it is only necessary for the foremen to cooperate closely to prevent interference of other important work. Where the work is chiefly concerned with one crew, the foreman of that crew is responsible for the completed job, and men from other crews work under the supervision of the foreman in charge.

A copy of all non-productive shop orders is sent to the safety department where they are checked to see whether all state law requirements as well as our own standards of safety are being met. These non- productive orders cover all work other than the actual schedule of product manufactured for sale, and I believe that our safety engineer will bear me out when I state that the consideration of safety has been such an important factor in our shop that it is very seldom necessary for design

or layout to be changed to conform with the most modern safety practice.

In cooperation with the maintenance department and the safety department is the medical department through which many messages upon safety are brought forcefully to the employees. The slogan of the medical department is, "A healthy crew working full time," indicating that to work safely and efficiently a man must be healthy. Our point of view is that a man doesn't need to be injured and he doesn't have to be sick. It is the men to whom this idea has been sold who are the back bone of our shops today. Do not think for one moment that we are referring wholly to the class in overalls. It is of vital importance that the foreman, the superintendent, the manager and owners get this point of view. That our managers and men do have this idea, is proved by the fact that our organization has two departments, "Safety" and "Medical," to fight the two factors which oppose our goal.

This also is proved by citing the accomplishments of these two departments in the reduction of time lost. The figures of the manufacturing division show that accidents are causing a time loss of less than one-half day per man per year, and sickness is causing a time loss of three days per man per year. The Medical department prevents accidents by reducing sickness which is itself a known cause of accident.

Departments Considered Especially Hazardous

Of the seven divisions in the maintenance department, the electrical, millwright and crane repair are considered the most hazardous. Many of the hazards referred to later as being especially applicable to the millwright division also apply to the electrician. The work of the electrician carries him throughout the plant, in every one of the shops both above and below the normal level.

In addition, there are many more hazards which require special vigilance on the part of the electrician in order that no injury results. The work on electric cables, transformers and switching equipment in underground vaults and tunnels requires special precaution. Here the switches controlling the circuits upon which men are working are locked with the workman's personal lock. Boots and rubber gloves are worn for insulation, pliers and screw drivers are insulated against shock. All iron boxes, lead sheaths on cables, etc., are grounded to make sure that no employee receives injury. Men on this work are required to work in groups, two being the minimum number allowed on any underground circuit. All circuits underground are worked on only when dead and with switches locked open, the men doing the work seeing personally that the switches are opened and locked, and unlocked and closed when work is completed.

On our overhead 4,000 volt lines, no one is allowed to work with the circuits alive. All switches controlling the circuits upon which men are working are opened, together with the hand operated disconnecting switches, and the circuit is grounded. These switches are opened and closed only by the electrical foreman who is always present when work is to be done upon the overhead lines.

When working on circuits in the shop the electrician locks open the switch controlling the circuit upon which he is working so it can not be closed until his lock is removed. If other mechanics are also working on equipment driven by motors on the same circuits, they also lock the switch open with their own locks and the switch can not be closed until all locks are removed. All switchboards and motor platforms throughout the entire shop have adequate hand railings around them to prevent the men from accidently falling off.

All new wiring throughout the shop is done in accordance with the state code. All control equipment on new work is of the remote control type with safety stops located at convenient places. On conveyor systems extending over wide areas, there is only one start button for each conveyor or other conveyors which might be operating synchronously with it, and there are several stop buttons located at various points along the line for convenience of shutting down instantly if necessary.

Specially Authorized Persons Handle Electrical Work

All work on electric circuits throughout the plant is performed by electricians of the maintenance department only. No unauthorized person is permitted to work upon or to tamper with any electrical equipment.

In places such as test floors, laboratories, etc., where considerable electrical equipment is installed and operated, one of the maintenance electricians is always in attendance to perform all the operating and maintenance work necessary.

For convenience and safety throughout the various shops there is in each large shop an electrician from the maintenance department who cares for all of the electrical work thus making it unnecessary for any unauthorized employee to come in contact with any electrical equipment other than a switch controlling the motor driving the machine that he might be working upon.

The millwright has included in his kit a pair of goggles to use while chipping concrete, pouring babbitt, lead, etc., and although a great deal of moving machinery is operating at all times, we have never had an eye injury from this cause in our maintenance department.

Each millwright and electrician is required to carry a padlock, the key of which always remains in his possession. As there is more or less danger in having men of several crews working together and that the work of one crew might endanger the life of men of another crew, switches, valves, etc., are arranged so that each workman can lock them with his own lock and same can not be disturbed by anyone until all of the locks have been removed by their respective owners.

Where portable ladders are necessary, we have found it of considerable advantage that each division within the maintenance department have and maintain its own portable ladders, and in some cases certain individual employees have their own individual ladders. Special care is exercised to see that the ladders are used only for such purpose as intended, and by only such employees as are designated to use them. Ladders are

purchased on strict specifications and must stand rigid inspection and test upon receipt at the plant. Before placing in service, each portable ladder is equipped with a mild steel shoe having a hardened steel point. Rigid periodical inspection of ladders is maintained and the observance of any defect whatsoever is sufficient cause for condemnation, putting ladders out of use until repaired or replaced. It is our general practice and policy to use rigid ladders and stairways whenever possible reducing to a minimum the necessity of using portable ladders.

All hand tools used by the maintenance department except carpenter tools are furnished and maintained by the company. A special tool crib for all hand tools, ropes, chains, ladders, jacks, shovels, wrenches and other maintenance tools and equipment is situated in this department, easily accessible to all employees. All tools are issued on check to the individual workman. The trained mechanic keeps his tools for such time as it may be necessary to perform certain work while the unskilled workman turns in his tools at the crib each night. Condition of all hand tools is carefully noticed. Whenever a tool is found with mushroomed or burred head, a loose or broken handle, or broken head, etc., the tool is repaired or dressed as the case may be before being returned to stock or reissued.

To guard against the common dangers, we require every workman to wear close fitting clothes to prevent being caught in moving objects. Each new employee is instructed to discard all rings and floating neckties. He is urged to wear stout soled shoes with hard toe caps. Rubber coats, boots and hats are provided for men working in damp places.

Methods of Handling Removal of Machinery

Where heavy machinery is to be moved, the millwright must exercise his judgment to prevent injury not only to himself but to others and to equipment. The moving of heavy machinery may call into play the use of several overhead cranes or it may require large outlay of equipment and rollers, tractors, etc.; special care is taken so that injury will not result from the moving of this heavy equipment. It is often necessary to put up guards or construct rails, indicating signs, lights, etc., especially on work below or above the normal level.

The hazards in maintaining the crane and hoist equipments are fully as serious and numerous as in the millwright and electrical departments and probably more important to the rest of the plant, due to the fact that approximately 65 per cent of our men are working under craneways. The crane maintenance department is responsible for the maintenance and repair of equipment and the instruction of all crane operators. The equipment consists mainly of bridge type cranes, both alternating and direct current up to 35 tons capacity. There are also several of the gantry type in the material yards and several locomotive cranes for handling coal and miscellaneous yard work. This department also has under its jurisdiction maintenance and repair of the elevator equipment throughout the plants.

As proper inspection and maintenance makes for minimum hazard, special care is given to this phase of the work. Each crane is inspected periodically depending upon the service, for electrical and mechanical conditions. Whenever an inspection reveals any defect, it is repaired at once and in this way many serious breakdowns and accidents are prevented. A weekly report made out by the crane operator showing the condition of his crane is sent to the crane division and a copy is sent to the safety engineer. This report is acted upon immediately by the crane division.

Making Repairs to Cranes and Craneways

When a repair man, who is always on duty, is called to repair a crane, he immediately takes charge and no movement of the crane is made except under his direction. Main switches are arranged so they may be locked open. This applies not only to crane switches but to the crane trolley control switches as well. Repairs of craneways are made only when the cranes are shut down and the trolley control switches locked open. A very important feature controlling proper and safe crane operation is lubrication. This work is done by the crane operator but under the supervision of the crane division. In this manner the proper oils and greases are used and it is seen that proper application of them is made on the various crane equipments.

The crane operator, while not under the direct supervision of the maintenance department, is instructed by the crane division in the manner of operating and caring for the equipment. In employing a crane operator, he must meet certain requirements such as perfect eyesight and good hearing, and these conditions are checked by the medical department every three months. He must be a man above the average, speak and understand English and have a high order of intelligence, as upon him depends the lives of hundreds of workmen below. Too often the crane man is not carefully selected and this results in improper handling of equipment and needless endangering of the lives of fellow workers.

The operators are instructed by the crane division in the details of caring for the mechanism. Special attention is called to the manner of lifting and to the means of connecting the load. He is instructed that he need not lift any load if he believes the slings are inadequate, or that the load is not properly connected, or that any accident might result from the lift under consideration. He is also instructed not to make side pulls and to be careful and not get the cables over against the trolley wires. One of the greatest factors in lessening hazards in this department is the fact that most of the crane operators are all old experienced men. They are more careful in their work, take better care of the equipment, more readily check minor defects and difficulties and consequently keep the equipment in better and safer condition.

Our carpenter and painter crews include many who are often called millwrights in some shops, and they are the men who not only do the wood work about the plant but also do the necessary maintenance steel work, painting, etc. This group consists of such men as are necessary

to do practically all of the building repair and maintenance excepting the pipe work and electrical work.

All hand tools, ladders and miscellaneous equipment used by this division are cared for in the manner already described.

In addition to the items mentioned, this division uses a great deal of scaffolding for its many duties. As in other departments the foreman is held personally responsible for the safety and ruggedness of this construction. He in all cases inspects it before putting it into use. In most cases our own safety standards are set higher than required by the state. The machines used by the division located in the maintenance department are equipped with the necessary safety guard, and the foreman of the department is held responsible for keeping this machinery and equipment in first-class and safe condition.

On all excavation work shoring is ruggedly constructed to reduce to a minimum accidents from cave-ins. Excavations are filled or covered as soon as possible after being opened. Rails and safety lights and signs are hung as becomes necessary in order to prevent the probability of anyone receiving injury due to the excavation.

No Accidents Happen to the Pipe Fitting Crew

Our pipe fitting crew consists of a group of men who have been with us a great many years and perform their work so well that our safety records for many years back do not show a single serious accident in this division. Their work covers all construction, maintenance and repair of the high pressure steam lines, air lines, water lines, gas, oil, fuel, and sewers and drains throughout the extensive plant. Their tools are controlled by the maintenance tool crib as previously mentioned; cribbing, etc., is done by the carpenter division. On all high pressure work and underground tunnel work where high pressure is on the line, the foreman always precedes his men and is present during important changes, repairs or alterations. All main line repairs are done with the utilities cut off and the valves locked. No one except the fitter crew is allowed to open or close a valve on a utility main, and all heat, radiators, blower systems, oil pumps, and equipment using high pressure steam or high pressure air are also under the control of this department. Great care is used in keeping the utility mains in good repair, it being realized that the slightest defect may quickly develop into a dangerous condition.

The plant operating crews of the various works are responsible for the operation and maintenance of the various power plants throughout the works. These plants contain high pressure steam boilers, steam engines, steam turbines. Diesel engines, hydraulic turbines, air compressure, and miscellaneous equipment, sufficient to care for all the utilities for shops employing approximately 6,000 men. Safety in operating the equipment rests directly on the shoulders of the engineers in charge.

Coal is delivered in hopper bottom cars and dumped directly where possible into the plant bunkers. Coal going into storage is unloaded with

oil engine locomotive cranes and rehandled to the plant bunkers with the same machines. Special care is exercised in this work, a safety car wrench being used for dumping the car bottoms. Great care is exercised when filling hoppers to prevent coal slides. Our practice of purchasing nut coal has assisted materially in lessening the hazards since we do not have the large frozen lumps to contend with as when burning screenings in winter. Coal is conveyed into the hoppers and fed by gravity to the stokers. Ashes are handled with a steam conveyor system, discharging them into a concrete hopper overhead and fed by gravity to steel cars and removed by locomotive.

Fuel oil is stored in underground tanks and pumped by electrically driven piston pumps through the circulating system which is buried underground, thus maintaining a constant pressure on all the burners throughout the plant and all of the auxiliary tanks at all times.

Boilers are operated by experienced men who are cautioned regarding the many hazards prevalent with this type of equipment. Boilers are all equipped with safety valves, safety plugs, stop valves, non-return valves, and drains in the main headers between the valves, to prevent steam or water injuring men who might be working in the boilers. Steam valves are operated only by the men who work on boiler equipment. Furnace work and stoking are carried on by this crew and the carpenter gang. Great care is exercised in erecting scaffolds and in tearing down and rebuilding the arches and sidewalls of furnaces.

Steel Runways, Railings and Toe Boards in Boiler Plant

Steel runways with railings and toe boards are located at convenient places throughout the boiler plant so the valves can be operated from them. Ladders leading to the top of the boilers and to the platforms are of permanent steel. Boilers are fully equipped with gauges and meters so that fire conditions, steam pressures, load requirements, water conditions, etc., are at all times known by the fireman so that the operation can be kept within safe limits.

The safety division is responsible for the safety appliances and the general safety of the entire works, both mechanical and educational. They make and apply most of the safety appliances. They have a small well-equipped shop with sufficient machines for building and repairing all of the guards used throughout the works. They test periodically all slings, both rope and chain, and no new lifting equipment can be put into use until after passing a series of rigid tests. Inspectors are at all times circulating throughout the plant, carefully checking not only for mechanical defects but for unsafe practices. All recommendations of the safety division are given first consideration and safety inspectors have the absolute power of stopping any machine or equipment found to be defective or in a dangerous condition until proper repairs are made.

Educational activities, such as the bulletin board, instruction of new men, compiling of statistics and records, issuing safety information to foremen and superintendents, investigation of accidents, etc., are carried out by this department, as well as the competition contests between the dif-

ferent factories, the departments of each factory and the foremen of each division.

The fact that the activities of this division are so broad and that they have the undisputed authority to compel safe equipment and practices, is a powerful factor in reducing accidents. Each workman throughout the plant seems to feel that to call any defect or unsafe practice to the attention of the safety division means that the hazard will be eliminated and a safe method substituted.

Our records for many years show that the maintenance department, one of the most hazardous divisions of the factory, has had one of the lowest severity and frequency rates of the entire organization. We believe that this is due to three factors: organization; placing of responsibility; and the type of personnel employed.

This is well, for the maintenance department must, of necessity, work in all departments of the factory and a safety and cooperative spirit shown by such a department can have only beneficial effect upon the organization as a whole.

Accident Rates in the Maintenance Department

CHAIRMAN DUNNEBACKE: Mr. Pease, you have certainly given us a very complete paper and I am sure that the Section gives you its full thanks. If you can run a maintenance department and keep your frequency under one-tenth as an average, over four years, you have accomplished something worth knowing about, especially when the average for the automotive industry is 1.06. You are to be congratulated.

If any of you have any problems on maintenance now is your chance. If he can keep his record down he must have some real dope.

MEMBER: I wish to ask whether your safety committee consists entirely of the safety department?

MR. PEASE: The safety engineer of the safety department and he or his representative, together with the various people concerned in safety work.

MR. THALNER: I listened to Mr. Pease's paper with a great deal of interest and he certainly has things sewed up there tight, and I think it would be interesting to know what percentage of the total people employed at his plant are millwrights and how their accident experience compares with the total experience of the plant. Have you those figures?

MR. PEASE: I don't have all of the data here. I do have the frequency rate, however, of our department compared with the total plant.

For 1922 the frequency rate of the maintenance department was 19.8 against 42 for the plant. In 1923 it was 18.5 for the maintenance department against 24 for the plant. In 1924 the maintenance department was 9.7 against 14.8 for the plant. In 1924 it was 12.8 against 20.8 for the plant. And in 1926 to date the maintenance department was 6.8 against 17.7 for the plant.

CHAIRMAN DUNNEBACKE: That shows that running through the years the maintenance department has been one of the safest in the whole

plant. It is far below the average in the plant, which I think is contrary to general experience. It has been my experience that the plant engineering department has a high severity and a high frequency rate.

Are there any other questions?

F. L. SMITH (National Carpet Company, Cleveland): I would like to ask what precautions they take in the care of ladders—that is, in the purchase and also in the maintenance. How do you arrange it? How do you check it and know what the inspection has brought forth?

MR. PEASE: The ladders are all purchased in accordance with standard specifications set by the safety department and when they are received they must pass through the safety department first. They can not be painted. The wood must be clear so that any defect would show and the ladders are usually placed with the two ends on supports and two men weighing about 200 pounds apiece stand on the middle of the ladder and jounce on it. That holds for all ladders that are received.

MR. SMITH: Also, how often do you inspect those ladders while they are in use?

Inspectors Are Circulating Through Plant Continually

MR. PEASE: The inspectors inspect them continually. They are circulating through the shop at all times and it is their habit to inspect every ladder as they walk past. They also go to the maintenance crib from time to time and inspect that.

CHAIRMAN DUNNEBACKE: When you see a defective ladder that you know needs repairing, do you put a tag on it or tell somebody to take it away?

MR. PEASE: The tag is put on and it is immediately removed to the salvage department for reconstruction.

MR. SMITH: You brought up the matter about points on ladders. Do you consider that a point is a good proposition on a concrete floor?

MR. PEASE: We have tried almost everything advocated and we believe a point is the best thing known yet.

MR. MILLER (Chevrolet): There is a qustion that wasn't touched on by Mr. Pease that is causing me quite a little bit of trial and tribulation and that is the trucks that are used within the plant as to whether they are considered as a part of the maintenance department and just the way they are handled as to care and operators.

MR. PEASE: The trucks are operated by men belonging to the individual departments. The maintenance of the equipment, however, is within the maintenance department.

MR. MILLER: Do you carry them as a part of your work?

MR. PEASE: That belongs to the shop department.

MR. MILLER: Is the employee considered as a part of your department?

MR. PEASE: He is under the supervision of the individual shop in which the truck operates.

W. A. BASON (American Radiator, Buffalo): I would like to ask Mr. Pease how they test the chain and chain locks?

MR. PEASE: They are tested twice yearly.

L. W. THOMPSON (Wagner Electric Company, St. Louis): It may be a little out of order but I would like to know if anyone has had any particular experience in controlling electric truck drivers throughout the plant?

MR. PEASE: Those men are entirely within the jurisdiction of the superintendent in the department in which they are working.

CHAIRMAN DUNNEBACKE: Has anybody else an answer to that question?

MR. THALNER: We are licensing every truck operator and every elevator and train operator in our plant. The man is sent from the employment department to the foreman to be tried as to capabilities for operating a truck. If he is O. K. he is asked to read the safety rules which are on a card. After he has read the safety rules and the foreman is assured that he understands them, the man signs the card acknowledging that he has read the rules and the foreman signs it and sends him back to the employment department. He is then hired and is sent to the safety division where he is given, after an examination on those rules, a regular operator's license similar to a state license which is issued by our secretary of state for driving cars. He is impressed at that time very thoroughly with the importance of operating his truck in a safe manner. In addition to that he is given a badge designating whether he is an electric truck operator or an elevator operator or a train operator. We hope that through the information we can give this man and with the supervision of the foreman we can eliminate the reckless truck driver, elevator operator and train operator.

Accidents Resulting from Truck Driving

CHAIRMAN DUNNEBACKE: This truck driving proposition should have your attention and serious thought. I am reviewing the accident experience of perhaps 60,000 men every month and I know there are an increasing number of accidents resulting from truck driving and that is something I would advise you to examine and study. Just last month one life was lost in our corporation when a man was driving a truck, turning his head half way around to see where he was going. He backed right through an elevator gate and went down one floor and was killed. If he had had his load ahead of him and was facing in the way he was going he could have seen the situation and he could have stepped off on the floor into safety.

Reckless truck driving is causing a great many accidents. Our efforts in the General Motors are to always drive with the load ahead and face the way you are going. That is the big rule in our company.

MR. SINNOTT: I would like to ask Mr. Pease who controls and how you do control the fusing of your plant, such as the fusing of motors?

MR. PEASE: The fusing of all motors is under the jurisdiction of the maintenance department and we have tried to set certain size motors for line shafting and certain size motors for other things, reducing the different types and sizes of motors to a minimum. The fuse blocks for each type motor are standardized as closely as possible and we try in every

case where it is possible to have a maintenance electrician to place the fuses. It is difficult to do that and sometimes others will do it and fuse too heavily but I don't know any other precautions we could take.

MR. SINNOTT: I mean when it comes to renewing fuses.

MR. PEASE: That is done through the maintenance department.

W. S. BASORE (American Radiator, Buffalo): Is it the practice in your plant for the electrician to be present and remove the fuses from the cutout box at all times and what does he do with those fuses?

MR. PEASE: Whenever any electrical work is done to remove the fuses we lock the box so they can not be replaced and he either lays them up or puts them in a bag or case.

MR. BASORE: Is he the only one who has the key?

MR. PEASE: He has his own personal lock.

J. MACKINNON (Ford Motor, Canada): I would like to know how he gets the workmen to use life belts on overhead work and if so how he gets them to wear them or makes sure they do wear them?

Overhead Work Is Done Only in Presence of Foreman

MR. PEASE: All overhead work is done only when the foreman is present. He is a man who has been in our employ for a good many years and he requires them to wear them. That is, we do not have crews go out promiscuously and take care of overhead work. It is only done when a well-trained foreman is present.

F. G. DEWEY (Remy Electric Company, Anderson, Indiana): I would like to ask Mr. Pease how he takes care of the flywheels on different presses when they are being repaired. Do you set them down alongside of the presses or do you dispose of them in some other way?

MR. PEASE: The machine itself is not to be used. If there is room they are taken out and laid down. If not, they are taken out entirely.

MR. DEWEY: What I have reference to is, when you are doing work on a shaft and it is necessary to remove the flywheel. Do you set it down alongside of the press and tie it with a chain or something of that sort or have you something to keep it from slipping or falling over?

MR. PEASE: It is not our practice to tie it. It is just laid down out of the way. It is laid down flat so it will not fall over.

MR. SINNOTT: I would like to ask what control you have over rope blocks and rope falls? Also what kind of sling you use when you throw over a truss hook and block or chain fall over it?

MR. PEASE: Most of the slings are rope. We have some steel wire and some chain. It depends upon the job.

MR. SINNOTT: Do you think it is a good practice to use a rope sling over a truss?

MR. PEASE: No, a steel wire is better or a chain.

MR. SINNOTT: What control do you have over the block and falls, I mean the testing rope and the testing block?

MR. PEASE: Those are done by the safety department. We do not do that in the maintenance department.

MR. SINNOTT: I ran into a double block and falls. The thing was only three days old and it had only lifted 1,250 pounds. The thing went bad on about a 10 horse power motor. On the inside, where the pin goes through, the shive was all torn to pieces. What caused it I don't know. I do know that block, to my knowledge, hadn't lifted any more than 1,250 pounds in a three-quarter lineup.

I say those things should be looked after and tested more rigidly than they are. Every Tom, Dick and Harry wants to borrow it and takes it out in the yard and you don't know what becomes of it. You don't know whether he strained the rope or bent the pin that goes through or not.

CHAIRMAN DUNNEBACKE: Are there any other questions concerning this paper? If not, we have some time left and I am going to turn it over for general discussion. There isn't a man here who hasn't come here with some particular question in mind or some particular point he wants straightened out. Likewise, there is no man in this room who, during the course of his work, did not develop some particular kink or some particular stunt which is outstanding in his safety work during the year or who has not done something better than he did before which has been a big help in his accident prevention work.

During the balance of the time this morning I want you fellows to ask questions, whether they are on the subjects which have been presented this morning or not, and if you have developed something you feel would be of interest to the rest of the fellows, get up and tell us about it. That is all these meetings are; they are the clearing houses of safety experience.

Protecting the Plant from the Careless Truck Driver

C. S. WINGERTER (Reo Motor Car Co., Lansing, Michigan): I would like to find out about the setting of machines. Is there no state law on that? I would like to find out how you handle that. Just what is the clearance and the distance?

CHAIRMAN DUNNEBACKE: Has anybody made a standardized rule on that?

What type of machines?

MR. WINGERTER: Mostly screw machines and automatic machines.

MR. BASORE: We allow two feet on lathes, presses, automatic screw cutting machines, etc. That is our practice.

H. L. JOHNSON (Baldwin Chain & Manufacturing Co., Worcester, Mass.): There is one point I would like to hand out as a method of protecting yourself in a measure against employing careless truck drivers for the plant and for motor trucks on the streets by cooperation with your local council. We have found that it works out very well in Worcester to inform the council of the record—that is the safety record of the truck driver. If a truck driver gets through, you report that to the Safety Council, if he was discharged for being an unsafe operator. The truck

case where it is possible to have a maintenance electrician to place the fuses. It is difficult to do that and sometimes others will do it and fuse too heavily but I don't know any other precautions we could take.

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drivers know that is being done and it has a very good influence on them. It is very beneficial, I think, in getting safe operators on trucks.

CHAIRMAN DUNNEBACKE: I might mention a certain accident which happened in our corporation because possibly some of you are not aware of this hazard. We had a case where we had a 10,000 gallon gasoline tank underground. We raised it up and emptied it and moved it over 500 feet by rolling it over the ground. There were four openings in that and the holes were about two and one-half inches. It laid on top of the ground six weeks and then it was filled to overflowing with water. There was a leak noticed on the outside of that and so the water was pumped out and an air hose was put in there for two hours. Then the welding crew came on the job and four minutes after that oxy-acetylene flame was put on the outside, the tank let go and killed two men and pretty nearly killed a third.

There is a great hazard in using these tanks if any kind of explosive mixture or liquid has been in them. You can't be too careful in handling or repairing them.

MEMBER: Was there any pressure there?

CHAIRMAN DUNNEBACKE: There was no pressure. The welding was being done from the outside.

MR. ADERBURG: I would like to know what the men here are using for marking aisles that lasts longer than paint?

A. W. DAHLSTROM (Metallic Door): For a number of years we have used the painted lines to designate the aisles in a plant. We are now considering using the metal washer or tag to replace a white line.

CHAIRMAN DUNNEBACKE: Mr. Reamer, what do you use for outlining floor lines?

S. H. REAMER (Cadillac): We don't do the painting altogether. We are using a large headed tack. On all wooden floors that is working out in the best way I know today. We tried metal strips and the result of that is that we have to remake them quite often but with the large head tack we have never noticed one where it is pulled up. We are very well satisfied and well sold on them.

MR. DOHERTY (Franklin): How far apart do you place the tacks?

MR. REAMER: About two inches. We made a double row so it shows up in good shape. We did experiment with a copper tack and we thought that could be polished more but just a common tack is all you need.

ADJOURNMENT

THURSDAY MORNING SESSION

October 28, 1926

A. F. DUNNEBACKE, Chairman
General Motors Corporation, Detroit, Mich.

The Thursday morning meeting convened at 9:45 o'clock, Mr. A. F. Dunnebacke, presiding.

CHAIRMAN DUNNEBACKE: As I told you yesterday, I think it is a good thing for us to get acquainted with the new officers, who are to run the Section for the coming year. I am therefore going to turn the session over to Mr. Arthur M. Williams of the Chrysler Motor Corporation. Mr. Williams was promoted from the secretaryship to the vice-chairmanship.

(Mr. A. M. Williams took the chair amid applause.)

CHAIRMAN WILLIAMS: Gentlemen, after the banquet last night naturally it is a wee bit late when we are getting started and to get through promptly we will have to cut out a lot of underbrush and commence to saw wood.

We are fortunate in having for our speaker on assembly hazards this morning a man who has gone as far in it as any other man in the country and he is well qualified to cover the subject. I am gratified to know that he is not only going to give it to us verbally but he is also going to show us some slides.

It is with pleasure that I introduce our friend Dutch Thalner of the Buick.

THE HAZARDS OF ASSEMBLY

R. F. Thalner, Safety Director, Buick Motor Company, Detroit, Mich.

The subject assigned to me will be treated in this paper from the time the stock is completely machined until it arrives at and passes through the assembly plant. Before going into any part of the subject it will probably be well to review statistics showing causes of accidents in assembly plants. It is necessary for me in giving this information to make a personal reference since my work is for the Buick Motor Company. I hope that you will pardon this personal reference and feel that although it shows the experience of only one plant it nevertheless gives a cross section of assembly plants in general.

Going back over our experience for the past nine months, during the time the present assembly plant has been in operation, statistics show that although the assembly plant employed 9 7/10 per cent of the men in the entire factory, it had only six per cent of the total lost time accidents and only two per cent of the total days lost as a result of accidents, these days being figured according to the standard table of equivalents.

On the face of it, this shows that the hazard in the assembly plant is not as great as it is in other units, such as sheet metal, foundry, woodworking, drop forge, etc., and I believe that this information is substantiated by the rates given in the Insurance Manual.

Analyzing the accidents which have happened in the assembly plant over this same period, we find that the biggest toll comes under the classification of hand labor, while second place goes to vehicles and third place to falling objects. Out of a total of 903 days lost for the nine months, 351, or a little better than one-third, were caused by hand labor, 276 by vehicles and 108 by falling objects. The other causes of accidents can be included under the remaining classifications, such as grinding and polishing, hoisting apparatus, hot substances and flames, hand tools, stepping on objects, falls of persons, and power presses.

Among some of the more common accident causes in an assembly plant are such things as being caught between chassis and cars, dropping material, slipping on floors, feet run over with truck wheels, closing car doors on fingers and many other minor lacerations and bruises, developed in the course of using wrenches, hammers and tools.

With this insight into causes of accidents we can pass to the specific hazards which may be looked for in an assembly plant, and to properly present them the following procedure, taking the product from the machine through its various processes, will be followed:

A. Transportation from Machine Shop to Assembly Plant.

1. Hand trucks.
2. Gasoline trucks.
3. Electric trucks.
4. Gas or electric tow motor trains.
5. Conveyor propelled trucks.
6. Conveyors.
7. Railroads.

B. Storage at Assembly Plant.

1. Order of assembly.
2. Proper storing space.
3. Housekeeping.

C. Sub-Assembly.

1. Adjacent buildings.
   (a) Stock distribution by hand trucks, conveyors or gravity feeds.
2. Balconies—in main building.
   (a) Stock distribution by gravity chute feeds and conveyors.
   (b) Properly railed sides and openings.
3. Within assembly building—main floor.
   (a) Frames—rivetting, ventilation, furnaces, and hammers.

D. Assembly Proper.

1. Conveyor line.

(a) Chain.
(b) Motive power.
(c) Stop buttons.

2. Appurtenances to conveyor line.
   (a) Frames—rivetting, ventilation, furnaces, and hammers.
   (b) Cables and their inspection.
   (c) Lighting.
   (d) Stock bins for small parts.
   (e) Belt and gear guards.
   (f) Steaming room.
   (g) Painting and drying.
   (h) Sub-conveyors.
   (i) Hoists.
   (j) Pit work.
   (k) Punches, drifts and chisels.

E. Inspecting, Driving and Storing.

1. Clearance between cars.
2. Good drivers.
3. Draining radiators.

F. Loading and Shipping.

1. Inside premises.
2. Outside premises.
3. Driveaways.

Under the heading of "transportation" we must consider the various methods of moving the stock from one plant to another. The one in which hand trucks are used brings into play the human factor more than any of the other methods because more men must be employed to carry out the trucking and consequently there is the possibility of having a greater number of accidents due to hand labor.

Devices on hand trucks can be used to eliminate certain accidents. For instance, when a hand truck is being used barrels and boxes are liable to slip out from under the load and cause injury to a man. That has been eliminated by the use of a brake on the axle. A man simply steps on a pedal under the truck and the brake is slammed on the wheels so they are pivoted fast to the floor while the load is being transferred from the load to the hand truck.

With the use of gasoline trucks more material can be transported under the direct supervision of one man, thereby eliminating a good deal of the hazard caused in handling individual trucks, but a hazard is introduced in the loading and unloading of the stock on the various large trucks. This, of course, can be curbed by use of the proper appliances such as individual electric motor or gas driven trucks.

You can use hand labor methods if necessary to get your stock off of the truck. You can roll it out on large trucks, on individual trucks, and you can use power methods, cranes and hoists. You can use electric trucks or gas motor driven trucks. Each, of course, has its individual hazards which will be treated later, but with regard to hand trucks the

gasoline truck eliminates the larger percentage of accidents which occur as a result of hand labor.

Another hazard entering into this type of transportation is that caused by congesting your plant highway with large trucks. If these trucks must use public highways there is the added hazard of meeting with public highway traffic condition and the hazards incident to that operation.

The use of electric trucks for transporting stock is somewhat similar to the hand truck proposition because a man must be employed on every truck to handle it although he is able to handle larger loads much more easily. He must necessarily be a very careful driver because serious injury always results in electric truck accidents.

The system of using gas or electric tow motor trains eliminates any of the undesirable features of the hand trucks, the gasoline trucks and individually driven electric trucks. The stock is loaded into trucks and trailers at the place it is finished, and these trailers couple together to form one long train. The entire train is then hauled to destination in the assembly plant where the stock can be fed to the line with very little handling. This undoubtedly has proven to be as satisfactory a method as any yet employed, but there are hazards entering into this particular type of transportation which must be guarded against.

Conveyor Propelled Trucks Can Be Used Advantageously

The method of holding the stock in its proper place while being transported and also the proper safety locking devices for the couplings between trailers should be given serious consideration. In making the trip from the plant where product is manufactured to the assembly plant there undoubtedly are curves and inclines as well as level pavement which must be negotiated; and it is for the double purpose of protecting the stock as well as life and limb that every precaution should be taken to keep this train intact until it arrives at its destination. It is just as important that this train have couplings that are safe going up or down hill and around curves as it is for a string of box cars to be properly hooked together.

Conveyor propelled trucks can be used advantageously where short hauls are required from one plant to another. The stock can be loaded on a truck and set over the conveyor and forgotten until the conveyor has drawn it to the other end where it can be placed in storage. This type of transportation can be used on the level or on inclines.

It is especially adapted for using trucks; for instance, in taking stock from the enamel plant to the assembly line your fenders must be put on racks and kept apart from each other so there is no scratching or damaging. Where you have a number of pieces and the load is light the men can handle the truck at each end, you don't need any power device, and it just resolves into taking the truck which is loaded with fenders, running it over to the conveyor and as the dog comes along it catches underneath the truck and takes it to its destination.

Probably the most efficient and safest method, providing the equipment is properly installed, in transporting stock is the conveyor which merely requires attention at the loading and unloading ends. The use of a conveyor eliminates to the highest degree possible the human factor because in the entire process of transportation the only help required is that which must feed the conveyor and that which must remove the stock when it has reached the assembly line. There is some additional help which must be employed to maintain the equipment but this is usually of a higher caliber than ordinary labor and consequently can be relied upon to protect itself. Proper mechanical safeguards over gears, chains and belts, as well as a number of stop stations along the conveyor, will make this equipment almost fool proof.

Although the conveyor does minimize frequency rate or number of accidents it does bring with its installation the possibility of what we may term higher severity rate. For instance, where 10 or 15 men are handling hand trucks and may have a number of scratches and bruises of minor nature, one accident on a conveyor being more severe usually results in a broken arm, leg or possibly death, and consequently with the installation of it should go every safety appliance which is deemed necessary for efficient and safe operation.

These buttons should be arranged so that when the conveyor is shut off at a certain point it can not be started except at that point.

Problems in Storing of Materials

The use of railroads for short inter-building hauls brings into play all the hazards common to railroad work and in addition those which are always present with hand labor methods, because a certain amount of the latter must be used in loading and unloading the cars.

In storing material at the assembly plant particular attention should be paid to the order of assembly, amount of storage space and housekeeping. Keeping the stock routed in orderly fashion of course eliminates confusion and resulting accidents. Keeping the proper amount of working space makes it possible for those who must handle material by hand trucks to eliminate conditions which cause accidents. Housekeeping, or the work of keeping storage rooms in neat and orderly fashion at all times, plays a very important part in the elimination of accidents, as you all know. A well arranged shop does not present tripping hazards or the other possibilities which go with the shop which is kept in a disorderly fashion, and consequently the housekeeping part of storage room work eliminates many unnecessary accidents.

Storage, therefore, is not and should not be a big problem as far as being hazardous is concerned if the proper attention is given to the three items just mentioned.

In every assembly plant there is a good deal of sub-assembly work which is done before the parts reach the final assembly line, and this in turn has been divided under three buildings. The hazards coincident with sub-assembly are similar to those of final assembly and consequently will

be treated under the heading. The method of distributing the stock differs with each type of assembly. For adjacent buildings stock can be distributed by hand trucks, conveyors, or gravity chute feeds. The hazards of hand trucks and conveyors have been discussed. Gravity chute feeds must be carefully constructed to be sure that men who are taking the stock from them will not be injured while doing so. This can be accomplished by lining the chutes with material which will decelerate the speed of the moving stock or by putting in long planks to act as a brake on the material as it comes down the chute so that by the time it reaches the bottom its speed and danger have been minimized.

Using Balconies for Sub-Assembly

I don't know whether I have drawn the picture clearly there with regard to those chutes but in assembling from a balcony going across your plant over the line you can feed your stock through these chutes just due to the force of gravity. You can make them curve this way or you can make them go straight. The thing to watch there is to be sure that the stock in coming down the chute doesn't interfere with the man who reaches in to get it.

The plank I have reference to is nothing more than a plank 12 feet long which is pivoted about half way up the chute and as the stock comes down the chute strikes the plank and the weight of the plank on the stock reduces the speed of the stock so that it barely falls out as it comes through and the danger of speed is gone.

In using balconies for sub-assembly the same methods apply as formerly referred to. In addition the balconies must be properly protected with railings, screening and toe boards so that no stock can be kicked or pushed on the workmen below. Openings in the floors of these balconies should all be protected in a similar manner.

Sub-assembly within the assembly building and on the main floor is probably only done at the first end of the line, as for example the riveting of the various brackets and hangers on the frame. The process of rivetting calls for the use of furnaces to heat rivets and the individual furnaces should be equipped with the proper ventilation stacks to carry off fumes produced as a result of the heating process. Trucks used to carry the frames while the work is being done should be so constructed that there is no possibility of the frame slipping off, and also so that it can be handled speedily after it has left the rivetting gang. Rivet sets and hammers should be kept in first class condition and safety collars provided on hammers.

The assembly proper has a number of hazards connected with it. First of all let us treat the conveyor line alone. The frame work supporting the chain should be covered the entire length on both sides so that men who work on the line can not get their feet caught in the chain; an accident of this nature always involves the loss of toes or feet or possibly part of a leg. The motive power for the entire conveyor should be completely inclosed not only from a safety standpoint but also from a pro-

duction standpoint. You realize what it means to hold up a conveyor line in an automobile factory for 30 minutes or even less, and with this end in view you can realize the importance of eliminating any possibility of damage to the motive power. A nut, bolt or any foreign body which might fall into the open gears of the conveyor would of course immediately disrupt the operation of the entire working force and cause an immediate shut down. A shut down of the assembly conveyor in turn checks the use of the stock, seriously handicapping every operation. Men getting caught in the conveyor at this point are always seriously injured. It is therefore the best thing from both safety and production standpoints to entirely inclose the mechanism which operates the conveyor.

Stop buttons should be placed along the line at various intervals and also one at each end to enable the conveyor to be shut down at a moment's notice if it becomes necessary. If a man is caught in it or if something goes wrong mechanically there should be enough stations so that too much time is not lost in trying to shut it down and the switches should be so arranged that it can only be started again from the point at which it was shut down. This can be accomplished by means of a board with lights in which each light shows up the point at which the conveyor was closed down. This will enable those who shut it down to start it again when they are ready and will eliminate the possibility of having anyone injured by having it started from some other button.

Hazards of Appurtenances to a Conveyor Line

The appurtenances to a conveyor line all have hazards to some degree. The installation of air or electric motors to do the various operations in connection with assembly work must all have counterweights so that they can be temporarily raised out of working position when not in use. These counterweights should either have safety chains attached to them or should operate in a specially constructed guard so that they can not strike men working on or about the line when they are lowered. One good method is to house a number of counterweights in one central place and then have access to the compartment by means of a door when it is necessary to change cables.

Steel cables should be used between the counterweight and the device they are holding instead of ropes because rope will not stand up under the severe usage which it is put to. The cables used for this work should be frequently inspected for wear and replaced whenever it becomes necessary.

Good lighting is a prime requisite for any assembly line and is the means of preventing accidents which occur to men on account of being unable to see their work. The arrangement of stock bins for small parts such as bolts, washers and nuts not only expedites the operation but also promotes good housekeeping and eliminates the accident maker which is always present in untidy shops. Belts and gears should be covered on any special machinery which is used such as paint pumps, motors operating blowers, grinding wheels, and so forth.

The steaming room probably has one bad hazard, that being the danger

of pieces which are blown off of the chassis flying and striking the steamer in the eye. Inasmuch as this man is working in a very warm room the ordinary glass goggle can not be used because it fogs up and in its stead a screen goggle has been very satisfactorily put into use.

The steaming room is a room where the chassis passes through and at that point there is a man who cleans the chassis thoroughly before it goes into the paint room. We call them rooms but they are nothing but compartments built over the line. The hazard there is the flying-particle hazard.

The hazard of painting brings with it the possibility of lead poisoning if the fumes are not properly controlled and directed. A first class ventilation system, preferably under the line, suffices to take off excessive fumes and any paint which goes past the chassis. Respirators may be worn if necessary but probably would not have to be used with a first class ventilation system.

The use of sub-conveyors feeding the main conveyor brings in, of course, the same hazards which have been mentioned heretofore and the same methods of correction can be applied.

Inspection of Hoist Cables Should Be Made Frequently

The use of hoists in bringing stock to the assembly line usually brings with it hazards which often result in very serious accidents. The cables used on such hoists should be frequently inspected and replaced whenever there are any signs of wear, and the hooks or chains must also be given very careful examinations. Men must not be permitted to stand under the loads, such as motors, because a failure of any part of the hoist mechanism would result in a very severe accident.

The use of pits brings in a hazard which can easily be rectified by placing guide rails along the sides of the pit to guide the car as it rolls along. If the guide rail was not installed there would be the possibility of having one of the wheels drop into the open pit and severely injure men who are working there.

Punches, drifts and chisels as well as other hand tools must be inspected constantly to see that they are not being used with mushroomed heads and men who use grinders to dress them down should be required to wear goggles while doing this work.

Inspecting, driving and storing the cars does not bring into play many hazards. Attention should be given to see that the proper clearance is maintained between car lines so that men passing to and fro will not be caught between them and a good deal of attention should be given to drivers and their driving methods. Fooling and stunt driving on the part of these men have caused serious trouble in the past and of course can only be eliminated through strict supervision. Exhaust gases from the cars can be deflected or taken out of the room with suction systems so that the unpleasantness caused by the gas in the room is removed.

In storing the cars before shipping one hazard manifests itself probably above any others and that it the one due to draining the automobile

radiators. If not properly conducted a very untidy and slippery condition can arise, especially in the winter months when an icy floor will cause broken arms and even more serious injury. This condition can be rectified by localizing that particular operation and then at this point supplying the proper apparatus for carrying away the water so that it is confined to a definite path of travel. It is even possible to run the car on a conveyor and have it drained while it is being conveyed over a certain area.

The problem of loading and shipping has been divided into three parts—that inside of the plant, that outside and that of drive-away cars. Within the plant we have only local conditions to contend with such as driving out of the store room onto the dock where the car is loaded, but in using a dock which is removed from your premises the car is usually driven to this dock over public highways. You then meet with the possibility of highway accidents such as will either damage the car, cause property damage or personal damage outside of your own plant. These conditions of course always give rise to damage suits if your driver is at fault, and consequently the entire situation rests with the proper supervision over these men to see that while they are handling your property on the street they do so in as careful a manner as possible, never exceeding their rights and always being sure that even if they have the right of way they should be sure they do not figure in any accident as a result of trying to assert that right.

Hazards About Railway Cars in the Yards

With regard to loading these cars the same conditions exist at both places. Cleaning of railroad cars used for transporting automobiles carries with it the hazard of removing nails and steel straps from the floor. The use of goggles or specially constructed tools for pulling nails will eliminate the eye hazard which is very serious. The material removed from the cars should be piled in a certain place along the track and picked up by the salvage department as soon as possible, so that men walking between the tracks will not step on any protruding nails or stumble over piles of lumber. Special care should be taken to see that these cars are not molested by freight engines bumping into them while men are working in them, and this can be accomplished either by means of derails or warning signal bells the length of the dock.

There is also the hazard of a man being squeezed between the automobiles and the car. The use of individual trucks under each wheel greatly facilitates the operation of putting an automobile into a box car and should be employed whenever possible because the easy handling of the object is the thing that eventually will eliminate any accidents from that source. After the automobile is in the car another hazard arises—that of nailing the blocks or straps which keep the automobile in place. This involves an eye hazard and can be corrected through either of two methods. One is the use of goggles and the other is use of specially constructed hammers known as the "Bullseye" hammer, which eliminates the possibility of nails which have been struck a glancing blow, from

flying. The use of this special hammer has proved that the principle upon which it is constructed is correct because no injuries have been reported with it on the job.

Another hazard which enters into the nailing work and possibly is sometimes overlooked until it causes nails to fly is that of having the wooden blocks, if such are used, stand out during the winter and become frozen. On account of being frozen, a nail presumably fast only penetrates the wood a very little, so that when struck a hard glancing blow it will always free itself and fly into the air, in many cases finding for its objective the eyeball of an employee. Blocks should therefore be installed in a place warm enough to eliminate this freezing condition.

Experience With the Bull's Eye Hammer

MR. MILLER (Chevrolet): I would like to ask Mr. Thalner what kind of a brake it was that he spoke about?

MR. THALNER: I am not thoroughly familiar with the operation of that brake but as I understand it from our maintenance department the brake will operate directly on the chain. For instance, we will just presume this is the chain coming along on the rails. The brake operates against the shoe and it is operated through a lever automatically from the pulling end of the conveyor so that the minute any speeding up occurs in the motor or the bull gear the governor balls fly out and apply this brake through an automatic mechanism. That just clamps against your chain and holds your load.

E. R. COMPLIN (Ford Motor Co., Canada): When you were speaking about the blocking in freight cars you said there were two safety devices, the bull's eye hammer or goggles. We have had a case where a nail has glanced off a bull's eye hammer and struck the goggles of a man and smashed those goggles. Undoubtedly the goggles saved his eye. He was using a mushroomed hammer.

We have had other cases where the nails have not actually struck the man but they have glanced from the tip of the hammer. Therefore, I would say the men should use the bull's eye hammer and goggles.

There was another point in speaking about safety stops on conveyors. It occurs to me that if you have that button stop on a long conveyor you have to have quite a number of them. If anything happens a man is going to be in a hurry to reach those buttons and he is going to make a dive for that button and possibly might slip and fall, or two of them are going to dive for the button at the same time and they will collide. Would it not be better to have a safety cord running the full length of the conveyor, handy to every man, with a locking device on the motor switch so that the motor can not be started again unless from the motor?

MR. THALNER: No, we haven't. I hadn't thought of this safety cord proposition. That runs 3,600 feet and it would be quite a lengthy arrangement. We have those stop buttons all along the side wall of this conveyor and the conveyor is floored the complete length of it so a man can get to it quickly. But the point you raise might be well taken.

With regard to the bull's eye hammer, I am glad to learn of the incident you have had and I wonder if anybody else using a bull's eye hammer has ever had any trouble with it?

MR. DUNNEBACKE: We had an accident resulting from a nail flying when a bull's eye hammer was being used but we still feel that it saves so many nails from flying that we advocate its use.

MR. HARNESS (Reo Motor): About a year ago we inaugurated the use of that hammer. It has reduced our accidents 75 per cent. We haven't had a lost time accident since we inaugurated that hammer.

MR. KNOWLTON (Chrysler): We inaugurated that hammer and have been using it for the past two years. There are two types of hammer—one with the bell face and the other with straight face. We found that those with the bell face chip off.

MR. THALNER: We had that same trouble. If you do go into that hammer proposition you want to be exceedingly careful that you get a hammer in which the sides are at right angles to the face. On the first hammer we had the side was beveled in so that by the time you got within a quarter of an inch back on this surface a direct line on the outside groove would chip at that point. You see you had no support farther than a quarter of an inch.

You also want to be careful that the outside groove is not too close to the outside because you can easily see that if you haven't the support to hold the nail the hammer will chip anyhow.

A System to Avoid the Hazard of Flying Nails

J. MACKINNON (Ford Motor, Ontario): Mr. Thalner spoke about the blocks used for getting nails out. To eliminate that we have made a practice of having all the nails started before they go into the cars. We have a little assembly room where those blocks are cut to size and standardized and we have men handle them and they are all ready for driving the nails in the blocks.

MR. THALNER: That is very good. The reason I raised that point is that we have a machine which enters (I think) three or four nails at the same time. The block is merely placed in a machine and by tipping the treadle three nails are entered into the block and then the block is sent out to the plant. That works all right and the machine is O. K. if the blocks aren't frozen and if the wood is soft; but when the blocks are frozen the machine doesn't function as well, and that is where we had trouble.

MR. LYONS (Studebaker): Just to satisfy myself, I want to know how many of the automotive people are using the bull's eye hammer. Is there any way we can get an expression on that?

CHAIRMAN WILLIAMS: Will those who are using it raise their hands?

(Twelve hands were raised.)

CHAIRMAN WILLIAMS: Now those who are not.

(Fifteen hands were raised.)

CHAIRMAN WILLIAMS: Might I add something? During the last six months we have had one eye case where the man was using one of these hammers. Possibly we have been a little bit quick at Chrysler's to criticize this particular tool and I appreciate the suggestion that Dutch has given us. I think we will go into that further before we finally say that they are no good.

MR. BARRY (U. S. Company): I know the rope just mentioned would operate 1,800 and 2,000 feet because I have seen it operate on very heavy calendar rolls where the hazards are just the same.

CHAIRMAN WILLIAMS: On rope trip lines over conveyors?

MR. BARRY: Over a small pulley.

CHAIRMAN WILLIAMS: There is only one thought there. It seems on the face to be very good. On a rope trip line where the conveyer line is 1,600 feet long, if some one down that line stops the conveyer in an emergency, who starts it?

MR. BARRY: He starts it.

CHAIRMAN WILLIAMS: Does every man on that job understand that it can only be started by the man who stopped it?

No One But the Foreman Can Start the Conveyor Line

MR. BARRY: The foreman is the man who carries the key and the foreman must actually start it.

CHAIRMAN WILLIAMS: Must he cover that line to find out why it was stopped? Must he go over the 1,600 feet to find that out?

MR. BARRY: He did in the rubber mill I was connected with.

CHAIRMAN WILLIAMS: And found out the condition that caused the stoppage and had it corrected and then everyone was in the clear ready to start it?

MR. BARRY: That was done.

A. J. DUDGEON (Ford Motor, Canada): Why can't that be put in sections?

MR. BIDDENCAMP (Metropolitan Casualty and Insurance Co., Chicago): The advantage of having those cords in sections would be that in the event of accident a man wouldn't waste any time in getting to that button. That is the advantage of the long rope, but by putting it in sections you would be immediately able to locate where the damage was and you wouldn't have to go over the whole line.

CHAIRMAN WILLIAMS: You would have that red light and the foreman of that particular sub-assembly or part of the main assembly would be able to start it.

MR. BIDDENCAMP: It is a great factor to have available when an emergency arises and the quicker you can get to the thing the better. There are 10 buttons, I believe, according to this paper, and there is a distance of 360 feet between the buttons. That is too much in an emergency.

MR. THALNER: With the use of a rope between the buttons, would

that encourage the fellows to fool with it? Has anybody had any experience along that line?

MR. MITCHELL (Chrysler): I have had that experience with rope between buttons. We had that in the Dodge Company while I was connected with it. We used a rope running to the button. Evidently any little particle might catch on that conveyor and someone could come along with a handle and catch that rope and the conveyor would be stopped. That is the trouble you run up against.

CHAIRMAN WILLIAMS: Where did you have the rope—where you had to get up on something to use it or was it down low?

MR. MITCHELL: It was down below in the channel.

CHAIRMAN WILLIAMS: Wouldn't it be well to have that so the man would have to step up to get it, say, up about eight feet?

MR. MITCHELL: You might take care of it that way if you had the room but we couldn't do it at that time.

MR. GRAVES (Michigan Mutual): Mr. Thalner has given us a very fine paper and covered the ground very thoroughly. There is one point he spoke of that I think needs a little emphasis. He spoke of closing the driving mechanism of the motor driven car conveyors. That is most always done when the driving mechanism is located down on the floor near where a man is passing, but the plants quite often take the view that that closure is not needed if the motor is up in some place out of the way. We have paid a good many claims in cases that have occurred on the isolated driving mechanism.

The Problem of Monoxide Gas from Plant Trucks

F. G. DEWEY (Remy Electric, Anderson, Indiana): I would like to ask Mr. Thalner if he has any trouble with the monoxide gas when using gasoline trucks, that is, complaints from the drivers in the factory during the winter months on small gasoline trucks as substitute for electric trucks?

MR. THALNER: We don't have many of them. The only place we used them is where I showed you for conveying motors and the ventilation condition there is in rather good shape because the doors are open and you have access to the outside air, but we use the electric truck mostly. Of course on our tow motor trains traveling from one factory to another the motor is not constantly in the shop. It is just in with its load and out and there is enough ventilation in the shop to take care of that. There are openings in the assembly line building, which is a very large building and well ventilated, to take care of all of the objectionable fumes.

CHAIRMAN WILLIAMS: Are there any others who have had trouble with monoxide gas?

There is a little picture I always carry in my mind of just how we fellows in the industrial safety work came into our jobs, how industrial safety had its beginning. About 15 years ago when it was started the insurance companies and others naturally thought, here is a problem

that is a good deal like fire prevention. The companies carrying fire insurance naturally entered this field, and in creating a new department to cover it selected a man possibly with fire insurance experience or rather insurance company experience. They had found through experience that a practical fire man was able to go through a plant and indicate certain fire hazards that could be cleaned up and eradicated and the risk improved; logically therefore they decided they could take an industry, clean it up from the mechanical standpoint and do the same thing in preventing industrial accidents that we have done in preventing fires.

I think we have accomplished a lot and we fellows have been working to quite an extent in this direction. We have gone far enough with it I believe so that now most of us realize that we can prevent at best only about 15 or 20 per cent of the accidents we are meeting with by still greater efforts along the mechanical lines.

The Big Job Is in Controlling the Human Equation

The big job, the big leak in this ship we are dealing with, is in the human equation, it is on the human side of it. We are just realizing that we are bringing men together in large masses for the production of economic goods, supplying our economic wants, bringing them together in a new environment with which they are not familiar. They have never worked under these conditions before in past generations. They haven't a thing that they have inherited in their makeup that teaches them that punch presses are as vicious as rattlesnakes. But there is something they have inherited that tells them that in a rattlesnake there is danger. Even the child who has never seen one before naturally keeps himself in the clear but the same child will walk up to a punch press and start to operate it and lose his fingers. He will do the same thing in the wood mill or in the thousand and one corners of our plants.

What nature has failed to do by giving this man a natural warning of danger in his new congested environment, we must supply in an educational way and it is up to each one of us, as we find ourselves trying to analyze, trying to clean up this job of safety, to gradually, as we can, broaden from the mere mechanical side of it over to the educational angles of it, to adjust ourselves, to adapt ourselves to the new wants in the safety field.

Therefore we have given this matter a place on this program today. It is not much in the point of time allotted, but I think the time will come when we will give it perhaps more than half of our program; that is something we will have to grow to as we can.

We have brought to you to cover this one section of the program one of the men skilled and trained in the best methods of getting information across to people. It is with pleasure that I introduce Professor Allen B. Forsberg of our State College.

SAFETY EDUCATION OF THE NEW EMPLOYEE

Prof. Allen B. Forsberg, Michigan State College, East Lansing, Mich.

It is a great privilege to discuss this subject with you—I say particularly to discuss it with you because of the importance that I attribute to this body. In my way of thinking there is no group in this country, there is no single group other than the labor managers in this capitalist civilization of ours, that can do more to destroy, that can do more to tear down those things that this capitalist civilization has given us the opportunity to take advantage of. On the other hand, there is no single group that can do more good in upbuilding and solidifying and coordinating various forces and conditions we have.

This organization, as has been stated by your chairman, is now 15 years old. Starting immediately after and in some cases a little before the enactment of certain accident compensation laws, it has reached wonderful proportions, but the labor managers in this industry, moved by this economic motive, have accomplished a great deal in changing certain trends that were undermining this civilization.

It was very easy work for the organizer or the agitator a few years ago to look over just a few industries in any locality and he could pick on his fingers at least 10 illustrations where the widow and the orphan had not gotten a square deal because of the hurry, because of the neglect of the human element, in that industry or establishment and great suffering resulted. We were supplying the agitator with all of the material that he needed to make a most vivid and destructive story. Today it is different. Wonderful changes have been accomplished. The best talent in the country has been concentrated upon accident prevention.

Unlike the European method of attacking a problem, concentrating attention upon relief, in America we have been concentrating attention on prevention. I believe that with the other hazards in industry outside of just accidents that cost the average worker something like three days of wages, we will probably be attacking other big risks to which the worker is exposed in industry that cost him in excess of 60 days' wages.

I have been asked to talk to you upon the new worker, the new employee. As I see it, it seems to be primarily a problem of adjusting a new man. He has been unemployed. He comes to you for a job. Picture, if you will, the state of mind of the new employee coming into the organization. He has a job now. The dominant appeal, it seems, that can be made would be one that would be tied up closely to that thought of insecurity because he has been unemployed. He has a job. It seems that safety directors have been very clever in capitalizing on that situation by tying up any of their appeals to security.

Census has been taken in industries to find out what are the appeals that move men most. It is the security of the job that has the biggest appeal. So in your bulletins, in your plant propaganda and educational program and disciplinary problems, security is the appeal that seems to

take most. As for the size of this problem of inducting a worker into the new atmosphere—selling him, you might say, the company and the company's labor policy in all its ramifications—of course, that is the bigger problem in industrial concerns where the turnover is high.

The ideal situation would be to stop on the exits instead of concentrating on the entrance, to try and have fewer men come into the organization by cutting down the number of men who leave the organization. That is about the best way; but of course with the multitude of changes in the technology of industry it is impossible to stabilize industry because of the tremendous over-development of the nation's industrial capacity to produce.

So there are those periods when there must be reductions in a payroll and naturally every time you are rebuilding your working force you are again adding a number of new men, men you don't know very much about. You hope to know more about them. You don't know why they left the last job, you don't know their mind. They don't know the company policy, they have heard something about it—and most companies are not any too free to make definite what is the labor policy, what they really expect of the men. Some concerns have done wonderful work blazing a trail as a sort of standard for many of us to pattern after.

Some Folks Think They Know a Good Man By Sight

I have enumerated some things that might be considered. I might tell you of one of the old ways of tackling or approaching the problem. I have a friend of mine who feels that he can look over a man and by observing the points of his head and the bumps on the forehead and the peaks on the nose and the shape of the jaw he can tell the job that will fit the man; the mind, of course, is of no consequence.

That is a rather amateur approach but it is an approach. It is a sincere attempt but it really seems to have accomplished very little. Personnel men and labor men dig deeper than that. There are certain truths we can use to accomplish good work.

First of all, in inducting the employee into work you are considering hiring him. One of the organizations that I have in mind that has done a pretty good job requires the employee to go through a very extended series of questions and answer them in a positive or negative way. At least once in that employee's lifetime he has been asked to face definitely some problems and he is asked to attach his signature; he is asked to commit himself definitely to certain principles that you consider basic in your safety program. That is an approach.

I am teaching management work in Michigan State College and I spend a good deal of time acquainting myself with the different safety programs. Since I am new, I haven't been able to avail myself of all the opportunities there are for making a study. There is a surprisingly big range but Michigan certainly in comparison with other states is doing wonderful work in the direction of human relations in industry.

After an employee is in the organization he is probably temporarily considered. He is introduced to his foreman. In most concerns he is sent up to the foreman without a guide and told very little about what the company has to offer, what the opportunities are in that concern. The company has made very little attempt to make that man feel that that is a fine outfit to work for, that it is a mighty good place to stay. He knows what his obligations are. He knows his wage scale. Is that all the man is interested in? Can you appeal to something bigger than that? It seems that our progressive programs do make a bigger and wider appeal, a more fundamental appeal than merely those that I have mentioned.

Some of our concerns are requiring the employee to set aside one hour during the first week, in which he is given a series of short talks by different members of the organization; and of course a very important part of that one hour or half hour in some concerns is devoted to the safety program. There is not a list of requirements but the program is sold to him in terms of the things that he is primarily and dominantly interested in—in terms of security, in terms of his family.

I always remember that picture that went through the poster service of the National Safety Council. You have probably seen reproductions of it. It was the picture of a smiling baby—the biggest safety argument there is. It is convincing. That has the selling value if you want to talk in terms of safety.

What of that little manual that is given the employee? You are hired and you are handed a manual and told to read it. You stick it into the vest pocket of your overalls and never look at it.

Eleven Little Pamphlets to Each New Employee

A number of my students last summer hired out in various concerns and of course they made very regular and very detailed reports on what they saw. One concern handed the employee 11 little pamphlets. One concern was good enough to bind them all in one heavy piece of paper. The student conducted a little study in that concern and found that that material wasn't read. The average employee coming into the concern doesn't care very much about a bundle of by-laws that have been created; they aren't intelligible. How much better it would be if somebody bothered to work out an intelligible analysis answering very definite questions that are of concern to the average worker? What does he want and what is it that the concern has to offer to the safety program that meets these fundamental wants?

Of course this lecture idea of putting aside one hour or one-half hour has been very effective in the concerns I have covered where it has been used and they speak very highly of it. There may be a number of people who can suggest some things that are far better and they can probably show that they haven't been very successful with that method.

Bulletins have their place, valuable as they are, but too often we are

satisfied with just a syndicate service, a service that is prepared by a national organization. It naturally follows that if a bulletin is to have an appeal to workmen in almost every type of industry it must be very general, and since it must be very general it loses the local touch. How much better it would be if you could supplement those national bulletins with a number of local touches—a local situation that has developed! Photographs like these would be far more attractive to our own employees (while if they were sent through the country they would be less attractive naturally). The person that the writer would mention, of course, would be known by the members of that department and probably other departments. Pictures of buildings and machines would recall something to them that they know, hence the association would be more effective.

Suggestion Campaigns Good—But Not Too Many

Suggestion campaigns have been very effective in many concerns, but the explanation most people give is that suggestion campaigns work all right if two or three campaigns are conducted probably three months apart and then are dropped. Various explanations are given but the thing isn't kept up as religiously as it might be. It probably goes on that way for a year and then they start again. Still some of the concerns that have had the best reports on the use of suggestion campaigns are those that keep at it everlastingly, that put on a campaign probably every three months and keep it up; even though the suggestions coming in each time are small in number the total would be greater than if the suggestion campaigns were farther apart, every year or so.

The plant publication in the home carries safety messages along with it. I think the plant organ is probably the most effective means of selling and keeping safety sold. There, too, of course you have your national services that are very valuable. They are the gist of the experiences of numerous concerns and various industries and they are valuable, but just as the plant organ often degenerates into a front office, white collar gossip publication, so it is with the national safety service. Too often it is merely loaded with national propaganda rather than taking advantage of local situations and pictures of vivid experiences in the plants concerned. The plant propaganda by means of the plant organ would be far more effective.

So much for various devices that may be used by an industrial concern to mold the individual to his job in a safe way. I think one thing we must concentrate on more in the future, as it is becoming more important with the ever-increasing productivity of machinery and of industry in general, is the problem of bringing down and reducing the irregularities in industry. If we can reduce the irregularities in production we automatically reduce the irregularities of employment, hence the problem of inducting new individuals, strange individuals, into the concern becomes of less importance.

I really came down here to raise some questions and to get acquainted with you and to tell you something of what my observations have been in visiting a number of concerns of the state. We are only in the experimental stage, you might say, in promoting the industrial program. So if I have made some criticisms that strike home, please take them in the spirit in which they are meant.

CHAIRMAN WILLIAMS: In Detroit there is one thing definite that we have in mind in educational work for this winter. You all know how difficult it is to get the average shop man to give a continental whether he gets hurt and to get him to think seriously of what it might mean to him if he does meet with an accident. The average man thinks of an accident as something that always happens to the other fellow, not to himself. Possibly that is due to the fact that we are all more or less conceited. We can't take a text and preach to the fellow in the shop. He resents any effort at teaching if it is clothed that way.

We have found that we can build up in that man's mind a desire to avoid accidents, a fear of being physically handicapped, of losing a leg, arm or hand. We can show it in a picture but it only goes in through his eyes. We are all eye-trained.

Instructing the Employee in Practical First Aid

We have Dr. Shields here with us today from Washington, from the American Red Cross. He has had a world of experience in the one specific thing we can do to get safety across to the man and that is in first aid. Don't understand me to mean that we are going to put in first aid to compete with our own first aid rooms in our plants or that we are going to run our plant surgeon out of business. The specific thing we want to do in that, the thing of primary importance, is to sell the man safety, build up in that man's mind a desire to avoid being hurt, to avoid losing some of his members. It doesn't cost him anything to carry the information around. He may need it out on the bathing beach or in an automobile accident, far away from medical assistance. It has a very good sales value. When we put this in our plants this winter in Detroit I want to tell you something of what we may expect, and if you do the same thing, what you may expect from it.

The Bell Telephone companies, with something like 200,000 employees—one of the largest employers in the world—so far as their male help is concerned have covered about as hazardous work as we have to deal with in the world. In 1921 in Michigan we were running one accident a day, 300 accidents a year. Competitions and everything else didn't seem to get us any place. We taught first aid, starting in January, and in the month of February we went through the month with increased production and increased hazards with only two lost time accidents. Why? We hadn't told those fellows to be careful. When we lashed Bill Jones to a board in a practical demonstration of what was to be done to him if his back was broken—and every one of those men was lashed to a

board in the demonstration—it went under his skin. We were educating him and he knew what it would mean to him to lie in that position for months; it went in in a way that it wouldn't go in under any other circumstances.

We boiled this down to just practical problems. It wasn't a lecture method. It was the job method and partially the conference method with it. These fellows are eye-trained. You are going to get the information into their heads, ears, eyes and sense of feeling, and in that way you make a pretty deep groove in the record, a groove that lasts. If you look at a picture it makes a groove and a deep one but it doesn't last, but if you can get the fellow to work at the thing with his own hands or to feel the thing at the same time, it lasts.

Before we put that on we were running 18 accidents in Michigan for a given period and a given number of men. The Bell of Pennsylvania had put on first aid training and that was about the only thing they were doing in addition to what we were doing in Michigan and they were down around 4 while we were about 18 or 20. That was in 1920 or 1922. I talked with one of their superintendents and he told me that today for the same number of employees and the same exposure they were down under one, with increased production. The unit of production had gone up per individual. They had done things in preventing accidents and they had done them chiefly through first aid.

Opposition to First Aid Is Likely To Be Met

To the Detroit boys I want to say that we want to get started this coming week. You are going to meet opposition from your doctor or your surgeon because he doesn't know what it is all about. All you have to do is get across to him the simple fact that his business in the first aid room will increase rather than decrease after you put it on. Why? Because in your first aid class you get across to the man the importance of taking the minor scratches and cuts and bruises to the first aid room to get them treated. You are going to cut down your lost time accidents due to infections. They are not going out into the shops and compete with your first aid rooms. They will know the danger of removing something from the other fellow's eye and will send him to the nurse. Why? Because they know their own hands are all grease and dirt. They know why they shouldn't undertake to do anything of that sort until they wash their hands thoroughly and they haven't time for that.

You are going to meet some opposition from the management. They will say, "We are paying our nurses and plant surgeon for that." Get the facts across to the management, that this course will more than pay for every dollar that is put into it month by month as you go through with it. It will pay for itself, pay the biggest dividends of anything they can put their money in.

You are going to meet some opposition from your foreman. He will

say, "Why do I want to go down there and spend 16 hours at eight meetings to learn that bunk? We have a first aid department down there."

Is your plant competition down to the point where your foreman is asking you, "For goodness sake, what can I do to cut down the carelessness in my department? I am here at the foot of the sheet. How am I going to get out of this hole, out of this jam?" Here is something you can use. You can say to these fellows, "We will get behind you with a good snappy program, with stereoptican slides during the lunch hour. We are going to give you a lot of material that you are going to hand to your men. We are going to give you a card for every man with his name printed on it. There is a place for him to sign that enrollment card at the bottom and you are to deliver these cards to your men."

After this sales talk goes across explain to them that this card must be returned signed or unsigned because you, in turn, have to send it up to the big boss. Some of the men will sign the thing but they won't go. Then they will be followed up with an absentee card.

A Clever Plan for Enlisting Interest in First Aid

The thing to do is to get them to sign up and when they get in the first class, inside of five minutes after that class is called to order they are interested in a complicated bandage and it beats any bow knot tie they ever saw. That is used to break down their oposition. They become interested in that intricate knot and from then on your course is just nothing but one practical problem after another and each one of the problems is worked out on a definite, common accident that you meet with every day in your plants.

Your success in this will depend on just how wisely you select these accidents for the problems to be used in putting it across.

We are getting the material ready and by the fore part of the week it will be all set. Our management is already sold and also our first aid room doctors and nurses. So far as the Chrysler is concerned, we are down now to the foremen. We are not going to say a word to the men until we are ready to strike, and when we strike it will be a good, live, snappy campaign for two days and it will wind up with a card for the man to sign or refuse to sign.

I would like to take advantage for just a moment of Dr. Shields' presence. He is here and it is an opportunity for all of us. He always has a mesage on this thing because teaching the work of safety through first aid is a job that has been a big one, especially in the mines and in the more hazardous lines of work, and I think Dr. Shields is the outstanding figure in that line of work.

DR. SHIELDS: Mr. Williams explained the safety value of first aid and he has been very active in getting up what we call this first aid institute for lay instructors that we are to start next week. I might say this: that these men who take this course are supposed to put in at least 24 hours of class work, two hours a day, and at the end of that time we are going to give them two examinations, one for the standard course and

the other for the advanced, as we call it. To all of those who pass the practical examination the Red Cross will give cards which will entitle them to act as lay instructors—that is, to teach first aid classes, as Mr. Williams explained, in the plants and to hold examinations, etc.

The standard course, as we call it, for students that these lay instructors give will be a minimum of 15 hours. That can be divided into periods of one hour if it is thought best, or it can be put into periods of an hour and a half, which would make ten lessons including the examination of an hour and a half. These lessons, as Mr. Williams explained, will consist of about 45 minutes, or an hour and a half of demonstration of the instructor and talk. The other half of the lecture will consist of actual demonstrations by the men themselves.

We usually divide them up into teams of five and give them a specific problem about an accident to work out. Then we criticize their work and they criticize each other and so on. Doing something with their hands makes a profound physical impression on them. They also get the visual picture with the eye and the actual manual impression with the hands.

I might close by asking you to ask me any questions. I can answer questions pretty well but I can't talk in a consecutive way very well.

E. C. JACOBS (American Mutual): I would like to ask if the purpose of this course is to teach these men to apply first aid to themselves and their fellow workers while engaged in their occupation in the plant?

DR. SHIELDS: Yes, in a way it is. Of course, as Mr. Williams explained you have your up-to-date emergency station and dispensary but they really would use more first aid outside than they would in the plant.

Just What Does Practice of First Aid Mean?

MR. JACOBS: If that is so, where would the line of demarcation be drawn? At this late day after all of these years of telling the men for every cut and scratch they should go to the first aid room, we are not going to tell them to take care of the little cut and scratch and to go down to the dispensary for the big ones. When does he know what the big one is?

DR. SHIELDS: A little cut or scratch is really worse than a big one. The majority of cases of blood poisoning occur from the little insignificant things that have been neglected and what first aid does is to teach the man to apply to a doctor quicker than he would before, and in this first aid course we teach him just as much what not to do as what to do.

MR. JACOBS: If it is true that the small cuts and scratches are more dangerous than the large ones, isn't there a tendency, because of this course, that the man will treat those small ones and probably cause some trouble?

DR. SHIELDS: You might imagine so, but it is the opposite that happens. When I started first aid in the mines I had the doctors come to

me and say, "Are you going to teach miners how to be surgeons and railroad men quacks?"

I said; "I don't think so. I think we are not going to interfere with your bread and butter at all."

They were frank enough two years after to come to me and apologize, saying that they were mistaken. They said the men came to them with more little injuries and more little cuts than they did before they were taught first aid. You know, knowledge doesn't do a man any harm and so I don't believe you need to be afraid you are going to have self-treatment at all.

MR. JACOBS: The thing I have in mind is the small amount of time that is given to this man for the purpose of teaching him first aid. Certainly he can't acquire a working knowledge of that matter in the time allotted to it.

Another thing I understand from the way this question has been put this morning is, that if this is for the purpose of educating the worker we are going about it in a roundabout way. I wonder just what your experience has been—what you think of a definite and rigid shop rule with respect to cuts and scratches? When I say that I mean all that I say. I say a worker shall be discharged if he does not go to the first aid department—not on the first offense. In our plant we are going to establish a shop rule that is to be enforced just the same as we would with respect to production. What effect would such a rule have as compared with the system which you are discussing? Which do you think would be the best?

Three High Spots in First Aid Instruction

DR. SHIELDS: Both. That is exactly what we are doing. The first aid that is taught this man makes it easier to enforce your shop rule because he knows why you have the rule. I thought I made that clear when I explained selling the doctor.

MR. THALNER: Is there any tuition in connection with this course or is it all gratis?

CHAIRMAN WILLIAMS: The textbook we will use in Detroit will be the standard Red Cross textbook that is sold on a basis of practically cost of publication—60 cents. Our corporation will absorb that for each student. Possibly some others didn't get that one fact. This gentleman's question brings it up and I want to emphasize this: that we graduated out of a total of 1,800 men over 1,600 in first aid in 1922 (I believe it was) or the spring of 1923; and since that time I don't know of a single solitary case of infection that developed; for two years after that we kept a record on every case of infection and we went back to see whether that fellow had ever been taught first aid. We hadn't had a case of lost time accident due to infection because that fellow got enough in his class work.

There are three high spots in first aid that we work on. We get a

very good picture of what infection means and the reason for getting to the first aid room to get relief. They don't wait on the job for one, two or three hours. They know it should be treated and they go there and get it attended to. They know they can't attend to it themselves because their hands are greasy and dirty. They know that because they were taught that in the first aid class. Those are the things they actually get in this class.

MR. COTCHER (Murray Body Company): I think that Mr. Jacobs is unduly alarmed. I think that Dr. Shields knows enough about first aid to know what the definition of it is. First aid is that action necessary first to save life and prevent suffering, and second sufficient treatment to get the man where a doctor can take care of him. That is all first aid is. It isn't medical treatment at all. I don't think Dr. Shields' course is gotten up with any idea that a first aid man is competent to treat on his own responsibility any wounds or any other conditions.

First Aid Is a Bridge to the Doctor and Nurse

I have never had this Red Cross course but I had a lot of instructing to do in first aid in the army. That is one of the things we had to do with our companies. Those of you who have been in the service know what it is to line them up and put them through the first aid demonstration and discussion. That is one of the things we impressed on the men —that first aid is only that action which is necessary to stop a condition which might cost a man's life, stop the bleeding or whatever it may be, place him in a comfortable position to be transported to a medical infirmary or place where he can be given proper treatment. Of course, you know that nobody except a licensed doctor is competent to take the full responsibility for treatment—not even a registered nurse can do that. A registered nurse can only act under the direction of a doctor.

I don't think you will have any trouble with first aid of that kind.

CHAIRMAN WILLIAMS: We have had a lot of trouble in getting the men to go to the first aid room to have minor scratches and bruises taken care of. This is a systematic way, an orderly way, a way we have tried out by experience and a way we know that works in getting across to the men the importance of going to the first aid and then they do it.

There are three high spots, treatment for shock, artificial respiration and the control of arterial bleeding. The control of arterial bleeding is something you have to teach and we do that in class in a very few minutes. It is boiled down to the point. We have had one case this year where a life would have been saved if someone on that job had had first aid training. First aid is a bridge, as I have heard the doctor explain, that merely carries the man from the injury and places him in the hands of the nurse and the doctor with less shock, less loss of blood and in a better condition and with a better chance for recovery—a patient reinforced for them to work on and deal with if the accident is severe.

In our shops in the handling of men and getting them to the first aid

room, many a simple fracture has been made compound because the men did not know how to get the patient to the surgeon as he should be gotten there. Instead of in any way entering into competition with the regular established medical procedure of our plants it keys in with it, supplements it and rounds it out where it can do a hundred per cent job.

DR. SHIELDS: I might say for Mr. Jacobs' information that in some of the largest corporations, like the Bethlehem Steel Corporation, which has the most up-to-date surgical department under Dr. L. M. Showdy, they train from 600 to 800, sometimes 1,000 men in first aid, and they have emergency stations in all of their plants. Also, the United States Steel Corporation has practically the same thing. They train people in first aid and they wouldn't do it if it was going to compete with their medical and surgical men.

MR. JACOBS: I am not saying anything against first aid education. As a mater of fact, I believe in it. I have taken two or three courses in first aid and I would take some more if I could get them.

The thing I would question, and I do not advocate this, is that a man or woman would apply any first aid treatment to themselves while engaged in this work. If this plan is for the purpose of teaching the man the importance of going to the first aid room, I wish it well and I would advocate it very much, but I do not advocate the men's taking care of injuries they receive while at work.

CHAIRMAN WILLIAMS: The question in your mind was well taken but it is outside of the problem entirely because, as the Major has explained and as I have tried to explain, that is one of the essential parts of the course, to get the fellow into the first aid room where the case can be properly dealt with. But the big point, don't forget, is this: we are selling that man safety in a way that will get under his skin as no other way would. That is what justifies the expenditure of money by your corporations. We can't get that man to visualize the pain he is going to suffer from an accident in any other way we have discovered. We are only 15 years old in safety. We may eventually find ways of getting facts inside of men's heads and we may find a better way than first aid but we haven't found a way up to date. Inasmuch as we haven't anything better, we are going to use it and we are going to make a practical application of the best we have.

ADJOURNMENT.

FRIDAY MORNING SESSION

October 29, 1926

J. W. HENNING, Acting Chairman
Automatic Electric Company, Chicago, Ill.

The Friday morning meeting convened at 9:30 o'clock, Mr. A. F. Dunnebacke presiding.

CHAIRMAN DUNNEBACK: It is very gratifying to see that so many of you stayed over for this final meeting of the Automotive Section.

Due to the importance of safety in punch press work and due to the large number of accidents that we have every yeear from punch press work, we have set aside an entire session to be devoted to punch press hazards.

Mr. Henning will handle this part of the program.

(Mr. J. W. Henning took the chair.)

CHAIRMAN HENNING: I believe the first thing on the program is a talk by Mr. Kaems. We have got to go through this pretty quickly.

WHY A POWER PRESS SECTION?

A. L. Kaems, Safety Engineer, Simmons Company, Kenosha, Wis.

I don't know why I am always picked on to give a talk. I imagine that by this time most of you have heard me so often that you are tired of listening to me.

I am not going to talk on punch presses but I have been given the subject, "Why a Power Press Section?" It may be interesting to you to know how this started.

In 1919 in Cleveland I gave my first talk on punch presses. Mr. Williams, who had been with the Industrial Commission of Wisconsin, had gone with the National Safety Council. Knowing, as he did, the large number of serious accidents which occur on punch presses, he conceived the idea that a talk should be given on that at the National Safety Congress in Cleveland. He asked me to give that talk and I consented.

At that time I was working for the Wisconsin Industrial Commission. The state has a law whereby only two members of any one of the different departments in the state can go to any convention or on any trip and be paid by the state. As this came at a late date and other arrangements had been made for men of our department to go, I paid my own expenses to this convention. I want to tell you gentlemen today that nothing ever gave me greater pleasure than to be called upon to go there, and I have never paid out money with a better feeling than I did that money.

I remember distinctly that there were just a few of us. I was given 20 minutes to talk. I went to that convention with just two wooden models to show what could be done in this work, and it has grown tremendously since that time.

I might say this first: they did not know of a place to put this talk and they came to the conclusion that the Automotive Section would be a good place for it. Some of the people there were using punch presses but they were not interested in anything pertaining to the automobile industry. For that reason they began to write into the Council and ask, why not have a Punch Press Section? The committee at that time could not see its way clear to do that and it has tried from time to time to find some way in which this would fit in.

A Question That Has Grown Tremendously

At every congress this question has come up. After Cleveland the next congress was in Milwaukee. It was taken up there. The next congress was in Boston and that same thing came up. Then a decided step was taken when it was held here in Detroit four years ago to see if some way couldn't be found by which it would be possible to make some change in the naming of the Automotive Section so it would fit in with punch press users. Of course, that has fallen through each time.

But this question has grown so tremendously, due to the fact that there are so many small concerns throughout the country using a few presses with hazards just the same as for those who are using many.

For that reason the committee has decided to set aside a Section for punch presses. If you will think back to the time of my Cleveland experience with just two wooden models and look over this splendid exhibit we have here today, you can just see how this has grown by leaps and bounds, and that has only been done in these last few years. Many of the exhibits at this congress have come a long distance—for instance, the Westinghouse Electric Company from Pittsburgh, the National Stamping Company from Milwaukee, the Ternstedt people from your city, the Studebaker people from here; and the Automatic Electric Company from Chicago has shown a card which will convince anyone who uses punch presses how safe this work can be done. There is no doubt in my mind, and I know that there are at least a dozen men in this audience today who will stand up and tell us that punch press accidents in a few years from now will be as scarce as hen's teeth. That is due to the intensive work that has been put in by these people.

So the thought is with us that if we have a separate section in which we can not only have a display as big as we have today but one five times as big, we can put it into a room in which we will have someone stationed all of the time and that will give each and every punch press user in the country who comes to this convention some place where he can go and talk matters over and tell his troubles and someone will be there to help him overcome his difficulty.

There is no need of my telling you that it is important that the users of punch presses should all know the hazards of this work. Yet if we set ourselves to it with real thought, it has gone beyond the time of speaking of reading papers—the time has come when this question must be dealt with in a different way. It has come to the point where it is an engineering proposition, if I may give it that high-toned name. Yet men who have been successful in making real progress in this work know that it just requires horse sense and each and every one of you can do it if you once set your mind to it.

For that reason the Executive Board of the National Safety Council has, in its wisdom and its deliberations, found that it would be necessary to allow those who have asked for it time and again that a separate Section be devoted to the punch press.

CHAIRMAN HENNING: The next will be a short paper by Mr. Whiting to take the place of Mr. Beyer. Mr. Beyer couldn't be here and Mr. Whiting is to take his place on that paper.

MR. KAEMS: As long as this is going to be brought up, to facilitate the work I would ask the chairman to appoint a committee to nominate officers for that Section so that if it goes through we won't have any delays later on. If there is no objection, I would like to ask that that be done now.

CHAIRMAN HENNING: On that committee I appoint Mr. Schwab, of the Aluminum Goods Company, Mr. Gerding, of the Western Electric Company and Mr. Kaems, of the Simmons Company. You can get to work and get your slate up so we will have it at the end of the meeting.

MR. WHITING: Mr. Kaems says he doesn't know why everyone picks on him when they want to get the practical solution of the punch press hazard. We know the reason he doesn't know why he is picked upon—because he is too modest. He is a pioneer in this field, as we all know. You will notice in the film that has been prepared that he has been picked on again as a movie star on this punch press hazard.

Pardon me for reading this paper because it was not written by me but Mr. Beyer of the Liberty Mutual who was unable to come to the congress at this time.

BUILDING SAFETY INTO POWER PRESS TOOLS

David S. Beyer, Vice-President and Chief Engineer, Liberty Mutual Insurance Company, Boston, Mass.

The power press is right up in the front rank as an accident producer, and is second only to the circular saw as a remover of fingers.

The use of punch presses in industries such as those considered in our Insurance Manual under the classification "Metal Goods" has made it necessary to charge rates two to three times those of an average industry, such as "Machine Shop" in order to secure sufficient premium to pay the losses.

The chief hazard of the press is at the point of operation, where the

stock is inserted and worked upon. Aside from that it has merely the ordinary drive hazards which are common in all mechanical industries but which cause comparatively few accidents.

It is obvious that where the plunger can be enclosed so that a finger can not pass underneath it while the press is in operation, the punch press hazard has been pretty well eliminated. This is possible in many cases where sheets of metal, fibre, paper, etc., in comparatively thin sections, are worked upon. There are many industries, however, where odd sizes and shapes are used, where it is impracticable to enclose the plunger in this manner and in such cases some special arrangement must be resorted to, if the accident hazard of the machine is to be controlled. Many devices have been developed in an effort to overcome this condition, by means of safety appliances to be placed on the presses themselves or a special tool for manipulating the stock in such manner as to avoid the necessity of placing hands under the plunger.

Nearly All Devices Subject to Limitations

These devices have more or less value and some plants have made very good records through their use with constant care and follow-up. Nearly all such devices, however, are subject to one or more of the following limitations or objections:

1. It is difficult to get the operators to use them.
2. They slow up production.
3. They are so expensive as to be impracticable for small orders.
4. They have a complicated mechanical mechanism which is liable to fail at a critical time.

It accordingly follows that a device which can be firmly attached to the machine, which simplifies the operation, which keeps the fingers out of the danger zone, and has the additional merit of increasing production, would furnish the ideal solution for the press hazard.

Such a device is the slide or gravity feed, which is demonstrated in a new film which will be shown before this session of our Congress.

The slide or gravity feed is not a new thing to many of us. It has been advocated by our old friend Gus Kaems for a long time. He has blazed such a clear trail in pointing out the way to beat the punch press hazard, that all I can do is to add some personal testimony and additional evidence on the value of the methods he has outlined.

The builders of punch presses, for years, have furnished special slides or gravity feeds on request for certain kinds of work to which they thought they were particularly adapted. In most cases, however, these feeds were expensive and in some instances they cost about as much as the machine itself, so they were not practical for the ordinary shop which changes its product frequently and has many short runs.

I believe Mr. Kaems was the first man to realize and apply the possibilities of the slide or gravity feed to a miscellaneous run of work, through the expedients of simple specialized chutes or feeding devices which could be made up quickly, at slight expense, by anyone with a little ingenuity and familiarity with this kind of work. He also broadcast the

fact that such a device would usually pay for its cost many times over in increased production.

We are all familiar with the "sales resistance" that is commonly encountered in trying to get most mechanical safeguards adopted. When you can show a plant manager, however, a device such as that illustrated in our picture, which "took two hours to make, cost sixty-five cents for material and increased production 150 per cent," he is going to say "lead me to it!"

If anyone has any doubt as to the practicability of this method of guarding I believe this picture will go a long way towards convincing him, containing as it does, the testimony of representative concerns such as the General Electric Company. The Bosch Magneto Corporation, the Simmons Company, etc., illustrating a number of the many machines where slide feeds have been installed, resulting in increases of from 30 per cent up to several hundred per cent in the production output of the machine.

The Main Thing to Interest the Superintendents

After getting the backing of the management on this form of guarding, the main thing is to interest the superintendent or foreman of the department and the diemaker, by a few practical applications of the principle, so they get the idea and can apply it themselves.

The Liberty Mutual safety engineer was himself a practical diemaker for 27 years. He was one of the hard-boiled "show me" type, who started to listen rather cynically to a talk by Mr. Kaems a year or more ago, in which Kaems spoke of the results that had been secured from the application of slide feeds. However, before the talk was over he began to enthuse, and when they went into the shop together he began to say, "I can make a slide feed for this job—and this—and this," and it was only a short time before he had a number of the most hazardous presses, several of which had been responsible for one or more accidents, working on slide feeds.

Since then he has become an enthusiastic advocate for this method of controlling the punch press hazard, and he makes the statement that he has never seen a job yet for which he could not devise a slide or gravity feed.

This combination of imagination and practical knowledge of shop conditions has brought about very successful and interesting results.

He called at one plant about nine o'clock in the morning and the superintendent, after a little persuasion said, "I will give you just five minutes to tell your story." Three hours later the superintendent was still holding onto the engineer, getting suggestions and working out applications of the idea, and a number of presses were promptly equipped with these devices.

In another plant the manager pointed out 10 presses, each of which had caused an amputation, and said, "Go ahead and see if you can apply feeds to them at a total cost not exceeding $100."

Three days later, when the engineer left the plant, every one of the presses had been equipped with a satisfactory device and the cost was within the figure mentioned.

I don't want to imply that there is no other method of getting results in safe operation of a punch press except through the slide or gravity feed. Many other devices which are effective, or partially so, have been developed. However, where they depend on the intelligent cooperation of the operator for success they are almost certain to fail sooner or later.

Probably the majority of punch press operators are young men or women who have little conception of the hazard of the job they are performing. They are careless or thoughtless, and difficult to educate on the dangers of their work. In some cases I have secured a show of interest on the part of the girls, particularly, in pointing out the fact that no boy would care to hold hands with a fingerless girl!

However, I am firmly convinced that the best, and in the end the cheapest method, of guarding punch presses, is to build safety right into the operation, through a chute device which is either made a part of the die or attached to it.

The mere slide itself does not give complete protection, if the plunger is open so that the operator can reach under it in case a piece should become misplaced. A guard or barrier should be provided in conjunction with the slide feed so as to prevent some hasty and ill-advised move of this kind on the part of the operator.

CHAIRMAN HENNING: Is the Nominating Committee ready to report?

MR. KAEMS: I suppose we would have to have a discussion first.

CHAIRMAN HENNING: All right. The meeting is now open for discussion.

Punch Press Experience From Mr. Kaems

MR. DUNNEBACK: I know a lot of you fellows came down here to hear a little more from Gus Kaems. My first knowledge of Mr. Kaems was at the National Safety Council meeting at Louisville, Kentucky, two years ago. After I saw his slides and talked to him personally and heard his talk I went back and I didn't lose a minute. What I got our manager to do was to send a practical, common sense mechanic out of the tool room down to Kenosha to stay a week with Mr. Kaems to see what he was doing. I know you fellows all want to hear more from Gus.

I also know that unless he can cuss a little he can't get it across so well. So I think I express the sentiment of all of us when I say we would like to have Mr. Kaems tell us in his own language the principle underlying this feeding process.

MR. KAEMS: You know it is awful when you are accused of a thing you don't do. Only yesterday I was over at the Cadillac Hotel and a fellow came up to me and he said, "Hello, Kaems, I'm glad to see you. We always like to hear you talk. We can understand you because you know how to swear."

Mrs. Kaems calls my attention to that too. That isn't nice and I always deny that I swear. She has said to me, "August, if you don't think you swear, you come damn near it."

I have learned in 20 years going through the plants that I could always make the other fellow understand what I was trying to drive at much better if I could swap a story with him, take a chew of tobacco or just tell it in my own way and swear a little with it. It gets it across much better. Then you know how we are all people of habit and it grows on one. I often say that I am not going to swear any more but sometimes I can't help it. If anyone of you have been in this work as long as I have you know that when things go wrong you just can't help swearing. You swear good and loud and it kind of relieves you. Otherwise you would go nutty.

Now I will have to say this all over again. I got started in this work some years ago when I went with the Commission. When we use the punch presses and they began to cut off fingers everybody began to look for some way to get around it. More money has been spent and more thought given to this one subject than to any other that has ever been brought out anywhere, due to the fact that when you get an accident on a press it is a serious one.

The First Safeguard Was Not So Good, After All

I remember when the first safeguard came out the man demonstrated very clearly to us that he could put a pencil underneath that gate when it came down and that it was impossible for an accident, and we all said "Hooray!"

I went out and helped sell that because I wanted to help cut down the accidents. You know if you go out to sell a thing, where do you go? You can't go to a stranger but you go to your friends. You tell them, "Now, boys, I now have a safety device for your punch presses. You buy one of them and your troubles will be over. I saw that thing work and I know it is going to do what it is expected to do. Get one."

"All right, we will buy it on your recommendation."

They bought one and pretty soon I got a letter from one of the men saying he wanted to see me. When I went there he said, "Here is your damn guard. We lost a finger on it. This is what happened."

Then of course that thing was poked in the head. Then the sweep guard came out and they said that where the gate guard was lame the sweep guard was strong. Again we got the samples and the same results—fingers were lost again.

I was called into a plant where they told me they had spent about $20,000 in perfecting a gate guard and I found there a boy who had lost three fingers. Of course he was careless and all of that. Then I went and investigated and wondered why in the world that boy had to lose his fingers on as simple a job as that was. I went home and thought that matter over. Then I went back to that plant the next day and asked them to give me their machinist and said we would make the job absolutely safe.

The reason I went into that factory was because there was a dispute. We have a statement in our law that if a job is not perfectly guarded according to the commission's rules the boy was entitled to 15 per cent increased compensation.

That boy started to work again and he worked about a half day and he found he would not be able to run a punch press any more and that he would have to look for some other work for which he would be fitted. I began to think of the seriousness of that and then I began to wonder if something could not be done to eliminate that. Then the question arose in my mind as to why these accidents occurred? The accidents are due to the fact that a man must put his hand in the danger zone to put the piece in and again to take it out. That was the old way.

A Slide Feed That Increased Production

I went to that plant and we made a slide for that job and had it working in a very short time. It increased production and made it a safe job. From that day on I have steadily kept after this, making use of it wherever it could be done. If you do that, of course every time you make a die safe you have one hazard less to think of.

Probably the first thought that came to me about that was, why do we have railroad crossing accidents? The first safety sign I ever saw was when I was a youngster. The sign was at a railroad crossing and it said "Look out for the cars while the whistle blows and the bells rings." That was the first safety sign I ever saw.

Of course, in those days we were driving horses and the horse could tell much sooner than we could if a train was coming because his sense of hearing was better. But now we have come to a time when automobiles are being used and I don't care how careful a man is and how well he drives, if he keeps on crossing railroad tracks long enough sooner or later he will be caught.

I decided that the only way to stop that would be to stop crossing the tracks and that the same thing applied to dies. They should be fixed so that you wouldn't put your hand underneath the die no matter what happened. Something may happen to the press and it is bound to repeat no matter what we do. But if we don't have to put our hand in this danger zone, then of course we don't care what the press does. So I have gone on and applied it time and again. I have talked to my friends and they have applied it and wherever it was used they had the same results that we did.

The reason I went to the Simmons Bed Company was this: when I was working for the Commission they were running 700 presses and were cutting off fingers at a rapid rate. If I remember correctly, 36 fingers were cut off in 1919. I asked the Commission if they would let me alone so that I could go to that plant whenever I wanted to use my own time on it and I would finally stop their accidents, to which they consented. I went there and I knew that it was not necessary to cut those fingers on the jobs that they had. So I went to the

general manager, who had grown up from the ranks and to whom you could talk very easily. I talked this matter over with him and he said, "All right, Kaems, we will remedy this."

When he took it up with his engineering department, toolmakers, and so on, they said, "That bird is crazy."

After the next accident I was there again. He finally said, "Somebody in this crowd must be right or wrong." Then he put it up to his department superintendents and they said, "The only way to cure him is to hire this man and if he doesn't make good we will tie a can to him so fast that it will make his head swim."

So they put the proposition up to me and the first six months I was there they cut off seven fingers. I want to tell you fellows that I was sweating blood, knowing that each and every one of those accidents didn't have to occur. But it was like everything else. I couldn't go into that plant and tell those fellows they were a lot of damn rummies. If I had, I wouldn't have had a friend there in a week. The thing I had to do was this: when we had an accident I had to go ahead and find some way of overcoming it quietly. I tried to get them interested. That didn't help so I started out and just made one slide first. When I had that slide completed I took it into Mr. Farist's office and I said, "Mr. Farist, I have just made one job safe and increased your production 65 per cent."

He said, "The hell you did. Why, damn it, you couldn't do that. We are as productive as we can be. You couldn't increase that 65 per cent."

I said I did, and he immediately pushed a button and had the department superintendent come in. He said, "Bush, did we increase this production 65 per cent?"

He said, "Yes."

Problems in Making the Punch Press Safe

Then Mr. Farist said, "If that is the case, what is the use of talking about it? Let's get busy."

We have some 4,000 or 5,000 or 6,000 dies there and it has been impossible to have all of them made safe. If we take three dies a week and make them safe we are doing a big job. That would only give you 150 a year, but we are continually keeping at it. We have reduced our accidents and in 1924 we only lost one finger on a punch press. This year we haven't lost any up to date. That shows what you can do by just using horse sense.

The first question that will be asked is "How many draftsmen do you need?"

You can't do it that way. What I have done has been done in a very simple way. I couldn't have a draftsman if I wanted one. If I had a draftsman I might be able to tell him how to build it and then when he got started he would say it couldn't be done. We did it in a practical way. We took a piece of tin and bent it up and found how it would slide and then we would often run 25,000 pieces through just a piece of tin bent up.

There is another thing it does for us. Our scrap has been cut to almost nothing due to the fact, which must be conclusively shown, that by sliding the work in we were more accurate than by setting it in by hand. I won't say you can't set a piece as accurately by hand, but in a day's run the man's hand and all of the other things that enter into the work don't function as they should. For that reason we had more scrap before than we have now. When the slide is once made the piece is the same shape, it is the same weight and it has got to go the same way all of the time. For that reason our scrap has been almost nothing.

I wish that instead of a lot of foremen and a lot of the other men who have come to see that, that the executives would come here so that we could sit down and talk it over quietly between ourselves and make them realize what that work really means to them. I know that everyone who has been using this method of doing it will bear me out when I say that production increases immediately. Our punch press room with 700 presses has increased its production over 65 per cent. That speaks for itself. We are not figuring floor space and all of that, which would be an added saving also.

A Work Growing by Leaps and Bounds

When I went there they were buying presses continuously, buying presses all of the time. Now when we need a press, where do we go to get it? We go into the punch room because we don't need them any more. One thing leads into another. Many of these things I have shown here today are old. We don't do that any more. When we do it we make it automatic. You haven't any idea, what that does to you. This work leads from one thing to another. You can't stop it. You can't separate safety from production. When you make a job safe you make it productive.

I am glad to see that today this work is beginning to branch out; that the American Association of Mechanical Engineers is going to hold a meeting in New York on December 8 and a lot of this stuff you see here they want down there. That shows that people are beginning to think about it. The other day a gentleman said to me, "This thing is growing by leaps and bounds. It is like a snow ball which is small at first, but when you begin to roll it gets larger and when it gets to a certain size it grows tremendously fast."

That is exactly where we are at now. But all this work can be done. You can do it the same as Mr. Henning has. He can tell for himself that no more than five years ago he had no thought of what he could really accomplish when he once got at it. There are many more plants throughout the country from which I receive letters continuously that are getting the same results we are. And, boys, it is a worthy cause. Just stop and think of the maiming and crippling of the men who are working on these presses. I can't think of a thing which so gets me as to find that someone has lost a finger.

Fortunately, we are not employing girls at presses. They did have girls

once upon a time, but they took them off before I went there due to that very thing—that girls were losing fingers—and Mr. Simmons himself put a stop to that.

I have a picture of the Bosch Magneto Company. The week before I was there three girls had lost fingers and we sold this idea to them. That was fresh in their minds and they could see this thing through our eyes. Last spring I went down there again and you wouldn't have known the place because of the things they had really accomplished. It is the selling part that counts, but we can't sell it until the big man becomes really interested.

Let me tell you my own experience. I have been in our plant for years and I am going to tell you that our tool superintendent wasn't sold on this idea as he should be until a very short time ago. We had an understanding that no die was to go out unless I saw it. Yet dies went out which I hadn't seen and which were not correct and we had to make changes which cost money. I took this matter up with the general manager and told him that if we had real cooperation that would save a lot of money.

Backing of the Active Management All-Important

Mr. Lindblomm, whose picture you have just seen, is one of the most even-tempered men I have ever seen. When I would bring this matter up for his attention he would call the men in and give them a good talking and say, "Now, boys, don't do that."

If you threaten your men and say you are going to do so and so and then don't do it, they are not going to pay much attention to it. These men would go out and say, "The old man is only kidding."

He went up a step and someone else took his place. One day I walked into the tool department and found a new set of tools which had not been sent to me. I was just raising the roof with the department superintendent and I believe I said some of the things I am not going to say today. Our new superintendent stood up behind me and I didn't see him. When I got pretty well through he said, "What is the matter?"

I said, "Look at these dies. Here is a man ready to put them into a press when he knows it is contrary to rules and regulations."

He said, "Why, I thought you were going to see all of the dies before they went out."

"That is the understanding, but I don't see them. That is the trouble."

Fifteen minutes later the tool designer and the superintendent of the tool room came to my office and they tried to explain away why those dies had been brought in and I knew what had happened. They had been called on the carpet and if I know Mr. Smith, and I think I do, he talked very plainly to them and what he said was something like this: "Now, boys both of you know those tools should have the O. K. of Mr. Kaems before they go in there. Don't you?"

"Yes."

"Why didn't he see them?"

Then I would be willing to bet $2,000 he said something like this: "This is the last time you fellows will be told about this. It won't be told to you again. If you don't do that, somebody else will."

And they know he isn't going to tell them again. After this there will be cooperation and the thing will be done. That is exactly how it must be done. I know your difficulties—each and every one—when it comes to doing some of these things. Unless it comes from the top, unless the fellow who has the real say, demands that that must be done you are not going to get anywhere. If you had a machine that was spoiling $100 or h of material today, $500 worth of material next week, and $1,000 worth of material a month from now, would the general manager let that go through? No, he wouldn't. He would call in those men and say, "What is the trouble? Why is this machine spoiling all of this material?"

"Well, the machine is out of order."

"Then you fellows better get busy and fix it."

Of course he would say that. What is the difference? The fingers aren't overhead, if I may put it that way, and the material isn't itself up to a certain point spoiled material.

We must get it into their minds that that is just as important and more so; that that is the thing that must be done; that they must be taught and must get into this question and must demand that that thing be done. Until they do that, we can't get anywhere. I have talked to a lot of the safety men in large plants and when I hear of the large amount of red tape they must go through to have something done I just wonder how it is possible to do anything? No wonder we don't reduce punch press accidents if we don't get better cooperation from those higher up to push this thing along.

Safety Work Paid for by Increased Production

It has made wonderful strides, as I said before. Just this morning I had a long talk with one of the men here in this community and he told me confidentially that cooperation was coming finally. That is why I said it is taking this long time to come about. That is why I would like to see the managers here. I would like to see those in charge of these plants. I would like to have them go over those difficulties and see what can really be accomplished. We must sell it to them. I don't blame them for wanting production, but I know we could get this across if we could just show them all of the work that could be done for this in dollars and cents.

Our increased production has paid for all of our safety work and it has done a lot more, and that is what can be done in each and every concern in the country, I don't care where it is and I don't care what kind of work is being done. It is about time we got at it. Otherwise we will have more stringent laws and more things pushed upon our backs, which we sometimes think are wrong, and yet we owe it to our fellow men who are working for us. We must make better conditions for them

if we want to get on. If we don't we are going to have more trouble than we are having, due to the fact that we are not getting that ignorant class of boys; we are getting the boys who have gone through school and who are trained in a different way than they have been. It is up to us to make these conditions such as we can and look them straight in the face and then we can feel that we have done our share, and then only can we ask them to do their share.

CHAIRMAN HENNING: If there are any questions that you would like to ask Mr. Kaems he will be glad to answer them at this time.

MR. KAEMS: This gentleman was modest and he asked me whether we run small productions. I want to say, and I have often said, that our plant isn't any different from any small production plant in the country. Sometimes I think we are a little worse. Someone will get a rush order and he immediately gets busy and wants this at once. If we were running a small shop somewhere the men would have to take their turns until they got the material, but with us, where they are right in the plant, they go to the big men and say, "We must have this in order to get this order out," and the order is run through the line and they get it out at once. It is not unusual to have a job on a punch press changed four or five or six times a day.

The Cost of a Safety Slide Is Very Small

If you just stop to think about it, what is added when the die is made? If it can only be gotten down into their mind, the cost is so little that no one should hesitate to do that. As I said to you before, with a bent up piece of tin which was fastened on the bolster plate we ran 25,000 pieces just the same as with the slides we have now. We made these other slides first of lighter material. But we have a careless way of taking care of our dies. I have sometimes harped on that, but you know it is just like when you start poor housekeeping, they hang the clothes upon the floor and all that. They take a die and throw it in the die vault and bend it all out of shape. So we have gone on and made it so they can throw it and yet keep it in shape.

You can do this no matter how small the place is and no matter what you are doing. With 65 cents worth of material and two hours of work you can put that slide on the machine and increase production 150 per cent.

MR. DUNNEBACKE: Supposing a safety engineer wants to start in this slide feed work in press work. Where is he going to get the best results? Is the best plan to go to the chief die designer and ask him to go after it, or just to get some practical, common-sense, all-around handy mechanic to undertake the work?

MR. KAEMS: Don't go into the die room because everyone of the die makers works according to blue prints and they work according to the thousandth of an inch. That is our great trouble every time we have tried that. Yet time and time again, after it was on, we had to take it and loosen it up and do one thing or another to it. When I went there

the thing I asked for was just a good handy man, a good machinist. I was very fortunate in getting a fellow who had done a little safety work and he was a good mechanic. I told him first what we wanted and he was like all of the rest and he said, "You can't do that, Mr. Kaems." But he doesn't say that any more. We have a sign in our office which says, "It can be done," due to the fact that when I told him to change a certain job, he said, "You can't do that."

I said, "Are you sure you can't do this?"

He said, "Yes."

I said, "You don't want to commit yourself, but are you damn sure you know it can't be done?"

He said, "Yes."

In five minutes I showed him he was mistaken and since that time he has never again said, "It can't be done." I just tell him what I want and he takes care of all of the work. If he wants to get the thing just right he gets a rule and puts a piece of metal on it and he holds it there and it slides and in a litte while he gets what he wants.

Get a Good Handy Man to Make the Slides

The thing to do is to get a good handy man and let him take care of that and let him get some other handy man to help him. We don't want a man who is going to get too technical because that isn't going to help you, but if you get one good man with good horse sense you would be surprised at what he can do for you.

We never had much success even by getting the tool makers to do that. In the first place, with one of those men everything must be polished and fine and cut down to a thousandth of an inch and all of that stuff and that isn't necessary at all. They spend three times as much time on it as they should. I do not say this to belittle any of you tool makers. You know your little troubles. When you build dies they must be down to a thousandth of an inch and that is the trouble with the tool makers. That is why I say, don't get somone who is too technical on this work. That doesn't need to be down to a thousandth of an inch. Just get some fellow to handle it who has some ingenuity; he has got to think a little. If you do that, you will be surprised at how many things he will work out. After the men find that a thing works well—they have a head just as well as we have and they give suggestions if they know they get credit for them.

If a man works out a little thing for us, he gets credit for it. There is another thing we have done. You hear time and again that you can't get men to use this and that. We haven't any trouble with that at all, due to the very fact that when you increase production and let a man earn a dollar or two a week more than he has been earning, I am going to tell you he is for you. He wants to make money, $2 a week means $100 a year. That is how we have been able to get the men to use it. We have sort of pushed them into it. We have had fellows who wouldn't work on it on a bet until they saw that the fellow working next to them was earning a couple of dollars more a week than they were and immediately they wanted a slide. After they get them they are for them.

You have to look at the other side a little bit. You can't push it all down their throats. That isn't fair; it isn't right. They don't give it the same thought that a lot of us have given it, but you can teach them. We haven't had a bit of trouble except with one man who has not one whole finger on either hand. He lost them all in our plant before we had these slides and he has been the hardest man to handle. He admits that his average pay has been $42 a week due to the fact that we made slides for him. Once in a while he forgets himself and goes in there with a stub. I caught him once or twice—he has worked there for a long time—and I said, "Shorty, if I ever catch you doing that again you are going to get a different job. We don't want to do that because you have worked here for a long time, but you can pick out any kind of a job you want. Do you know of any job around here?"

He said, "No."

I said, "There is only one job you can do and that is sweeping, but you can't earn $42 a week sweeping. Don't forget that. The next time I catch you doing that we will make you a sweeper without any talk about it." And we would. He thinks of $42 against probably $25 and he surely obeys the law and the rules.

Of course there are no two ways about it. You have simply got to put your foot down. I have tried everything in the world and yet there is just one way that you can make a man realize and think of it and that is when you hit his pocketbook.

One of Those Who Said It Couldn't Be Done

CHAIRMAN HENNING: The remark that Mr. Kaems made there hits pretty well home when he said, it can be done. I used to have that same habit and I used that same expression a good deal—it can't be done. I had to change that very quickly if I wanted to continue to work. At least, the executives over me discovered that it can be done and it must be done and therefore I had to change it and get down to hard tacks and the result was that we did get it done. I remember particularly that I was told, "Henning, it can be done and it must be done. If you are going to continue with this idea that it can't be done somebody else is going to do it." The result is that we are doing it.

It hit right home when he made that remark. I know Mr. Kaems would like to have me talk on our stuff. I don't know that I could say much about it because he has pretty nearly said all that can be said on that line of work.

R. H. LUCKENBACK (Budd Mfg. Co., Philadelphia): I wish I could get up and talk like Mr. Kaems can but I will say this: I used to be one of those fellows who said it couldn't be done but I have since realized that it can be done. Further than that, you have seen a little demonstration in the rear of the room showing how it can be done. Mr. Clark, who is here, would be glad to show anyone through their plant and show that it can be done. I was a lone visitor at his plant on Tuesday afternoon and I want to tell you that it was worth going to see.

CHAIRMAN HENNING: If Mr. Clarke is in the room we would like to hear from him.

E. F. CLARK (Ternstedt Manufacturing Co., Detroit): The picture that has been drawn here has been very much my own experience, not only at the present time but in several other plants. The one exception that I will name is the Universal Button Company.

I went with the Universal Button Company in 1912 and they had dies that were chipping off the fingers and apparently they didn't know how to grasp the situation. Being an employee of the insurance company at that time, it was to our interest to stop them in some way or get off the risk. Because of their recent experience, the management was induced to make the effort and started them off with a slide apiece. One of the girls had an accident on a slide feed caused by her leaning against the guard. The guard gave way and a piece was chopped out of her finger. This induced the manager to remark to me, "I wish we could do without the press operator."

Applying the Principle in a Button Factory

As a result of that I thought for a minute and it struck me that having a uniform product the size of the button, and it is perfectly round, that that would be an ideal thing to experiment on automatically, and I made the suggestion that they use a slot, similar to the one here, and that they take the blanks and roll them down and finally use the stripper plate with a bell crank on the press and in that way make the drop automatic.

They have done that and they have some very clever setups. They have a little pick and if the piece sticks on the point it comes down more rapidly than you could possibly do it yourself. It would pay anybody who has the opportunity to visit the Universal Button Company and see these automatic machines. They have about 60 presses and about four or five men are all of the employees they have in that department. They take stock from the blanket press up over the aisle and down to a forming operation. They have presses wherein three pieces are assembled in one die automatically. That is going the pace. That is really punch press work.

We are drifting that way and I want to say that Ternstedt is drifting that way faster now than they ever have within the four years I have been with them. It has been a hard struggle there with very few illustrations for the men to see and get ideas from in order to work out their own problems. But we have patiently drifted along and tried sympathetically to introduce the thing. I believe now that Ternstedt is on the right track with plenty of sand on the rails.

We have kept open house with a view to trying to demonstrate some of our safety guides. We have a diversified exhibit here that shows the different methods of making dies safe. Some of them at first glance don't appear to be safe but the safety is there just the same. Also, instead of making the job absolutely foolproof, we give the oper-

ators credit for having intelligence enough to understand that we are depending on them, that they are not willing to jeopardize their fingers. We also give them a systematic training of eight days in order to illustrate to them that these dies are to be handled in a certain way. It is expensive to have green operators shooting two or three pieces through a day in one operation and if a piece only gets half-way in it is fatal to the die also because it cancels the one side and destroys your tool.

We take them in hand and we tell them, "Now this company has spent money making the dies safe and it is up to you to assist; it is your fingers that are at stake. Only by following your instructions religiously can you save your fingers, and our job is to see that you follow those instructions."

Any time we catch an operator taking a chance we warn him and after that we say, "Here you are out," and out they go. This process of handling new employees, I think, is highly important unless you do make your tools foolproof, because after a time an operator will lose that sense of fear and get a sort of false confidence that will lead him to do something he shouldn't. We provide all manner of hand tools and we attempt to provide the right tool for the right job. I want to say that I hardly believe in the nibbers being a slow method of feeding. We have women up there using a pair of nibbers. There is one woman who does it very rapidly—I think 22,000 or 23,000 pieces a day—and there is absolutely no hesitation and absolute accuracy. That is due to the fact that we have allowed her to remain on the one job sufficiently long to secure this skill.

MR. KAEMS: I would like to hear from George Thompson. He can tell a good story if he wants to.

WHY I CAN TALK TO YOU ABOUT PUNCH PRESSES

G. S. Thompson, Detroit Insurance Agency, Detroit, Mich.

I had hoped you wouldn't get me started. If I get started on this die proposition, I am just like one of those repeating phonographs, I haven't got sense enough to shut up.

Let me tell you why I am in this insurance game and why I can talk to you about dies. When I was a kid they put me at die making. I went to work when I was 14 years old and had to go to work at 6:00 o'clock in the morning and work until 6:00 o'clock at night and I got $3 a week. I was tied out to an old mechanic. Outside of living with my own family, that was about all I had that I could call my own. I have been through the mill and I have had the bumps. I have had a No. 9 shoe thrown up under my coat tails more than once. That is the way they used to teach me.

I decided to go in business for myself, and if you don't think it takes a lot of sand, try it, because when Saturday comes around and the bank balance is low you have to scratch gravel to beat the band because

the boys on the bench don't know anything about your troubles nor do they care anything about your troubles.

I finally got up to a plant of 60 men and we were perfecting factory processes. By that I mean that a company, instead of doing the experimental work in their own shop, which is expensive and which in the main is not entirely satisfactory because they are influenced by their shop condition, would send that work to us. If you will take somebody on the outside who doesn't know anything about the troubles of the shop and say, "That is what we want to do. How are we going to do it?", he will do it for you because fools have walked where angels fear to tread. That is the reason.

I found that it wasn't a really hard job to take the "t" out of "can't." You can do anything that you want to do if you want to do it badly enough. You have to sacrifice; you have to give something; you can't have your cake and eat it.

The Accident to Marie Started Him to Thinking

When the war came along a lot of us were wiped out of existence. I was one of those wiped out, but before that I had something that proved conclusively to me that it wasn't necessary to stick your hands were lots of other ways you could get them nipped off without doing in the mouth of a punch press to get your fingers nipped off. There that. I also found that you could make the press operator just as efficient without sticking his fingers in there.

We were making a die to make a Heinz pickle. It was to be made out of painted tin and it had to have all of the warts on it, too. If you boys haven't tackled painted tin you haven't been through the punch press game because when you press up painted tin you can't break the paint. You have to bring them up out of the paint. I had a girl working for me at this time and she insisted on putting her finger up there to make sure one of the warts would not slip off. I said to her, "Marie, you look out. You are going to get your fingers nipped in there." Sure enough about 9:30 or 10:00 o'clock, after the party the night before when you see four things where there is only one actually, Marie came in with a piece out of her finger.

I said, "You got it, didn't you?"

"Yes."

"What were you doing?"

"I was pushing that piece there and getting that wart out."

"Now, you have a wart on your finger and you will have one there as long as you live."

I decided that if a punch press would chop up a beautiful young lady's hand, I wasn't doing my stuff, so we turned the pickle around the other way. It was an American can press with two front rod stays in it. The first thing we did was to put on another piece of tin and in a few minutes we had the darn old pickle sliding down

just like they slide in the chutes when they brine them. I said to myself, "Here we have been doing this thing all of the time at a cost of 20 cents a hundred. Look at the money I was losing just because I was too dumb to see the thing."

Then we built other dies and other things until when the war was over and the battles were all won, I said, "I don't see any particular reason why I shouldn't start in the insurance game because an insurance man is a missionary." It isn't the experience he gets in one plant. He sees the experience they have in all of the plants. Then they gave me that heart-breaking job of following up accidents, of analyzing accidents.

It is an awful game when you go in a hospital and see a man laying there with a bandage, with his fingers chopped off or something of the kind—all perhaps because of foolishness, because of carelessness, although I have wiped that word carelessness pretty much out of my vocabulary because of something Mr. Bennett said in the A. S. S. E. meeting the other day. He says we say we are trying to make men think—we are all thinking all of the time but we don't always think right. That is the idea. We are thinking and our gray matter is working. Gus was the first man to come out before the world and tell the world how to do this thing. Lots of us know how to do it but we weren't liberal enough to come out and say it because we considered it stock in trade.

A Hard Test But the Problem Was Solved

I was down in a concern in Ohio and I knew the manager of the plant very well. He said to me, "Thompson, your stuff sounds all right, but can you do it?"

I said, "Yes, of course we can."

So he picked up a piece from his desk that looked like a crab. You fellows from the east know what a crab looks like. The moment you touch it it hooks fast to you. He said, "Show me how to feed that."

He didn't give me any tin or any part of his shop. All I had to do was to go back and buy a bottle of glue and steal all of the blotters and advertising matter that I could find in the hotel. I didn't get through until 3:00 o'clock in the morning but by that time I had this thing going down there every time. I woke up at 7:00 and I was out at the plant at 7:30 without breakfast.

At the gate the man said to me, "Where are you going?"

I said, "I haven't got time to talk to you." And I went right on. I was going up to see the big fellow. I was going to take his scalp that day. I put the thing on his desk and I commenced to shoot this thing down one after another. Finally he stopped what he was doing and he said, "What do you call that damn thing?"

"You said I couldn't feed that. There it is. Now you do it." So I shoved it over to him and he did it. He did everything he could to stop

it from working but it always went down where it belonged. Then he said, "Come on downstairs."

At 8:00 o'clock we brought in the foreman of the die department and said to him, "Look at that."

He looked at it and he said, "It works."

He turned to me and he said, "Will you stay here today?"

I said, "Yes, I will stay here today and tomorrow, too."

We started in on that plant and we fixed four dies Saturday afternoon and we fixed six dies Sunday. You know I don't get paid for ing Sundays but Sunday is like any other day to me. I wanted to prove to that man that it could be done. When those slides were put into operation Monday morning a sign was put up on the wall and you can find that sign there today if you go to that plant. It says, "Any operator detected placing or removing a piece from between the dies with his fingers will instantly be dismissed. If you want to get fired, use your fingers on the dies."

One of the Old-Time Hard-Boiled Kind

There was a man there as hard-boiled as any man you ever saw. There is a man who has progressed along the line until today he is the head of a big organization. He was a toolmaker. He saw the application. He saw what could be done and he did it. You can do the same thing.

If you have a punch press section and you operate your punch press section as I believe it should be done, you men in the plants want specific cases proven to you. That is what you want. It is all right for us to tell you; it is all right for all of these dies to be brought here and shown to you; it is all right to tell you that this principle can be applied and that it can be done; but you have your own particular baby in your own plant. You have your own particular problem from a production standpoint. You can't tear down your organization to build it up with something else. You have to crawl along just as you did as a child, before you can walk. You have to creep to get your balance and after you get your balance you start; after you walk you start to run. There is nothing to it. This is the only way you will accomplish it in your plant.

There is no use fighting the die maker. There is no use fighting the die designer. It is a case of salesmanship, of selling. Do you suppose 15 years ago that you could have sold me on any kind of stuff like this? I would just say, "You're nuts. Get out of here." So will any other superintendent or die maker or manager in your plant today because he isn't thinking along that line. You can't make automatic dies for everything because it would sink you financially. It will sink your organization financially.

Just use common sense. As one of the boys over in that small plant session said, "use consecrated common sense." If you can use consecrated common sense in your job you will do this. You are not going

to slide every piece the first time. You are not going to produce a whole lot of production. There may be some dies on which you will penalize production a little bit, but if you do you have done this: you haven't decreased the rate of the employee but you have taken the burden away, and that burden is one, two or three fingers when they are chopped off.

I maintain today, and I always have maintained, that it is absolutely not necessary to feed a punch press with your fingers. I say again, and I am willing to back up the statement, that there isn't a piece made today that can not be fed some other way than with the fingers, just as accurately and perhaps a whole lot quicker.

Simple Problems Are Sometimes Hard to Work Out

It is fair to consider this point, too, in the shops. You men know as well as I do that the reason your dies break, the reason your dies wear out, is because the man feeding the press does not register his piece every time and it causes an undue strain on your cutting edges and before long your die is gone or the piece gets cross-sectioned and the die comes down on it and ruins it. Of course you die makers want to feel that when you put that piece in the slide it is going to go down there because that's your baby, that costs money, and you don't want it all buggered up. You want that die to remain. What is the result of the chute feed dies? Isn't it fair to assume if you place that piece in there in its position it is going to go to its destination every time? Of course it is and it is going to be 90 per cent accurate. With hand feeding at the best it isn't 75 per cent accurate, and you know it.

Doesn't it appeal to you that applying a principle of this kind levels off and cuts down the die repair? I know that it does. I know that Ed Clarke found it out. I know that a hundred of the other plants know that it did. So if it does it for them it will do it for you. If you want your Punch Press Section and you are interested enough in it, then don't be afraid to bring your die along.

I hope some day to see punch presses set up. I hope to see dies set up and operated, if necessary. I don't mean a great big fender die or a side rail die or a cross-section die, but just something that proves the purpose. Do you know that today there is one concern in town here that handles a sheeet three and one-half feet long and eight feet wide and the man goes up and shoves it in the machine and goes away and leaves it? Would you try that on a combination blanking, forming and piercing progressive die? When it is done it is only a half-inch cross section. Yet it works and one man runs three blanking presses. Think it over. It isn't anything wonderful. It isn't anything complex; it just means using the old bean, that is all.

I think it was last year that Admiral Sims said it took him a long while to find out why they put the head on a pin. He finally figured out that the reason was to keep the pin from going in too far. The same

principle applies to this. Don't think for a minute that you are going out and turn the shop around and everything is going to go well, because it isn't. They put the head on the pin so it wouldn't go in too far. Go easy at first but when you do go, go all the way down to the head and stick there.

I haven't anything more to say to you than this. God bless you in your movement for a punch press department. May the greatest success in the world attend your purpose. Then let the charity of your heart and the liberality of your mind open up the sources of experience that you have all had and let it flow to the National Safety Council conventions so that you will have the biggest Section in the whole organization, so that you will have the greatest amount of good for everyone and so that you can return your employee to his home every night all in one piece.

CHAIRMAN HENNING: Gentlemen, it is just as Mr. Thompson said. You can make this one of the biggest Sections of the National Safety Council, and I believe we are going to do it by a lot of hard work; otherwise I don't believe we will be able to get anything.

The Nominating Committee ought to be able to give their report at this time. Mr. Schwab, I believe you are the chairman.

MR. SCHWAB: The Nominating Committee has met and has selected the following nominees for officers for this coming year for your approval.

REPORT OF THE NOMINATING COMMITTEE—POWER PRESS SECTION

Chairman, T. O. Meisner, American Can Company.

Vice-Chairman, J. H. Henning, Automatic Electric Company.

Vice-Chairman, W. Dittmer, Westinghouse Electric Company.

Secretary, A. L. Kaems, Simmons Company.

Executive Committee: F. Boraks, Liberty Mutual Insurance Company; H. Schwab, Aluminum Goods Company; C. S. Gerding, Western Electric Company; H. Sinclair, Worcester Stamped Metal Company; E. J. Clark, Ternstedt Manufacturing Company; L. W. Thompson, Wagner Electric Company; W. J. Graves, Michigan Mutual Insurance Company; J. Larson, Clum Manufacturing Company; R. Marter, National Enamel & Stamping Company; F. Mares, Perfection Stove Company; G. S. Thompson, Detroit Insurance Agency; G. Kuechenmeister, Dominion Forge & Stamping Company; S. H. Slaymaker, Fairbanks Morse Company.

CHAIRMAN HENNING: You have heard the report of the Nominating Committee. Are there any other nominations? If there aren't any, we will have the secretary cast a unanimous ballot for the officers as set forth in the report of the committee.

ADJOURNMENT.

Cement Section

New Officers of the Section

CHAIRMAN: R. FRAME
Alpha Portland Cement Company, Easton, Pa.
VICE-CHAIRMAN: T. F. HALPIN
Marquette Cement Manufacturing Co., Chicago, Ill.
SECRETARY: A. J. R. CURTIS
Portland Cement Association, Chicago, Ill.

Committees

MEMBERSHIP: HENRY A. RENINGER, Chairman
Lehigh Portland Cement Company, Allentown, Pa.

October 26, 1926

R. FRAME, Chairman
Insurance Manager, Alpha Portland Cement Company, Easton, Pa.

THE opening session convened at 9:45 o'clock in Parlor B of the Book-Cadillac Hotel, Detroit, Michigan. Mr. R. Frame, insurance Manager, Alpha Portland Cement Company, Easton, Pa., presiding.

CHAIRMAN FRAME: Gentlemen, it is a pleasure to see this fine turnout of men who are interested in the safety activities that have been carried on in the different plants for the past year. It is a pleasure to the officers of the Section to note the large increase in attendance. It is my hope that you will feel very much at home in this meeting, that the addresses will prove of unusual interest and that you will all feel free to enter into the discussion. Tell of the good work you are doing. Undoubtedly there will be questions you would like to ask, because there are those here who would be very willing to trade experiences.

The first item on our program is a report from Mr. Jacobsen covering the officers, and his report, as secretary of the Cement Section. He has been with us so many times that an introduction isn't at all needed. I know you are anxious to hear him.

H. G. JACOBSEN (Manager, Bureau of Accident Prevention and Insurance, Portland Cement Association, Chicago): Gentlemen, last year at the Congress in Cleveland we had a very good representation, but this year we will eclipse that attendance quite considerably.

As a part of the association activities, of course, you understand this

work of the Cement Section really runs hand in hand with the work of the Bureau of Accident Prevention and Insurance of the Portland Cement Association. These two bodies—practically one, you might say—have endeavored to keep up the work in our industry during the year. Immediately after the spring meeting of the association in New York, we held a meeting in Phillipsburg, New Jersey, for the eastern district, and we had present there a little better than 200 cement representatives. We had a fine program, and I am sure that meeting was the most interesting ever held in that section.

A little later we held another meeting at LaSalle, Illinois, where we had representatives from plants in the middle west, and we had around 100 representatives there from various cement plants.

Meetings of that kind have been held regularly from year to year and have helped us wonderfully in keeping up the interest of the various sections.

A Forty-two Per Cent Reduction in Accidents

I traveled through California about two months ago to attend the Pacific Coast Safety Conference in San Francisco and also the first aid contest being held at the same time. We had in San Francisco 25 or 30 cement men taking part in the various meetings. The Pacific Portland Cement Company's team went home with one of the prizes in the first aid contest. We contemplated holding another meeting in Kansas City, but it became impossible to have that meeting at the time we expected to hold it. I believe we should arrange a meeting in Kansas City, or in that territory. Kansas City is a good place for a Cement Section meeting, and it ought to be held some time in the near future.

You all know about the statistics prepared by the Portland Cement Association. If you have studied the figures in the little book containing statistics for 1925, and also figures for preceding years, going back to 1919, you will have seen that last year we made some wonderful improvements in our accident prevention work—a little better than 42 per cent reduction in accidents since 1920. Considering that figure is for the whole industry and not for a few plants, it becomes even more significant. We take both good and bad figures and compare them year by year. This year promises to be the best year we have had so far in the cement industry by a very wide margin.

We have a campaign going on in the industry at the present time—a general accident prevention campaign. For good reasons we don't call it a no-accident campaign, because we are not ready for that yet, although I think we will be shortly. We are trying during the last three months of this year to see if we can not eliminate practically all of our fatal accidents, at least. If we can do that, this year will stand out far ahead of any previous year.

I want to take this opportunity, men, to thank you personally for the interest you have displayed this year. It is difficult, I know, for people outside to realize how the accident prevention work in the cement industry has taken hold the last few years. I am not going back six or seven

years—just the last few years. There has been very remarkable improvement in the interest being shown, from the top to the bottom, at all our plants. I will say that the situation looks very encouraging and there is no reason why during the next few years the cement industry can not make some records that should be broadcasted all over the land. We have too many fatal accidents, but we are getting after those, too, and they are coming down. I hope this year to show a reduction of 50 per cent in fatal accidents. We can't eliminate all, but we can make a very considerable reduction.

The accident reports from the various member plants are coming in in very good shape now. We have very little trouble in getting accident reports. We have very little trouble in getting the man-hours. In fact, we meet very little trouble of any kind, except in connection with the accidents themselves. We have too many of them, and we are trying to eliminate them as far as possible.

Early this year at the meeting of the association in New York, the Portland Cement Association's safety trophy was awarded. We took considerable pride in awarding not only one trophy but two trophies, inasmuch as last year we had two plants that had no accidents at all. Those two were in Canada. No. 8 plant up at Port Colborne, Ontario, and the Duluth plant of the Universal Portland Cement Company. L. M. McDonald is superintendent of the Port Colborne plant.

A Record of 521 Days Straight Without an Accident

At Canada No. 8 they ran 521 days straight without an accident. In fact, Mr. McDonald told me yesterday that they have done 700 days with the loss of only 18 days. Gentlemen, that is a mark to shoot at.

The Duluth plant also did not have any accidents last year. The trophy given the Duluth Company will be unveiled on November 3, and the one in the Canadian plant will be unveiled inside of a week or two. It is unfortunate that it has taken us so long to get those trophies, but on account of their size and their great artistry it took a great deal of time to get them after the announcement of the awards was made. They are wonderful, and their owners will treasure them more than anything they have.

CHAIRMAN FRAME: You have been introduced to Mr. McDonald and Mr. Huth. I wonder if Mr. McDonald wouldn't tell us about how it feels to win a trophy. I know there is a certain wonder in the minds of these men as to how you have been able to go through an entire year without a lost-time accident. Mr. McDonald, will you tell us briefly how you accomplished this wonderful result?

L. M. MCDONALD (Superintendent, Canada Cement Co., Ltd., Port Colborne, Ont.): There is one thing about an accident prevention campaign which bears mention and that is the fact that it takes a long time to get to the point where you can win a trophy; you have to work for a great many years. You will probably need to try various organizations

and many schemes, conduct a great publicity campaign. But the most fundamental thing in safety work is placing the responsibility on your foremen. You must place the responsibility for your safety, just the same as you place the responsibility for any other part of your plant, on well-qualified men. The men you have selected as foremen of the plant naturally are these qualified men on whom you must depend.

I can candidly say from the first day we placed the responsibility of the safety work on our foremen, which was in October, 1923, we saw a marked reduction in accidents. We could see that they were thoroughly sold on the proposition of safety. They were absolutely assured that the responsibility was theirs, and from that day on our safety work made a marked improvement. In fact, during 1924 we successfully went through nine calendar months without any accident, and we had only 35 lost days during that year.

So we have paved the way to this trophy from 1920 to 1924 by safety education. Education shows that accidents can be prevented. It certainly is an assured fact that if you once can get that idea into your organization—that accidents don't "just happen"—that there is a cause and a reason for every one of them—you can absolutely count on your safety work being successful.

My secret of success is contained in these few words: "Educate your foremen"; they in turn will educate their men. You will then soon have the whole plant educated in accident prevention work. If you once prove that accidents can be prevented, you will never have them afterwards.

CHAIRMAN FRAME: Thanks very much, Mr. McDonald. It is reassuring to know that your plan still holds up and that you are continuing the very good work that started some years ago.

How It Feels To Be Awarded a Safety Trophy

Mr. Huth, will you now tell us something about the trophy that you are going to place on display soon?

GORDON C. HUTH (Superintendent of Safety and Labor, Universal, Duluth): It feels mighty good to get a trophy. At our plant we didn't realize what we were getting until the other day—a week ago yesterday, I believe. I came into the plant and found a flat car and something of unusual size upon it. Upon investigation I found it was the trophy. It is a huge thing. We set it up the other day. It stands eight feet out of the ground, is two feet thick, and weighs 15,000 pounds. That isn't a thing that is going to deteriorate and fall apart in a hurry. We have a monument to our safety work from now on.

Mr. McDonald told you how the work was accomplished at his mill. I would say that what he has done is similar to what should be done in any place where there is successful accident prevention. I can say in just a word or two that we succeeded by various means and ways to get everybody in our organization to put his shoulder to the wheel, and in that way we acomplished what we did.

CHAIRMAN FRAME: I will now make the announcement that the Nom-

inating Committee was appointed some months ago: Major H. A. Renninger, of the Lehigh Company; Mr. Frank H. Sass, of the Universal Company. The third member was Mr. David Adam, of the Lawrence Company. I am sorry to say that he was unable to be with us on account of a hospital operation, but he sent his regards to all his cement friends and hopes to be with us another session. I am going to ask Major Renninger if he will kindly introduce the next speaker on the program.

Report on Membership in the Cement Section

MAJOR RENNINGER (Lehigh Portland Cement Co., Allentown, Pa.): Ten years ago our next speaker was good enough to come to a meeting of the Cement Section—I think it was here in Detroit. If I remember correctly, there were 10 present, and of those, six were the speakers. There were four in the audience. What I want to bring out is that we have grown from practically nothing to the size of this meeting here.

I want to make a short report to the Cement Section. When we started we had practically only two or three companies that were members of the Cement Section and members of the National Safety Council. At the present time our membership is 70. Among those 70 members, as nearly as I can figure out, we have something like 41,000 employees; and that does not include one concern which has been assigned to the Cement Section, which is doing work somewhat similar to the work we are doing, and also has a cement plant. That company is the Pittsburgh Plate Glass Company. Adding this to the number of employees, we have something like 53,000 men in the Cement Section.

I am glad to say that during the past year there were but four memberships canceled. Of those four, the Acme Company was taken over by the North American and is still a member of the Cement Section. The Tidewater, which was taken over by the Lehigh, is still a member. The Indiana Portland was taken over by the International. While they dropped out under their own name, they are still members of the Cement Association. The only resignation we have was the Wilson Portland Cement Company of New Zealand. I don't know why they resigned, and it is too far to go over to find out. We have nine new members this year, making a total of seven additional members.

If there is any one official who has been interested from the begining in accident prevention, it is our next speaker. He was one of the original members of the Committee on Accident Prevention and Insurance of the Portland Cement Association when that committee was formed in 1914. Mr. Bissell, now Chairman of the Board of the International, was one member, and Mr. G. S. Brown, of the Alpha, and myself were the others. At that time Mr. Hill was elected secretary and remained in that position up to the time he went into service. If you will remember, he went into the flying corps and was killed. Since that time Mr. Jacobsen has been our very able and efficient secretary.

Mr. Brown has always had accident prevention work at heart. In the early days when we needed help and advice we always went to him. He

would always go to the Executive Committee of the Cement Association and fight our battles. I think you will agree with me that we are very fortunate in having Mr. G. S. Brown, president of the Alpha Company, to talk to us on accident prevention and what his company has done.

ACCIDENT PREVENTION FROM THE VIEWPOINT OF AN EXECUTIVE

G. S. Brown, President, Alpha Portland Cement Company, Easton, Pa.

In October, 1916, ten years ago, I presided as chairman of the Cement Sectional Meeting held under the auspices of the Fifth Annual Congress of the National Safety Council at the Hotel Statler in this city. At that meeting there were 14 present, including myself, and in looking over the minutes the other day I noticed that in my concluding remarks, I said that I hoped I could be with you again some day. That Cement Sectional Meeting was the second one, the first having been held in Philadelphia the preceding year.

When I look over the group that has assembled here today and compare it with the few representatives who were present ten years ago, I am impressed, as in no other way, by the increase in interest on the part of the cement industry in the protection of its employees from the hazards of their occupation. You gentlemen who are on the "firing line," so to speak, undoubtedly regard the subject of accident prevention as a somewhat abstract proposition and find it difficult at times to keep an active interest in it, when you have so many other matters pressing on you for attention—matters which are apparently much more important, in that the prosperity of your organization depends upon continuity of operation and economy of procedure in your plants. Nevertheless, in spite of this drawback, progress has been made in the cement industry in reducing accidents.

I do not conceive it to be my function to analyze in detail the statistics of the plants which have reported to the Portland Cement Association during the past ten years. This has been done in such a masterly way by Mr. Jacobsen, manager of the Association Bureau, that I can add nothing to it.

What I would like to do is, if possible, to bring some message of encouragement to you men who are working continuously to reduce accidents in the cement industry. My interest in this matter changed from the sentimental to the practical about 1910 or 1911 when the first compensation laws were being discussed by the legislatures of New York and of New Jersey. As I recall it now, the first law was passed by the state of New York and was later declared unconstitutional. This was followed by the enactment of a law in New Jersey which passed the constitutional test, and thereafter New York passed another law which also was declared constitutional. Since that date nearly all of the other states have passed compensation laws.

As a result of these early laws a determined effort on the part of the

management of the Alpha company to reduce the number of accidents about its plants was begun. Our work at first was more or less intermittent, but the fact that I, during the years from 1911 to 1915, was in close contact with the operation of the plants of this company brought home to me in a very emphatic way the real importance of accident prevention work; and as time went on, I gradually came to see that no effort that we could make to prevent the maiming and killing of our workmen was too great or costly to be tried.

While I no longer have the close contact with the operations of our plants that I had in those years, I still have the same active interest in the accident prevention work of our own company and of our industry, and it is a matter of pride with me that not only have the efforts of the Alpha Company had a measure of success, but the work of the accident prevention committee of the Portland Cement Association has also been successful.

Many different methods have been tried by the company that I represent and by other companies in the industry to stimulate the interest of the men themselves in this work. When we first started work, the greatest stress was laid upon the protection of machinery. I was very soon convinced that by far the major number of accidents about our works came from the carelessness and neglect of the individual who was hurt or of some fellow employee, rather than from unprotected machinery. Therefore, while we continue to follow the suggestions of the various state commissions, as to the protection of machinery, we felt that our real job was to get the cooperation of our employees themselves, and that has been our effort for the past ten years.

The One Per Cent Safety Bonus Plan

Frankly, it has been discouraging at times to see, that in spite of all we have attempted to do, after the final figures are made up and a review of the results for the year made, we at times seem to have gone backward. In recent years, however, I feel that we, as well as the industry, have made real progress. Shortly after the first of this year we made a careful study of the accident records of the Alpha Company and were far from satisfied with the result. We had, we thought, impressed the executive force with the sincerity of the president and directors in regard to this work, but evidently they had not gotten that fact across to the employees. I came to the conclusion that perhaps a monetary reward would stimulate the interest and enthusiasm of our employees, and after careful consideration by the management and consultation with the operating officials of our various plants, the Alpha Company established what we call "The one per cent safety bonus plan."

Without going into all the details of this plan, it is sufficient to say that if a mill has operated for a month without a lost time accident, the employees of that plant are entitled on each payday, so long as the plant goes without a lost time accident, to an addition of one per cent of their earnings as shown by the payroll. We are much pleased with the results so far. The lost time accidents for the first nine months of

this year at the various plants operated by us aggregate 40; the lost time accidents for the same period in 1925 were 94. The number of days lost during the same period in 1926 was 855, and in 1925 there were 1,539 days lost. The days lost per one hundred thousand man hours worked for the first nine months of 1926 aggregate 48, while for the year 1925 the number of days lost per one hundred thousand man hours worked was 494, which includes an allowance for four fatalities.

We have been extremely fortunate up to date this year, in that we have had no fatal accidents. Whether this safety bonus will in the long run continue to bring good results, time only can tell, but I am convinced that it has brought about a much greater degree of cooperation on the part of our management and employees than has been known in our organization heretofore. This attitude was well expressed by one of our superintendents, who in an address to the employees under his supervision, said, "When the company not only asks us to be careful but is willing to pay us for looking after ourselves, we certainly ought to comply with its request."

I have touched upon the value of cooperation and I think we may say that our industry has succeeded in getting not only a fair measure of cooperation on the part of the workmen, but, in many instances, on the part of the management of our plants. Nevertheless, there is, it seems to me, still lacking in many companies that full measure of interest and cooperation on the part of the chief executives which they should have.

The Attitude of Management the Determining Factor

These men, in my judgment, should give hearty and continuous support to the efforts of those who are charged with the actual work of educating our employees to safety methods. I speak from the standpoint of the chief executive of an organization, but I am sure that many of you present are executives also, although it may be in a subordinate capacity, and I want to urge upon you most emphatically complete and thorough cooperation on your part with the efforts that are being made in your plants for the prevention of accidents. I think there can be no truer statement made than this, "The attitude of the management will determine the attitude of the employees." If the attitude of the management is that of carelessness or intermittent attention to this particular problem, you can hardly expect workmen to have any other than the same viewpoint. If, on the other hand, the management takes a personal interest in these efforts, if it shows that it is willing to spend money for the protection of machinery and the education of its employees, it can expect a hearty response from these employees.

I can not close this portion of my talk better than to quote an extract from a letter written by W. J. Harahan, president of the Chesapeake & Ohio Railway Company, to Colonel George Harvey, editor of the *North American Review*. This journal had published an article entitled, "Murder on the Rails," and in writing a protest about it to Colonel Harvey, Mr. Harahan said, "The railroad managements have no responsibility

which is greater and no purpose which is more definite and pronounced than to protect the safety of the traveling public." I should like to substitute for "railroad managements," "managers of the cement industry," and for the words "of the traveling public," the words "of the employees of this industry"; and I wish that all of us who have any responsibility in the industry might take it as a statement of our plan and purpose. It would then read "The managers of the cement industry have no responsibility which is greater and no purpose which is more definite and pronounced than to protect the safety of the employees of this industry."

The Fatal Accident Most Important Problem in Industry

It is well known that competition is one of the strongest incentives that men can have, and this incentive in recent years has been used to great advantage in our industry. The trophy of the Portland Cement Association is being worked for by the individual mills of the organizations with much interest, and as the competition goes on, I think I can see a distinct increase in interest on the part of our mills. The offer of the trophy by the Bureau of Mines in 1925 called "Sentinels of Safety" was productive of great interest. The publication of the safety records by the press is of much value. Nothing is more conducive to the morale of a plant than to find that it has been mentioned by the press as having done well in some particular or over a specified time.

The fatal accident in our industry is our most serious problem. It is true that a permanent injury is also of serious moment, but the majority of those who receive permanent injuries are still able to earn their living, to care for their families and enjoy life. The fatal accident, however, removes from the family its wage earner; it takes from him the probable enjoyment of many years of life; it results in the disorganization of the home and the lack of education for the children, or makes it necessary to call for help from those charitably disposed. These are the practical results, but it also causes that great sorrow which the death of a loved one always brings to those who are in his circle of friends. The latter is a thing for which no adequate compensation can be made and the report of a fatal accident is the most distressing one that can come to me as the chief executive of our company. Every effort, therefore, should be made to prevent fatal accidents and as we are successful in such efforts we may count our whole campaign successful.

Your program promises to be most instructive as well as interesting; from your papers and discussions at this meeting you will get a great deal of benefit. When you go back to your plants, you will carry with you ideas which you can put into practical operation. It may not be possible to apply all of the plans which will be outlined at this meeting at every plant, but you will unquestionably get different viewpoints from those you have had in the past and I hope and believe that as a result of this meeting the cement industry will continue its efforts to prevent accidents to its employees with increasing success.

CHAIRMAN FRAME: We are very grateful to Mr. Brown for taking his

valuable time to meet with us today in the discussion of our accident prevention problems. I know we have found his viewpoint interesting, and it undoubtedly carries a large measure of encouragement so that we may continue our good work. Each of these addresses and papers is open for discussion or questions. I know Mr. Brown will be pleased to answer any question which you desire to ask.

T. F. HALPIN (Marquette Cement Mfg. Co., Chicago, Assistant to General Manager): I don't care to ask him any question, but I should like to take advantage of this opportunity to congratulate the Alpha Company on the very fine record which Mr. Brown just told us about, and I should also like to congratulate the active head of that company.

MR. JACOBSEN: I think it would be interesting if Mr. Brown would tell us how many plants have succeeded in getting under the line and getting their slice since this bonus has been granted. I understand that there was a month during which you had quite a run on the bank.

Further Discussion of the Safety Bonus Plan

MR. BROWN: As a matter of fact, I don't know exactly how the thing has worked out. We have 10 organizations working under this plan. I know there was one mill that had quite a struggle to get on; it couldn't seem to get started under the plan. They would work pretty nearly a month without an accident and then some fellow would do something he shouldn't. Although there would be a row about it, they wouldn't get their safety bonus.

One per cent was added to what the man earned. I should be very glad indeed, and I know our directors would be glad, to have every plant receive that bonus every pay day throughout the year. There is no money we would spend more cheerfully to gain the cooperation and enthusiasm of our employees in this particular work. Mr. Frame can perhaps give you some detailed figures. He may have them in his mind.

CHAIRMAN FRAME: With Mr. Brown's permission I will say that so far the Alpha Company has paid out about $9,000 on the one per cent bonus plan. It began in May of this year. If we continue at our present rate, it looks very much as if the Alpha management will contribute almost $16,000 in bonus awards. The Catskill plant and the Manheim plant have received their bonuses every month since May. The Catskill plant has had but two lost-time accidents this year. Those were in the early months and they have continued to collect their payments.

We have with us today representatives from all of the Alpha plants—some 10 in number. Mr. Searles is here from Martins Creek No. 3. I should like Mr. Searles to tell us briefly what the men of the plant think about the bonus plan and how much interest there is in it.

G. B. SEARLES (Plant Engineer, Alpha, Easton, Pa.): I am unprepared to say much about it other than to speak of the success of the plan. The men have been very thankful for the bonus every pay day—not particularly for the amount of money, but because of the things for which it stood. When we lost out a couple of pay days for accidents recently, we

were sorry to find that those accidents were lost time. Everybody in a case like that is anxious to see and tell the foreman in a department where the accident occurred how that particular kind of accident may be overcome and to ascertain whether the accident was serious or not. I feel sure this one per cent bonus plan has been a great success.

CHAIRMAN FRAME: Undoubtedly some of you other gentlemen are trying a plan to stimulate interest in safety which probably borders on the bonus idea. Perhaps it may be something better—something novel. You have the opportunity to let us in on it. Is there someone now who cares to report on his success along that line?

MR. JACOBSEN: I am not telling any secret when I announce what the International is doing, because that has been broadcasted. The International Company has a number of plants, two in Texas, one in Kansas, one in Alabama, one in Indiana, one in Virginia, one in New York, two in South America, and one in Cuba.

The early part of this year they started a bonus system—we may call it. It works this way: they divide their plants into groups, not exactly by departments, but attempt to draw certain dividing lines so that each group is on a fair basis with other groups in the same plant. Each year that a group runs without an accident, every employee in that group gets $10 the first year. The second year if they succeed in carrying on without any accidents they get $20, and so on up to five years. So that it is possible for men to win $50 in one year if they have gone without accidents that length of time. If they have an accident, they immediately slide down to the bottom and start all over again. The plan has created considerable interest.

A Plan That Arouses the Interest of the Employee

I have been around to quite a number of the International plants lately, and many of the men are convinced that at the end of the year they will have a $10 bill coming to them. I am sure that many of them will get it. On the other hand, there are several other groups that have lost out, due to a small accident, and one accident in that particular group means that every man in that group loses out. It is quite a calamity for the individual not only to have that particular accident but the stigma attached to him that he was the man who kept the rest of the fellows out of their bonus. I remember in one particular plant there was an accident and the men said, "There goes $10."

I have explained to you how they have a lot of fun out of it. That is the only way to look at it. As Mr. Searles has said, the $10, or whatever the amount may be, is only a very small part of it. I really believe the pride the men take in winning the $10 is worth 10 times that amount and that is just the way it should be. I am sure that particular plan is going to work out very fine, too. There are a good many other schemes around the various plants that help to keep up the interest among the men—such as having men sent around to meetings of this sort and various affairs that we arrange for during the year at various places.

MR. BUCK (member of local contracting firm): I have been appointed to attend this meeting of the Construction Section on account of our close relation with cement. We are concrete contractors here in Detroit. I should like to ask Mr. Brown if he carries his own insurance in his company?

MR. BROWN: We carry our own insurance in some plants, and have state insurance in others. We take whichever is cheapest. We carry our own insurance in Michigan, Illinois, and New York. We are in the Manufacturers' Association in Pennsylvania. In West Virginia we belong to the state fund. For certain reasons we belong to the state fund in Ohio. There is no compensation law in Missouri, but we hope to get one there this fall.

Planning the No-Accident Campaign

C. C. REID (Office Manager and Safety Inspector, Ash Grove Lime & Portland Cement Co., Chanute): We have no bonus system, but we think we are making a fine record down there and we want to tell you men about it. Ending October 31, if we have no accidents until that time, we will have run seven months without a lost-time accident. Our first real accident prevention campaign was in June a year ago when a one-month campaign was inaugurated. We went through that successfully. We didn't start another campaign until July this year. During April, May, and June, up to July, we had no lost-time accident. We are going along so well that we want to make it six months more.

We had a meeting at which we had speakers and opened up a campaign. We had several out-of-town people address us. We put on a rather novel scheme to create interest. We built a large bulletin board about 12 by 16 in a sort of time office where every employee could see it as he went through. On that we had two sets of hands which ran from April to December, inclusive. As we went through each month without an accident, we would move up a hand.

Another device we had was a hand that counted the days. Every day that passed without an accident the hand would move up. On each side of the billboard was a space to be filled in every day which said, "If you work faithfully you appear here." On the other side were items of interest which were changed daily. At the time we started we appointed about 60 inspectors over the plant. Each inspector was to watch his department for infringement of safety rules and hand it in to one of the committees. If he infringed any rule he would appear on that board the next morning. We found that this created a lot of interest, for no one wanted to appear there. On the right side we changed the bulletins daily and entered items of interest to employees.

We have found that when we make our own bulletins the men pay more attention to them. We have a novel scheme of making bulletins. One of our employees, a painter, cuts out large posters and uses a spray gun brush on them and makes all sorts of posters that are very interesting.

I want to say that if there is a minor accident, I am called to the office just as soon as that happens to find out whether it is going to be a lost-time accident. That is how much interest is created. Everyone is up and coming because they don't want to see that record broken. We hope to go along without any accidents not only this November and December, but also longer. I am going to try to get a different idea to take back to start in January.

CHAIRMAN FRAME: That is very fine, Mr. Reid. We share with you in the good wishes for your continued success. Mr. Stroud of the Mitchell plant of the Lehigh Company is here today. I have an idea he can add something to this discussion.

WALTER A. STROUD (Foreman, Lehigh, Mitchell, Ind.): I do want to tell these gentlemen who have their trophies to install that we have had ours now for six or seven months. I want to say that that trophy certainly is creating considerable interest, not only on the part of the employees, but on the part of the general public. It has been surprising to note the number of questions that have been asked as to just how we got it and what we did. Every man in Mitchell can answer those questions, and it certainly gives the employees a feeling of pride to tell about it. I have had occasion to talk with several employees, not only foremen, but the men themselves, about what a pleasure it has been to them to explain to a stranger in our little town just how we got that trophy.

MAJOR RENNINGER: As far as those Mitchell plants are concerned, I want to say in addition that the last report shows they have gone over 10 months without a lost-time accident.

Another Idea—"The Veterans' Safety League"

There is another thing which we are going to start at the end of the year which is of interest. We are going to start the Veterans Safety League. That will mean that any department which has gone through a period of five years can be a member of that League. I know that at one plant we just finished with three departments that had gone a period of five years without an accident. At Mitchell we have got nine departments that have gone 1,000 days, three departments that have gone over 2,000, and two that are almost up to 2,500 days. The quarry, which I feel is always the hazardous part, has three departments that have gone seven years.

CHAIRMAN FRAME: That is a wonderful record, gentlemen. I give you credit for it. Any quarry section that can go seven years without an accident is entitled to honors.

H. L. MEAD (Manager, American Cyanamid Co., Brewster, Fla.): I want to ask Mr. Brown one question. We have very much linked up our safety work with production. I wonder if the Alpha plants receive bonuses for high production in addition to the safety bonus?

MR. BROWN: No, they do not. I have never been able to work out what I thought was a fair method of compensation to apply to produc-

tion of cement. As all you men know, the production of cement is dependent upon a whole lot of factors besides the human element. If we would attempt to pay men by any scheme I have thought of up to date, using production as the basis for pay, we would find ourselves frequently in a position where the men wouldn't get anything. We have instances in which an accident happens and a piece of machinery breaks, or perhaps we have a storm come up that stops quarry operation, or something of that kind. Those instances are not the fault of the men, but the fact is that we can't run full time and we have got to cut our production—not on account of the men but for reasons that they can't possibly control. For that reason we have never attempted to pay men on any of the so-called bonus methods in our plant, except in the packing house. There may be some mills which pay on the basis of production, but as far as I am concerned, I wouldn't know how to do it equitably; nor have any of our people ever been able to work out any method which I thought was fair to the employee.

A Concrete Way of Showing Management's Approval

MR. MEAD: We don't have a bonus plan. We don't have it either for safety or production. But I wonder if it is absolutely true that the human element isn't present just as much in production as it is in safety, and whether the element in which the man isn't to blame doesn't enter into the matter of safety as much as in production? I know that we chalk up a big lost-time accident mark for a man who happens to have sprained an arm in some small way who is off for one day, and in the same manner we chalk up a lost-time accident for a fatality. We don't have many, but it seems to me it is true that the men aren't to blame in lots of accidents and also that the men are to blame in lots of lost production cases.

MR. BROWN: Perhaps I ought to say that I don't consider the safety bonus plan as a bonus. The amount is too small to be considered as an addition to the men's pay. What it is intended to do is to show in a concrete way that the management, including the directors of the company who gave their approval to this plan, are interested in this safety movement and that they are so interested that they are willing to pay money to have accidents stopped. When you divide $16,000—which is the amount Mr. Frame estimates we are going to pay this year—among several thousand men, it isn't very much to each man.

But there are very few men who won't respond to that sort of a suggestion. There aren't many who don't want to see the stamp on their pay envelope, "Safety bonus," amounting to one per cent of what they have earned. I understand that applies from the superintendent down. It is not given because of the actual money value, because a man who earns $150 in two weeks gets only $1.50.

MR. MEAD: I wonder how far that same $16,000 might go in another way. The money in itself is not important, as Mr. Brown has said. I wonder how far that would go on a vacation plan or something that

is possibly a little more constructive in preparing the men from the bottom up for reducing accidents?

VAL ROBERTSON (Electric & Safety Engineer, Canada Cement, Montreal): We are attempting to stimulate interest in accident prevention work in our plant. We have had rather a large number of trivial accidents, in which a man gets a little hurt, reports the accident, and takes a day off. So to try to stimulate his interest we have had some discs made, safety tokens—similar to our time checks. When a man comes in on shift he takes his ordinary check, an aluminum check, which corresponds to the number of his brass check. On this we have a message in French and English concerning safety. For in our province we have to deal with two languages which makes it hard to get an accident prevention campaign over, and the posters from the National Safety Council are in English, and the majority of our employees can't read English. I think it is a novel idea put up by our safety committee. We have had these discs struck. A man takes one out when he comes on shift and when he goes out he puts it back in the time office. We are of the idea that if a man does this twice a day he will know something about safety in time.

CHAIRMAN FRAME: New ideas are continually coming forward to interest the men in cutting down the accidents. Does anyone else want to add something to this part before we go to the next subject?

Eliminating Some of the Lost Time

W. F. WEIDNER (Quarry Superintendent, Lehigh, Mitchell): This is a place to exchange ideas on safety, and while I am not a speechmaker I want to tell you how we eliminated some of the lost-time accidents in our work. In my department it was always very easy for a fellow to be told to come back the next day when he had a sprained ankle or thumb. I finally appointed a committee of three whose duty it was to investigate the case of absence without permission and ascertain whether he was hurt. They would usually find he was working on his automobile, making a garden, buying a car, or something of the sort. We didn't fol'ow that practice long before there were fewer lost time accidents. Perhaps what I have said will be of benefit to others here. The trouble with the minor accidents is that they are reported after the men are out.

O. F. SCHULZKE (Chemist, Missouri Portland Cement Co., St. Louis): At both our plants, St. Louis and Kansas City, beginning with January, we started what we call the foremen's no-accident bonus. This bonus is prorated on the number of men the foreman has working for him. In other words, he gets so much per head. At the St. Louis plant we have 27 men participating in this bonus, and the amount of money we give out each month averages from $100 to $130. We feel that it has also helped the quarry, which had a very bad year last year. We have split it up into five sub-foremen. Out of a possible 45 prizes up to the first of October, we have given 43. Although our record is nothing to brag about in the mill and is not as good as some records you have heard

about, we feel that this plan has helped and it has rewarded the man that we hold responsible for the accidents.

CHAIRMAN FRAME: Mr. Jacobsen has enjoyed the intimate friendship of the next speaker on the program, and I deem it a pleasure to invite him to introduce Mr. Green to our cement friends here today.

MR. JACOBSEN: This is an unexpected honor. I have had the pleasure of knowing the next speaker for many years. In fact, I think he got his job on my account. I didn't know him before he got his job, but I got the company frightened by telling them they had to have a darn good man, so they hired this particular gentleman. I tried to get him to go to Cleveland last year, but for some reason he found it impossible to come. So this spring in New York Mr. Frame and I happened to meet his "big boss" and we asked if Mr. Green could come over to Detroit to speak to us at the Safety Congress, and he said "Yes."

I then said, "We will consider that finished. We are not going to write to you any more about it. This is final with us. Much obliged." So Green is with us today.

Mr. Green of the Riverside Portland Cement Company, Los Angeles, has something interesting to tell us—a good many things that some of us frequently forget in connection with our accident prevention work—things of extreme importance—well worth considering.

THE RELATIONSHIP BETWEEN THE PHYSICAL EXAMINATION AND ACCIDENT PREVENTION

Eugene T. Green, Insurance and Personnel Department, Riverside Portland Cement Company, Los Angeles, Cal.

A few weeks ago in the city of Philadelphia some 130,000 people turned out to witness a prize fight which resulted in the crowning of a new champion. Youth was served that night. A young man who had previously passed a successful physical examination for service in the Marine Corps of the armed forces of the United States became a public idol.

His success is primarily and directly attributable to the fact that he entered the ring a perfect physical specimen of humanity. Obviously he was physically a better man than Dempsey. A few hours before he won the heavy weight championship he was obliged to undergo a thorough physical examination, which the legislature of Pennsylvania, in their wisdom, declared should be a pre-requisite wherever such contests are held. The legislature of nearly every state requires both principals to a boxing contest first to undergo a thorough physical examination, which accounts for the fact that in the prize ring these days we rarely hear of a serious injury.

Not long ago I witnessed a football game on the Pacific Coast, and during the four quarters of play not one man on either team was injured

seriously enough to be taken from the game. Sporting authorities agree that football taxes more severely the physical endurance of the contestants than does the prize ring, and after witnessing this game the thought immediately occurred to me that the fact that these men were in such excellent physical condition made it possible for them to engage in such serious physical encounter without resultant injury to themselves.

Before any man qualifies on the football teams of the big universities these days, he is first subjected to a thorough physical examination to determine his ability to withstand the punishment to which his body will be subjected.

The first qualification for military duty in any of the armies of the world is the ability to pass a physical examination.

It therefore seems appropriate that industry should give some thought to this subject when it has been shown the way by the great universities of this country, by the War Department and by the legislatures of our states.

High Standards of Health Influence Accident Rate

The time shall come in industry when certain fixed standards of physical condition must be realized. There is just as much reason to require a high degree of physical perfection as there is to demand that an applicant be possessed of intellect or skill.

We have reached the conclusion at our plants in California that the higher we maintain the physical standard of our personnel the more gratifying will be the results we are attempting to obtain in the matter of accident prevention. I have, therefore, come to this meeting to urge the necessity not only of a physical examination when an employee enters the service, but, likewise, repeat that examination during each succeeding year of his employment.

A few months ago we conducted thorough physical examinations of our employees, and as a result of those examinations we have come to the conclusion that fewer accidents should be expected from any industry employing men selected through that medium than from an industry which entirely disregards the physical status and selects their men at random. When this practice becomes universal I believe 50 per cent of this accident prevention problem will be solved. In any event, some drastic measure must be employed to mitigate the thousands of accidents that occur yearly in the industries of the United States. I am not convinced that any lasting good can come from relying solely on mechanical safeguards and the distribution of accident prevention propaganda.

It occurs to me that those of us who are engaged in the conservation of human life have paid far too much attention to the theory of constructing mechanical safeguards and appointing committees to watch out for the welfare and safe conduct of our men; in spite of all these precautions and our thought and study, we are still faced with the proposition that our efforts have been only in part rewarded, for safety in the industries of the United States still leaves a great deal to be desired.

In the hope that we may learn something of the causes of accidents, we have, during the past six months, devoted considerable time and thought toward ascertaining what physical defects exist in our personnel. We somewhat disregarded for the time being the effect and concentrated more attention upon the cause. By the effect, I mean, we subordinated the installation of mechanical safeguards to another method by which we sought to reach the cause.

During the past year accidents which seemed entirely preventable and wholly unnecessary continued to occur. Within a short space of time three deaths occurred at our plant under such circumstances that we became convinced that a physical inventory of our employees should be made. A man died at the steering wheel of his automobile upon his arrival home after completing the day's work in our plant. A machinist expired while sitting on the work bench in our machine shop after he had set aside an acetylene torch which he was using. The coroner found an enlarged heart. A man was sent to fuel an engine and while sitting astride the water jacket fell to the concrete pavement and suffered a fractured skull.

Having been confronted with accidents of this sort, we felt the time had come when we should take a physical inventory of our men and determine whether or not certain pathological conditions existing in them might not be responsible for accidents of this sort.

The Physical Examination Report

With that end in view we caused to be prepared a physical examination report, which we thought was an improvement on other reports obtained from large industries and life insurance companies on the coast. Our report recited the name of the man, the department in which he worked, length of time employed in that class of work, and then obtained a thorough family history. We further obtained a complete history of all the accidents and illnesses which he had suffered during his life. With that history we proceeded to the physical examination of every employee.

The necessity of such a report is very obvious. It is pertinent to know whether or not certain ailments which exist might not be directly attributable to some former accident or illness, or, perhaps, be congenital in their origin. We felt we were entitled to know whether or not injuries sustained elsewhere might not be responsible for physical defects which we found.

Before a man is hired by us for any service, he is first subjected to a more or less thorough examination. However, our plant has been in operation for 15 years, and no subsequent examinations were ever made, so, up to a few months ago we had many men in our service of whose physical condition we were entirely ignorant.

Accordingly, two very capable physicians were employed to look over every employee on the job. To my mind the most essential thing for comprehensive physical examination is the opportunity of the examiner to examine the patient stripped. One physician made a thorough test of

the eyesight, hearing, throat, teeth and tonsils, and then directed the men to the chief examiner, who went over them from chest to feet. In addition to this examination we required every employee to submit to a blood Wassermann for syphilis, and unfortunately we found in the personnel of two cement plants over ten per cent of our employees were afflicted with syphilis in some form. While it is true that most of these positive Wassermann's came from the Mexican element, it also happens that the Americans were well represented.

We found a man with syphilis was running an engine who only a few weeks before had been affected with dizzy spells while handling the throttle of that engine. He had in his charge the lives of several men and somewhat over $100,000 in plant equipment. We found a syphilitic crane operator whose any act of omission could snuff out the lives of other men. We found one kiln burner who was color blind and who could not distinguish blue from vermillion. His work required him to be in the vicinity of fuel, gas and water lines, all painted a distinct color. In an emergency such as fire he probably could not distinguish between a fuel line and a water line if required to put out that fire.

Finding the Physical Defects in the Employee

Over 15 per cent of our men have actual hernias and over 50 per cent potential hernias. A potential hernia is one which will become actual if the workman so afflicted attempts to lift a heavy object when he is not balanced. To avoid the possibility of actual hernia he must always have both feet on the ground in such a position as to centralize any strain which may come upon the abdominal muscles.

Out of some 700 men examined we found over 2,600 defects, which means that on an average, four defects exist in every employee on the job.

Now, as to this subject of accidents occurring to these men of physical imperfections:

We must agree that a man who has syphilis does not have the coordination of mind and body that a normal healthy employee is possessed of. It was observed in many of the ten per cent of our employees who are syphilitic, that many of them had been injured under circumstances for which no reasonable explanation could be given, or else they contributed in some manner toward the injury of someone else. Syphilis is not a germ as we term germs in the popular sense, but rather an infection of the blood stream. When observed under the microscope these spirochetes of the blood stream are a multitude of black, spiral worms. The blood supply of a body so polluted first attacks the tissues of the brain, next the central nervous system and finally the means of locomotion. A mind can not remain alert and at the same time undergo the destructive ravages of syphilis. The very fact that the official statistics of the state of California show that 70 per cent of the inmates of our state institutions for the insane are afflicted with this condition should be evidence enough of the wisdom of that statement.

We found a great tendency toward throat trouble and pyorrhea among the men. It is well known that a pus accumulation in the tonsils or around the teeth causes focal infection. The kidneys and the bladder are required to absorb this infection, and any man whose system is fighting the effects of such a condition is not the same alert, efficient employee he would be if that condition did not exist. His mind is sluggish, his movements are sluggish, for the very simple reason that his vitality is being dissipated.

I am willing to admit that there may be all this necessity for mechanical safeguards, safety committees, bulletin boards, posters and what not to keep such a man eternally vigilant for his own safety; but I do not admit that all these mechanical precautions, these coats of armor we equip our workmen with, and all this accident prevention propaganda, will play such an important part in our work if it can be arranged that we may deal with more men whose minds are alert and whose muscular movements are not impaired by a toxic poisoning. This argument is not intended to prove either the worth or the worthlessness of the safety device, for we have expended many thousands of dollars in their installation, but rather, to suggest that in a broad sense any physical means to promote safety has its limitations. It can not be denied that the most insecure thing in the world is a feeling of security.

Large industries everywhere are spending thousands of dollars each year in training first aid teams, in the installation of safety devices and mechanical safeguards, and with the exception of a few, no thought whatever is given to the removal of causes which all too frequently make these installations necessary.

Keeping the Human Machine in Good Repair

In the last analysis, the human body is nothing more nor less than a piece of machinery. It functions efficiently only so long as we keep it in good working order. The same thought and attention should be given the repair and upkeep of our body that we give to an internal combustion motor. We would not think of driving an automobile more than a year without grinding the valves, adjusting the carburetor and tightening the brakes. By doing so we should have prolonged the life of that motor, and incidentally, perhaps, have prolonged our own life. The bodies of men are often subjected to a strain even greater than is a piece of machinery, and sometimes those bodies are more sadly abused. An annual inspection of the mechanism which enables us to be on the job and contribute something toward civilization and society should be just as much in order as the annual inspection we give the boilers around our plant and the motor cars we drive.

I can not help but feel that the one person who can do more than any other toward the prevention of accidents in industry has been entirely forgotten and overlooked, except after the accident occurs. Every plant should enlist the assistance of the plant physician, not only when a new employee comes to work, but also every year while that employee remains in the service he should have a physical examination. Such defects as

are found, should be remedied before they become serious, before they put a man in such physical condition and mental frame of mind that he becomes a target for an accident.

This apprehension which employers feel toward the reaction of their employees when they ask them to submit to a physical examination is without foundation. Our men met this request with enthusiasm, and when recommendations were made to them by our doctors for the care of their health and the correction of conditions and habits which existed, these recommendations met with whole-hearted response.

We have a benefit fund for our men to which each employee contributes in proportion to his earnings. This fund entitles the men to hospital and surgical care when they are ill or sustain injury outside the scope of their employment. This fund has been in existence over ten years, and a reserve well into four figures has accumulated. The men realized after these examinations were made that the entire amount they had accumulated could quickly have become dissipated if certain chronic conditions which were found were permitted to continue uncared for.

Employees Do Not Object to Rigid Examination

We have been asked whether or not our employees objected when we required them to submit to a blood Wassermann. There was not one protest, so you must realize that men these days are concerned about such things, and thinking men everywhere have come to the conclusion that there should no longer be any mystery about this affliction, for there is no scientific data about its acquirement to justify the odium which befalls its victim.

Many people guilty of no moral transgressions whatsoever are numbered among its victims. In cases where we found that condition, we obtained for the men a reduced medical rate and they receive treatment for this condition at cost. While they continue in their efforts to rid themselves of their affliction they may remain in our employ.

The whole success of this periodic physical examination depends upon the assurance of the employer to his men that he is actuated primarily for their own welfare and in that he must be sincere. If defects are found which warrant a change of jobs, the change should be made. Men should be placed at work which their physical handicaps and limitations permit them to do. However, the whole scheme will collapse and fail, if it is used as a weeding out process, and its purpose will be defeated if these measures are resorted to. There should be no necessity in any well organized plant to follow that procedure. Secondly, the men owe a duty to their fellow workers. Third, is the desire of the company to keep its employees in such physical shape that they may be able to work steadily, and their efficiency not be impaired. Finally, the frequency of accidents is lessened.

We have not had sufficient time to observe all the benefits which we believe will be manifest by this periodic physical examination, but my thought in urging this practice at this meeting is in the hope that you will take back with you to your plants the experiences which I am relating.

Our physical inventory was made at some expense, but we have already been more than fully repaid for that expenditure.

I can not help but feel that our men are representative workmen in industry and that the alarming number of defects found in our personnel will not only be our experience but will likewise be your experience.

I want to quote a brief extract from the report of the Surgeon General of the United States Army concerning physical defects found in drafted men during the war:

Army Experience in Classifying Physical Defects

"The percentage of defective men varied materially according to the section of the United States from which they were drawn. The number of defective men by states varied from 64 per cent in Rhode Island to 35 per cent in Kansas. Rhode Island, the most urban of all states, whose population is largely engaged in manufacturing, stayed at the top of the list largely because of the defective and non-resident stock which has been drawn to that state. Kansas, on the other hand, is largely agricultural and such of its population as is of foreign origin is of the more robust type. From the cities came the largest percentage of defectives—55 per cent—while those from the rural districts showed but 44 per cent. Of all class 'A' men examined during the draft 21 per cent were found physically unfit for all military service, or in other words, more than one young man in five was physically unfit for all military service, either at home or abroad. More men from the cities were rejected than from the rural districts and small towns, owing not only to the environmental condition in the large cities, but also to the character of the foreign population congregated in them. Thus Rhode Island, which has the largest number of defectives, had also the largest number of boys rejected. Forty-two per cent, or almost one-half of all between the ages of 21 and 30 who were examined from that state were rejected for any type of military service whatever, while from Wyoming only 13 per cent were found to be physically unfit."

It therefore appears that the boys from the wide open spaces constitute the greatest physical asset that the industries of our nation possess. These figures should impress us. Young men must be taught to realize that the industries of this country have come to the point where they place as great a value upon the physical standard as they do upon intellect, and the boy who sacrifices his health along the primrose path will in the end receive but scant consideration when he comes to the employment office. If the universal practice of a physical examination had been in force at the time of the selective draft it would seem that many states could have shared the distinction of Wyoming. Whenever industries of this country place a high value upon the physical condition of their employees a higher standard of physical manhood in the United States will obviously result.

In conclusion, may I hope that at the next meeting of the National Safety Council others of you from the cement plants of the United States

will come here and tell us of your experiences in accident prevention work by a periodic physical inventory of your men. Give serious thought to the advantages obtained by enlisting, as your greatest sentinel of safety, the plant doctor. Not after some crushed and broken piece of humanity is carried from the mill, some fellow whose physical condition was such before the injury that he could not think when danger confronted him, but rather enlist the help and good service of the plant physician every day of the year. Keep these men in shape so that they will not be needlessly handicapped by physical imperfections.

At every cement plant physical testers are employed. It is their duty to test cement for its tensile and compressive strength. We employ them because we realize that the first consideration in the use of cement is its factor of safety. The very word "cement" is symbolical of this thing we call safety. Therefore, safety should be the first consideration for the men engaged in that industry. When defects exist in our product its function as a factor of safety remains in doubt. By the same token, when physical defects exist in the men identified with that industry they constitute a great hazard to themselves and to their fellow workers. If we are convinced that we owe a duty to the user of cement by subjecting it to these physical tests, then we also owe the same duty to society, by ascertaining whether or not the physical condition of our men is such as to make them a menace to industry, to their fellow workers, or to themselves.

Correlating the Accident Statistics of Industries

CHAIRMAN FRAME: Mr. Green has given us a new angle on the importance of physical examinations. The paper has been presented in a splendid and able manner, and the material given is the outcome of Mr. Green's wide experience. I know that the subject is of unusual interest to you men and that you will want to ask him some specific questions.

With Mr. Green's permission, I want to make a little break in this morning's program. We have a gentleman here who has an interesting message to bring to us. His time is valuable. He must speak at other Sectional meetings. In order to permit him to render his valuable service elsewhere, I am going to call at this time on Dr. Ethelbert Stewart, United States Commissioner of Labor Statistics, Washington, D. C.

DR. ETHELBERT STEWART: I come to say one thing to you gentlemen, and that is that as the United States Commissioner of Labor Statistics, trying to correlate and bring together the accident statistics by industries, I find that the statistics of the Cement Section of the National Safety Council are the very best that come to my office. You have done a piece of work that must inevitably result in a rapid decrease in your accident rate. I don't know that each individual plant uses these things. I don't know that you are making the proper use of them. I can't answer for that.

In the first place, you have a definite industry. Cement means cement. It doesn't mean, as the chemical industry means, anything from lipsticks

to laundry soap. You have something definite to work upon and you have succeeded in doing the basic thing: get your one-man-hour exposure in your industry and relate your accidents to that. Statistics can not reduce accidents, but they can tell you where the accidents occur. They can tell you where to spend your money. They can save you from spilling your money all over the place when the most of your accidents are occurring along a very definite line. That is certainly worth while.

Again, I am able to say to the other Sections: Why can't you fellows do as well as the Cement Section? Have all the brains gone into the manufacture of cement? I have been able to use the fact that you are doing good work, that you are doing perfectly wonderful work, with very great effect. I have been able to show that you have reduced your accidents. You may say what you want about statistics—that is one of the standard jokes, like the mother-in-law joke and all that sort of thing—everybody thinks he can take a whack at the statistician and statistics—but if you come down to bed rock, you know if you are going to improve the accident situation in your plant, you have got to know where the accidents occur. That is statistics.

Industry Owes a Debt to Those Killed in Accidents

I just want to tell you how proud I am of you fellows and how much I have got out of the work you are doing. Industry owes something to its dead, as you said in your latest report. We have the grave of the Unknown Soldier. We are doing all that we can as a tribute to those who died on the battlefield. But industry owes something to its dead, just as the nations owe something to their dead. One thing that you owe to your dead is to do all you can to make this poor fellow's death operate to prevent other deaths as much as possible.

I may be going at this in a very bunglesome fashion. I didn't expect to speak here until last night when I signified my wish to tell you what I think of your work along that line. But I do want to impress you, if possible, with the importance of continuing and further perfecting your statistical work, not only for yourself but for the influence it is going to have on the other Sections.

I thank you for the opportunity you have given me to speak to you.

CHAIRMAN FRAME: We are grateful to Dr. Stewart for that kind expression on the good work that the Cement Section of the National Safety Council is doing. We are all very much interested in it, and I don't think there is a single person here who will not continue to send in his accident reports to the Bureau, his man-hours, and all other information which will enable the officers of the Section to understand how to center their efforts in this good work.

Mr. Green is almost a doctor in his knowledge of physical conditions and defects and the generally good results his company has obtained along that line. Mr. Green is doubly willing to enter into a friendly discussion with you gentlemen regarding the merits of this question. I know you have made mental notes of certain important questions that

have struck you during the course of his address, and it will add greatly to the success of your meeting if you gentlemen will come forward and let us have your questions.

N. C. LOUNSBURY (Safety Engineer, Nazareth Cement Co.): I want to take this opportunity to compliment Mr. Green and the Riverside Portland Cement Co. on what they have been doing along this line, because I know they are on the right track. The reason I know it is because we are doing exactly the same thing. I know from the results we have obtained we are on the right track. Furthermore, I want to say that every cement plant in the country should have some kind of active plant hospital.

You may think that is a rather radical statement, but I know, from what you have heard Mr. Green just tell you, that you can see its benefits. I want to tell you that in the past year, since we have had this dispensary of ours in active operation, the minor accidents which cause one or two or three days' loss of time have been reduced 90 per cent. Furthermore, we have never had a case of infection which has prevented a man from doing his regular work.

In our foremen's meetings, men have voluntarily stated that their work per man since this dispensary has been in active operation. I ever you may want to call it. The men in your organization will appreciate it. I have two men alongside of me who will bear me out in that statement.

Meeting the Cost of Operations and Lost Time

CHAIRMAN FRAME: It is only natural, when we study our accidents and try to win trophies and control that lost time, that we enter into a search of the question as to what causes accidents, and that brings us right back to physical examination to start off with. Is there someone else who wants to add a word or two on the subject?

MR. ROBERTSON: I should like to ask the speaker, Mr. Green, if I time books have shown a marked increase in the number of hours of don't know whether all you fellows agree with Mr. Green and myself, but I know if you try this out that you will find it works. It pays in dollars and cents, and it pays in the humane, altruistic aspect, or what understood him correctly. I think you mentioned in your talk that out of the various disabilities the men have quite a lot which could be corrected by operation. Does the company go to the expense of operation and paying the men for the time lost?

MR. GREEN: We have a benefit fund for our men, to which each man contributes in proportion to his earnings. For each contribution the man makes, we make a similar contribution. We do pay, yes. We pay the men their wages while these conditions are corrected. By virtue of the contribution which they make into the fund, which is augmented by our contributions, all these physical conditions and defects are corrected and remedied without any cost to the men whatever.

MR. ROBERTSON: I should like to ask further, is it compulsory?

MR. GREEN: Yes, it is compulsory. It is a fund which may be used

only in the event of sickness or defect of a non-occupational character. Of course, in the case of injuries sustained in the scope of their employment, the expense is borne by the company. The men's fund takes care of non-occupational injuries only, all injuries off the job, and ordinary illnesses, and so forth.

MR. ROBERTSON: I am very much interested in that because we tried to institute something of the same kind. Unfortunately, in our Province it is not legal to deduct the amount from the workmen's pay. We tried to have the men pay into such a fund voluntarily, but it was not successful.

MR. GREEN: It is not legal in the state of California and elsewhere to make any deduction for hospital or medical care for occupational injuries, but if it is for illness which is not occupational we may make the deduction.

CHAIRMAN FRAME: If I am not asking for private information, Mr. Green, how much per month does a man pay into that fund?

Details of the Employee Benefit Fund Plan

MR. GREEN: The men whose salary is less than $100 per month pay 50 cents. Those whose pay check is $100 or over contribute $1.

Of course, this fund has increased from year to year. We now have about $5,000 in that fund. As a result of these examinations, we have a committee of our men who take care of this hospital fund. They came to me after these examinations were made and said that they realized for the first time during all their years of identification with our company that had we not at this time made these physical examinations and taken steps to correct these conditions which we found in our men that we would have had certain cases of ulcer which would have kept the men on their back for months and months. We had cases of epilepsy, Bright's disease, and any number of diseases which sometimes require months of hospitalization. These men realize that perhaps it may be this year, or next year, but the time would come when the entire fund they had accumulated would be dissipated in the care of these things. So we anticipated and warded off conditions that might later have become chronic.

Getting back to this subject of the 10 per cent. That was one exception in which we did not pay the cost of medical attention ourselves. That is, that is one of the rules of the hospital fund. It seemed to us to be putting a premium, perhaps, on moral transgressions by doing that, despite the fact that we do not know how it was acquired. I want to say that these men who did have a positive Wassermann when these examinations were made, with one exception, now all have been cured and the blood test which was taken on the last bunch a week before I left shows that only one of them had a positive reaction.

MR. BROWN: I should like to ask Mr. Green whether they have regular hours at which the physician appears at the plant, so that anyone in the plant is free to ask him any questions in regard to his personal

health, irrespective of conditions that may arise. For example, if a man comes to work feeling badly, he has to work. He has to earn a living and he comes to work in spite of feeling badly. He may have a headache or stomach out of whack. Do you have regular hours for the physician to appear at the plant each day to whom the man may go for advice?

MR. GREEN: We have three doctors at one plant and two at another. These doctors at Riverside are always available to our men. In addition to that we have a nurse who comes to the plant from 8 o'clock until 12. If men are feeling badly or there is something about their condition which the nurse could not undertake to prescribe for, then the man is indirectly prescribed for by the doctor.

MR. BROWN: But the doctor does not come to the plant daily at a certain time each day?

MR. GREEN: No.

MR. BROWN: What do you think of a plant of that kind, where the doctor has office hours, say, from 10 to 11 o'clock every morning and the men are privileged to go to that doctor during his hours of service at the plant and ask him any question they like or get medicine if they need it?

MR. GREEN: I think that is a splendid idea. At our plant conditions that the nurse can not take care of are cared for by the doctor. At our Golden State plant the doctor is at our hospital. We have a hospital for both plants. From 9 o'clock until 12 every day men may leave their work and come to this doctor, and he will prescribe for them and have them under observation.

MR. BROWN: As between the two methods, do you think your Golden State is better than the other?

MR. GREEN: Yes. As a matter of fact, we shortly contemplate establishing the same method at Riverside.

The Doctor On the Job Saves Illness and Lost Time

MR. BROWN: It has been my idea for sometime that if you have a doctor in a plant at certain definite hours every day, a great deal of sickness in lost time would be gotten rid of, because the men won't go to the doctor if they aren't sick enough to have the doctor come. If he goes to the doctor when he feels badly, the doctor will tell him what he has been doing that he ought not to do, and give him something to remedy his trouble, and in that way he may often ward off serious attacks of illness.

MR. GREEN: At Orlando we try to conduct the work so that there are three hours of time for a sick call. The man may leave his work and his place is substituted while he is gone.

I want to say something about the yearly periodic examination. It is held during the month of May. Next year, just as soon as we can, we are going to call the men in alphabetically, call them in again, and keep it up always.

MR. HALPIN: As I understand it, you have more than one plant doctor and that the men use their own prerogative as to whom they want to take care of them?

MR. GREEN: Exactly!

MR. HALPIN: Then the fee of the doctor is based according to the number of cases he handles?

MR. GREEN: The doctors are on our pay roll.

MR. HALPIN: At a stipulated salary?

MR. GREEN: Exactly!

MR. HALPIN: It might be interesting to those who have had a plant doctor, to know that we had one of the first in the cement industry; we have had one since 1918. He comes to the plant one hour each day. The hour has never changed. He comes from 2 o'clock until 3 o'clock and takes care of all the little ailments and slight injuries that might occur during the day. Our record shows that we have done fairly well at our plant in the last six or seven years. We hope it will continue.

MR. BROWN: In order that Mr. Jacobsen may not feel I was asking questions out of curiosity only, I might tell him that we already have at three plants a doctor coming at regular hours of the day. In other words, we are "sneaking up" on the proposition.

CHAIRMAN FRAME: During this interesting discussion of the merits of the plant doctor, we heard a few things said about a nurse. I should like to have Mr. Lounsbury tell us something about the male nurse they have at the Nazareth plant. I have heard very good reports, and I am sure it would add to the interest of the discussion.

A Practical Male Nurse Who Treated Many Cases

MR. LOUNSBURY: We have a male nurse at the plant who is on duty 10 hours a day, the same as most of the men in the plant. To show you how effective he has been, we have kept an accurate record of the number of cases which have come to the dispensary and found that the total at the end of the year was 2,098 cases of all sort and descriptions. I have a list in my pocket of the variety and number of cases which have been treated, and they take up two sheets of paper about 12 inches long. This man has had quite a good deal of experience. He has had 19 years of experience as a graduate nurse. I believe he started in one of the big hospitals in Boston and then went to the Canal Zone where he was in the Government hospital for practically 15 years.

This man has had so much experience with work of this kind that he is, with all due respect to doctors, able to serve in the capacity of a doctor within very large limits. If anything happens which is too serious for him to undertake, he is never afraid to admit it, and he will always send the man to a regular physician. We have three at our service right in the town who also take care of our men.

FRANK H. SASS (Universal, Buffington, Ind.): We have three nurses at our dispensary. That is, they operate on an eight-hour day. We have one graduate nurse who is a woman nurse who works from 8 to 4 in the

afternoon; from 4 to midnight, and from midnight to 8, the work is taken care of by men nurses, so there is someone in the dispensary all the time. The doctor reports to the plant every day at 11:30 and he stays until 12:30.

I think our doctor has been on the payroll pretty nearly as long as the first man that was put on originally. I think he came to our plant about 1906, or some such time as that.

From the tone of Mr. Green's talk, I don't think he is very favorable to mechanical devices. At least, I was led to believe that. As far as physical examinations are concerned, I think they are a good thing, but I should like to know just about how intelligent the men are at these plants where they don't think much of mechanical devices.

MR. GREEN: I think our men are representative men in the cement industry. I will say that there is a tendency on the part of our men to resent the proposition of our assuming the role of being our brother's keeper, and they believe they have as much sense as we have and that we don't have to build a Wall of China or put a coat of armor around them so they won't get hurt. At our Orlando plant the number of safety installations is less than at Riverside, and just because of the fact that we attempted to usurp that God-given faculty at Riverside they have in turn put the whole burden of responsibility of their safety on us, and as a consequence we have 50 per cent more accidents at Riverside than Orlando.

The Problem of Many Nationalities in Industry

MR. SASS: What is mainly the nationality of your workmen?

MR. GREEN: Mostly American. We have some Mexicans doing outside work, but such Mexicans as work inside the mill do speak the English language.

MR. SASS: I think we have representatives from about every country in Europe, and most of them when they sign their names use a cross. I don't doubt but that they were all given a certain amount of brains and everything else, but they don't use them, and you can't get them to use them.

MR. GREEN: I think the plants in the East have a decided advantage, because that is more or less of a melting pot. There is not one man in a hundred who comes to our plant in search of a job who has seen the inside of a cement plant. He doesn't know the difference between a ball mill and a steam shovel, whereas you men are in the cement district and have the opportunity of hiring men who are more or less raised with the industry, and I think you have the advantage in your favor.

MR. SASS: No, the men we have were not raised in our industry, by any means. Most of them are the fellows that the other fellow doesn't want—that's what they are. You probably find that your turnover is very small.

MR. GREEN: It is very great. Our turnover is 20 per cent a month.

MR. SASS: You are talking in small figures, then. We find that when

the industries around the Calumet region send out a call, then our men start leaving and we have to start hunting for more, because, of course, we are a little bit out of the way. Our men have to take a bus to get to work, whereas if they work down in Indiana Harbor, Gary, East Chicago, Hammond, all they have to do is step out of a backyard and they are at the job. They would rather do that than come to our place, get up and catch a bus and come up.

I met a man a short time ago from Australia. He says they pay no attention to accidents. He says that all the men are intelligent men and don't use any mechanical safeguards whatever because they are not necessary. I will wager there are a lot of us in this room who if we could say the same thing would feel mighty fine—but we can't do it.

MR. GREEN: I don't say that physical examinations take the place of safety devices, or that safety devices should be subordinated for something else, because we obviously are not accomplishing as much as we should by the things we are doing. I don't mean to say that physical examinations are going to result in our throwing our goggles into the Pacific Ocean. I do say we are relying entirely too much on the installation of safety devices and not getting back to the proposition of the human element. The first thing to do is to deal with the human element who are receptive to the things we have.

A Discussion of Labor Turnover in the Plant

MR. SASS: That is true. Still, at the same time you have got to have those mechanical devices; but I will admit that your physical examination is going to help you a lot because I really believe that the accidents we have had at our plant have been due to the physical condition of the man at the time the accident happened. At least that was the conclusion we came to. I think we are coming to physical examinations ourselves within a short time.

MR. HALPIN: I am rather interested in the matter of turnover. We all have large turnover, but when I have investigated I have found it is in the departments where we have seasonal work. You have a machine shop, burners, etc., that are always with you. Then your turnover only exists in your general labor and packing, and that condition exists in all cement plants.

MR. SASS: In the mechanical end—that is, skilled and semi-skilled work—I don't suppose we run any higher than anyone else, although I am inclined to think that perhaps our turnover in that respect might run a little higher.

MR. HALPIN: You say your turnover is 500 per cent a year. In other words, you turn over your whole plant several times a year, according to your figures. You actually do not do that because you certainly have a constant organization in your mill or you couldn't run. You couldn't change on your burners and head repairmen every day.

But you do have a large turnover in your seasonal jobs, and that condition exists in any cement plant. We all have that problem. Sometimes we might have to load 15,000 barrels a day. We get the men to

load them. Then three days afterwards we might have to lay all of them off again. The report says that 506 men left this month. Then you get called for it. If you analyze the figures you know why they left. Turnover has something to do with accident prevention, because if you keep your men in the plant and teach them accident prevention then you are not going to have accidents.

A. E. SNODGRASS (Safety Director, Louisville Cement Co.): Do you find that you have a greater percentage of accidents with the new men?

MR. HALPIN: From our records I would say that the accidents occurred to the new men. I think almost everybody will bear me out in that statement. Mr. Jacobsen's statistics show that they happen to the new men, that is the really serious accidents.

Relative Importance of Mechanical Safeguards and Education

MR. JACOBSEN: I really think when you come down to brass tacks that you all agree, but you just say it differently. I agree with Mr. Green. The guarding of the machinery is the result of the education, and the education and the training are not the result of the guarding. I would much rather have an old rattletrap of a plant that wasn't guarded and have men in there who would listen to reason and would be willing to meet me halfway than I would have a brand new plant that was perfectly built and perfectly guarded in every respect and then do nothing more. We have a new plant which was built rather recently, and five men have been killed in that plant since it started up—not because the men were caught in machinery or anything of that sort. The machinery was in perfect condition. But the men for some reason or other—it is unexplainable—got into trouble. I don't know how they did it. Nobody can possibly explain in a reasonable sort of way how they managed to get hurt, but they did get hurt.

Just to illustrate this point: We had an old employee killed in a coal dust explosion because he used an open torch underneath the coal bin in the kiln. Somebody upstairs happened to shake down a little dust, a couple of handfuls, and that started trouble. The man was killed right then and there. He had been in the plant for years.

We had two other men killed in a coal dust explosion—men who had been in the plant for years, who should know all about coal dust. We had three men burned to death a little while ago in a cooler. They were working in the cooler and the gases from the kiln backfired from the cooler and burned instantly.

From all the reports we receive at the association office, it is plain to me that Mr. Green is right to a very large extent. You, Mr. Sass, are continually working along the same lines that Mr. Green is or you wouldn't get results. You have hardly had any accidents this year, and in spite of all the steel that is furnished you, you couldn't possibly prevent them except through training that group of men that you have all the time.

In regard to new employees, there are certain stock arguments that I always get. When I get out to Green's, he complains about the Mexicans, that he has too great a labor turnover. Down south they have too many

niggers. In the east they have two many foreigners. Those are stock arguments. Really, when we get down to brass tacks we generally find those things haven't got a thing to do with it.

I talked with a gentleman from the east a little while ago. He said they had a number of accidents in their plant, in which they lost about 1,800 days last year. I spoke to a gentleman there who is very well posted on what goes on in that plant and he said:

"Our plant runs in two shifts and our neighboring plant runs on three. Every time they need men down there they leave the two-shift plant and go to the three, and we have all the riff-raff. That in my opinion is the reason for all our accidents."

Then I spoke to the general superintendent. The funny thing about it is that I am a foreigner myself; so is he. He is the same kind of a landsman that I am.

He said, "Jacobsen, there are foreigners and foreigners. There are a lot of low-grade Italians and Poles and Lithuanians, and so on." I suppose he meant to say we were all right, while the rest didn't amount to anything. That was his reaction to the question.

After he got through talking I asked him, "Really, have you ever tried to figure out what is the reason for your accidents, what causes your accidents, who gets into them, how long the men have been with you? You are just guessing. Is it a logical thing to assume that the foreigners cause the accidents?"

Severe Accidents Sometimes Happen to Old Employees

I got out all the reports when I returned to Chicago, and I found that 70 per cent of all the men who had been injured that year were American people. I don't know how many were employed at that particular plant of either class; and about 70 per cent of all the men injured at that particular plant have been with them more than six months. A man who has been in the cement plant six months, according to your theory, is certainly not any longer a new man. Yet that has happened time and again.

I agree with Mr. Halpin that some of the most severe accidents happen to men that have been at the plant a long time, for the simple reason that men who have been at the plant a long time get into jobs where there is real danger. Most of the new men work around the yard, on the floors or things of that sort, and the old men as they graduate from one to the other get into the repair gang or run the steam shovel, and things of that sort. Naturally, they are very likely to get into severe accidents more than some of the new fellows.

After many years' study of this proposition I have come to the conclusion that it is purely and simply a question of training and education. If we get a man properly trained and educated he is not going to cause accidents. Suppose it is myself and I get into an old rattletrap of a plant. I have a desire to work carefully and see the men around me work carefully and keep away from accidents. Don't you believe I will

get a handrail put on the stairway and a guard put on the belt? I certainly will. That is logical. Mr. Green doesn't mean to say—if I may take the words out of his mouth—that machinery should be run without guards. I do say this, that if we forget to train our men and just simply guard the machinery we are not getting anywhere.

MR. HALPIN: I should like to take a parting shot at Mr. Green. He said we were endeavoring or assuming too much, that we were taking all of this accident prevention on our own shoulders. I have been at these meetings for a long time, and I think at every meeting we have had something on the education of the employees. I think if you will look at the records of the association during this time that the educational features have been the main part of our program. We have done nothing but endeavor to educate our men. It is not that we were in charge of accident prevention work and tried to do it all. We have tried to get the man to think for himself. I am not so sure that he understands we are trying to do that, but what we have been doing in the east has been to educate these men.

I presume most of you gentlemen here have known Mr. Jacobsen for a good many years, and you all know he is leaving us. He is resigning as manager of the Bureau of Accident Prevention and Insurance, Portland Cement Association, the first of this month. Of course, it isn't at all necessary for me to tell you what an important element he has been in the work and to speak of the wonderful record that he has compiled for all of us since he has been in here. I think I have known him just about as long, or probably longer, than most of you, some eight or 10 years. Shortly after he started with the association, back in 1918, he made a visit to our plant and started us on a course that not only compiled a wonderful record for our company, but saved us money and built up a morale that money couldn't buy.

I think it no more than right that we present Mr. Jacobsen with some testimonial of his endeavors since he has been in the association. I think that a little gift along with the testimonial will be appreciated by him and will let the world know that we have appreciated him. The suggestion is that we get a few dollars from each of you and that this afternoon we go out and purchase something appropriate and present it to him before the meeting is over today.

It was duly moved and carried that each member contribute to the gift.

ADJOURNMENT

TUESDAY AFTERNOON SESSION

October 26, 1926

The final session of the Cement Section convened at 2:10 o'clock, Mr. R. Frame presiding.

CHAIRMAN FRAME: It is a pleasure to announce the next speaker to you, principally because he has benefited from the many discussions that have arisen in Cement Section meetings and from the different articles that have been published concerning the success of member companies, together with his own initiative and ideas. I am sure you will enjoy the message he brings to you. It gives me great pleasure to introduce Mr. Parry of the Glens Falls Portland Cement Company, Glens Falls, New York.

A YEAR'S EXPERIENCE WITH A BORROWED PLAN

Edward H. Parry, Glens Falls Portland Cement Company, Glens, Falls, New York

When our chairman invited me to speak at this session of the Congress, I felt it would be entirely out of place, because I was so new at this safety work some of the old-timers might resent my intrusion. In giving this paper I have no desire to tell anyone how it should be done, but simply to give the experience of my own plant for the past year. It may be that our experience will be of value to some of you in settling your own problems, for, in the last analysis of this safety work, I believe, every plant is a distinct unit and differing conditions make it impossible for any rules except very general ones to be adopted. The purpose of these Congresses is for the exchange of ideas so that all of us may benefit by the experience of each of us. It is really a "Clearing House of Safety ideas."

I was given permission to choose my own subject and I have chosen "A Year's Experience with a Borrowed Plan." This subject was the most natural thing in the world for me to select, for it was just a year ago at this Congress that I became actively identified with the safety movement. I have referred to our plan as a borrowed plan for it is a mixture of the ideas I received during a week's study with Mr. Jacobsen, just previous to the last Congress. I feel that whatever credit is due us for the improvement we have made should go to Mr. Jacobsen, Mr. Sass of the Universal, Mr. Halpin of Marquette and Mr. McDonald of the Canada Portland. These gentlemen were kind enough to give me their ideas and I have felt perfectly free to use them as I saw fit.

The plant of the Glenns Falls Portland is somewhat out of the line of travel and receives few visitors, so a brief description of the plant will not be out of place. We have a million-and-a-half barrel plant that during the past three years has gone through a complete reconstruction and is

now modern in every respect. We operate our own quarry situated about a quarter mile from the plant. Our entire force is about 350 men, made up largely of Italian and French-Canadian labor. The plant is operated on a three shift basis throughout the year.

The story of our accident experience for the past year would be without point unless the result of a previous period is briefly considered and comparison made between the two. In the calendar year 1925 we suffered two deaths, 38 lost time accidents, resulting in a total of 892 days lost time. Disability charges for our two deaths and permanent disabilities amounted to 15,999, or a total of 16,891 days. In a year's time we had dropped from 54th place in the severity rating to 112th place. There was an excellent chance for improvement and only a small chance to make a worse record.

Plainly the first thing to be done was a thorough examination to determine if possible what the reason for such a record might be. On the surface there was no apparent reason. A complete safety organization was in operation, bulletins were used, warnings were posted, first-aid treatments were compulsory and yet there were accidents with appalling frequency and severity.

A careful analysis of all accident records gave very little help. All departments seemed to be uniformly bad and it was not surprising that there was a feeling amounting almost to a conviction that the sacrifices of human life and limb were essential to the manufacture of cement. The only evident fact brought out by this analysis was that the human element was responsible for the great majority of the accidents. Machine accidents were very infrequent, and in that respect we were no different from other plants in the industry. Evidently the factor of "Interest" was the factor that was lacking.

A Meeting That Marked the Beginning of a New Program

The month of October was spent in an analysis of all accident records, the month of November in organizing a foreman's committee to take hold of accident prevention, and the last month of the year in perfecting plans for an intensive campaign to begin the new year.

In our first meeting together these foremen were accused of being responsible for more than 75 per cent of the accidents because of their failure to use the authority they had in the direction of accident prevention. That first meeting marks the beginning of our new program based on the personal responsibility of each foreman for the safety of each man under his jurisdiction. With the cooperation of this committee we felt sure improvement was certain, and the results show we have had the wholehearted support of each member. We made no mistake in placing our goal too high. We knew perfection was not possible in one year, so our aim was set on a good substantial improvement.

During these first three months of my "Experience" very little actual safety work was done. It was a period of preparation for the year 1926. This period resulted in one death and 18 lost time accidents, thereby hold-

ing up the tradition of the industry that the last three months of the year are more disastrous than any other period. It was a discouraging time for a new safety director.

We began this year with the following organization:

The foremen made up our central safety committee which has supervision of every angle of safety work. It was felt necessary to place authority behind the movement and these foremen gave us the most natural means of doing so. Each foreman was made personally responsible for the safe conduct of his department and safety was placed on an equal footing with production and efficient work. A mark against any one of these is a mark against the record of that foreman. This committee makes its own inspections, passes on all recommendations of the safety director and act as an advisory body for the safety director. Every item of the safety work is reported to them and they are constantly in touch with affairs. I can not too highly commend this committee for the help and support they have given me. Without this support I am confident we could not have made the improvement we have.

The Second Committee an Instruction Committee

The second committee is made up of representative workmen from each department and is essentially an instruction committee. Weekly meetings are held and all phases of safety work are taken up. Attendance is compulsory, a part of the men's work. The immediate good this committee does is a doubtful quantity, but each time the membership is changed each department has a man that has been instructed in accident prevention work and has had the safety idea thoroughly drilled into him. We rely on these men to help carry along the floating force that is continually changing.

Our plant is divided into 14 departments that follow as closely as possible the natural divisions of labor. A safety competition is run between these departments for periods of three months. At the end of each three months we wipe the slate clean and start fresh again. A cash award is given each man in a department that has completed the period without accidents causing loss of time.

This competition began on January first and on April first we were able to reward nine of the 14 departments. Five were eliminated by accidents that should not have caused loss of time. The old idea of taking a vacation for each slight accident was working. No effort was made by the personnel department to hurry these men back. In most instances when they came back their welcome was not a cordial one. They had caused their department to lose out in the competition. One man, I recall, lasted one day and quit, another two days, and a third less than two weeks.

Ever since that first period a man is back on the job the morning following an accident unless there is not a doubt of his disability. Vacations are not taken that way any more. I believe that is the most valuable lesson the safety department has taught. It has effectively cut out one of the causes of our consistently poor record and is naturally reflected in

our severity rating. At the present time we find our lost time accidents are serious enough to cause loss of time, and we have made our problem one step less complicated.

This first period of our competition showed up one failure of the idea. A department losing out in the beginning of a period would lose interest until the second one started. It was not thought advisable to shorten the periods, so this defect was let go. It was really a mechanical defect that could be met by close personal supervision on the part of the foreman. The second period of this competition was a complete success. There were no lost time accidents during this period and we were able to run 107 consecutive days without loss of time. Our best previous record had been 42 days. Our greatest pleasure at this record was that we had practically rid the plant of the idea that accidents were essential to the manufacture of cement. That was a victory in itself.

A Decided Reaction in the Third Period

During the third period there was a decided reaction, apparently without cause, unless it was due to the intensity of the work through the whole plant at the height of the shipping season. This third period spoiled our good record with four lost time accidents. This third period also marked the end of my year's experience on October first.

For purposes of comparison I propose to take the periods January 1st to October 1st of the years 1925 and 1926. The following figures cover these periods:

	1925	1926	Reduction
Fatalities	1	0	100 %
L-T Accidents	29	16	44.8%
Days Lost Time	6,437	386	94 %

As I have mentioned before, the last three months of 1925 resulted in one fatality and 18 lost time accidents. The first nine months of 1926 we show improvements of 100 per cent, 44.8 per cent, 94 per cent over the same period of 1925. Without undue optimism I believe we will be able to increase these percentages of reduction by the results of the last period of our competition. We have our men fairly well imbued with the essential idea of safety and that is "No Chance Taking." Our paramount idea has been that the management does not expect or want any man to take any chance of injury. We expect to take care of the machine hazard and we expect every man to watch his own step.

From the humanitarian point of view our experience has been successful. We may say we have prevented one fatality and a considerable amount of serious and painful injuries. Any corporation in these advanced times would gladly spend any reasonable amount to prevent a fatal accident, but these advanced times also provide us with compensation laws that are expensive and it is perfectly possible to justify an intensive safety campaign from the financial viewpoint.

New York state is probably the most liberal of any in its provisions for

injured employees. In certain cases the maximum benefits for a fatality may reach $25,000. No other state can attain this mark at the present time. Compensation is based on two-thirds of a man's average weekly wage, with a maximum rate of $20 a week. Payment is not made for the first week unless disability should extend seven weeks.

The cost of our compensation insurance for the first six months of 1925 amounted to approximately $13,590.49; for the same period of 1926 approximately $1,748.83, or a saving of $11,841.66. I regret that I was not able to obtain cost figures for nine months of 1926 but the Actuarial Department of the State Insurance Fund is undergoing a reorganization and I have had to content myself with the figures for six months.

The cost of our competition was $2,770 and that amount covers the increased cost of the safety department in 1926 over 1925. Adding these figures to the incurred medical and compensation cost for 1926 we can show a saving of $9,071.66. We justify our giving a cash bonus for safety by the fact that we are taking it from our Insurance Fund and giving it to the men. It should not be necessary to purchase a man's safety, but there is nothing that appeals to the average working man like an increase in his pay envelope. We were anxious to get immediate results and took this means to stir up interest.

A Year of Hard Work and Satisfying Reward

I do not want to convey the impression that the officials of my company base the success or failure of accident prevention work on any profit or loss result. My job was to cut down accidents and it was certainly a pleasure to justify that work from the financial viewpoint without resort to the plea of humanitarian feelings. Every safety director has a possible "out" on that plea, for no one can measure the value of human life in terms of the cold dollars of our business world.

So much for the accident experience of my plant during the past year. It has been a year of work, with the reward of results obtained. As representative of my company, I am anxious to know how many plants can show greater percentages of improvement than we have. Our committee is quite proud of these figures, but it does want to know how we stand in comparison with other plants. We are not yet able to compete with the leaders, but we expect to be there in time.

We are trying to build a solid foundation so our superstructure will stand the test of time. Our leaders in the industry have made a long ladder for us to climb, but we are working on the assumption that the only thing a record is good for is to be broken. If in this calendar year we climb up a few rounds in the association records we will consider that a recompense for our work and an incentive for further improvement.

CHAIRMAN FRAME: Mr. Parry has made one more contribution to the long list of successes which have come to those who take an active and right kind of interest in trying to curtail accidents to employees. He brought out many good points in his paper. I think you remember

he asked some of the representatives present to state what their progress has been so far this year. His paper is now open for discussion. You responded splendidly this morning. Who is going to be first this afternoon?

MR. SASS: Mr. Chairman, I was wondering about this excuse that Mr. Parry mentions in regard to taking a vacation. How does that come about? Hasn't the doctor got the authority to say whether the man is able to work or not?

MR. PARRY: Mr. Sass, we are located in an entirely different position from you. We have a small plant with 350 men. We have no plant physician at the present time. We have a staff of city doctors that we call on, as the case may be, and they take on compensation cases in addition to their regular practice. In fact, we don't get any real cooperation from them. A man may be hurt and the doctor will say, "Well, if you feel like it, take off a couple of days," when perhaps he would be a lot better off on the job. That is a condition we have got to change; but we haven't been able to change it yet.

MR. SASS: There should be somebody in authority to say what length of time the man should be off, if he should be off at all.

MR. PARRY: One period of three months of that competition settled that. As long as that competition is in force we won't have any trouble. Of course, the men will gradually lose interest in it, and it will have to be changed by some other plan to make it as interesting as it was to begin with.

Malingering of the Employee a Big Problem

MR. MCDONALD: I was very much taken up with Mr. Parry's paper, because it really goes through practically the same stage of evolution that was necessary for us to go through to reach the degree of perfection—if we can call it perfection—that we reached.

Malingering, in my opinion, is one of the greatest difficulties we have to contend with in accident prevention work. It is difficult, as in the case of Mr. Parry and myself, to depend entirely on local doctors with family connections with the men, and to have them cooperate with you so the employees will return when they legitimately should. You have got to stimulate among your own men that policy which really should be the duties of a doctor—more especially when you haven't got a plant doctor of your own and have to depend on the doctors of that district to do the judging for you.

I find myself, and experience proves, that it is absolutely an absurdity for a man to lose one day or two days for an accident of any kind or nature. I scarcely believe there is any minor accident which will compel a man to lose a 24-hour period from work. He could just as well have used his own judgment and used his own discretion and worked for that 24-hour period as lose the minimum time of one day. When you get to the more serious accident, then you have to depend largely on the judgment and discretion of the doctor, but if you can get the full cooperation of the doctors to realize the effect on the record of the plant of

those long extended periods, which can not be called anything but vacations, you are then really making a good step toward bringing down your days lost and bringing the stimulus to your accident prevention work.

I have found in our experience that malingering is one of the biggest factors we have to contend with. We are fighting it all the time.

CHAIRMAN FRAME: Who else has something to add on malingering that cuts into everybody's accidents and gives a list of lost-time accidents when in reality you can cut them down 50 per cent to start with in the cases in which the men stay out one, two, three, four and five days for minor injuries, minor scratches? Where they are handled with discretion and a little forethought, the man can stay on the job and it is certainly more to his advantage than taking these vacations.

Another Plant Approves the Safety Bonus Plan

MR. ROBERTSON: I was very much interested in the address Mr. Brown gave at the first session, as well as the address by Mr. Parry. The thing that particularly interested me was the bonus system. I am just going to say something about the bonus system. I don't want to offend anyone by what I am saying.

In this bonus system, I take it that each individual man in the plant gets a bonus of either one per cent, or some stipulated amount. Gentlemen, do you think it is necessary to bribe a man to protect himself from getting hurt? That is just a point to consider.

I quite agree that it is a fine thing to work for a trophy, and to have everyone in the plant work toward that end. Those trophies are wonderful things and have done a great deal to cut down accidents. We are all trying to win the trophy. We have got one and we hope to bring another up to Canada.

CHAIRMAN FRAME: Mr. Rader, I wonder if you would add something to this bonus discussion and the merits of the system and how it works.

F. H. RADER (Electric Foreman, Alpha, Easton, Pa.): In regard to the bonus system, we find it works out very nicely. When it was first instituted, the thought went around quite generally that according to our brother's idea it was more of a bribe system. But we hunted up the matter and found that idea existed in the minds of those in whom the safety work had never taken root. You know, we have some fellows in the plant who make a little guess at safety work. We found this idea prevailed in those men rather than in those who were at the head and were extremely interested in safety work.

Then we got around to those men and talked over the matter, and we finally got them to see that it wasn't a matter of a dollar or two per month in their envelope. While that was appreciated, of course, I don't think there were any in our plant who actually needed the extra dollar or two, but rather they got the idea that it was to encourage those not interested to come along. After they had actually received the first or second bonus, they began to open up their brains a little and began to think differently. Finally they thought, "It is not the money so much,

but I don't want to be the fellow who is going to keep you out of your bonus."

We have a safety committee of all the foremen around the plant. I have actually gone through our plant and seen men working on certain jobs that were rather dangerous. I heard one fellow say, "Look out there. You are going to keep some fellow out of his bonus if you get hurt. Don't do that. Tie that or put a heavier chain on that." That idea has got all over the plant.

We had a fellow just a couple of days ago who got a little hurt, and he said jokingly, "Gosh, I was afraid I would have to lay off, but I decided not to because I didn't want to keep you fellows out of your bonus." That was said in a joking way, but we have instituted in their minds a purpose that we never dreamed we could get.

While this little monetary award doesn't amount to much, it has really taken what you might say the lower class of employees and given them a consideration and a thought, and it helps the rest of us who are actually interested in safety work as it ought to be carried on, and we are getting rid of (we might almost call them) these hunchbacks, because they don't stand up straight to show themselves. They seem to put more time into their work.

Amazing Interest Shown by Employees in Safety Effort

CHAIRMAN FRAME: Dan Ziegler is here from the Catskill plant. I want Dan to say a few words because at his plant they have had only two lost-time accidents so far this year. They have had wonderful success and I need not tell you that because of that record they have shared in the bonus payment every month. There has been some comment at this Catskill plant about this bonus.

DANIEL L. ZIEGLER (Plant Engineer, Alpha, Catskill Plant, Clementon, N. Y.): This reminds me of what Mr. Frame was saying on Sunday evening. In previous years we were pretty unfortunate in our accidents. Since this bonus system came into effect, it is amazing to note the interest and the reaction that have taken place amongst the members. Of course, it was discussed at our various safety meetings, and it didn't seem to meet with very much approval. The same old argument came back: you are bribing the men to be saved. But as the months went on, we were gathering influence and the men realized it wasn't a bribe. None of them think so now, because they see the cause and effect and the results that have been obtained.

One of the main things we can show down in our plant is what we have accomplished with the quarry. We haven't had an accident in our quarry for 21 months. In our mill they feel that if the quarry can do that they can do it in the mill itself. Interest has been generated through the effect of this bonus, and we hope to continue that way.

CHAIRMAN FRAME: While we are talking about records, is there any company that has a clear record in 1926? If so, we should like to hear about it.

MR. BAYLOR (Louisville Cement Co., Louisville, Ky.): We have a record

in our quarries of going two years without a lost-time accident, the 19th of August. When I left home I told our general foreman, "Whatever you do, let's put her over for 1926." We have done it. We can do it again. What we have found out, (myself, anyhow), is that you have got to educate your men if you want to get any success. You can't drive them. That has been tried. You have got to educate them. Start with the foreman and then go down to the men. When we have a new man I go to the quarry once or twice a day. There the older men take the new one and educate him as to the hazards of the job.

"Four years ago we had a man cut his finger doing that," they will tell the new man. That is the way they watch him. In the stripping and in the quarry and explosives crew we have only one division. We have not hurt a man in 25 years due to explosion—premature explosion. We did have a premature explosion last year, but it seemed as if the men got away in the snap of your finger. We have not had an explosion that killed or injured a man in 25 years.

CHAIRMAN FRAME: That opens a new angle of thought. Who else has a record he can boast about?

The Foremen Are Responsible for Employee Safety

MR. ALLEN (U. S. Gypsum, Oakfield): We have a record of 22 months, not a lost-time accident in our warehouse. The man-hours during that period cover 800,000, during which time we had 750 new men. New men constitute our biggest hazard. We have put the matter of safety up to the foremen. Our foremen have given us good results. We have them to thank for our success. Every new man has been taken over with the idea that nothing must happen to him. When you get your foremen working on a basis of that kind your success is almost assured.

CHAIRMAN FRAME: Mr. Allen, wasn't it your company that won the trophy from the United States Bureau of Mines?

MR. ALLEN: I couldn't say, sir. I am in the warehouse and have nothing to do with the mines.

MR. JACOBSEN: They won the trophy.

MR. BAYLOR: What kind of shelter have they got for their men? Do they ever lose any men by blast? We have cylinders to protect our men. If anything we do will be of benefit to anyone else along the line of safety, we will be glad to give anyone the details.

CHAIRMAN FRAME: Thank you very much. That is the kind of cooperation that gets results.

W. F. WEIDNER (Lehigh, Mitchell, Ind.): The previous speaker asked a question about the protection of men in quarries. We have had a great deal of that experience. The plant has a sheet metal drum of a cone-funnel type. It runs up about six feet cylinder type and then is finished out like a funnel. We have any amount of those of different sizes. For illustration: with a shovel crew, in plug hole drilling they shoot from two to five times a day, and they will have one of the larger size, because it will probably stand there for a week so that plug hole shooting will hurt no one. Then we have smaller ones for end lines or

dinky men where there are only three or four men. They can lay them down or roll them anywhere. We have done this for three years and we have never had a man hurt from plug hole shooting.

When it comes to battery shooting, we make an arrangement with the dynamite foreman that everybody is clear for shooting, and we don't take anyone else's word for it.

N. B. WITT (Motor Repairs, Alpha, Manheim, W. Va.): We don't use any cylinder because we mine stone and there is a rib of pillars to get behind on account of plug hole shooting. For other blasting they use sheet iron that is fixed up a slope, so the blaster can get under it while they are shooting. On their shovels they use sheet iron roofs, which in case of shooting in another tunnel or taking down a bad tunnel from the roof or side wall, the men are protected. This is found to be a very good system.

No Man Liked to Lose His Safety Emblem

Speaking about the bonus. The one per cent bonus did our place more good than anything else. We used the monthly safety button first. It did some good. Of course, it was new in the way of safety work. Then they used the button in this way: if a man had a minor accident, whether he lost any time or not, he had to deposit his safety button for 30 days. The men hated to go into the office and hand in their button to the foreman for a finger smashed or some trivial accident like that, something that didn't require any lost time. That got pretty well next to the individual employee in thinking safety. He didn't like to lose his button.

If someone didn't have his safety button, his fellows would ask, "What became of your button?"

He would say, "I got my finger mashed and had to turn it in for 30 days.

So when the bonus plan came around they didn't get the idea that they were trying to purchase the accident or the men's safety, but they simply created the idea that the company was extremely interested in the employee not getting hurt. They looked at it that way. The bonus plan has been a very good plan in our plant. I think it has made more of a success than anything else—not because of the amount of money involved or anything like that. But we lacked interest in the individual employee, and that bonus plan seemed to bring that around more than anything else.

C. L. BUNN (Pennsylvania Dixie Cement Corp.): I have lived in the south so long that I am a little superstitious about getting up to brag. We have a remarkable record this year. I attribute it to the education we instilled in the men. We have not had an accident since January 12 of this year, or 287 days. Last year we had 15 accidents, with 581 days of lost time. This year we have had two accidents and 10 days of lost time. I have said enough.

CHAIRMAN FRAME: That is a start in the right direction. Who can add a few more words to this wonderful testimony? Accident prevention is not a dead issue.

A. J. EALES (Bessemer Lime & Cement, Youngstown): I haven't much to say, but I do want to say that Mr. Parry's paper is a lot more optimistic than the old fellow from Glens Falls was when at Buffalo. He certainly was pessimistic in his attitude on safety then.

But I think we ourselves have done fairly well. We have had three accidents, with 38 days of lost time. I attribute that entirely to the education of the foremen. For a long time we couldn't get the foremen to get really interested, but now I think we have got our foremen thoroughly interested in the safety movement. That gives us one idea before we have had an accident here. We had a man with a slight accident, and he was going to lay off. The foreman said, "If you lay off I am going to ask for my time." So we have sold the foreman on it, and I think that is the main feature. Sell the foremen and the foremen will sell the men.

CHAIRMAN FRAME: This question of foreman's responsibility is a highly important one. Who else can add something to it?

Artificial Resuscitation Saved His Son's Life

W. A. WOODRUFF (Lehigh): We made a fairly good record this year. In fact, the way we count it, from the first of last October until the first of September, we got through without any accidents at all. During the whole of this year we had no lost-time accidents up to the first of September. Then about the 15th, I think it was, we had a fatal accident. That is the only accident we have had so far this year.

There is one question that hasn't been touched upon that I'd like to hear discussed. That is the question of artificial resuscitation. All the foremen and all the safety men have been taught that prone method of artificial resuscitation. I think it is a very valuable thing. I think so because I saved my own son's life by that very thing. We have had one or two cases of it at the plant, and I just wondered how much of that had been practiced in other plants or whether it was practiced at all.

CHAIRMAN FRAME: Mr. Woodruff, before we go into the answer to your question—and I think there are a number who will answer it very quickly—will you give us a little more detail on that occurrence. I am sure it will be a good practical lesson to all of us.

MR. WOODRUFF: My son was taking a bath in the bathroom and was overcome by natural gas. The gas was escaping and he didn't know it. He fell over in the bathroom, and when we called him to supper he didn't answer.

My wife said, "Thornton doesn't answer. There is something the matter. The door is locked."

I rapped on the door and called for him, but he wouldn't answer. I maintained that he wasn't there, but my wife insisted that he was. So I had to go around and tear open the window and get in. I found him on the floor. He was still breathing, but heavily, as is customary under those circumstances. I got him out in the fresh air and applied artificial resuscitation, as we had been taught at the plant by our plant doctor.

Along that line, I want to say we have a good record for having a plant doctor. He has been with us ever since the plant has been running, 25 years. What saved my son's life, the doctor himself said, was the work that I did immediately. If we had waited until the doctor came we might have lost the boy.

CHAIRMAN FRAME: That is undisputed testimony as to the value of resuscitation, of teaching the men how to go about it when the emergency arises. Is there someone else who is using this same method? If so, will he tell Mr. Woodruff something about it?

W. W. HAMILTON (Plant Engineer, Alpha, Ironton, Ohio): We have 15 men at our plant who have taken this course in the Schaefer method of the Bureau of Mines. They have a car going through Ohio several months and give a week's instruction free of charge. To show you the value of this, we had 75 miners overcome at one time with gas and these 15 men worked on these fellows and we didn't have a single day's lost time as the result of this accident, due to the fact that the men were trained to handle such cases.

CHAIRMAN FRAME: That is a wonderful feat—75 men overcome by gas and all at the same time, practically—at least they were all discovered in that condition. They had some first aid men trained in this method, and these trained men went ahead, as Mr. Hamilton has explained, and by their successful manipulation of this prone pressure method were able to resuscitate all these men, so that they did not lose any time from their work. Without it, there is no telling what might have happened. If there is a delay before the doctor arrives, it may prove fatal. Can someone tell us about resuscitation? You are likely to meet with it in any number of ways.

Need for Artificial Resuscitation Always an Emergency

E. G. HAMMER (Electrician, Alpha, Jefferson Barracks, Mo.): One thing is certain: You shouldn't give up that method. We worked one hour and fifteen minutes on a man and brought him around. After that they came with a pulmotor, but they could only use the pump and could not give him any oxygen. The doctor said the resuscitation method saved his life.

C. H. DENMAN (Chemist, Alpha, Bellevue, Mich.): You can never tell when you are going to need this method. We had our departments divided off so that three or four from each department would come to the laboratory and the first aid men would instruct them in this method. We had only one occasion to use it in the mill. One of our men was out joyriding with two or three strangers. I don't know whether he had had "white mule" or not, but one of the fellows went all in. A doctor was sent for. The doctor looked at him and said, "He is done for."

The fellow at our mill said, "He isn't." He rolled him off the cot, started work on him, and brought him to. So you can never tell what you are up against with doctors.

We have two doctors in our town. One likes to keep a patient as long as he can, and the other doctor is very easy. He is this easy:

There is a truck driver who was a little discouraged about his work. He came in and said he got kicked with a Ford truck. We gave him a little rubbing on the wrist and fixed him up. The next time we saw him he came up with a big aluminum splint.

We said, "Where did you get that?"

"The doctor put it on."

"Is your arm broken?"

"Yes, cracked bone."

We had an investigating committee at our mill to go to the bottom of every accident. I immediately went to the doctor and asked him if this man had a broken bone, and the doctor said that his arm was strained so he put on the splint. I immediately said to the man, "I want to see you at Dr. Haight's office (that is a dentist in our town who has a wonderful X-Ray).

He said, "I'll be up there at 2 o'clock."

Handling the Doctor Who May Want to Interfere

He was there before I was, had the splint off, had moved the chair and got underneath and taken a picture of the arm, which showed no broken bone. That fellow didn't care about accidents or time lost or anything of the sort.

In regard to the bonus, we find although it isn't much, it does help. We will have men come for first aid and other men will follow them and say, "Say, Charlie, is that man going to have any lost time? Is that going to affect our department?" Although it doesn't amount to much, it surely creates more interest.

MR. HAMMER: In regard to resuscitation: with all due respect to the medical profession, many times in the case of shock, drowning, gas, etc., medical men tend to fool around a little while. As long as they have the patient under their care you can't touch him. It is a good policy to get the doctor to declare him dead so you can begin working on him.

We had a case happen in St. Louis in which the doctors declared the patient dead. As soon as this was done, they pushed the doctor aside, and that man is climbing poles today for the Union Electric.

MR. SASS: A few years ago I used to be on some kind of a team that answered pulmotor calls. That is, we would jump into an automobile, throw the pulmotor on board and away we would go. When somebody would get tired of living and try to commit suicide, we would work on him. Sometimes we were successful; sometimes not.

The pulmotor is a rather hard proposition to work with, providing it is in the hands of an inexperienced man. In such a case, it is likely to do more damage than good. As far as this prone pressure method of resuscitation is concerned, we teach our committee men at the different committee meetings. Then periodically when we hold our different safety committees throughout the mill, we instruct as many men as we possibly can. One plays the part of the patient, and the other is the operator. This way the man gets an idea of how it feels to be worked upon and he also gets the idea when he is working on someone else.

MR. KLEIN (Universal): On this subject of Detroit not knowing what the safety convention is, this morning on the way in I picked up a gentleman staying in the outskirts of the city. He noticed my badge and said, "What is this about?"

I started to explain and said, "Last year in Cleveland I went back with just one idea, just one phrase that I thought was the most worth while thing I had gained during my time in Cleveland."

He said, "What was that?"

"Stop at the curb. A man from Chicago organized the Stop-at-the-Curb Club for children."

This is outside of cement. When we teach our men safety in the mill, we feel we have gone a long way. Mr. Huth has the perfect record. We all hope to accomplish it. We have gone a long way in the mills, and all of us hope to have perfect records, but outside of that safety work is not as good as it should be.

The idea of stop at the curb is an excellent one. Children can join this club by writing to this newspaper and giving their names. All they get is a button which says, "Stop at the curb." If any child running along the street will stop at the curb, there is a life saved practically every time. These children will run out. I have told the men in our plant to apply that everywhere, that where there is danger, that is the curb line and to stop at the curb, to think an instant before they go ahead.

A Banquet Helped Put the Safety Idea Across

In our mill I have tried to put a curb line on all danger places. If every man will stop at the curb, the same as this Chicago newspaperman tried to get the children to do, it will be one way of stopping our accidents.

CHAIRMAN FRAME: We should like to have a few words from all of you. Is Mr. Switzer here?

E. C. SWITZER (Petoskey Portland Cement): Our company during its operations got a very poor record for accident work. We have had a safety committee for the past three years, but we weren't able to put the safety idea into the men until about a year ago. Then we got the men together at one of the hotels of our city and had a banquet for them. We had one for the men on the day shift earlier in the evening, and had a later banquet for the men on the other shift.

The result has been that during the present year we have had so far two lost time accidents. In January, the latter part of January, we had an accident that caused the loss of six days. In May we had a man get his leg broken in the quarry, cutting up old iron for scrap and other stuff that had been broken by blast in the quarry, by which he lost 120 days. Those were the only lost-time accidents we have had so far this year. For us it is quite a record. It is not what we hope to accomplish but it is something that is worth while.

Like others who have spoken today, we have gone through the valley of tribulation and we are making progress. We hope some day to arrive

at the point where we can go through a year or series of years without any lost time.

MAJOR RENINGER: There is just one thing I want to call attention to which I think we ought to take a little notice of. Year after year we come here and we just talk about our individual plants or what the other fellow did. We don't give very much attention to safety matters outside the plant. Just a short while ago a gentleman spoke about the curb line. There are children in and around the plant, and that is something we are vitally interested in. We have had one or two accidents of children hurt by cars or in some other manner.

Safety Committees Should Do Work Outside Plant

In small towns—and most of our plants are located in small towns—your cement plant is probably the biggest operation there. I think it is up to safety committees to do some work outside the plant and to try to educate the children. I think we ought to pay more attention to that and not be selfish and confine the work to the plant alone. We should spread out. If we ever want to get across this message of safety, we have got to branch out, particularly in the small towns. The only people who can talk safety in small towns are the safety committees of the plant.

Last year over 15,000 children of school age were killed. I think one of the saddest stories happened to a man who usually gets to this Congress, an assistant superintendent of the Carnegie Steel Company, a man whom a great many men know. His little daughter was hurt last week, run over by an automobile, and that is why he isn't here at the present time. I think the safety committees can do a lot to get the superintendents and teachers interested and educated. I think every safety committee of the companies ought to try to see that the schools in that town get a copy of the safety educational bulletin, that they get a copy of the safety calendar, and things of that sort. We can spread this gospel of safety, of school safety and at-home safety. I think it would be an interesting subject for every safety committee to take up, to make it part of your program to talk about public and school safety. I think it would be interesting for all of us to carry home that idea, not to be selfish and confine the safety work to our employees and the plant proper.

MR. EALES: Along that line, whenever we have a general safety meeting, we get an outside speaker and we have the speaker in the school to give safety instructions to the school children. Along with that we have a motion picture film. The last one we got was "Ask Daddy." That film is solely for children. If you haven't seen that film, you want to get it. I am sure that it will help you in your safety work with children, because your children are eventually going to be your workers, and if you have them trained in safety before you get them, it will be all the easier for you.

MR. DENMAN: We have a meeting twice a month. One is a foremen's meeting, and the other is an open meeting. At this meeting we usually

try to get an outside speaker if possible. We have started this year to invite the public, that is, the business men, the school boys, and the superintendent of schools, particularly. We have had some men come to us and say, "I didn't know you men did this work." They rather thought we had to kill men every once in a while. We have tried this way of getting to the children so when they grow up and have to go to work they will know what safety means. We had a speaker at the school auditorium and joined with them and had a wonderful meeting. I think it has done a lot of good.

F. E. TOWNE (Superintendent, Manitowoc Portland Cement Co., Manitowoc, Wis.): Mr. Chairman, I said too much last year. Last year was our first year of really serious activity in safety work due to the fact that we were practically a new plant. I am almost afraid that we have not got our bearings, so to speak, and that there was a certain amount of good fortune wrapped up with the results we had last year.

So far as numbers go, our record this year is not as good as it was last year, I am sorry to say. In terms of lost-time days, we have only about one-fourth the number of lost-time days and about one-fifth the number of compensation days that we had last year. I am certainly convinced that the real necessity in safety work consists of two things: perhaps primarily education; and hand in hand with that, being everlastingly at it. Keeping the thing before the men all the time promotes the spirit of safety and gets it so thoroughly drilled into their system that they take real pride in the results being obtained.

Men Are Often Reluctant to Report Accidents

We had one striking illustration of that a few days ago. A man had the misfortune of turning his ankle. The injury was very painful, but he didn't say much about it. The next day we noticed he was limping around and having considerable trouble. We asked him what was the matter. He told about his misfortune. While he was lining the kiln, he had stepped on some clinkers, slipped, and turned his ankle. When asked why he hadn't reported the incident, he said that it didn't amount to very much.

As a matter of fact, it really did amount to something, we tried to tell him, and as is always the custom, we insisted on his being reported to the doctor at once. We take that measure of determining whether or not an accident is serious, by either reporting to the doctor or to the superintendent of the hospital with which we have direct connection. The result was that the physician called at his house and told him that the ankle should be put in a cast, that his absence wouldn't last long and he would be back at work in five or six days. He put on hot applications that night to help remove the inflammation and the next day he would put it in a cast.

The doctor returned the next morning about an hour later and did not find the man. The man was on the job. The hot applications worked wonders.

We asked him if the ankle was any better, and he said that it was a great deal better. He kept right at that with hot applications all night long and used a hot water bottle, and the doctor said he really did think that 75 per cent of the injured men every place could do for themselves what otherwise would necessitate the services of a doctor over a considerable length of time.

One thing more that came to my attention this morning was an inference drawn partially from Mr. Green's statements concerning the guarding of machinery. Along that line, the habit has become so thoroughly settled upon the men in construction work of any nature at our plant that the guard rail and guarded runway are generally the first things to go around a piece of new machinery of a permanent nature. After the machinery is put in, then the wire netting or the guard around that machinery is put in. The one big thing this does is to create a sentiment for safety.

The Malingerer and the Man Loyal to His Plant

A good many men feel they have just as much sense perhaps as the other fellow. They are not going to get caught in that but they do realize there is a certain element of accident when their back is turned. A piece of loose clothing or something of that kind may be caught. They have got to the point where they will not take the chance. I believe that is hand-in-hand with the spirit of education. The more education we can drum into the men, the less chance they will take.

J. H. LEGGET (Superintendent, Plant No. 5, Canada Cement, Belleville, Ont.): Just one thing crossed my mind when Mr. Parry was talking on the subject of malingering. It seems as if you have to go into giving a bonus to keep the men from getting hurt.

I thought of a case that happened at our plant where we took on quite a few men for some construction work. In one gang there was a man who met with a little accident—not serious at all. The man had just started to work. It was a gang that had several hundred days clear, with no lost-time accidents. That record didn't mean anything to this young man. He laid off for a day and came back to work and spoiled the record. They had to go back and start all over again, after having had 600 days clear.

A day or two afterwards a man in another department had a finger broken. He had been with us for quite a time and he secured the first aid treatment laid down by Mr. Jacobsen. The first thing he said when he got in the office was, 'I don't need to lose any time. I'll be on the job inside half an hour."

The doctor put his finger in a splint and the man was on his job within a half hour after he met with the accident.

CHAIRMAN FRAME: Gentlemen, we have with us Mr. Curtis, of the Portland Cement Association, who has always been vitally interested in promoting the welfare of that important organization. He has a few words of good cheer and optimism to give us at this time with partic-

ular reference to the importance of keeping up the standard of our accident prevention.

A. J. R. CURTIS: Mr. Chairman, probably it is inappropriate for me to say anything at this time. As yet I must plead ignorance of accident prevention work and would prefer to listen. However, I am surprised and delighted with the enthusiasm of your meeting. It was much beyond my expectation to see the number that have come here for this session devoted entirely to cement mill safety.

In our industry we have made the proud claim for years that "Portland cement contributes much but consumes nothing." The product of the cement mills goes into structures which greatly benefit humanity and guard it against danger. Indeed every dollar spent for cement brings benefits worth much more; but we can hardly say, and intend it to be taken as literally true, that our product consumes nothing as long as we have mill accidents. As Mr. Brown stated so clearly this morning, one of the great objectives in the business of manufacturing cement is to sustain our workers and help them to attain contentment and happiness unmarred by the tragedies called accidents.

The Cement Section Suffers a Great Loss

The Cement Section suffers great loss in Mr. Jacobsen's resignation. Our speakers have brought that out and it has been very pleasing for me, as his friend and associate, to hear the fine sentiments expressed concerning Mr. Jacobsen and his work. He has engaged in it wholeheartedly for nine years and in that time I have never seen "Jake" downhearted or out of patience. He has always been busily occupied with schemes and plans for enlarging and perfecting the work.

When a salesman goes out to sell goods the desire to get the name on the dotted line is the thing that keeps him concentrating, but in work of this kind, I believe that accomplishment depends almost entirely on inspiration. If a man doesn't believe in accident prevention work 100 per cent, his efforts can not possibly succeed. There is hardly a person so far down the intellectual scale that he can not detect whether the man addressing him really believes in the thing he is talking about or not. Success with safety work in the cement industry seems to be due largely to the fact that the superintendents fully believe in the work and have impressed the idea on foremen so well that the latter have taken it on down the line to each individual worker.

Mr. Jacobsen tells me that he has been trying to arouse greater interest in our accident prevention magazine. As a result a considerable amount of material of the right sort has been collected and the distribution built up to something over 2,000 copies. These results, he tells me, have been accomplished by hard work. I can not feel that 2,000 or 3,000 copies of a magazine circulated every two months represents the possible good to be accomplished by the use of the printed page, when we are considering the accident prevention work of about 140 cement plants employing 45,000 to 50,000 workmen.

The point is illustrated by an incident the other day. I visited a mill which seemed to have an unusually low proportion of illiteracy. Apparently most of the workers read English. This mill, which is using the magazine somewhat more extensively than the average plant, distributes only 14 copies, although there are some 150 men employed. Without wanting to be critical, I would like to suggest that the investment in money and effort in this magazine can be fully justified only through the effective use of greater numbers.

The responsibility for making the magazine interesting rests largely with you men who have actual charge and supervision of safety work in the mills. We can not provide the kind of talent that will duplicate your knowledge and experience. What one man can do, even though he be privileged to travel around, is small indeed as compared with the daily opportunities of those who see what goes on in the quarry and about the mill. The magazine requires a great many short, snappy plant safety items, with photos or sketches, if possible.

Can we not depend upon you to put your shoulders to the wheel and help us in Chicago who want to help you? If so, there can be no question about the future success of our safety campaign.

CHAIRMAN FRAME: I am sure we can back up the thought of Mr. Curtis that there still remains much to be accomplished in the good work that Mr. Jacobsen started in the prevention of accidents and the creation of enthusiasm and the right kind of business and trying to limit the number of injured men.

I think at this time we might call on Major Reninger for the report of the Nominating Committee and proceed with the election of officers for the ensuing year.

Report of the Section Nominating Committee

MAJOR RENINGER: The Nominating Committee appointed by the chairman, after careful consideration of this subject, submits to you the names of the following persons:

Chairman—Mr. Russell Frame, Alpha Portland Cement Co.

Vice Chairman—Mr. Thomas Halpin, Marquette Cement Co.

The Nominating Committee feels that a chairman should serve for two terms, as it takes him at least a year to become acquainted with the work.

The Nominating Committee also offers the following suggestion, or resolution, that all past chairmen become permanent members of the Executive Committee of the Cement Section.

Respectfully submitted,

(Signed) DAVID ADAM, Lawrence,
FRANK H. SASS, Universal,
HENRY A. RENINGER, Lehigh.

CHAIRMAN FRAME: I am not qualified to enter into the vote or the expression of opinion of those present, so I am pleased to delegate the continuance of this important subject to Mr. Jacobsen.

CHAIRMAN JACOBSEN: You have heard the nomination of Mr. Frame as chairman and Mr. Halpin as vice-chairman. Are there any other nominations from the floor?

(It was regularly moved, seconded and carried that the secretary be authorized to cast a ballot electing Mr. Frame chairman and Mr. Halpin vice-chairman.)

CHAIRMAN FRAME: I am sure I am grateful to have your expression of confidence in the officers of the past year. We realize we can do nothing but coordinate the efforts and the good-will of those who have helped us in the past. I can do nothing more than promise that the officers will devote their best accomplishments to further the work of accident prevention and to make our meetings interesting and to provide speakers which will add greatly to our purpose.

Mr. Halpin as vice-chairman will have the floor.

MR. HALPIN: All credit for the success of the association the past year is due to the chairman and not to the vice-chairman, for he has had nothing to do.

A Testimonial Is Presented to Mr. Jacobsen

CHAIRMAN FRAME: At this time I want to express the keen loss which the Portland Cement Association and which the individual plants, particularly the employees of the plants, including the officers, feel in the loss of Mr. Jacobsen. As you have heard a number of times today, this is the last meeting in which he will be officially connected in this important line of work.

I am going to ask Mr. Halpin to further express the feeling that we have on Mr. Jacobsen's loss.

MR. HALPIN: Mr. Jacobsen, speaking on behalf of the members present, we can not permit you to leave the association of these men who have been with you a good many years without at least a written testimonial of our sincere regard and appreciation of your efforts these many years. I have a testimonial, written and signed by the members of the member companies here, which I take pleasure in presenting to you.

In addition to this written testimonial we want to present a monetary testimonial of our appreciation of your good work and your friendship and everything that goes with it. I am no speechmaker but I present this on behalf of the members present.

(Members arose and applauded.)

MR. JACOBSEN: You know, gentlemen, this is quite a surprise. It certainly is good to know that I have that many friends here. You may think that you are going to get rid of me with this, but I am going to stick with you to the bitter end. I have had the pleasure of serving the Portland Cement Association for a good many years in this kind of work. Really, when all is said and done, it has been a pleasure, because I have made more and more friends every day out among the plants and in this kind of work.

When you get down to brass tacks, there is only one thing that counts. I think that is friendship and good-will in accident prevention work. Without that you get no place. I certainly want to thank you for this wonderful surprise. I don't want to look a gift horse in the mouth, but of these two things, I would rather have this testimonial. This watch I am going to carry and look at, and the testimonial I am going to take home and preserve forever. I don't have any children to show it to, but I am going to keep it anyhow.

We are going to meet tonight, gentlemen, at the dinner party. I am not going to give you a lot of sob stuff, but will you all do me a personal favor and be present tonight?

MR. MCDONALD: Mr. Chairman, I certainly would like to voice the sentiment of the former speaker with respect to the departure of Mr. Jacobsen. It doesn't take but six years to go back, to feel that Mr. Jacobsen, for myself, for my plant, for my organization, in fact, I speak for the whole organization of the Canada Cement Company, by his personality, by his good-will, by his friendliness, by his thorough knowledge of accident prevention work, was a great incentive to us in our plants in the showing we have made in the years gone by. We cherish his friendship, his memory, and we join with the others in wishing him Godspeed in his future career.

MAJOR RENINGER: I feel there are a great many men right here today who probably would like to get up and say something but who are more or less backward. I do know everybody here, and the plants throughout the country, feel the same towards Mr. Jacobsen as we do here. I feel that what Mr. Halpin has said, and what the Canadian representative has just said, and what I am saying here today, is the expression of everyone in this room and of the men back at the mills throughout the United States.

MR. TOWNE: May I ask if the latter portion of Mr. Reninger's report was adopted concerning the suggestion for the members who were past chairmen becoming permanent members of the Executive Committee?

CHAIRMAN FRAME: I don't believe it was. I am glad you called it to our attention.

(It was regularly moved, seconded and carried, that all past chairmen become permanent members of the Executive Committee of the Cement Section.)

ADJOURNMENT

Joint Meeting of Cement and Quarry Sections

October 27, 1926

E. E. EVANS, Chairman
President, The Whitehouse Stone Company, Toledo, Ohio

THE joint meeting of the Cement and Quarry Sections convened at 9:45 o'clock in the Book-Cadillac Hotel, Detroit, Mr. E. E. Evans, Chairman of the Quarry Section, presiding.

CHAIRMAN EVANS: Gentlemen, we will at least attempt to come to order. Mr. Frame, chairman of the Cement Section, suggested that I open the meeting. He had a very strenuous day yesterday, and on the strength of that I have agreed to relieve him to some extent. That doesn't necessarily mean that I shall relieve him of all the work.

I want to say at this time that I believe the Cement Section is to be congratulated upon finally persuading Mr. Frame to act as their chairman for another year. I think those quarrymen here will agree with me that the Cement men have shown mighty good judgment, and I want to at this time take the opportunity of congratulating Mr. Frame.

R. FRAME (Alpha Portland Cement Co., Easton, Pa.): Thank you, Mr. Evans.

CHAIRMAN EVANS: At the last National Safety Congress held in Cleveland an experiment was tried. The experiment was a joint meeting of the Cement and Quarry Sections. It worked out so satisfactorily and the meeting was so harmoniously conducted that it was decided to continue the plan this year. The attendance this morning would indicate that it is and will be a satisfactory meeting.

With reference to the safety movement: I am convinced that there must necessarily be some merit in it, because when any project has sufficient merit that it will permit quarry operators and cement men to conduct a joint meeting and do it harmoniously, I am sure there is merit to that project. Not that we have anything against the cement men. If we did, we wouldn't show as great a willingness as we have to cooperate with them in this world-wide safety movement.

We have rather a lengthy program, and I believe that any further remarks from me would necessarily be a digression. However, I am going to take advantage of an individual who is a little taller, carries

more avoirdupois than I do, and have him at this time say a few words to you. Mr. Frame!

MR. FRAME: Members of the Quarry and Cement Sections of the National Safety Council: It is indeed a pleasure on the part of the cement men to meet again with our good friends from the Quarry Section. Mr. Evans has stated that the meeting worked very harmoniously last year, and the cement gentlemen felt that it would well serve our purpose to have a joint meeting again this year.

Safety is indeed a live subject. There is never too much that we can do to cut down these accidents, and I know of no better method than a meeting of this sort whereby we can report on the progress made, present our individual problems, and encourage that discussion which enables all of us to understand the other man's viewpoint and the peculiar methods which he has used to obtain those results which we all are after.

CHAIRMAN EVANS: I am quite sure we are now going to have an interesting talk, or perhaps a paper on "Safety in the Cement and Quarry Industry." We will have the pleasure of listening to Dr. R. H. Lansburgh Secretary of Labor and Industry, the State of Pennsylvania.

SAFETY IN THE CEMENT AND QUARRY INDUSTRY

R. H. Lansburgh, Secretary of Labor and Industry, State of Pennsylvania, Harrisburgh, Pa.

I am a little dubious as to just why I was brought before this particular joint meeting, unless it be that in Pennsylvania in the last year we have been making extensive investigations into quarry accidents, and as a result of those investigations and with the complete and most hearty cooperation of the quarry industry of the state, have developed in Pennsylvania for the first time a safety code of regulations governing the operation of quarries.

Any of you who are from Pennsylvania will realize some of the problems that have been met and faced during the last year in the development of this quarry code. We feel that it probably represents almost the last word in quarry safety. Just at the present time it is being lived up to by the quarries of the state, enforced by our department.

From the experience which we have gained in the development of that code and the discussion leading up to its development, as well as our experience in inspection under that code in the last six months, we have learned one very fundamental fact; and it is about that fundamental fact that I am going to talk to you this morning.

The cement industry is the most completely organized for safety in the United States. The closely knit organization which you have developed extends not only throughout the cement plants themselves, but into the quarries in connection therewith.

The quarry industry, other than that portion of it which is connected with the cement plants and certain outstanding large operators prob-

ably here represented, is almost totally unorganized for safety. This condition represents a challenge to those of you interested in quarry safety, peculiarly because of the extremely hazardous nature of the quarry industry and the fact that a very large majority of its accidents are of the type which can only be reached through effective safety organization.

There is probably no other industry in the country where such a large percentage of accidents arise from non-machine causes, or where safety practices, as developed from experience within the industry, bear such an important relation to accident reduction.

Five causes stand out prominently as representing about 75 per cent of all accidents in the quarries of Pennsylvania. The statistics of the United States Bureau of Mines indicate similar conditions throughout the United States. The five causes are as follows:

1. Explosives and explosions.
2. Cars and engines.
3. Falling objects.
4. Falls of persons.
5. Handling materials.

Explosives and Explosions

The first cause is one which to consider brings with it endless discussion of the handling and use of dynamite. Experts claim dynamite can not prematurely explode, but accident reports show continually from one to six persons injured by premature explosion of dynamite. Examples of accident reports are as follows:

"Man preparing to charge a hole, the dynamite exploded and killed one man and injured four others." Another, "Men were charging a hole in the quarry, the dynamite exploded injuring four men." In the first instance, the man who prepared the charge should not have been permitted to carry the charge to the body of men working on the bank. Only the person necessary to place the charge should have been permitted to handle it or be near it. He should not have been permitted to create an unnecessary hazard which did not in any way assist in the carrying on of the work. In the second case, when charging holes for blasting, seldom if ever is it necessary to have more than two persons, and in many instances only one person is necessary, to prepare the blast. In every instance the number of persons handling the charging always should be kept down to the minimum because of the danger of premature explosion.

Another type of accident reports reads: "Two charges of dynamite had been placed, both charges being connected with the switchboard. After the charge had been set off these six men returned to the place to work, when suddenly one charge which had failed to go off discharged, injuring all six men." In this case after the charge had been set off, only the person in charge of the blasting should have been permitted to return to the working place, and he should have made a thorough and

complete inspection of the cause of the second charge failing to fire before permitting the other five men to return.

Without getting into detail or technicalities of handling explosives, it is perfectly evident from that type of report (which we are constantly getting) that if consideration is given to keeping the number of men around the explosives down to the minimum the total number of injuries is going to be reduced.

Cars and Engines

This class of accidents in general is caused by lack of supervision and a disregard for the well-known safety practices. Oil and gas engines operated in quarries where artificial light is seldom used should not show such a heavy toll of human life or such a large number of non-fatal accidents.

Tom Smith was riding on the trip. He cut the engine loose and fell under the trip. Death resulted two hours later. He should not have been permitted to ride on a loaded trip. If he was the conductor, he should have ridden on the engine and not on the trip. If the track had been properly graded it would not have been necessary to make a flying switch, which evidently caused this accident. Flying switches can be entirely eliminated by proper grading of the track, which can be done in most quarries at very little expense.

John Brown was assisting the work to replace a car on the track when the engineer started the engine, throwing Brown under the car. A fracture of the left leg and fracture and laceration of the right leg resulted. If the foreman or other person in charge of retracking the car had been a real safety man, he would not have permitted the engineer to move the engine until he was certain that every person assisting in the retracking was out of the danger zone.

Jim Green was loading a car when the car upset, pinning him underneath, which resulted in a compound fracture of the left leg. This case illustrates clearly the necessity of placing only competent persons in charge of quarry operations. It seems impossible to believe that a foreman or other person having charge of a quarry failed to see that the load was so heavy on one side that a car would topple over and injure the workmen. Proper supervision could and will prevent such accidents.

Accidents due to falling objects are principally caused by falls of material and clearly illustrate the necessity for careful inspection of the working face. Too much emphasis can not be placed upon face inspection, as the following accident reports show: "While employee was loading shale into a car a piece of shale fell from above, striking him on the head, causing a fracture of the skull. Death resulted ten days later."

"Employee was repairing channelling machine. A piece of stone fell striking him on the head, causing instant death."

"Employee was charging a hole for a blast when a stone fell from above fracturing his right arm."

"Employee was barring stone when a loose stone fell from above fracturing his left foot."

"While loading shale, a piece fell from the face and employee suffered a bad contusion of the left leg."

Such reports are received by us daily from the quarries of Pennsylvania and illustrate the necessity not only for daily inspection but constant inspection of the working face. If the foreman can not find time, the plant must provide for inspection by a competent person during the time when men are loading and before men are permitted to commence drilling. Face inspection is one of the most important means of reducing accidents.

Falls of Persons

The nature of quarry work requires men to be at the face during almost every hour of the day, and they are constantly in danger from slides and falls. The use of life lines and belts is the greatest safety factor for men employed in this class of work.

To illustrate the necessity for life lines and belts in such operations the following accidents are available: "Employee was working at the top of the quarry, his foot slipped, causing him to fall 40 feet into the quarry. Death followed a few minutes later."

"Employee was barring stone from face when another stone fell from above causing him to lose his balance. He fell into the pit below and received injuries which caused his death the following day."

"Employee barring stone from ledge 15 feet above the quarry floor when his pick slipped, causing him to lose his balance, falling into the quarry and resulting in serious injuries."

"Man was barring stone when a piece of stone struck him, knocking him from the ledge. He fell eight feet into the pit and death resulted from the injuries."

This is sufficient evidence of the need of life lines and belts in quarry operations. While the use of these devices would not have prevented these accidents, I am positive they would have prevented loss of life in the three fatal cases cited.

Handling Materials

Handling materials stands out very conspicuously among the accidents in quarry operations. During the first six months of 1926 15 per cent of all accidents in the quarries of Pennsylvania are charged to this cause. Broken bones, mashed fingers and injured hands and feet result from the careless handling of material. Failure to use goggles when loading and breaking stone is responsible for many of the accidents charged here. The following type of accident reports are commonplace.

"Man was loading stone when a piece of stone flew from the hammer of another employee, striking him in the eye." "Employee was breaking stone with a hammer when a piece of stone hit him in the eye." "While

loading stone, a fellow employee pulled down some loose stone, and before injured man could get out of danger his foot was smashed." "Fellow employee was pulling rock down from ledge when it broke, rolled down and crushed injured man's leg."

And yet that type of accident is one which can very definitely be prevented by proper safety organization. Furthermore, as we all know, safety organization pays dividends finally as well as from a humanitarian aspect. I therefore asked the head of a department of one of the large industrial states of the United States, which has as one of its duties the prevention and reduction of industrial accidents, to say to you that there is a general field before you. That field is, after having cleaned up your own operation and your own job, to interest the men around you, to interest your fellow quarry operator.

This type of accident clearly indicates the lack of safety spirit caused by lack of the proper safety organization, and it is evident that a campaign of education among foremen, as well as employees, is necessary to reduce this type of accident, as well as the other types which have been discussed.

The interesting fact about a large percentage of quarry accidents is that there are no complicated engineering problems involved in their prevention. Accidents from machinery are relatively few.

The present accident situation in the quarry industry in the United States represents a challenge to you who are interested peculiarly in quarry safety to stimulate the interest of that great mass of quarry operators who, as yet, have paid but little attention to that element in ou daily industrial life which we have all come to Detroit to discuss—safety.

Discussion Following Dr. Lansburgh's Paper

CHAIRMAN EVANS: I am sure that we feel deeply grateful to you, Doctor, for the interesting and instructive talk that you have given us this morning.

I might say, too, that several meetings of the quarrymen of Ohio have been held in that state during the past year. The last meeting was called by Mr. Kearns, who is Superintendent of the Division of Welfare and Hygiene of the Industrial Commission, at which meeting the consensus of opinion of the quarrymen was that Ohio should have a quarry code.

We took that stand largely from the fact that the larger operators were spending time and money in an attempt at least to properly safeguard the employee. Our rate has been steadily increasing, not because of fatalities that might occur in the larger plants, but because of the lack of interest manifested by the smaller operator. In other words, many of the quarry operators who are conducting a safety campaign in their plants are penalized because the smaller operator does not consider it worth while. A quarry code, if I am correct, Doctor, will correct those evils, to some extent, at least.

DR. LANSBURGH: It should if it is enforced.

CHAIRMAN EVANS: The state should enforce it.

An opportunity will be extended you men at this time to ask any questions of the Doctor with reference to statements he has made in connection with the operation of the code in Pennsylvania.

VAL ROBERTSON (Electric and Safety Engineer, Canada Cement Co., Montreal): I was very much interested in Dr. Lansburgh's paper. We operate quite a large quarry in Montreal.

The point I am particularly interested in is the inspection of the face quarry. Also, you say the men use life lines, I presume, when they are throwing down any of the overhanging rock. How do they go about it? We have never used them. We do inspect the quarry face, but as to using life lines, we have never tried that. I would be very much interested to hear Dr. Lansburgh or someone else tell me how to go about it. As you know, it is a pretty hard thing to get the quarrymen to put on a life and a belt line.

Use of Life Lines in Pennsylvania Quarries

DR. LANSBURGH: Mr. Robertson, if you were to take a trip through Pennsylvania tomorrow through the quarries of the state, you would wonder where I got that stuff on life lines. That is, you would find but very few of them being used. A year from now you are going to find a lot more, because of course that particular feature of safety is one which is going to meet with the opposition of employees until they get used to it. At the present time our department is endeavoring to extend the use of life lines, not only out through the quarry industries but through many industries. If any of you know about the hazards of window cleaning, for instance, you know that one of the fundamental safety devices in cleaning windows above ground level is a belt to hook on to a proper device on the window, so that the man can't fall.

You may also know that it is very difficult to get the men not alone to wear the belts but to use them. You constantly read how in large cities, say, New York, where your hazard is greatest, men drop to the pavement and are killed, with their belt around their waist, which had not been hooked on.

Similarly, in bridge erections some of the largest companies, such as for instance the American Bridge Company, have for years been playing with the idea of life lines and belts. It is only recently that they have really made a dent in the minds of their workers as to the necessity thereof.

For instance, in the erection of the great Delaware River bridge spanning the river from Philadelphia to Camden, there were men who lost their lives because they dropped into the water, despite the fact that one of the regulations of the company which was erecting a portion of that bridge provided for life lines. It was not until the end of that job, really, until some men had lost their lives, that the life line really came into more or less general use in the construction of that bridge.

In quarry operations exactly the same thing is faced. It is not common practice and it has not been common practice. Quarry operators in Pennsylvania who know the desirability of experimenting with that, mostly recognize the fact that the main difficulty there is going to be in getting the worker to know that this line is not going to hamper him, and to realize that if he slips, we will say, and gets a broken rib from a broken life line (which he may very possibly do) that it is better to have a broken rib than to be dashed to pieces on the floor of the quarry below.

All of that is a process of education which we are only starting on. The quarries which have started the use of life lines in Pennsylvania (I am told by our inspectors), are mostly certain slate quarries which have some of the most hazardous conditions to deal with. Of course, it is not practicable, generally speaking, to use a life line unless a man is working for some continuous period in approximately the same place. That is, the difficulties of the line are greater than the benefits derived, possibly. I am sure that I am answering your question exactly in the way that you wanted. If I am not, I hope you will ask again more specifically. Generally, the major difficulty in the use of the life line is in the education of the worker, not in any production aspect at all. The fastening of the line at some convenient point is simple, but getting the worker to put it on is not.

Life Lines Will Prevent at Least Some Accidents

CHAIRMAN EVANS: There is a gentleman here who has had some experience directly and indirectly with quarry operation. He needs no introduction to you men. I am going to call upon him to enter this discussion. There are many things that can be brought out that will be of benefit, I am quite sure. At least, any statements he may make to you will be of interest and benefit. We will now hear from Mr. Jacobsen, of the Accident Prevention Bureau of the Portland Cement Association. He is going to start something.

H. G. JACOBSEN: I came in after Dr. Lansburgh had read most of his paper. I really don't know what he has said. However, we had Dr. Lansburgh with us last year, and I think we are on friendly terms with the Doctor.

In regard to this matter of life lines, I certainly believe that the life line could be used to considerable advantage around quarries—cement quarries as well as other quarries. Every year we have men badly injured and sometimes killed, due to slipping on the quarry face. I am sure, Dr. Lansburgh, that a life line can be used in many cases.

On the other hand, in many cases it will be difficult to use. The difficulty lies in getting the men to use it rather than getting a place to tie it to. The same thing holds true in regard to using life lines along the plant proper. Each year several men are killed, for the reason that they did not use life lines. Our great trouble is not in the quarry but in our bins. I believe that is an item which will be discussed later and so I will not talk about that now.

There is another thing that we have trouble with in our quarries, and that is our quarry cars. We have more men killed every year from operation of quarry cars than from anything else. I feel that I can positively say that over a period of years quarry cars take a bigger toll than anything else we have. While in some instances it may be due to poor construction of car, in the majority of cases it is due to carelessness and neglect and faulty operation of the cars we do have. We have men caught in coupling and uncoupling cars and in switching and from riding on the quarry trains. We had one man killed a little while ago while riding between the locomotive and the first car on the train.

We have tried to lay down a rule that no man should ride a train except on the rear end, where he is generally safe. In this case, the car jumped the track and buckled up, went into the locomotive at an angle and squeezed the man to death. We also had another man killed in the same way—being squeezed between two cars. I asked if that particular man rode on the last car of the train, and I got a letter back which said "Yes, but the train was backing up."

Accidents Come When Men Forget to Think

It is ridiculous, men, how we tie ourselves to rules and forget to think for ourselves sometimes. The rule says you have got to ride on the last car of the train. The man did. But the train was backing up. In other words, in spite of the rules we have and the rules we can make, we have got to come back to the man and rely on his intelligence—whatever he has of it.

We have other accidents in quarries, but that quarry car trouble is the greatest we have. Without question, that is very outstanding. We have very little trouble with explosives. We have, in fact, very little trouble with anything else. We have some wonderful records in our cement quarry. We know several quarries that have gone for a year or two without any accidents at all. In other words, we come to the point where our quarries in a good many instances are far safer than our plants. Although people that have not given the question much consideration invariably think that the quarries are regular slaughter houses. They are not, as far as we are concerned.

CHAIRMAN EVANS: The one main point that has been raised in connection with the statements made by the Doctor, as I gather, is with reference to the use of safety lines in and around the quarry face. Offhand, I would say from our experience that it is not altogether practicable. But in many instances they can be applied if the danger is very evident.

MR. FRAME: When the quarry code was first proposed in the state of Pennsylvania, I understand there was considerable objection raised to the regulation but through the splendid manner in which Dr. Lansburgh handled the situation, hearings were held at different parts of the state, and it was quite noticeable how the protest melted when these meetings went over the code in detail and the objections were boiled down, and

almost complete harmony was restored. I think it would be interesting if Dr. Lansburgh would tell us how he brought about that situation; in view of the proposed code, this will very soon follow in the state of Ohio and many of the quarry operators are representative of that state.

DR. LANSBURGH: In the first place, our department is charged by law with the development of such codes. Those of you who come from states that have never had any experience in it, should be sure to fight shy of legislation which incorporates specific safety provisions in the laws passed by the legislature; because you and I may sit here and discuss something this morning and say it is fine and incorporate it in a law, and during the year practice in the industry may change and you have on your hands a law which is obsolete.

We have just one law of that sort on our books and we know all about it. That is a law which prescribes the exact construction of motion picture booths, passed in 1909. You all know how the motion picture industry has changed since 1909, and anything passed then is entirely obsolete.

Laws Should Be Flexible Rather Than Rigid

There is just one saving clause, and that is a clause which says that our department shall have the right to modify any of these specific provisions in case the intent of the law can better be worked out by such modification. But the department has been trying for the last three legislatures to get the specific provisions of that law repealed and just leave that provision in it. If it hadn't been for that saving clause, the motion picture interests of the state of Pennsylvania would be in a fine jam at the present time. Exactly that thing exists every time you try to incorporate specific safety provisions in law. The thing to do is to get an enabling act and then let some proper state authority, after due public hearing, pass the regulation. That is the authority that we have to start with.

It is not written in the law that we must have public hearings, but that is our policy. It is the only sensible policy. If you are developing a code providing for safety regulations in any industry, the thing to do is to get the people most interested in it, namely, the people of that industry, to sit around and work out the code. This code was worked out by experts in our department and then taken to public hearing throughout the state.

As Mr. Frame mentioned, at the beginning there was opposition. That is an old story with us. We get opposition from every industry until the industry understands what it is all about—very properly so. I have had enough connections with industry to know that is a very healthy condition. If industry didn't want to know, they would be very likely to get anything shoved down their throats.

As soon as the quarry operators of Pennsylvania understood that this was a code based on practice, on best practice throughout the state, as

soon as the department could prove to them that it was practicable the opposition entirely vanished.

Of course, as is always the case, at each of the four or five public hearings, very valuable suggestions concerning changes in the tentative code were presented, and of course the code was modified. We haven't any perfect code yet, but our experience is going to show us what are the best provisions for that code. We know that certain provisions of the code will again have to be modified, but all we have to do is to modify them. We don't have to come before a legislature and ask them to modify it and maybe get it through in the jam the last day of the session. At any time the code is open for modification upon petition. If there is anything in the code which proves to be impracticable, we know we will get the petition. We know that in applying the code our inspectors will see what is impracticable. Thus, you have a situation where the industry and the State Department are constantly working together to see that the state safety code is not only on a practicable basis but a continual basis of best practice in the industry.

Just as soon as any reasonable man in any industry learns that that is what the situation is, any opposition against so-called government interference with business, or anything else you want to label it, vanishes into thin air, because there can be no opposition against proper safety precautions. You men who are safety men know that. It can't stand up.

CHAIRMAN EVANS: We are going to listen to what I am sure will be an interesting talk by a gentleman who is conversant with the proper use of cables. I say the "proper use" without any modification because if there is any piece of equipment in a quarry that is abused, it is the cables. I am going to call at this time upon Mr. H. L. Williams, consulting engineer of the Williamsport Wire Rope Company, Chicago.

WIRE ROPE

Howard L. Williams, Consulting Engineer, Williamsport Wire Rope Co., Chicago, Ill.

It is a great honor to be invited to give a paper before this section of the National Safety Council, and I hope it will be possible to offer something that will be of value to you, something that will create a better understanding between the wire rope users and the wire rope manufacturers, and at the same time aid you in getting better service out of your wire rope, as well as increased safety.

Wire rope is not of recent invention. Its history dates back to the past ages, but I have no desire to tax your patience by tracing this history down to the present day, because I feel sure you are more concerned about wire rope and its present use.

Wire rope is a highly specialized product, a delicate piece of mechanism, and great care should be taken to use the correct grade and construction for your purpose, and proper care should be given the rope before and while in use.

Wherever wire rope is used, human life is endangered. We can not emphasize this point too strongly.

When you purchase equipment using wire rope, it is a pretty safe rule to use the grade and construction of wire rope specified by the engineers designing the equipment, because they have given the problem careful study and wire rope manufacturers endeavor to work with the equipment manufacturers in deciding upon the best rope to use for their equipment.

Of course, if you alter the equipment after purchasing, it may be necessary to change the grade of construction, or both, of the wire rope. However, this should be done only after careful investigation and, if necessary, submitting your problem to the manufacturers of your equipment or to a wire rope engineer.

Submit Your Wire Rope to an Expert Engineer

In fact, all your wire rope problem should be submitted to an engineer, and not left to the average salesman, who will probably recommend that you use his company's sky-blue-pink strand because it is the highest priced and strongest rope they make. Perhaps it is the best rope for some purposes, but it may not be the best rope for your purpose.

Some may recommend that you use a special or freak construction, made only by his firm and given some fancy name. These furnish good talking points for salesmen and may be adapted to special purposes, but that does not necessarily prove that they will give good service on your equipment. In fact, my experience has been that none of these freak constructions stay on the market very long, and eventually their users all go back to standard constructions.

In buying wire rope you should be absolutely certain that you are getting the quality specified. It is difficult, almost impossible, for an expert to tell the grade of material used in wire rope by its appearance alone. How, then, can you expect your storekeeper or supply man to be sure he is getting the grade of rope that was specified? This is a very important factor from the safety standpoint which is being emphasized at this meeting.

In Chicago last week we had an accident report and the company said they were using steam plow rope. On investigation we found they had put on a piece of iron rope they thought was plow. Somebody picked up a piece of iron rope and thought it was plow, not knowing the difference. Of course the elevator fell. Nobody was injured but there might have been.

Most wire rope manufacturers realize the importance of this point and have taken steps to identify their highest grade rope by a painted or colored strand, but other grades of ropes are not so identified. This fact induced our company to place a distinct printed marker running through every foot of the hemp core of each separate grade of wire rope we manufacture.

The importance of this is also realized by the manufacturers of equipment. I quote from a letter by the president of Orton Crane & Shovel Company: "Our customers are entitled to know what they are receiving and in adhering to our policy of safety, we insist upon knowing the grade of cables with which we equip our cranes and shovels."

Very often an operator, in emergency, will accept anything that looks like wire rope in order to keep going and escape the expense of a shutdown. This can be avoided. Wire rope users should carry a spare rope for the same reason that auto users carry spare tires.

Care of Wire Rope After Received

After you receive your rope, be careful to protect it from the weather and from injury until you are ready to install it.

A five-eighths inch 6x19 wire rope (six strands of 19 wires each) made in one size wire construction contains 114 wires of .040 .042 inches in diameter. Some other constructions of this size contain wire much smaller in diameter.

While a five-eighths inch rope is strong and rugged, you must realize that the individual wires, being small, will not stand much abuse. The reel containing the rope should not be rolled over sharp objects. Heavy or sharp objects should not be thrown on top of reels or coils. Trucks or cars should not be allowed to run over rope. Acid should not be allowed to come in contact with wire rope. If the rope is not to be installed at once, it should be thoroughly lubricated to prevent rust.

Installing Wire Rope

When you want to break a wire, you first kink it, which causes it to break very easily. A kink in wire rope thus has the same effect. A wire rope that has been kinked is sure to give you trouble. A large percentage of the trouble reported to wire rope manufacturers is caused by rope being kinked either before or after being put into use. A wire rope so damaged may give way after being in service but a short time, causing much damage and even loss of life. Very often the employee is not aware of the damage done to the rope by kinking.

When wire rope is received on reels, do not allow workmen to lay reel flat and pull or loop the rope off as you would Manila rope. The reel should be placed on a spindle or shaft and the rope taken off by revolving the reel. If the rope is in a coil, it should be uncoiled by rolling along the floor or ground. Never lay the coil flat and pull the rope from the coil.

When installing wire rope, be sure sheaves are in line and that rope is not binding or chafing against side of sheave.

Never pound wire rope with a steel hammer. The wires being small can not stand this abuse.

Be sure sheaves, drums, guides and rollers are not scored, especially when putting on a new rope. A rope in use is usually pulled down some

in size, therefore, the score worn in the sheave, drum, etc., is usually smaller than the diameter of the new rope. This will cause serious damage to a new rope.

When two moving objects come in contact there must be wear. Sheaves, guides, rollers, etc., should be made of softer material than the wire rope or the rope must sustain the wear. It is a question of which you would rather have sustain the wear, the sheaves, etc., or the rope.

Lubrication

This is an important factor and can not be too strongly emphasized. Proper lubrication will reduce the wear caused by rope operating over sheaves, etc.

It will also prevent rust and corrosion. Most of the oil companies have oil or grease prepared especially for wire rope lubricating and dressing. A dressing containing graphite is probably the most satisfactory. It should also contain penetrating oils so that the inner wires are lubricated, reducing internal friction and preventing rust. This is very important from a safety standpoint, as often the inner wires will fail because of rust or corrosion while the outer wires may show very little rust.

Fittings

Thimbles should be used where the rope is to be looped or where in attaching it is necessary to make a short bend. Unless a thimble is used, wires in the rope are likely to be damaged, causing rope to give away.

In attaching clips, be sure that the working end of the rope is placed in the base of the clip, while the U-bolt will bear against the loose or dead end. This will prevent crushing the rope bearing the load and breaking many of the wires. No matter how many clips are used they should all be put on in this manner.

When putting on sockets, etc., be sure not to allow any strands of the rope to become slack. One or more slack strands will throw the burden on the other strands, reducing the strength of the rope.

In conclusion, let us consider some of the causes for the failure of wire rope in service, in addition to the ones we have mentioned, and consider means of preventing these sudden failures.

We have mentioned—

Specifying wrong grade, size, construction, etc.;

Not getting grade specified;

Abuse of rope before and after installing;

Bad sheaves, drums, guides, rollers, etc.;

No lubrication, or wrong kind of lubricant;

Improper adjustment of fittings.

It is rather easy to watch the natural wear of wire rope in service. It is the sudden giving away that causes damage and is so important from a safety standpoint.

Crushing rope by allowing it to pile up on drum, or by getting caught

between sheave and frame of machine, or caught in some other manner, is one of the causes for sudden failure of ropes.

Jerking wire rope or overloading it will strain it beyond its elastic limit and after being so abused, it is likely to give away at any time, even with a small load.

We believe that all manufacturers, like ourselves, are doing everything possible to put out the best wire rope that can be manufactured, and if the users of wire rope will do their part in watching the points mentioned, a great many delays and accidents can be avoided.

CHAIRMAN EVANS: I am sure we feel indebted to you for your talk on cables. I believe the rest appreciate the fact that you are rather a modest gentleman because you have not given us a sales talk as applied to your company, but have given us some very valuable information as to how to use and treat wire cables.

General Round Table Discussion

The portion of our program that we are about to enter now, to my mind, will be the most instructive to you men here. Just how instructive it will be will depend largely upon how earnestly and enthusiastically you may take part in the discussion. This is going to be an informal discussion of problems which do confront the quarry operators and must necessarily confront the cement operators who are quarrying stone.

It is designated as a round table discussion. As the word implies, "discussion" means that if it is going to be productive of benefit to us, there must necessarily be a general discussion. The first subject which we will consider is that of how to protect workmen with regard to storage bins. Mr. Jacobsen a few moments ago, you will remember, attempted to enter in, or had a notion to enter this discussion. I am quite sure that he is rather familiar with some of the problems confronting quarry operators in dislodging stone in storage without unnecessarily endangering the life of the individual who may be in the bin at the time that the held-up storage gives way.

You will pardon me for stating an actual experience that occurred at the plant with which I am connected. We have, or did have, rather a large storage bin for screenings. A man who had been in our employ but a very short time was sent up into the screening bin to dislodge some screenings because of the moisture of the stone they had hung up and refused to come out through the bin gate. This fellow, without giving any thought to his personal safety, jumped in on top of what appeared to be a binful of screenings. Considerable of the screening had been taken out from the bottom. A crust, as it were, appeared on the top. His landing on the top dislodged quite a percentage of the screenings. In other words, he broke through and the screenings completely covered him. If the bin gate had not been open at the time he would have been killed. As it was, he passed through the bin gate with the screenings and we were able to revive him, but he was nearly suffocated.

The thought with reference to a safety line would apply in that instance. Had that individual been supplied with a life belt and to that belt attached a cable or rope, the danger would have been eliminated to a great extent.

I mention that as an actual occurrence and to suggest a line of thought which might be engaged in in this discussion. We should be glad to hear from anyone at this time. In view of the fact that Mr. Jacobsen had an inclination to speak of storage bins, I am going to ask him to open the discussion.

MR. JACOBSEN: I don't think there is a cement man in here—and I notice a few—who hasn't had experience with his bins, one way or another. The same thing takes place in the quarry industry. The reason I started to speak about that to begin with was that that is the most outstanding trouble we have had in the cement industry. The bin question has been the most troublesome. We have had more men killed in bins than in any other way over a period of years. To my notion it is entirely unnecessary to have a man lose his life in any kind of a storage bin, provided a few precautions are taken. It seems to me that the great trouble comes from the fact that men do not realize the danger in connection with such a simple thing as a binful of pulverized or finely crushed material. It looks so innocent that a new man on the job doesn't realize the danger.

If a man were compelled to use a life line on that kind of a job and always have a man stationed outside to watch that he conducts his work in a proper manner, to see that the life line is attached in the proper manner, I am sure that we could eliminate every one of those accidents. We do have plenty of things happen in regard to life lines. I won't mention this instance because there is a man here to help you out, Mr. Evans, who had a peculiar case some years ago. I will point him out to you.

A Fatal Accident While the Watcher Was Absent

We had another man killed a year or two ago in a bin. I will describe the case for you. There was a man in the bin. He had a life line tied to him, and he had a man watching outside. The chain sometimes gets interlocked. In that event we get trouble. That man standing outside is supposed to watch the fellow in the bin. He got thirsty and went out to get a drink. When he returned a second or two after, the accident had occurred. The fellow was covered up and was killed. That fellow forgot that he was stationed there to watch that fellow in the bin, and he was supposed to be there every second as long as that other fellow was in the bin.

We had exactly the same instance a short time after. The fellow in the bin asked the fellow outside to get him a plank to stand on. The fellow turned around for a second or two to get the plank, and when he came back the other fellow was gone.

I could point out numerous similar cases. I just mention these to

show you the little things that cause the trouble. The men have their life line, but you see how little it takes, even using the proper, prescribed methods, to get into trouble if you don't do it right.

In my opinion, we come back to the same question. It is a question of educating the men. Every man on the job ought to think for himself. Use the rope, but the important thing is to use his head. We can't get away from that. In my opinion, there is no reason in the world why any man should be allowed to go into any kind of storage bin without using a life line. It should be absolutely prohibitive, and there should be a man stationed outside to watch that fellow while he is in the bin, and the man should realize that he is there to watch him—not to take a rest. It is a safety measure which is just as important as no smoking around dynamite. We have had far more men killed in bins than from dynamite or anything else in the cement industry. I am sure that out of all the cement men there isn't a one who hasn't had one or two cases of bin trouble. If there are any men here who are so modest they don't want to get up, we will simply have to put a stick of dynamite under them and get them up.

CHAIRMAN EVANS: If you need any dynamite, we will call on McLaughlin.

One Man Was Supposed to Look After Six Others

You prefaced your remarks by stating there was a gentleman in the room you would point out to me. I should like to have you do so at this time. My idea is that he might have something to contribute.

MR. ROBERTSON: Mr. Chairman, the accident that Mr. Jacobsen was reciting happened at our plant some three years ago, I believe. We have six bins where we store our crushed stone. Owing to climatic conditions—we are up rather far north—we have a lot of trouble with the stone freezing in these bins. At times, especially at night, we had to put men in to feed the stone so it dries. In this case we had the six men and we had belts and safety ropes attached. Also, we found a place to attach the end of the rope, but we only supplied one man to look after six men working in the bin.

That was our mistake. He couldn't watch the six men. In this case the man who was killed had actually called for a little more rope. His movements were restricted and he asked for some more rope and they allowed him to have the extra amount. Then a slide came. He went down into the center of the discharge chute. When he called for help, three or four men started to pull him out. Then another fall came and broke the rope. When they got the man out he was dead.

There is only one thing I have against the safety lines and belts. That is, when you put a safety line or belt on a man you in a way give him a false sense of security. He seems to think as long as he has the rope attached he is perfectly safe. We are now of the opinion the safety belt is necessary, but that it is absolutely essential to have another man hold-

ing on to the end of the rope in such manner that he can't slip away from it, and to always keep the line taut.

As you know, the great difficulty is to get men to wear these safety belts. And we continually experience the trouble. We have to clean off our corrugated iron roofs. It is the hardest job in the world to get the men to put on the belts, and it is still harder for one man to tell another to hold the line. He thinks it is absurd to have four men working and four men standing by. I am convinced that is the only safe way of handling the situation. It really means two men to the line: one on one end, and one on the other.

M. H. HUNTER (U. S. Gypsum Co.): I should like to bring out a line of thought. There is a question in connection with safety belts and life lines. Just what has been the experience on temporary jobs, in the case of a man going down in the bin for only a minute or so? I wonder if that is not the time, really, when accidents happen. It takes only a few minutes to get down the bin, and they fail to use a rope in such cases.

My experience in connection with using safety locks on the switch is that they don't use the lock, excusing themselves on the ground, "It only takes a little while." Then something is liable to happen. I should like to have that question answered if any of the gentlemen here have had experience along that line—in which an accident occurred because the use of a rope and line was dispensed with on account of going into a bin for only a few minutes.

Generally About Ten or Eleven Men Killed Each Year

CHAIRMAN EVANS: I think you are right in what you say, because in a crushed stone operation the screening bin is probably the only bin that will hang up. That doesn't happen very frequently. It does during wet weather because the moisture in the screenings causes it to become almost as firm as cement. For that reason it holds up. As has been stated, in the extreme northern sections where freezing weather starts early, it freezes occasionally. I think that happens very seldom in stone producing plants, with the result that has been mentioned. It takes just a moment and it is necessary for a man to go down into the bins so very seldom that safety appliances are not used in connection with the employee. That is merely stating my observation. You all have had some experience, and in order to have a general discussion I should like you to relate what has happened in your particular case. It seems to be rather an important subject for us to consider.

MR. JACOBSEN: I merely want to say that the men may not realize how serious it has been with us, but we have each year generally about nine, 10 or 11 men killed in bins in the cement industry. That is how serious the situation is. It is not a question of once in a while, every two or three years, but at the rate of eight, nine, 10, or more men killed each year. That has been the biggest item we have had on our list for years.

W. A. WOODRUFF (Lehigh, Iola, Kans.): We have had considerable trouble with bins at Iola, Kansas. We have lost five men in our shale bins. It was all preventable, as far as that is concerned, we all realize that. But it shows how dangerous the bins are. We have had the same experience with the bin freezing on top and men being caught in that way. We have used the life lines. They gave us some satisfaction, and of course they are a big help, but they don't save all the men.

We generally put two men in the bin, one to watch and one to take out the material. We also went to the bottom of the bin, and constructed a concrete roof in there with a place underneath where the men were at work, so that they and the material sent through the chutes would be protected by a strong concrete roof. That is the way we overcame the trouble in our bins.

The Foreman Carries the Key to the Locked Bins

MR. HUNTER: I brought up a question a little while ago in the spirit of help. Just to give you an idea of how important we consider the matter of the safety of a man in bins, our vice-president, Mr. Knott, issued strict orders that bin doors be locked and the key kept by the foreman whenever necessity arose for a man to go down in the bins. The foreman goes up with the men and sees that the proper safety belts are used. If the time for going to the bin is short, in that case the foreman stays there until the man comes out, locks the door again and keeps the key.

But if it is necessary for the man to be in a bin for an extended period of time, in that case he stations a man with strict orders not to leave that bin door until the men are out of the bin, and then to lock the door and bring the key to him. That is why my experience in the past on the safety line has been that a man can get injured on temporary jobs—something out of alignment. That is why I brought up that question.

J. W. HAWK (France Stone Co., Toledo): What is the use of going into a bin where you have to use safety lines?

CHAIRMAN EVANS: I am stating from personal experience that by the use of a long pole all the material isn't dislodged by punching up through the bin gate.

MR. HAWK: Can't an agitator be put in those bins to agitate that stone without having to go into the bin and punch it down?

CHAIRMAN EVANS: I think that would be a rather complicated arrangement. I don't know just what thought you have in mind with reference to an agitator, but as far as the stone quarry end of it is concerned, it applies almost entirely to screenings.

MR. HAWK: We killed three or four men about eight or 10 years ago, but I don't think we have killed any since, and I haven't heard of any being killed. We don't send anybody into the bins. We use agitators altogether.

CHAIRMAN EVANS: I think it would be of interest to everyone if you would tell us more about the method.

MR. HAWK: Agitators can be made from the material that almost any plant has got around the quarry.

CHAIRMAN EVANS: I think it might be interesting to some of us at least to get some idea from you as to just what sort of construction this agitator is.

MR. HAWK: In making an agitator to use above the bins, you can use material you have around the place. They can be made from steam shovels, steam or hoist chains, or anything like that. The crank from an old steam engine could be used for making this equipment. This may be used with friction for running it, and it should not be run over 20 or 25 revolutions per minute. You would be surprised at the results. You can take the screenings out there in less time than 10 men can take it out.

CHAIRMAN EVANS: That is located centrally?

MR. HAWK: Right over the gate.

CHAIRMAN EVANS: I think that might apply to most of us who have had trouble in connection with the material holding up. Is there further discussion?

Too Long a Life Line Has Caused a Fatal Accident

C. H. DENMAN (Alpha, Bellevue, Mich.): Our bin trouble has been with the raw material. We have lost men before we had the belts, and we have lost them since. The trouble with the belt was they had too much line. We had a man up above, but the line was fast. Mr. Robertson's idea is the only one I can see that will overcome that difficulty. As soon as a man starts to slide, if he gets under the material, no one man or two or three men can pull him out. The great thing is to have a man out there to catch him before he gets under. Since we have done away with both line and men getting in, we have lost no lives. We have hoppered bottom bins that will draw out to a certain extent. We have let this material hopper in there until it will draw out freely. Now we use a long tube or a pipe with a valve on it and air. Since that, we get all the material out that is absolutely necessary, nobody is in the bin, and we haven't lost any lives.

MR. ROBERTSON: You will excuse me for still talking on the safety belt. I should like some gentleman to tell me what he actually means by that safety belt, and also which is the best type of harness to use to attach to your man? I think you will agree that simply attaching a belt around the waist is practically useless after a man has got into a chute, because you can't pull him. He is suspended and you can't do anything with him. I wonder if somebody could tell me what kind of harness he uses?

W. F. WEIDNER (Quarry Superintendent, Lehigh, Mitchell, Ind.): I have had charge of the quarries. We have a bin proposition, too. In fact, we use the life line. We also use it in our crushers. Fortunately, I have never lost a man, and I have been with the company about 21 years, in that respect. Whether it is because of the way we have han-

dled the situation, I don't know. We crush our stone with a mill. From two and one-half inches it goes down to dust. We put everything in the same bin. But I saw the danger in the arrangement we had a good many years ago. We take some gas pipes, three-quarter inch in size on account of the weight. We put a sharp tool on the end of each in the shape of a chisel. They are about 12 feet long. Then we build a platform on top of the bend, and I use short safety ropes so if a man does fall, he can't fall where he gets covered up.

Another thing, I never allow my bin pullers to pull stone while we are cutting down stone. I never allow the shutter open while we are doing that. After they cut the stone down, we allow them to open the shutter to fill the cars. But you don't lose any time anyway. It is just as easy to fill them afterwards as it is to have the shutter standing open empty. I have never had a man fall. The theory is to have a short rope directly over him. I have never liked the idea of having a rope coming out on an angle, because the slide of the stone may sweep him sideways. That is the method I have always used, and I use the same method around our big crusher. We absolutely allow no slack in the line—none whatever. When he hasn't enough room to work, the man himself has to give that slack. I use my rope double. It goes up through the big I-bolt. We use no belt; we use the rope instead.

We have a big steel rope in the ring, and the man can fit this to suit his own body. We find the rope to be better than the belt. We can fit the rope, double rope, and snap it on. That rope can be lengthened all the way from six to 10 feet, but with instructions that at all times he must not have any slack in the rope.

CHAIRMAN EVANS: I think that is a very good thought. I am sure that many of us have made a mental note of it.

A Life Belt Over the Crusher Mouth Means Safety

A. C. HEWITT (Engineer, American Lime & Stone Co., Bellefonte, Pa.): Answering Mr. Hunter who asked about the type of safety belts: at one of our plants where we have large-jaw crushers and it is occasionally necessary to get along the top of the crusher while it is running, our superintendent at that plant has devised a safety or life belt which the man gets into like he would get into a coat. In other words, it has a loop which fits around each shoulder and a strap down the back and a belt around the waist, so that the only attachment he has to make is to attach the belt at the top, between the shoulders, and at the ring to which the rope is attached. In that way, if a man falls he always is caught in an upright position, so he is not in any way hurt.

MR. JACOBSEN: Just one more thing—pardon me for interrupting. But along the line of the bin question, after a man does get caught in a line, it is sometimes very difficult to get him out. We have had several experiences in that respect. Some of the inventive minds in the cement industry have adopted the idea of having a barrel right near the bin

so that when they do get a man uncovered, just the head, they put a barrel over him so that if another slide does take place, the man is saved. They can keep on working and take time about it and save the man's life.

CHAIRMAN EVANS: That is a good suggestion. I don't know how this discussion has appealed to you men, but I am impressed with the statement made by Mr. Hawk with reference to a mechanical agitator. If something of that kind could be constructed in every bin where material stored is liable to be held up, it eliminates absolutely any necessity of having a man in or near the bin. In that case there would be no danger of a man becoming suffocated or carried down with the material in the bottom of the bin. If something of that kind could be devised, then this talk of safety belts over bins, the procuring of a barrel to put over a man's head in order to prevent suffocation and giving him free air and many other things could be dispensed with. That is how this subject with regard to agitators appeals to me.

How Practicable Is a Life Belt or Harness?

Protecting the individual versus guarding machinery in a stone crushing plant is general in its application. What applies to guarding machinery in a stone crushing plant applies to guarding machinery in any plant or industry. I believe that each individual here has something in the way of a method that may be peculiar to those adopted in other plants. Perhaps there should be a general discussion of this matter, with particular reference to the machinery that may be guarded.

In the cement industry, as I take it, you have stone crushers because you have mentioned life belts at the feeding stone crushers. You have your bins the same as we do in the stone crushing plants; and there isn't any of us but what can improve upon our safety methods with reference to guarding machinery or properly instructing the individuals who may be in and around that machinery.

As I say, this can be general in its application. But I believe before we can enter into a discussion or invite a discussion, it will be necessary for someone to be somewhat specific in mentioning crushers. That has been dealt with to some extent, but in my mind it is not entirely clear just how practicable a life belt or a harness and rope could possibly apply with absolute safety in so far as feeding a crusher is concerned. The safety would be practically assured if you had someone at your crusher standing over the men to see that they put on the harness.

I am going to ask you a question: have you had men feeding the crushers who would, upon your approach to the crusher mouth, immediately put on the harness?

MR. WEIDNER: We have been fortunate with the crushermen. I have a man feeding the crusher who has done it for years. I have had but three different men in the 20 years I have worked with them. We have a fellow who tends to the motor. I make this man responsible, to begin with, for all our safety rules. Perhaps we handle our safety committee

a little bit differently than some others. I have a safety committee in every department at all times. I have changed that committee. We have different men, but yet we have someone in every department. The motor tender is supposed to see that the safety man is following our safety rules.

I want to be frank with the speaker. We don't have any trouble with our safety rules. I have never caught a man refusing to obey any of our rules concerning a crusher. We don't work so very many men in our crusher, and I always try to make it a practice to have a man down to understand what we want. If he feels he is afraid of the job, we are afraid of him, and we give him some other job. In other words, we don't put him on the work. That is one of the rules I have made in our safety game. Sometimes I find a man who will make a good steam shovel man but who is not worth a dime on the dynamite works. Sometimes a good dynamite man is not worth a dime in the crusher building.

I didn't want to discuss that, but I have found that the best experience I have had was a great deal along the line of letting the man who is capable of doing what you want him to do be on the job.

CHAIRMAN EVANS: I recall an experience that an Ohio operator had in connection with the crushers. This happened a couple of years ago. The man who fed the crusher during a lull in the stone coming up the incline sat on the spider of the crusher and fell asleep. He didn't put on the safety belt with the harness. He fell into the crusher and was killed. Of course, that is the human element. If you knew that man was in the habit of falling asleep and saw him sitting on the spider of the crusher, you, of course, would have told him just what the result might be, and consequently through educating that man you could correct that fault.

How an Accident Happened at the Stone Crusher

DON C. SOUDER (France Stone Company, Toledo): I should like to know if any of the boys here have had any one killed in a crusher. There has been a lot of talk about crushers. Can you tell me if anyone has been killed in a crusher, and what was the cause of that accident?

MR. WEIDNER: I might answer that question. I don't know the year, but it was something like 22 years ago that this happened. Perhaps Mr. Jacobsen will remember the incident. Lehigh had a man killed at the plant I am working at just before I came there. But they didn't have as large a crusher. They had what they called a No. 9 Allis-Chalmers. I suppose different quarries have different ways of discharging their stone into the crushers. That has a lot to do with the men working around the crushers. In our particular case, we are not using size-up cars but dump steel cars with an end door on them; which every quarryman knows is not a desirable piece of equipment, especially using the 91 shovel and trying to put out from 6,000 to 8,000 pounds to the shovel. Anyhow, that is the equipment we have at the present time in the car. That is what we are using. That is what they were using at that time but on a smaller scale.

This fellow was the crusher attendant. As you all are aware, they were not practicing safety rules at the time; that is, there were no such things. Every man practiced his own safety rules as well as he could. This man's particular job was feeding the crusher. Every so often there would be a car on which the latches wouldn't trip. He would latch the cars in case they didn't latch when they pulled up.

In this case, the fellow unlatched the car, and a rock being thrown out of the car struck him about the shoulder and threw him head first into the crusher, where he was killed.

About the belt: I merely want to say we have been using a belt, but there is more danger in getting dumped into the crusher than there is in a man ever falling into a crusher. If you had side dump cars and you are pulling on the level of your crusher that would be a different proposition. Our stone falls about 12 or 14 feet out of an end car. To head off that safely for the crusher tender, he has a signal that the hoist men are absolutely under control of at all times.

To make it still more safe, after he blows his signals for a stop, he will not make any move until he sees that the hoist has stopped. Of course, we have to depend to a certain extent on our hoist men, with whom we have so far been fortunate. As I said before, we are particular about the length of the rope we have—never to allow any slack when he has to do boring or anything of that sort. Many times a man has slipped with a rock and fallen down, and because there was no slack in the rope, it was simply a matter of getting up again.

Various Opinions About Guarding the Crusher

CHAIRMAN EVANS: Indirectly answering Mr. Souder's query with reference to crusher feeding, my knowledge and observations are that the crusher is the only piece of machinery in a stone crushing plant that you can not guard. Your gears on the machinery, your elevators, your stairways, your runways, can and should be guarded so as to protect the employee. The open mouth of the crusher, where you dump in the stone, is the only piece of machinery that can not be guarded by screens or otherwise. Consequently, we are discussing the crusher proposition, taking it for granted that if a code is in effect in any state that the employer lives up to the rules and regulations for properly guarding gears and other machinery.

MR. SOUDER: Yes, but I still want to know if you know of any crusher feeder that was killed in a crusher while he was feeding it, not while dumping the car. We have always discussed at meetings the subject of men getting killed in the crusher, but what we want to know is what crusher feeders have been killed? Nobody seems to be able to tell us about a crusher feeder having been killed in a gyratory crusher.

MR. WOODRUFF: I don't want to take up your time and keep you from your dinner, but I do want to enlighten the gentleman. That thing actually has occurred. We had a case of that very kind at Iola, Kansas. The crusher feeder slipped. The material was being dumped at that time on

a kind of slanting platform. It is his business to rake it down into the crusher. The crusher feeder platform was tolerably well empty, a little in each corner. The man stepped on the slanting platform to rake what was in the corner down to the crusher when he slipped and went through the crusher. It was the worst mutilated body I have ever seen. It made a safety man out of me as far as keeping life belts on the men is concerned.

MR. SOUDER: But that was not a gyratory crusher.

MR. HUNTER: Mr. Chairman, when Mr. Weidner was talking for the first time on this crusher problem, I was utterly amazed at his practical presentation of the subject. I believe he hit at the heart of the problem. I would have bet a million if I had it against a dollar that he was a foreman. I asked him a little while ago and found out that was what he was. He is a foreman. Without getting personal, I wish you would pay him a compliment for his presentation, because I firmly believe that that is your big problem in accident prevention work: the practical application of organized safety on the job.

CHAIRMAN EVANS: We all join with you in that feeling.

A Safety Screen Has Been Placed About This Crusher

ALFRED H. LEH (General Foreman, Grant Portland Cement Co., Philadelphia): I must take exception to the remark that you made about its being impossible to guard a crusher. We have in operation a trailer crusher 36x48 inches, and I will say it is practically impossible for a man to get in the crusher. The only way a man could get hurt by the crusher would be in the event that he wanted to commit suicide. This arrangement, however, is brought about by mechanical feeds. I don't know if anybody is familiar with the feeder or not. We don't dump on the crusher and in turn take the feeder to the crusher. The crusher itself is surrounded with a safety screen four feet high. The only way one could get into the crusher would be by getting over the top of the safety screen.

CHAIRMAN EVANS: What I said applied to the gyratory crusher, with possibly a mouth 38 inches and then trying to get a 40-inch stone through it. Of course, it would be impossible to guard the mouth of the crusher because you would have to get down and do something with the stone.

MR. SOUDER: Then you haven't answered my question yet.

MR. JACOBSEN: I just want to answer Mr. Souder's question point blank. He asked if anyone knew of any accident with a gyratory crusher. I know of an accident in a gyratory crusher which happened long before I came with the cement industry. I don't know of a single one during my affiliation with the industry, but I do know of one man being killed before I came with the industry.

MR. SOUDER: We had a man killed in a gyratory crusher, and he was a crusher feeder, but it happened that a fellow workman caused the accident. There was no stone being hoisted up the incline; we had side dump cars. He walked up on the platform where the cars are dumped and was

talking and visiting with fellow workmen. All at once the hoist man noticed in the quarry that the locomotive had brought another train of cars to the foot of the incline and the cable hooker hooked his car on, and the hoist man, looking out of the window watching the cable hooker, started his hoist. As the cable drew up, it hit the fellow on the legs, that is the employee who was on the platform, and threw him into the crusher. But, of course, he was really out of the course of his employment. He wasn't on the platform on the floor where the crusher is located. He was merely visiting and this cable in drawing up hit him on the legs and threw him into the crusher.

CHAIRMAN EVANS: I don't want to adopt a gyratory crusher as a plaything.

Dr. Lansburgh, you must necessarily have had some experience in your department in connection with what we have been discussing—crushers. Is there a regulation in your code that is somewhat specific as to how an operator shall guard against accidents at the mouth of the crusher or any portion of the plant?

The Crusher Is Stopped for All Emergency Work

DR. LANSBURGH: Very frankly, I can't answer your question. I have been trying to think what regulation we have on that, but I have forgotten how we finally ended up. It seems to me the answer to the crusher question is to use some device so that nobody has to get near the crusher at any time. That has been brought out here several times and that is modern practice. I think that is what everybody is getting to as fast as possible. I think, however, that I can get copies of the accident report of men who have geen killed in gyratory crushers, but I don't have them with me this morning.

MR. EALES: If we have a man who has to go into the crusher at all—that is, the gyratory crusher—we stop the crusher. With regard to the guarding of the crusher, ours is guarded with a standard rail on two sides. On the other side the cars are dumped. On the one side we have the wood for the electric cars and they dump automatically. On the other side we have a car of our own make—steam—which is dumped with a hoist. The whole car dumps it up so that no man is on the edge of the crusher at all except on the two sides where the rails are. Should a stone lodge in there and we can't displace it with a hook on a hoist, and we have to have a man put a chain around it, we stop the crusher and the man puts a life belt on and puts the chain around and then comes out of the crusher before the crusher is started up again.

CHAIRMAN EVANS: The next subject is the advantage of inspection trips to all operators on each stone out-cropping. I want to ask a question at this particular time that is pertinent to the subject that you may want to discuss, and how many men here have broadened their knowledge of safeguarding machinery in quarry operation by visiting other plants or getting in touch with their competitor, as it were, and each checking

up on the other? I should like to see the hands raised if there are any here.

There was a show of three hands.

CHAIRMAN EVANS: I think that is one of the fundamental phases of safety in quarry operation, in a word, cooperation. You know, when stonemen are not cooperating to the fullest extent, we are not going to go ahead as an industry. We should feel absolutely free to visit the plant of our competitor and he to visit ours. The reason this subject has been mentioned is perhaps because of a thought that was presented by an individual in the stone crushing industry in New York. This individual told me that he has several competitors—as all stone producers have—and while they fight like thunder in securing business, when it comes to the question of safety in the operation of their plant, he and his competitors are a unit.

Twice each year safety men from each plant are assigned to join a group that make a practice of visiting every plant in that locality, and each evening they check up and exchange ideas. In exchanging ideas they are finding fault with each other. In other words, you may enter my plant and see things that have been missed by our safety engineer. Perhaps something that is absolutely wrong has been missed by the safety engineer, and hence is corrected. He sees it each day and it does not impress him as a rather dangerous situation. But when you point it out, he realizes the danger, with the result that a correction is made there.

Advantages of Visiting Other Cement and Quarry Plants

If you desire to enter into a discussion, I think it should bring out the fact that in cooperating in the interests of safety we can no better serve our employee than to visit plants and check up on each other. The few hands that were raised in response to my question would indicate that it is not a general practice to visit the plants of your competitors. I do. I haven't been thrown out yet. The result is that our plant is protected to the extent that in the plant we have not had an accident this year. It is protected because we have secured ideas from our competitors that we have applied in safeguarding our machinery and in protecting the employee. There is where our knowledge has been obtained.

Gentlemen, the meeting is open for a discussion. Personally, I would feel that we had accomplished a great deal if we could leave this room feeling that we were sold on the idea of checking up on the other fellow. It is going to broaden our perspective. At the same time it is going to help the other fellow and he will help us.

MR. JACOBSEN: Mr. Chairman, you didn't get a representative vote on your question at all. I know you didn't because I am sure that every cement man here has visited some other plant and has attended meetings for exchange of ideas and been around to numerous places. It is merely natural modesty on the part of the cement men that caused them to keep down their hands.

I join with you, Mr. Evans, in your statement that there is nothing that wil enlighten you more than getting around and seeing something in the other fellow's plant, to talk with some other people, to get their ideas on the subject, and go home and apply it in your own affairs. It has been my experience, traveling around to all the cement plants in the country, that you are always ready to receive new suggestions with a free and open mind, say what you want, tell your purpose. Tell your purpose, and people then are generally more than pleased to see you and are willing to enter into a discussion with you about the question of accident prevention. I would like to show Mr. Evans how many cement men in here have been in our plants. Will you raise your hands?

There was a unanimous show of hands.

CHAIRMAN EVANS: I thought that a meeting of this kind would be productive of absolute confidence of one in the other. I had no ulterior motive in asking that question. The fact that I am in the crushed stone industry should not cause you cement men to hesitate in raising your hands. (*Laughter.*) I see that Mr. Jacobsen is in about the same position as Mr. Frame. He has the cement men subsidized. (*Laughter.*) Otherwise they wouldn't have elected him the second time to serve as their chairman.

Stone Quarry Operators Need a Little Educating

Is there any further discussion on this matter? It may be a common practice with you cement men, but I think that the stone quarry operators need a little educating. I think our session is going to bring about a closer cooperation. So much so that there won't be any hesitancy on the part of any one operator to visit the plant of a competitor until he is thrown out.

MR. EALES: We have five quarries in our district which are close together. I know that in all five of those quarries anyone is free to go there from the other plants with no restrictions at all. They will take you around and explain anything in any of the five quarries there.

CHAIRMAN EVANS: I want to say in all frankness that I have visited some stone crushing plants—if they could be called stone crushing plants—and it would bankrupt the owner of those plants if he were compelled to safeguard his machinery to the extent that some of the rest of us are doing. He has absolutely no idea or thought of protecting the employee, much less his pocketbook; and as a result the stone producers who are safeguarding the machinery and have some thought in mind with reference to protecting the employee are penalized because of the lack of interest on the part of the very small producer.

MR. EALES: They don't get inspectors around like Dr. Lansburgh's men.

CHAIRMAN EVANS: That is why we invite the safety code in Ohio.

Gentlemen, if there is nothing further to be brought up, I am going to call on Mr. Frame to say a few words. I know he has been very quiet, which is something very unusual for him.

MR. FRAME: Mr. Evans, I feel as if I want to compliment you and the other members of the Quarry Section on behalf of the Cement Section for the very splendid program which they have again put on today. I want to say to the cement men here that this entire program was arranged through Mr. Evans' Section, that the Cement Section had little if anything to do with it. However, we have enjoyed it all the more. Our interests are identical when it comes to the discussion of safety in quarries. We appreciate being with you gentlemen, and I again want to express the wish that we may enjoy a joint meeting with you again next year.

I might take this opportunity to invite the quarry operators to attend the first day's session of the Cement Section meeting, which is generally held a day previous to the joint meeting. While you may hear of some things or some problems in the cement industry which are not identical with your industry, I think when it comes to the discussion of the education of men, responsibility of foremen, and many other problems, you will find something of mutual benefit. We will welcome you there. I again want to express our appreciation to you for your program this morning.

CHAIRMAN EVANS: I want to say to you, Mr. Frame, and I am speaking for the quarrymen, that we deeply appreciate your expression of goodwill, and we feel, too, that the activity of your organization has in very great measure encouraged us to the activities that we have assumed in the Quarry Section.

ADJOURNMENT

JOINT LUNCHEON SESSION

Wednesday, October 27th, 1926

R. FRAME, Toastmaster

Insurance Manager, Alpha Portland Cement Company, Easton, Pa.

The joint luncheon of the Cement and Quarry Sections convened at 12:30 o'clock on the Mezzanine floor of the Book-Cadillac Hotel, Detroit, Mr. R. Frame, president of the Cement Section, presiding.

CHAIRMAN FRAME: Gentlemen, I am indebted to Mr. Evans, of the Quarry Section, for the pleasure of presiding at this delightful luncheon.

At our session this morning we were discussing the intimate problems of prevention of accidents. We talked a great deal about crushers, bins, explosions, etc. One of the most important elements of the question has been saved for this particular time. You have no doubt got a great many mental notes as to what you want to do when you get back home. The most important duty, as I see it, is for you to sell the ideas which you have gathered here today to your manager, to your foremen as you come in contact with them, and to your workmen.

I feel that this particular subject of selling safety is going to be ably handled by the gentleman who will address you in a few moments. It gives me great pleasure to introduce to the guests, to the members of the Quarry and Cement Sections, Mr. J. R. Davis, General Manager, United States Gypsum Company, Gypsum, Ohio, who will speak to you.

SAFETY, A SALES PROBLEM

J. R. Davis, Works Manager, United States Gypsum Company, Gypsum, O.

It has been generally recognized since the beginning of the safety movement that any organization must be practically sold on the idea of safety before satisfactory progress can be made in the prevention of accidents. All have undoubtedly used this very expression in one way or another, but how many of you have actually applied good sales tactics in putting safety across in your plant? It is only logical, if men must be sold on the subject, that sales methods be used, and it is just as easy to sell safety as it is to sell some article of merchandise.

One of the greatest sales weapons in the world today is modern advertising. It is a science in itself and takes on many forms, such as outdoor advertising, magazine, and newspaper advertising, form letters, etc. All of these have their value in a good safety organization. Sign boards, bulletin boards, plant papers, and circular letters should be, and are being used to advertise safety.

But are we using good advertising practice in this phase of our work? A good advertising man realizes the value of attractive sign boards and frequent changes in their makeup so that they constantly attract attention. He places them where the most people will see them and wastes little money in boards on the back roads and by-ways.

Are we applying these same principles to our Safety advertising? Our bulletin boards should be made as attractive as possible, the bulletins should be regularly changed and attractively arranged to draw the men's attention. News and other bulletins may be used on the board for the purpose of drawing the men so that they will read the safety bulletins while there. Bulletin boards and sign boards should be placed where they will be seen by the most men. Don't stick them off in corners, in out-of-the-way places, and expect men to read them. At night they should be well lighted, just as the live advertising man lights his sign boards. The same principles apply to the use of house organs, circular letters, etc. More thought should be given to the actual sales value of these mediums.

The Modern Sales Organization

I recently heard a luncheon club speaker say that modern advertising was the greatest spreader of Bolshevism in the world today. His reason is that it makes us all dissatisfied with the things we have. I do not believe in Bolshevism or desire to spread it, but if our safety advertising can make the men dissatisfied with their careless lot, we have made a big advance in getting safety across.

I know that many men will say this is not a new thought. You are following all these points at the present time and still do not receive the proper reaction from your men. Remember though that advertising is only a part of selling, and don't deceive yourself that you are really selling by doing only this. Here is where the real selling comes in.

A modern sales organization consists of a sales manager, division managers, territory supervisors, and actual salesmen. These may be backed up by special sales representatives, demonstrators and service men. All of these are already found in your own organizations, properly placed and fairly well equipped to take their part in an organization to sell safety.

In our larger plants the safety supervisor, or the safety engineer, or whatever he is called, is the sales manager for safety. It is his duty to direct the advertising and the efforts of the organization in conducting your sales campaign. Naturally, he must be properly qualified to fill the position and must be properly backed up by the management, the same as any sales manager. In a smaller plant where it is not possible to have a full time safety man, the plant manager becomes sales manager for safety, the same as most small plant managers are also sales managers for their products.

If there are various departments in the plant, the heads of these departments are the division managers for safety. They are the ones

who should know their own territories and under the proper guidance of the safety man, they should direct the work in their department. In the larger plant where there are additional men in the safety organization, some of these may act as division managers for certain parts of the plant and the department head then becomes a territory supervisor in the scheme. Other men in the safety department, such as inspectors, and so on, take their place as the demonstrators and service men for safety. They demonstrate the proper and safe way that work should be done and see that the workmen derive the greatest benefit from the safety work.

The next, and probably most important part of the organization, is the actual sales force. Who are the safety salesmen in your plant?

Your foremen. Much has been written and said regarding the foreman's place in accident prevention, but after all isn't he really the direct salesman of safety, and are not results produced directly proportional to his alibity as a salesman? No live sales manager would put a salesman on the road to sell his product unless that man knew considerable about the product and was himself actually sold on it. It is unfortunate, but true, that most of us go about our safety work blindly, scarcely realizing the value of the foremen in this work. Many times our foremen are working directly against our best interests, because they are not sold and the proper efforts have not been made by the organization to sell safety to each of them, and through them to the men in the plant.

Constant Contact Sells the Safety Idea

One thing that a sales manager follows is the number of calls made by a salesman. It has been definitely determined that the volume of sales is in almost direct proportion to the number of calls made. Many companies today have adopted automobiles for the very reason that they speed up their salesmen and increase the number of calls. Since the number of calls, or contacts, determines largely the volume of sales, who, then, in your organization is better fitted to sell safety than the foreman who is in constant contact with the men?

There are many ramifications in the modern sales organization, but after all it is personal contact which is largely responsible for most of the sales that are made. Advertising places the man in a favorable state of mind to the thing that is being sold, but it is usually the personal contact which finally closes the sale. How many automobiles would be sold as a direct result of advertising if the live auto salesmen did not follow up the prospect and close the deal? There are today several instances of great success in industry based entirely on the program of national advertising and direct personal contact through a widespread sales organization. Two of these that come to my mind are Fuller Brushes and Realsilk Hosiery; and let me say here that if these companies stopped their national advertising, or withdrew their salesmen from the field, they would soon cease to exist.

Their success is dependent on the continuation of sales work; and the success of our safety work in the end is not so much dependant on how good a sales organization we build up, but on how well they continue to use their salesmanship, for few men stay sold on anything.

No company is ever really a success, no matter how strong their sales organization, unless they have rendered a direct service to their customers and stood back of their products. In exactly the same way our efforts in selling safety will be of no avail unless we back it up with the proper spirit of service and prove to the men that we stand back of the safety movement without any reserve.

CHAIRMAN FRAME: You all enjoyed very much the splendid points brought out by Mr. Davis as to how we should take advantage of salesmanship in bringing about a deep regard for the prevention of accidents. That is all on the program today. We hope you have enjoyed the luncheon and that you all will come back next year with even more fervor.

ADJOURNMENT

Chemical Section

New Officers of the Section

CHAIRMAN: S. E. WHITING
Liberty Mutual Insurance Company, Boston, Mass.
VICE-CHAIRMAN: C. E. RICE
The Dow Chemical Company, Midland, Mich.
VICE-CHAIRMAN: E. C. ROGERS
Grasselli Chemical Company, Cleveland, Ohio.
VICE-CHAIRMAN: DR. LEONARD GREENBURG
U. S. Public Health Service, School of Medicine, Yale University, New Haven, Conn.
SECY. & STATISTICAL COMM. CHAIRMAN: C. F. WHITTEMORE
Western Electric Company, Chicago, Ill.

Committees

POSTER, H. L. MINER, Chairman
E. I. duPont de Nemours & Co., Wilmington, Del.
MEMBERSHIP: I. V. KEPNER, Chairman
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
PROGRAM: A. L. WATSON, Chairman
The Koppers Company, Pittsburgh, Pa.
NEWS-LETTER EDITOR: E. W. SPENCER, Chairman
Chemical Warfare Service, Edgewood Arsenal, Maryland.
ENGINEERING REPRESENTATIVE: L. A. DEBLOIS
National Bureau of Casualty & Surety Underwriters, New York City.
EXECUTIVE COMMITTEE (The Officers and)
M. F. GRASS
The Grasselli Chemical Company, Cleveland, Ohio.
DR. H. E. HOWE
American Chemical Society, Washington, D. C.
S. H. KERSHAW
National Safety Council, Chicago, Ill.
J. L. KISTNER
Elliott Service Company, Chicago, Ill.
DR. C. L. REESE
American Institute of Chemical Engineers, Brooklyn, N. Y.
J. S. SHAW
Hercules Powder Company, Wilmington, Del.

PROF. C. -E. A. WINSLOW
School of Medicine, Yale University, New Haven, Conn.

October 26, 1926

J. L. KISTNER, Chairman,
Elliott Service Company, Chicago, Ill.

THE Tuesday Morning Session, October 26, of the Chemical Section of the National Safety Council, was held in the Henry II Room, Statler Hotel, Detroit, Mich., and convened at 9:30 o'clock, Mr. J. L. Kistner, Elliott Service Company, Chicago, Ill., presiding, and Mr. C. E. Rice, Director of Health and Safety, The Dow Chemical Company, Midland, Mich., acting as secretary.

THE CHAIRMAN: It is a pleasure to welcome you, gentlemen, to this particular meeting. We are gathered for the purpose of obtaining certain specific information relative to our industries that will help to eliminate accidents occuring in those industries.

If any problem arises that you think we could solve or if we can be of any help to you in giving constructive ideas or criticisms relative to problems in your industry, I hope you will speak about them.

I am going first to call upon a few chairmen of the various committees. Mr. Kepner, chairman of the Membership Committee, will report.

IRA V. KEPNER (Chairman, Membership Committee): Mr. Chairman and Gentlemen: At our meeting held in Cleveland in 1925 we had 187 members . During the past year we lost 13 of those members due to the companies being absorbed by the larger parent companies or going out of business. But in their stead we obtained 25 new members. So at the present time we have 197 members or firms in the Chemical Section. We were working hard all during the year in connection with the National Safety Council in an endeavor to get new members. I wish that you boys who are interested in the Section would see if you can not interest some other chemical concerns on the outside and see if we can't bring them in. The only way we can do it is by personal contact. You can write letters and go to a lot of time and trouble but it doesn't have the same effect. Your efforts will certainly be appreciated by the Section.

THE CHAIRMAN: I will now ask Mr. Rogers, chairman of the Poster Committee, to give us a report on what work has been done in regard to getting posters for the Section.

E. C. ROGERS (Chairman, Poster Committee): Unfortunately during the past year we have not been able to get out as many posters relating specifically to Chemical problems as we have in past years, but we have secured a source which will give us a reasonable supply of posters for the coming year. I never before realized how difficult it was to make up a poster that would apply to the majority of the members of the

Section. When you stop to think of the diversity of products manufactured by the concerns we represent, you see why it is not an easy matter to get a poster that would be in general demand.

For instance, if I should make a poster covering zinc smelting, I don't presume there would be a great demand for it. It would apply to my business, but your products are so different we need your help in telling us what you want, not only from the standpoint of what the safety man likes but what would be interesting and useful to your men. When the new poster chairman is announced I think you should not only tell him what you need but also help him in gathering enough data to make up what you want. He can't do it alone, he doesn't know what your problems are. If he makes it upon his own experience he might not fit your needs. So help the new chairman by telling him what you want and by assisting him in getting the information.

THE CHAIRMAN: I would like to hear suggestions from some of the members at this time relative to obtaining posters for the Chemical Section. The National Safety Council, as we all know, has a staff of photographers who are willing to go to any plant and secure pictures that in any way will help to advertise safety in chemical plants. I am quite sure many of you fellows have conditions in your particular plants that would, if photographed and advertised, help a lot in other plants in reducing accidents. If any of you men have conditions of that kind, I'd like to hear from you.

Ideas For New Chemical Section Posters

S. E. WHITING (Assistant Chief Engineer, Liberty Mutual Insurance Company, Boston, Mass.): I suggest you call on individuals here that you know and make them get up and give you at least one suggestion on a poster so we can get the assistance. It is a difficult problem, and unless you men give us the ideas at least, we can't go through with them.

THE CHAIRMAN: I will call on Mr. Greenfield for suggestions.

C. W. GREENFIELD (DuPont-Viscoloid Co., Arlington, N. J.): I don't know as I could give you a suggestion offhand, but I am very much interested in the uses of the gas mask where there may be fumes. In fact, I have seen very few posters on that subject.

THE CHAIRMAN: I'd like to hear from Mr. Wakefield.

G. H. WAKEFIELD (DuPont-Viscoloid Company, Leominster, Mass.): On that subject, I hadn't given it any thought before I came up here and you have taken me rather by surprise. I should like to mail something in along that line rather than suggest something at the present time.

THE CHAIRMAN: Has Mr. Fellmer any suggestions?

M. L. FELLMER (Elliott Service Co., Chicago, Ill.): Out of a clear sky I can't think of anything in particular except specific eye posters, posters on the danger of neglecting eye injuries and a very good antidote, but I believe there is a poster of that kind in existence. I remember at the Monsanto Chemical Company we placed a poster which the Council got

out over every drinking fountain cautioning men that had an acid burn to use the jet of the water fountain in washing out the substance that entered the eye and we had good success.

THE CHAIRMAN: I'd like to hear from Mr. Miushull.

G. E. MIUSHULL (Safety Engineer, DuPont Rayon Company, Buffalo, N. Y.): I don't know that I have anything to suggest in the line of a poster offhand except what Mr. Fellmer just said, the immediate use of water after an eye injury or any kind of caustic or acid burn on the face or hands. Of course, they understand if they get a heavy dose they get under the shower. The average man doesn't think of the water. He looks for a neutralizer. I think if you put up a poster such as Mr. Fellmer spoke about it would be all right. We had one at the dye works, but it was not quite large enough and could be improved upon.

THE CHAIRMAN: It is a question in my mind whether we will do more good by having a general poster than we would by having a specific hazard poster pertaining to the chemical industries. I'd like to hear from Mr. Riederer in regard to that.

A Poster to Depict An Emergency Eye Wash

E. J. RIEDERER (Atlas Powder Company, Wilmington, Del.): I have not given this matter very much thought. The trouble we experience in our industry is that it is rather limited and in obtaining photographs for safety conditions we might expose a process or apparatus that is used only by one company. It would not be fair in a case of that kind to publish a poster for the simple reason that other companies would not use that kind of apparatus. We have things we have worked on for years and tried to develop guards for the individual case. In the explosive industry, it is a little difficult. However, there are hazards which are the same in all plants which I do believe can be fairly well covered by posters.

THE CHAIRMAN: I think that the way we will do the most good with posters in the chemical industry is to get subjects that apply a good deal to chemical industries in general. We all know the value of advertising safety and if we can advertise safety with a medium that applies to this particular business, I believe a lot of good could be accomplished.

I'd like to hear from Mr. Stratton in reference to that.

R. C. STRATTON (Travelers Insurance Co., Newark, N. J.): I believe the ramifications of chemical work are so varied that general bulletins will fit the case much better. Of course, that can be coupled with specific hazard photos. One in particular would be for those industries handling chromates and chromic acids regarding the peculiar type of chrome sores that come out from the handling of the material. That would be a suggestion. Along general lines, I have to concur with the other speakers and particularly the suggestion for chemical eye injuries, which are quite potent and which are working out. In a plant I know at the side of the drinking fountain they put on a separate jet for use as an emergency eye wash.

IRA V. KEPNER (Pennsylvania Salt Mfg. Co., Philadelphia, Pa.): On the back wall here are a few of the posters gotten out by the National Safety Council in the past year. I'd like to know what some of you gentlemen think of those posters. Are those the right kind? Is there any improvement we might make during the coming year? It is a problem to get out these posters and get them out regularly. Our own chemical members want a poster that applies particularly to the chemical industry. The only way we can get that is through suggestions from our members. In these samples, some have drawings, some are actual photographs. I would like to get the reaction of you gentlemen on these posters along that line. Could any of you give us any suggestions or help for the coming year? As your chairman said, the National Safety Council has a staff photographer that would be glad to go around and take pictures, providing he were permitted to do so, and where he could take a number of pictures which would pay him for his time. Are these what the membership wants, are they the kind and do they apply to our industry?

J. STERNER (Murphy Varnish Company, Newark, N. J.): We need a poster in the varnish line where benzol is used. It has a tendency to leave a skin rash which if not taken care of becomes infected, and we have quite a bit of it in our plants, sometimes with blood poisoning. A poster on this hazard in the lacquer trade would be very beneficial.

THE CHAIRMAN: I'd like to hear from Mr. Roach.

Many Posters Provided for the Chemical Trades

JOHN ROACH (New Jersey Department of Labor and Industry): I feel a great and vital interest in this subject, too, and I was surprised in looking over this list of posters available to notice how many of them have been provided apparently for the chemical trades.

I realize as most of you gentlemen do that the ramifications of the chemical industry extend into almost every industrial activity and that if we were to attempt to adopt a poster of a general character it would have to have such composite features as perhaps would render it unintelligible to the average workingman.

It seems to me this subject of developing a poster service for the chemical industry is something that might very well be committed to an intelligent committee that represents in some measure several of the more important branches of the chemical industries employing the larger number of people.

In some of the chemical plants a poster that would draw the attention to eyes affected from acid splashes would have no practical value whatever. On the other hand, there are industries where the danger to health or life is not from acid splashes but probably from vapors or contact with toxic substances. Then again you have the branches of the chemical industry where the material is corrosive and dangerous to handle, causing severe and painful burns, such as the chromates and the caustics. Posters along that line might very well help out the danger

of chrome burns and the extreme risk that is run when men handle the caustic materials without protective gloves and masks.

And then you get into this question of the risk from the substance and the vapors. It would probably take one with some highly developed dramatic instinct that would build up a poster that would have real practical value; but if it were done it seems to me it might more properly result from committee conference where all the facts might be given proper consideration. I know that that kind of poster service, whether in the form of a warning paragraph painted on a poster or by an allegorical picture, has a distinct value.

While you were discussing eye splashes an instance came back to my mind that occurred in one of our New Jersey industries where the workmen were handling nitric acid. Some two weeks before the incident a First Aid department had been organized in the plant and great stress had been laid on the value of instant treatment to save the eye. One of these workmen got some of this liquid splashed in the eye. A First Aid man chanced to be in the vicinity and he grabbed the injured man, put his head under a spigot and washed that eye out and saved the sight, although, of course, the man did suffer a painful burn. Now that kind of service has a very great value. It didn't prevent the accident but it prevented the loss of the eye.

Most Accidents in Chemical Industry Are Common Ones

MR. ROGERS: I have never seen figures in regard to chemical accidents throughout the country to verify this statement, but I will venture to say 85 per cent of the accidents in the chemical industry could occur any place and I don't believe over 15 per cent are due to the fact that we are in the chemical business. For that reason I am wondering whether our posters should not be broadened out to cover general matters as well as purely chemical matters. I also think that if the men would watch for unsafe practices and build posters on what they find, they would do as much good as anything else.

For instance, the other day I saw a man about to start to repair an acid line that had sagged. He was going to level it up. He never took the trouble to turn off the line. There was a good chance to break the line and perhaps be burned. That kind of thing causes accidents. We don't get the accidents, as a rule, in the dangerous places. We get them through someone doing some fool trick like the one I just cited, and I think if everybody would report such incidents we could build posters from them that would do a whole lot of good.

MR. STRATTON: I want to revert back to the value of photographs or drawn pictures. To take the question out of the chemical industry and put it into a general one, our experience proved to us that a photograph has a far greater value from an educational standpoint than a drawn picture or slogan. I don't know why that should be any different in chemical work. The pictorial presentation of a thought to the average workingman has more educational value than words which perhaps are

unintelligible to him. You appreciate that when you realize the average intelligence in any plant is that of a fourteen-year-old boy and the average workman can't read high flown English. This is why it has worked out that the photograph has the greater value.

It was stated a few minutes ago that photographs might disclose secret processes but it is easy to restrict a photograph to the safety features and block out the rest. The objection should not enter into the problem at all.

C. B. DICKEY (Corono Chemical Division, Pittsburgh Plate Glass Co., Milwaukee, Wis.): I think Mr. Rogers' suggestion the most practical one I have heard and I think most hazards are matters of ordinary care. It is always some little fool thing some man does that causes the accident.

MR. MITCHELL: In regard to the poster exhibit, take the two posters, the grave yard and the old bed at home; I'd like to get the opinion of some of the men here whether that kind of poster is popular or not. Personally, I don't care for it; I'd rather have the poster that was like the one with the acid spigot or something like that. I think general posters of that nature are over-done.

Good Posters May Be Used Again and Again

MR. FELLMER: It just occurs to me that once in a while in taking exceptions to posters of a general nature we overlook somewhat the psychology of the thing. No matter how familiar we are, no matter how stale these things appear to us who see them every day or week, we must not forget that to the fellow who sees them for the first time they are of a different value. Very many of us formed a habit of using a poster for a while and then throwing it away. Personally, I never have had that happen. I always post my posters in such a manner that they can be used again and then file them under proper classifications. I think that impression may be a subconscious one but I think it crops out in the remark the gentleman just preceding me made.

T. F. WETTSTEIN (United Lead Co., Keokuk, Iowa): I would suggest that you take a census of accidents and of those causes that are causing the most accidents. and try to act them out in the place where they happen, and then take photographs.

THE CHAIRMAN: That is a very good suggestion, Mr. Wettstein.

Has anyone any further suggestions? If not, we will consider the discussion closed.

I would like to hear from Mr. Whiting, his report for the Industrial Poisons Committee.

S. E. WHITING: The Industrial Poisons Committee is not a research committee, if I may repeat what was said last year, merely a compilation committee. The real research work is done by the committees such as the Benzol Committee and the new one on Spray Coating methods. It may be worth while to emphasize that we put in convenient form the

best information we can gather on commonly used poisons. For example, take the data sheet on Nitrous Fumes. If the DuPont Company has had a generation of experience with nitrous fumes and has developed a certain technique in the matter, it does not follow as a matter of course that everyone knows what that technique is. So we put it here on a one page sheet, and, if you have nitrous fume exposure, I feel it is your duty to get copies of this data sheet at one cent each and post them in your plant, and give it to your doctor as well, so that he will know the situation, because we go into the medical treatment as well as the plant conditions and also the individual workman's part of the problem of avoiding fume poisoning.

Six Bulletins Issued on Industrial Poisons

We have now issued six bulletins; one on carbon monoxide, one on hydrogen sulphide, one on chromium. A speaker just mentioned the danger of chrome sores; we feel we have put into the Chrome Bulletin some very definite and practical ideas on handling chrome sores. The fourth of our data sheets was on Nitrous Fumes, already mentioned. Next comes Benzol. Take the Benzol situation—many of you have seen the final report of the Benzol Committee, a fine research job, but don't expect very many factory men to read that whole report. I don't know how many pages it has and I don't think all users of benzol will read it, but this Benzol data sheet contains the gist of that research which cost thousands of dollars and much labor by experts. Of course, we had the O. K. of the Benzol Committee before issuing the data sheet.

Now, this fall we have had the impertinence to issue a data sheet on Lead; it is printed in the November issue of NATIONAL SAFETY NEWS. The exposure to lead is very broad. I think there are very few industries that don't have it more or less. It is causing disability. I think it is up to everyone that has that exposure to utilize this Lead data sheet and I don't care particularly whether it is absolutely the last word or not, looking at it as a layman. No doubt many doctors will disagree with our conclusions, the advice on treatment, etc. But we did take this precaution: we got the most up-to-date information on lead research that we could find. The sheet was checked by a department in Harvard University Medical School that has been spending at least $10,000 on the investigation of lead poisoning.

My only criticism on this work of the Industrial Poisons Committee is that after we finish the individual data sheets they are not being utilized as fully as they might be in minimizing these hazards from common poisons.

THE CHAIRMAN: Our first speaker on the program this morning is Dr. Ethelbert Stewart, Commissioner of Labor Statistics, Washington, D. C. You no doubt are acquainted with Dr. Stewart and some of his work. I will call on Dr. Stewart to address us.

NEED OF A MORE DEFINITE BACKGROUND FOR STATISTICS IN THE CHEMICAL INDUSTRY

Ethelbert Stewart, United States Commissioner of Labor Statistics

In 1860 the average span of the life of man in the United States was 38 years. In 1925 it was 57 years.

Most of this has come from the result of our attacks upon the causes of infant mortality. We have been saving the babies. Today the baby death rate on the east side of New York is less than it is on New York state farms, or on the farms of the middle west, where we have centered our fight in the cities. In the two decades from 1900 to 1920 we decreased the death rate of children from five to nine years by 48 per cent, from 10 to 14 years by 42 per cent, from 15 to 19 by 12 per cent.

In all of the earlier years of life our death rate has decreased, for we have waged a war on tuberculosis that has practically wiped it from the earth. Epidemics of cholera, yellow fever, in fact any epidemic that spreads over a very wide area, have become things of the past. In each case these gains have been the result of determined, well organized intelligent fights against the underlying causes of diseases.

With the introduction and radical development of high speed machinery the revolution in type and method of building construction, and with the advent of the automobile, we are faced with a new source of death rate, a new method of shortening the average span of life. We are killing our population now by accidents; I will not say instead of diseases, but in addition to diseases, and we are not organizing on any plane or scope at all commensurate with the necessities of the case an adequate attack upon this menace. There has been some remarkably good sharpshooting. What we need now is the choice of a battleground and a line of battle which will warrant us in saying as Grant did that "We will fight it out on this line."

In fact, the worst disease that we have today may be described as a placid indifference to the hazardous occupations. We are "going after" the few remaining serious ailments. We are "going after" cancer, though admittedly we are still a long way "after"; however, with much greater hope, for once we get it we have got it. We are "going after" diabetes, and there isn't much doubt that within the next twenty years it will be as thoroughly controlled as tuberculosis is today, although it is not susceptible to the same social attacks.

A very few of us when compared with the whole number are "going after" our death rate from accidents. We are able to work up a great deal of enthusiasm among our own crowd, but the crowd is small. The only thing we can say to cheer us on is that it is growing.

I have estimated that the death toll from industrial accidents is probably not under 23,000 per year, while the non-fatal injuries number 2,500,000. The public accidents as distinguished from the industrial, by which I mean automobiles, railroads, etc., run up to 22,000 probably. And these accidental deaths for the most part occur within the ages where the death rate indicates an increase.

The question that interests us especially here today is how much of this annual toll of death, how much of this annual maiming and crippling of men is attributable to the chemical industry.

When you ask me for statistics I must in common with all other statisticians whose statements are worth anything ask you in return, "Statistics of what?" In this case I am perfectly willing to attempt to give you some statistics of accidents in the chemical industry if you will tell me what you mean by the chemical industry. I have seen no two classifications which agree and I have seen no classification—not even that of the Bureau of Labor Statistics, which under most circumstances is reasonably intelligent—which contained, to my mind, a particle of common sense.

I can give you the statistics of accidents in a sort of catch-all group which has been called the chemistry classification, but which, if we take the larger elements of employment into consideration, might just as well have been called something else. This group usually includes smelters and copper refiners. I am unable to see where there is any more chemistry involved in making pig lead out of lead ore, zinc lead out of zinc ore, copper pig out of copper ore, than in making pig iron out of iron ore. Almost one-fifth of the deaths occur in this industry. The frequency rate is greater than the average of the frequency rate of the entire group including this industry.

A Confusion of Terms in Classifying Statistics

I fail to see where there is any chemistry or chemical process involved in grinding oxide of lead mixed with oil in grinders until it becomes what we call paint, any more than it is chemistry to grind wheat into flour. I fail to see where there is any chemical process involved in mixing hot rosin with hot linseed oil and boiling them together until you have a thing we call varnish. It is no more a chemical process than lard rendering. The manufacture of linseed oil consists in grinding the seed, boiling the meal and pressing, purely mechanical processes in each instance and at each stage of the game. Yet here again nearly one-fifth of the deaths and a very large percentage of the total and permanent disabilities charged to the group occur in an industry which might just as well be classified with cement mixing.

In the case of soap making it has been stated that here two or more chemicals under heat do, when brought to the boiling point, react upon each other so as to produce a third substance which we call soap. I grant you that; but in the manufacture of glass a mix composed of sand, which out of deference to the gentlemen present we will call silica, mixed in the dry with salt, soda ash and lime as a flux, or where the higher grades of glass are to be produced a form of lead instead of lime, when subjected to a high degree of heat results in a most astonishing chemical action which produces an entirely different substance, namely, molten glass. Up to this point the manufacture of glass is purely a chemical process, infinitely more complicated than the manufacture of soap, and yet you do not have glass manufacturing classified as a chemical industry. There

is no more chemistry involved in the manufacture of soap than there is in the production of sulphite pulp or sulphate pulp.

In the manufacture of some of the dyestuffs we doubtless have to deal with real chemical processes. Just how far this group should be weeded out I do not know. Certainly in the manufacture of ink, blacking and polishes we have to deal solely with a mixing process.

The essence of my plea to you gentlemen today is to get together and reclassify your industry so that it shall include those things which properly belong to the chemical industry and those things only. You need not be bound by anything. The Census classification of 1919 bears very little resemblance to the Census classification of 1923. The classification of the Bureau of Labor Statistics follows closely upon that of the Census only because in our volume of employment work we must have the total number of employees to form a basis for our weighting. This we can only get from the Census, hence to a very great extent the Bureau of Labor Statistics follows the Census, right or wrong. You gentlemen need not follow the classification of the workmen's compensation commissions because there is no startling resemblance between the compensation classification of chemical industries of New York and Pennsylvania or in fact any other of the states except those which have copied absolutely from somebody else. I took occasion the other day to ask the Bureau of Foreign and Domestic Commerce for its classification of the chemical industry. The classification as a whole does not conform to anything that I have ever seen before and some of their groups might include anything from a lipstick to a bar of laundry soap.

Reclassification in Chemical Industry Urged

Now it is utterly useless to talk about statistics of accidents or anything else as related to a group of things which have so little in common. You may say that the Chemical Section of the National Safety Council subdivides its various groupings and gives the accidents separately, and to this extent gets away from the difficulty of which I speak. Within certain limits this is true, but after all the total is a combination of all these dissimilar groups, and the grand total and averages include figures for industries which have no place in the classification.

I would urge that the chemical section proceed at an early date to give us a classification of the industry which can be defended from every point of view, and I can assure you that when such a classification approved by this organization is completed you can force its adoption by the Census, and by reason of its adoption by the Census most other Government bureaus would adopt it necessarily. You can force its adoption upon the compensation commissions and upon their premium rating bureaus, and you can force its adoption upon the rating bureaus of the insurance carriers. When I use the word "force" I do not want to suggest anything even resembling boxing gloves. Every state and federal organization wants the best classification and groupings of industries possible. The Census Bureau must perforce use large groups. It can not subdivide

as we would wish it to do because of the enormous amount of work involved. A chemical classification is a convenient catch-all because in the last analysis everything is chemistry. When we breathe we inhale a quantity of air which contains a percentage of oxygen which the system extracts almost instantly and uses to oxidize the blood—purely a chemical process. When the farmer raises corn or wheat he is simply applying the chemical processes of air and earth and sunlight to transmute them into grain. The air above the earth and the waters beneath are alike chemical compounds, and what the poet Aratus said may be properly applied to a personification of chemistry, "In him we live, move and have our being."

But when you ask a statistician to give you an accident hazard rate on this sort of classification, he goes up in the air. The first step, therefore, toward an intelligent handling of this subject is an intelligent classification and a real definition of what we mean by chemical industries.

I would suggest in passing that if it is possible to do so there might well be a classification which would be based upon the actual manufacture or production of chemicals as distinguished from their use in the production of other things. This distinction alone would eliminate a number of the absurdities, such as soap.

Statistics Will Show Where Effort Should Be Expended

But I do not pretend to tell you what to do. I simply wish to advise you what I think you ought to do to make it possible for us to really get a line upon the accident rate in the industry. Once you define your industry the methods of securing the accident rates of the industry are the same in chemistry as in anything else: note and report every accident which causes the loss of time beyond the day, turn or shift in which the accident occurs, giving the cause and nature of the accident, and tabulate these in connection with the actual one man hour exposure not only to the industry but to that department of the industry or occupation in which the accident occurs.

And right here I want to pause long enough to congratulate you and thank you as a section for having compiled, so far as your membership is concerned, a record of one man hour exposure. The application of these accidents to your exposure will give your rate not only of frequency but severity, which will show you where your accidents are happening and where your severer accidents are happening as against your minor ones.

This is all that statistics can do toward accident prevention. Each individual employer or manager of each individual plant must do the rest. Statistics can not prevent accidents. They can only show you where it will pay you to get busy.

I am presenting here a table containing the information in existence in the Bureau of Labor Statistics up to the present time on accidents in the industry, partly as it is now classified, but from 1914 down for a particular section or group of plants which probably do come under a

more circumscribed and refined classification than the general one. This shows that in 1908 there was a death frequency rate per million hours exposure of 3.5, dropping in 1919 to 0.41; that in non-fatal a single group of plants, perhaps the largest single group, has dropped from a frequency rate per million hours exposure of 25.87 in 1915 to 16.30 in 1920, the total million hours exposure from 37.12 in 1916 to 16.8 in 1920.

Number of Full-Day Workers, Number of Accidents, and Accident Frequency and Severity Rates in the Manufacture of Explosives, Dyes, and Chemicals, 1908 to 1920* and 1923 and 1924**

Year	Hours of Exposure (thousands)	Equivalent full-year workers	Frequency rates (per 1,000,000 hours' exposure)		
			Fatal	Non-fatal	Total
1908	9,963	3,321	3.50	.....	.....
1909	12,129	4,043	2.06	.....	.....
1910	14,070	4,690	2.20	.....	.....
1911	14,184	4,728	1.20	.....	.....
1912	13,719	4,573	.80	.....	.....
1913	12,873	4,291	1.71	.....	.....
1914	12,399	4,133	.57	.....	.....
1915	160,398	53,466	.59	25.87	26.46
1916	112,581	37,527	1.07	36.05	37.12
1917	119,202	39,734	.43	35.33	35.76
1918	195,405	65,135	.46	25.69	26.15
1919	51,624	17,208	.41	18.22	18.63
1920	48,396	16,132	.50	16.30	16.80

Year	Hours of Exposure (thousands)	Equivalent full-time workers	Number of accidents	Frequency rates (per 1,000,000 hours exposure)	Severity rates (per 1,000 hours exposure)
1910	14,070	4,690	430	30.57	14.43
1920	48,396	16,132	813	16.80	3.67
		Explosives			
1924	4,330	1,443	22	5.08	2.80
		Dye Manufacture			
1924	5,450	1,817	96	17.61	6.14
		Total Chemicals			
1923	18,044	6,015	422	24.55	4.78
1924	48,450	16,150	1,187	26.13	3.07

*National Safety News, Feb., 1921, p. 4.
**National Safety News, June, 1925, p. 31.

This shows what can be done by extreme care, and I think this corporation has exercised extreme care in a group of plants that may properly be classified as chemical plants. I may say that the control of this group of plants is entirely satisfied that safety pays, and it is going on with more and better improvements and methods. I think the accent perhaps should be upon methods.

DR. STEWART: Outside of the paper I just want to say one thing in regard to a point that was brought up here this morning and that is the very large percentage of accidents in the Chemical Group that might occur anywhere. I suppose most industries would show the same thing but anyhow your industry shows a very large, in fact, the highest per

centage of accidents from slips and falls, not only from an elevation but slips and falls on the level. Now that can occur anywhere. It may be that your floors are not as clean as they might be. But anyhow slips and falls are not necessarily an accident hazard connected with chemistry alone and until you can define what chemistry is, you can not see where your typical accidents occur. While I wouldn't for one minute say a word about calling attention by posters to specific things, yet after all your business is like the business of every other concern. Keep up the instinct of safety as far as you can develop that instinct among your employees. Keep your floors clean, use non-skid floors as much as possible, and go after the slips and falls, that's where your greatest trouble is.

A Special Committee on Reclassification

MR. KEPNER: Mr. Chairman, I move you that we well consider the thought of Dr. Stewart in making a reclassification of the chemical industry. Just as he says, there are many concerns classified in the chemical industry because they don't know where else to put them and there is a whole lot of difference between making lip sticks or soap and making a real chemical compound or process. I move you, Mr. Chairman, that the incoming chairman appoint a committee to well investigate that thought.

(Mr. Kepner's motion was seconded and properly carried.)

THE CHAIRMAN: There is no question that in order to direct intelligently the work of the Chemical Section of the National Safety Council we must have accurate statistics and classifications on the accidents now occurring in such industries. Some time ago the National Safety Council issued a skeleton form to its members requesting certain information concerning the number of accidents and their classification in the industry. We received a very meager return from this form. I don't know whether some of the members feel they are giving some information that will be harmful to them later on, but I can assure you that the Council keeps all this information to themselves and not for publication, merely for the purpose of intelligently directing the work of this Section.

MR. WHITING: How can we get additional copies of Dr. Stewart's paper?

DR. STEWART: I believe I have a list of your membership. If I haven't, you can furnish me a list and I will mail a copy to each member.

THE CHAIRMAN: Has anyone else any further questions to ask regarding Dr. Stewart's paper? If not, we will go on to the next speaker's paper.

I am sorry to announce that Dr. Fetzer, who was to deliver a paper on Occupational Diseases in the Chemical Trades and also a Report of the Occupational Disease Committee of the American Chemical Society, will not be with us this morning. He has sent a telegram:

"Sorry that I can not attend Congress at Detroit. Was ready to go but certain patients at last moment insisted that I give them my personal

attention at this time. I feel very bad about this matter, since I promised to be present. Have several requests for my paper."

Copies of Dr. Fetzer's paper can be secured from the Council, I am quite sure, and it is printed at this point in the Congress Transactions.

REPORT OF THE COMMITTEE ON OCCUPATIONAL DISEASE AND HAZARDS IN THE CHEMICAL TRADES, OF THE AMERICAN CHEMICAL SOCIETY, APRIL, 1925-1926

Dr. L. W. Fetzer, Chairman, Dallas, Texas

The first Committee on Occupational Diseases and Hazards in the Chemical Trades reported in the month of April of the year 1914.

A report was rendered each year thereafter and in every instance the respective committee has stressed in one fashion, or another, the dictum "that industrial efficiency, upon which the production of material wealth depends, has its strength in a healthy working force or factory personnel."

In the interim, that is between the appointment of the first committee and the present one, there have sprung up, in the various public health, strictly medical and safety organizations, groups or sections who are concerned in the various aspects of industrial health. Each of these groups, or sections, has tried in its own way—and sometimes at a great disadvantage; to obviate some of the untoward conditions which exist, or are supposed to exist, in certain plants.

Labor organizations have also contributed their moiety to the elucidation of the occupational disease problem and they, like all the rest, have brought about some improvement.

The representative universities of the country, through their departments of public health, industrial hygiene, pharmacology and physiology, and with superior research facilities, have cleared up many mooted problems, and have pointed out new hazards in industrial work.

Then we have the work of the state and government agencies, like the United States Bureau of Mines, the United States Public Health Service, U. S. Bureau of Labor, and others, who give us data which are very welcome indeed.

Each year gives the matter of occupational diseases more publicity than the year before, and no little of this is bestowed upon the chemical and closely allied industries irrespective whether it be just or unjust.

There are a great many reports pertaining to occupational diseases on record which will not bear ordinary analysis in the light of modern findings in pharmacology, physiology, chemistry and pathology. In contrast to this statement we must add that there are probably hazards which need early removal for the good of the working force and the industry owners alike.

Some members of the chemical industry have joined one, or more, of the health and safety organizations, mentioned in the foregoing, hoping in this way to keep abreast of any hazard which may come in their particular factory. In fact a number of these have shown even more interest in that they have contributed, more or less, in a financial

way to certain studies, or surveys, which are carried on by a subcommittee of the particular organization. All of this is laudible and deserves special commendation.

Then we have constituents of our industry who are concerned only with the making of chemicals and allied substances, and who content themselves with meeting the issues as they arise.

The committees during the past few years have suggested ways and means of meeting up with the occupation disease situation. They have placed emphasis on one point especially, namely that of making a study of these conditions within the confines of the American Chemical Society. It has been argued that "occupational diseases are purely and simply medical problems." We have met this statement, and similar ones, with the rejoinder that a great deal of our public health, and industrial health work, is being successfully administered by professional men who are not physicians. Even this statement is not offered to mean that the committee recommends that matters which have to do with the industrial health should be taken out of the hands of the medical fraternity. The committee only wants to remind the colleagues in industry that good clarity can only come to the situation when the chemist becomes a better industrial hygienist and the physician knows more about what goes on in the works in a chemical way. This represents the crux of the matter, and it has been said before.

Plan for Clearing House on Industrial Hygiene

It has been remarked that chemists have their hands and minds full if they keep pace with the progress being made in industry. An unexpected accident, and perhaps a fatal occurrence, blots statements like this one into oblivion.

In this matter of occupational diseases we are still in the formative period. Your committee has on several occasions mentioned the good that could come from a modest and well directed clearing house for occupational hygiene. The idea which owes its inception to the late Charles Baskerville, ought to be set up by the chemical fraternity for the purposes of the chemical industry. Until we have an institute of this character the data on occupational diseases and hazards in the chemical trades will remain unanalyzed and unclassified.

The committee has tried to settle on some plan whereby a clearing house on industrial hygiene will become a reality. After going over the literature detailing some of the experiences of other organizations it came upon a plan which has been put into practice by the Mid-Continental Oil Association. Briefly told, the Mid-Continental people have a "Safety Institute" at Tulsa, Oklahoma, in charge of a full-time safety engineer. It has been in existence for about three years and it is supported by graded subscriptions paid by the oil refiners. Built around the institute is a "Safety Council" composed of the safety men, claim agents, and statisticians, from the respective oil concerns. All of it represents an honest effort on the part of the oil refiners, to do something apart from what is being done by extraneous private agencies, and the state and

governmental agencies. It appears to your Committee that no difficulties should lie in the way of creating such an institution. Only good can come from it.

The Role of the State in Industrial Hygiene by Emery R. Hayhurst (*American Journal of Public Health*, Vol. 15, No. 8, pp. 681-685), is a timely discussion and is of importance because it brings out just how much of a part the states and some of the territories and insular possessions are playing in Industrial Hygiene.

Taking the states as a whole this preliminary study revealed that very few were giving any attention in an official way to the subject of industrial hygiene and outside of sanitation to the health of the worker, or to the prevention of occupational diseases. It was further found that standards as to what ought to constitute healthful working conditions were practically lacking in the statutes and present only in one half dozen state departmental regulations. It is questioned whether many of these standards would bear the light of present day knowledge. While some of them are excellent, some questionable, some wrong, others are mere verbiage. "Enforcement is almost a dead letter in many of the states and in many of them the personnel charged with the work is insufficient or incompetent. Under the circumstances there is the inclination to sidestep the issue of proper inspection and supervision of industrial hygiene matters." Serious consideration should be given to the placement of the subject of industrial hygiene. Should its supervision be in labor departments or health departments? In what department should the end results, i. e. occupational diseases, be considered? Does it make any difference provided trained personnel is on the job? See also "Industrial Health under Non-Medical Supervision" in the Journal of American Medical Association, Vol. 85, No. 8, pp. 561-564, by the same author.

Government Should Control Sale of Hazardous Substances

It has been frequently suggested that regulating the distribution and sale of hazardous substances might well be a function of the Federal Government. J. A. Tobey, in the *American Journal of Public Health*, Vol. XVI, No. 3, pp. 244-249, brings up the subject anew and lists a number of substances and commodities which enter into daily life and into the industries, and which under some circumstances represent hazards. A few of the items mentioned are lye and other alkalies; commercial acids such as hydrochloric, sulphuric, nitric, etc.; paints and varnishes and rat poisons. The discussion of the paper by E. Stewart, which in some respects is an extension of the topic, relates to white phosphorous in matches, and industrial hazards of radium.

Since mental symptoms have been noted from exposure to anilin, arseniuretted hydrogen, benzene, carbon disulphid, carbon monoxid, carbon tetrachlorid, dimethyl sulphate, dinitrophenol, ether, hydrogen cyanid, lead, manganese mercury, methanol, methyl bromid, naphtha (benzine), nickel carbonyl, nitroglycerin, selenium, tellurium, toluidin, trichlorethylene, turpentine, etc. (See Hamilton Industrial Poisons; Kober and Hay-

hurst Industrial Health;) it is not too far fetched, the Committee believes, to stress the importance of including mental tests in the periodic examinations of working men in chemical plants. It is a well-known fact that many individuals who show good stability when performing tasks under ordinary conditions, will temporarily break down when engaged in another industry and show gross and dangerous incapacitation or nervous instability. This is strikingly brought out from the examinations made on aviators at the aviation fields and especially at the School of Aviation Medicine Research Laboratory, located at Mitchel Field, L. I., N. Y. Put some workers under unusual atmospheric conditions and they will do unexpected acts.

More Emphasis on Industrial Hygiene in the Schools

Psychologic and psychiatric examinations have also done much to discover and to satisfy the grouch, the kicker, and the general trouble makers in industrial establishments. Such examinations frequently prevent undesirables from joining the working force at all. Some persons who appear mentally sound to the employment official are often grossly pathologic to the observing psychologist and psychiatrist. It has been shown that not all of the so-called "nervous breakdowns" are due to overwork. Many of these are due to financial or familial troubles, while the occupation they are engaged in is simply incidental. Rest will relieve the condition due to overwork, but not so with the other.

More emphasis is now placed upon industrial hygiene in the curricula on chemistry and chemical engineering than ever before. In some schools and universities where the subject has not received attention we have the assurance of its introduction in the next term. The seed will find most fertile soil in these places.

The subject of eyesight conservation has been mentioned repeatedly in our reports. A publication comprising 219 pages, and of great value, is one entitled "Eye Sight Conservation Survey," by J. E. Hannun, issued as Bulletin No. 7 by the Eye Sight Conservation Council of America. Although this publication does not contain very much on occupational eye diseases which could come from the chemical trades it contains a great deal of material which ought to be read by everyone who has control of industrial workers. Other publications issued by the same organization are "Eye Conservation in Industry," which is part of the "Study of Waste in Industry" conducted under the auspices of the Federated American Engineering Societies, and "Eye Tests in Industry," a pamphlet prepared for the purpose of assisting firms to establish visual tests as a regular procedure. It is through reading such tersely written publications that new view points are gained for accident prevention.

The proper lighting of factories has been the subject of discussion for quite a number of years. It is only comparatively recently that very marked strides have been made in this comport. The literature is vast.

The physiologic aspects of glare are discussed editorially in the Journal of the American Medical Association (Vol. 86, No. 7,. pp. 488-89).

It comments especially on the findings of B. A. Nowakowski, from the School of Public Health and Hygiene and Johns Hopkins University, and reported in the *American Journal of Hygiene*, Vol. 6, No. 1, (Jan. 1926), who believes glare a condition of visual discomfort which depends on two factors and both due to contrasts of illumination on the retina. One of the factors is attributable to the failure of the eye to adapt itself to a stimulus of a small area and of high intensity in consequence of which there is an irritation of the hypersensitive retina. The contrast between the glare spot and the surrounding retina produces discomfort that is proportional to the intrinsic brilliancy of the glare light. The other factor is a depression of visual acuity when there is a sufficient contrast between the illumination of the glare spot and that of the fovea.

E. R. Hayhurst, in the *American Journal of Public Health*, Vol. XVI, No. 3, pp. 218-223, gives a clear-cut, terse discussion of the problem of carbon monoxid poisoning in its various aspects, bringing up the question what constitutes the delayed type of CO poisoning; the possible late sequellae; whether asphyxia explains all of CO poisoning; is CO poisoning a disease or an accident?; CO hemoglobin during smoking; gas fired heaters; automobile exhaust gases, with emphasis on the question whether moist combustion mixtures are more conductive to CO formation than dry mixtures; and finally whether tetra ethyl lead gasoline constitutes an additional hazard to the distributor and user?

The Problem of the Miner's Safety Lamp

Since the gas hazards in manholes are similar to those in mines, the Mine Safety Committee of the Bureau of Mines (Report of Investigations, Department of Commerce—Bureau of Mines No. 2710) was asked whether the miners safety lamp is a practical device for indicating inflammable gases in manholes. The Bureau's committee does not deem the safety lamp suitable for manholes because hydrogen gas may be formed therein. On the other hand, the safey lamp is safe in the presence of methane, but it should not be used in hydrogen or acetylene, because they cause explosions in the presence of these gases. The dangerous gases found in the manholes under observation contained ammonia, benzol, carbon monoxid, gasoline, hydrogen sulphid, sulphur dioxid, carbon dioxid, nitrogen, ethane, methane, hydrogen, and unsaturated hyrocarbons. The possible source of each of the aforenamed gases is mentioned. It is believed that most of the respiratory hazards or explosion hazards arise from the leakage of city gas—natural or manufactured gas; into the sewer system. Tests for explosive gas mixtures were made at the manhole with a gas bomb constructed of a 2 by 2 by 2 by ¾ inch pipe tee, reducers, stop cocks, and an automobile spark plug in the ¾ inch opening which is illustrated in the original. Gases from the hole were transferred to the bomb with a rubber hand bulb and tubing and sparked by means of two dry cells and an automobile spark coil. Explosions are indicated by a kick on a pressure gauge attached to the bomb. Explosive gas mixtures were found in one hole at Pittsburgh and two

at Philadelphia. Tests with palladium chloride test papers for CO indicated that the method is satisfactory for concentrations of the gas which will overcome persons quickly, but is not sensitive enough to detect lesser amounts which exert their effects on man more slowly. The holamite indicator (iodine pentoxide) is more satisfactory in this regard. These findings can find application in numerous chemical works.

The Bureau of Mines in its investigations of gas masks for use in mines and allied industries has studied and developed various types of masks for protection against noxious gases and fumes that may be present in mines, metallurgical works, chemical and other industries.

Chemical and Physical Tests on a Type of Mask

In Reports of Investigations No. 2719 of the Dept. of Commerce—Bureau of Mines, there is recorded the results of chemical and physical tests that were made on a type mask (see Schedule 14A, Procedure for establishing a list of permissible gas masks; fees, character of tests and conditions under which gas masks will be tested: Bureau of Mines, August 25, 1923), which is intended for protection in air against all gases, vapors and smokes. The mask may be identified by an approval plate bearing the seal of the Bureau of Mines and the number 1403. The tests were of two kinds, those made with chemical testing apparatus involving chlorine, hydrocyanic acid, sulphur dioxid, phosgene, carbon tetrachlorid, gasoline, ammonia gas and carbon monoxid and those by men wearing the masks in poisonous atmospheres and in most instances engaged at certain tasks. The latter tests were made in sulphur dioxid, 1 per cent carbon tetrachlorid, 1 per cent ammonia gas, 2 per cent carbon monoxid, 2 per cent and 0.5 per cent; cotton smoke (?); and tin tetrachlorid smoke, 0.5 per cent. All of the tests were of 30 minutes duration excepting the smoke tests, which lasted 25 minutes. The chemical and physical tests showed that the canister provided protection against all classes of poisonous gases, vapors and smokes and can be safely used in most cases where respiratory protection is needed. Notwithtanding the important limitations of never entering an atmosphere containing less than 16 per cent of oxygen, and concentrations of poisonous gases exceeding 2 per cent (3 per cent for ammonia), is stressed.

The maximum permissible resistance of canisters to the flow of air at 85 liters per minute, four inches of water during the test life was attained only in one instance. The permissible limit for the complete mask is five inches of water with a canister of maximum (four inch) resistance and a complete mask showed 4.6 inches on inhalation; on exhalation the resistance was only 0.3 inches. The Bureau of Mines specification for filtering efficiency against smoke is 50 per cent; all of the service canisters showed 67 per cent efficiency which is a substantial margin.

The masks worn in the poisonous atmospheres gave good protection throughout all these tests. The life of canisters for successive different gases is also discussed in the original.

In our 1924 report we gave the findings of the Commission for the

Investigation of Carbon Monoxid Poisoning of the American Gas Association. One of the recommendations was that cases of CO poisoning be treated with an inhalation mixture consisting of 95 per cent of oxygen and 5 per cent of carbon dioxid administered by a special apparatus. Three appliances for the administration of the CO_2+O_2 mixture were examined by the Commission and passed as satisfactory. The oxygen-carbon dioxid method has now been in use for about three years and at the present time 300 organizations possess approved apparatus for giving this treatment. Reports coming from many of these organizations indicate that the inhalation treatment is exceedingly valuable in mild gassing, where it relieves or prevents the occurrence of headache, nausea, etc. Serious cases which are still breathing revive rapidly and thoroughly, and it is practicable to use the method with the prone pressure artificial respiration method when breathing has ceased. (C. K. Drinker, *Journal of Industrial Hygiene*, Vol. VII, No. 12, pp. 539-558) J. S. Haldane gives expressions as regards the soundness of this method of treatment in *Journal of Industrial Hygiene*, Vol. VIII No. 1, as follows: "I wish to say at once that I am strongly in favor of the carbon dioxid admixture. Not only does the carbon dioxid, by increasing the depth of breathing hasten in corresponding degree the elimination of carbon monoxid from the blood, but the carbon dioxid itself gives marked and immediate relief to the anoxemia . . . I remember well how disappointed I was about 30 years ago when I tried on myself the effects of pure oxygen when I was on the point of losing consciousness during experimental carbon monoxid poisoning."

Reports on Cases of Poisoning from Illuminating Gas

Bed sores appearing early in a previously comatose, or still stuporous, patient are regarded by M. Rabinowitz, *American Journal of Medical Sciences*, Vol. 170, p. 98, as indicative of carbon monoxid poisoning. These lesions are not found so early in other conditions.

Gurich (*Munchener Mediz. Wochenschrift*, Vol. 72, pp. 2194-2197); *Journal of American Medical Association*, Vol. 86, No. 6, pp. 455, reports on four cases of fatal poisoning with illuminating gas in which the heart changes were hemorrhagic necrotic foci surrounded by leucocytic infiltrations. The septum, and particularly the papillary muscles of the left ventricle showed the most severe changes. The median layers of some of the arteries of the brain were necrotic and filled with lime.

The carbon monoxid literature is reviewed very satisfactorily in Public Health Bulletin No. 150, by R. R. Sayers and Sara J. Davenport.

While we are on the topic of gases it is well to refer to the valuable work being done by the Chemical Warfare Service on protection against gas poisoning. In "Chemical Warfare" Vol. 12, No. 2, pp. 3-5, we have the first of a series of discussions, on "Chemical Warfare Agents and First Aid Treatment" which deals with chlorine. Then the excellent and more pretentious Army Medical Bulletin No. 16, the results of a

study made by Lt. Col. H. L. Gilchrist, Medical Corps of the U. S. A., on special duty with the Chemical Warfare Service, published by the Medical Field Service School, Carlisle Barracks, Pennsylvania. Both of these publications, although intended for the use of regular army and reserve officers, have a very great peacetime value.

According to A. R. Koontz (Archives of Internal Medicine, Vol. 36, pp. 204-219) war gases can hardly cause serious disability. Experiments made on animals (dogs whose lung tissue is far more delicate than the same tissue in man), with lethal concentrations of war gases showed practically no pathologic lesions from two months to two years after recovery. In only a small minority of the cases was the lung damaged, but this was not extensive and is generally in the form of small patches. All of this is ultimately resolved into fibrous tissue.

According to the *Journal of American Medical Association*, Vol. 86, No. 12, p. 882, the director of the U. S. Veterans Bureau has appointed at the request of the American Legion and other agencies a board of physicians to study the residual effects of war gases. The investigations are to be started at once and will cover a period of twelve to eighteen months and necessitate the study of the present physical condition of about 70,000 men who were gassed during the war.

The Modern Theory About Adequate Ventilation

Industrial poisoning is reported in a chemical worker by H. E. W. in *Journal of American Medical Association*, Vol. 85, No. 14, p. 1081, from inhaling denatured alcohol containing one gallon pyridin base, and one gallon of benzine per hundred gallons. The actions of the various constituents are discussed and preventive measures are stated.

Our ideas of the causes of discomfort and inefficiency in what is usually regarded as due to bad ventilation has been subjected to considerable revision during the past two decades. The crowd poison theory is no longer accepted and authorities agree that the most important principle in general ventilation is the maintenance of thermic conditions in the air which will promote normal heat loss from the body. The dry bulb thermometer reading as the sole index for judging comfort is no longer tenable, while the question whether the wet bulb thermometer reading can be absolutely relied on is also open. The subject reported upon by C. P. Yaglou (The Thermal index of atmospheric conditions and its application to sedentary and to industrial life by C. P. Yaglou), (*Journal of Industrial Hygiene*, Vol. VIII, No. 1, pp. 5-19; see eter reading can be absolutely relied on is also open. The subject is also "Ventilation in Hot Industries," June issue, *Fuels and Furnaces*, 1925, by the same author) of the Harvard School of Public Health and formerly research engineer of the American Society of Heating and Ventilating Engineer's Research Laboratories.

A thermal index of atmospheric conditions was developed by comparing the warmth sensed under a wider range of temperature, humidity and movement of air. This is called the effective temperature index. It is determined by means of charts, given in the original, from the

dry and wet bulb temperature readings and from the movement of air. With this method it was found that measurable physiologic effects of atmospheric conditions were found to follow closely the scale of effective temperature, regardless of temperature, humidity and movement of the air. The effective temperature for the comfort zone at rest was found to lie between 63° and 71°. The practical application of effective temperature to sedentary and to industrial life is given in detail, and the upper limit of temperature efficiently endured with muscular work was found to be 80° effective temperature. A method for improving hot industrial conditions is suggested.

At its recent meeting the Committee of the National Research Council (Science, Vol. LXIII, No. 1630, pp. 328-329) on the "Atmosphere and Man" reviewed, among other things, the plans for presenting the essential facts of certain investigations which were made for the committee (of the N. R. C.) by representative manufacturing establishments on the effect of indoor and outdoor conditions on industrial efficiency. Consideration of these records led the committee (N. R. C.) to suggest that graduate schools of the universities should delegate a number of specified researches within this field to qualified students. Emphasis is made on the ever growing interest in the effect of atmospheric conditions on health, mortality, and efficiency, and the hope is expressed that it might be feasible to pool the interest of hygienists, physiologists, meteorologists, and statisticians in order to unify many of the specific endeavor under way.

Cases of Resuscitation After Apparent Death

Resuscitation was accomplished after the cessation of vital functions for over 15 minutes (N. C. Kapur, Indian Medical Gazette (Calcutta) Vol. 60, p. 582) by flapping a cold wet towel onto the chest, respiration, heart sounds, and pulse were restored.

H. Schridde reports (Klinische Wochenschrift, Berlin, Vol. 4, p. 2143) on 37 deaths by electric currents of not more than 220-250 volts. Burns were not always present, but in most cases evidences of a thymic constitution were noted. Edema of the legs was found in 21 cases, while cause of death in the remainder could be explained by auricular fibrillation.

Prof. Jellinek in a lecture (*Journal American Medical Association*, Vol. 85, No. 26, p. 2048) before the Vienna "Seminar Abende" for general practitioners discusses the causes, pathology, and treatment of accidents due to the electricity. The sovereign remedy is artificial respiration, but it must be applied early and may have to be continued for several hours. Until death spots appear, there is still hope even though the current strength was heavy. All of this is also true of injuries by lightning.

In the mining, metallurgical and chemical industries, numerous problems arise requiring determinations of solid and of liquid particles suspended in air. Frequently, these problems are of local interest and involve purely economic or operating difficulties; on the other hand, toxic

effects from the inhalation or the ingestion of substances suspended in air may be a matter of concern. This paper, by Philip Drinker and Robert M. Thompson, entitled "Determination of Supenoids by Alternating-Current Precipitators," in *The Journal of Industrial Hygiene*, Vol. VII, No. 6, pp. 261-272, is devoted to a discussion of portable alternating current precipitators applicable to the quantitative determination and microscopy of dusts, fumes and smokes in air.

In the gravimetric determination of dust in air, it is often desirable to use apparatus and methods which permit sampling at high rates of air flow. Otherwise it requires too long a time to collect enough dust to make reliable weighings. P. Drinker and R. M. Thompson, Harvard School of Public Health, Boston, Mass., in the *Journal of Industrial Hygiene*, Vol. VII, No. 8, pp. 352-357, describe an improved form of the Drinker, Thompson, Fitchet dust sampler. For previous work see Journal American Society of Heating and Ventilating Engineers, Vol. 30, p. 695.

Considering the apparatus from the viewpoint of the field worker, the following disadvantages are to be noted: (a) care is required in cleaning out the collected dust; (b) the apparatus is unsuited to the determination of fumes like freshly burned ZnO, or smokes like tobacco, which are difficult to wet with water; (c) the water evaporated by bubbling air through the apparatus must be replaced; and (d) the water freezes if the wet bulb temperature of the atmosphere reaches 32° F.

Advantages of the Apparatus

The advantages of the apparatus are: (a) samples of dust are collected at rates as high as 300 liters per minute, at gravimetric efficiencies of 95 per cent, or more; (b) the resistance to air flow is low enough to permit the use of light vacuum cleaner motor fans, the speed of which can be controlled by rheostat; and (c) the total weight is about 25 pounds, when the vacuum cleaner motor, mounted as in Figure 2, is used, and 10 pounds, with the Hancock ejector.

Philip Drinker gives the size-frequency and identification of certain phagocytosed dusts in the *Journal of Industrial Hygiene*, Vol. VII, No. 7, p.p. 305-316. From the size measurement of phagocytosed dusts and their approximate frequency of occurrence in endothelial cells from sputum of men exposed to dusty air, an attempt is made to predict the relative power of certain dust particles to produce pneumonokoniosis.

From a comparison of dust inhaled, as sampled by electric precipitator, and dust in the cells from human sputum, selective phagocytosis is indicated.

The medium size of the phagocytosed particles was found to be 1.15 microns in diameter and the mean 1.275 microns, in cells whose diameter varied from about 13 to 17 microns. The size-frequency curve of the phagocytosed particles is shown to be asymmetrical, and plots as a straight line on Hazen's logarithmic probability paper. Photomicrographs of the dust cells and the size-frequency curve of the phagocytosed particles are given, with details of the methods used in measuring the

particles and determining their size-frequency distribution.

The quantitative determination of dusts, fumes and smokes in air presents a problem of interest and practical importance to the ventilating engineer, hygienist and the physician. (*Journal American Society of Heating and Ventilating Engineers.*)

A classification of dusts, fumes, and smokes is suggested and is based on the size of the particles and the methods by which they are liberated into the air. Owens' jet dust counter is described, and its usefulness in general dust problems discussed with the aid of photomicrographs of dust and fumes collected by his device.

Electric precipitation is discussed in its theoretical and practical aspects as applied to small precipitators for the determination of dusts, fumes, and smokes in air. It is shown that practical operating efficiencies at close to 100 per cent can be obtained in field and laboratory work. Photographs of complete and incomplete precipitation of ammonium chloride fume are given.

Study of Dust Particles in the Lung Tissue

A method of mounting transparent celluloid foils on which particles have been precipitated is described in detail. By this method measurements of particle size may be made from the collected sample of dust, fume, or smoke without disturbing the precipitate.

The physical character, the size, and the chemical composition of dust particles that reach the alveoli of the lungs by inhalation have generally been studied after they have become fixed in the lung tissue, or after they have been ingested in the alveoli by the phagocytic action of the "dust cells." Ultimately some of these loaded dust cells come in contact with the ciliated epithelium and are expelled with the sputum. While dust in sputum can be examined, measured and analyzed chemically on suitable microscopic mounts, it happens that dust thus examined may have been contaminated with dust from the upper respiratory passages. All of this will not allow judgment as to the characters of the dust particles which eventually reach the depths of the lungs and which are responsible for lung damage. R. M. Thomson reports from the department of ventilation and illumination of the Harvard School of Public Health (*Journal of Industrial Hygiene*, Vol. VII, No. 9, pp. 385-390) on a method and apparatus for sampling alveolar dust. Through the examination of the alveolar air for dust content it appears possible to predict with a greater degree of certainty the amount of damage which is likely to result from the inhalation of toxic substances. Alveolar dust can be sampled directly by using Owens' jet dust counter, Kotze's konimeter, Hill's dust counter, or an apparatus in which is incorporated the best features of the former three, in conjunction with Haldane's alveolar air sampler. The purpose of employing Haldane's sampler is to prove that the specimen is truly alveolar. Analyses were made with the Haldane gas analysis apparatus. The method is said to have a broad field of usefulness in studying the actual particles which reach the lungs by vocations involving much dust.

Cecil K. Drinker, Philip Drinker, and Katherine R. Drinker, in the

Journal of Industrial Hygiene, Vol. VIII, No. 10, pp. 440-443, report on an effective method for conducting experiments on dust inhalation. The natural protection of the lungs of animals against the inhalation of dust is very great, and is enhanced by quiescence and light breathing when dusty atmospheres are encountered. These facts have made it hard to introduce dust into the lungs without long exposures or excessively heavy concentrations of dust in the air breathed. By adding 10 per cent carbon dioxid to dusty atmospheres, breathing is much increased and short exposures result in uniform and satisfactory distribution of dust particles in the pulmonary alveoli.

In problems proceeding from the inhalation of dusts, fumes and smokes it has long been desirable to know something definite of the size and dispersion of the particles as they occur in the air. P. Drinker, R. M. Thomson, and Jane L. Finn (*Journal of Industrial Hygiene*, Vol. VII, No. 12, pp. 567-576) conclude that the photometric methods in field work have a primary advantage in the rapidity with which the readings are made and the subsequent reduction of work in the laboratory. Photometric methods may be applied to all true colloids like acacia in water or tobacco smoke in air, as well to coarse unstable suspensions like silica dust in water or in air. Among the disadvantages are expensive equipment requiring great care, in accuracy and use, and not being of coat pocket size. The methods can not be indiscriminately applied to different suspensions, or even to the same substance suspended by different methods unless the size dispersion and color are alike. They can not be applied with quantitative accuracy to suspensions in which the concentration of particles is approaching the region of opacity to light.

A Study of Humidity Control in Residences.

A study of humidity control in residences is reported by P. Drinker in the *American Journal of Public Health*, Vol. XV, No. 8, pp. 689-695. According to C. E. A. Winslow of the Department of Public Health, Yale University School of Medicine, the first definite step toward first-hand scientific study of industrial hygiene in the United States was inspired by a problem of factory ventilation. In an article printed in the *Journal of the American Medical Association*, Vol. 85, No. 13, pp. 968-973, Winslow discusses the subject of factory ventilation and industrial tuberculosis as a general problem, the relation to poisonous fumes and dusts in which carbon monoxid and lead are regarded as the most important of the purely industrial poisons, although it is mentioned that there are many others that affect smaller groups of workers in a more or less intensive degree; dusts predisposing to tuberculosis, and methods of control. Silicosis comes in for a share of the discussion.

May R. Mayers of the Bureau of Industrial Hygiene of the New York State Department of Labor (*Industrial Hygiene Bulletin*, Vol. II, No. 8, pp. 29-32) reports observations in differentiating between pulmonary tuberculosis and silicosis. In so far as the clinical appearances in both of these conditions are similar and in fact do frequently occur together, and the X-ray findings in the advanced case of silicosis are almost in-

distinguishable from that of advanced tuberculosis it is entirely impossible to understand either, unless one knows the pathological changes going on in the body. Case histories and X-ray pictures are included in the article. A new bulletin on silicosis is in the hands of the printer.

C. M. Sails, chemical engineer, of the Bureau of Industrial Hygiene of the New York Department of Labor (*Industrial Hygiene Bulletin*, Vol. II, No. 9, pp. 33-34) gives a report on the physical and chemical analysis of siliceous dust samples.

C. Norris and A. O. Gettler give the post mortem and chemical findings of four cases of poisoning from tetra ethyl lead which was acquired during the manufacture of the anti-knock compound, (see *Journal of the American Medical Association*, Vol. 85, No. 11, pp. 818-820). A volatile lead compound was isolated from the brain tissue of two cases although a non-volatile lead compound was present in all four brains. No volatile lead compound was observed in any of the other tissues examined.

Findings in the Investigation of Lead Poisonings

Contrary to the usual findings in lead poisoning, the bones in these cases did not show a very high lead content when compared to the amount found in the other tissues. Calculated on equal portions of tissues the brain and liver exceeded the bones in lead content. Since the brains contained much more lead than is usually found in cases of lead poisoning, it is assumed that brain tissue has a specific attraction for tetra ethyl lead. As the lungs contained a somewhat high amount of lead, it was concluded that absorption occurs through this channel, while the large amounts found in the liver and kidneys can be explained "as a process of attempted removal from the body." All of the organs, inclusive of the blood, contained lead.

The committee appointed a few months ago by the Surgeon General of the U. S. Public Health Service, consisting of Profs. W. H. Howell, Johns Hopkins University, D. E. Edsall and Reid Hunt, Harvard University, Julius Stieglitz, University of Chicago, W. S. Leathers, Vanderbilt University, A. J. Chesley, and C. E. A. Winslow of Yale University to establish whether any ill effects can come to the public health from the products of combustion of gasoline containing tetra ethyl lead has rendered its first report on January 17, 1926. For those interested in the matter, we suggest that they first read *Public Health Bulletin No.* 158 as a prologue in order to obtain clear vision to the subject. The committee concludes on the basis of actual observation that there are at present no good grounds for prohibiting the use of ethyl gasoline as a motor fuel provided that its distribution and use are controlled by proper regulations.

The *Journal of the American Medical Association*, Vol. 86, No. 5, p. 353, commenting editorially on the report remarks: "If the use of leaded gasoline becomes widespread, conditions may arise that would render its use more of a hazard than would appear from this investigation. . . . In the meantime . . . physicians should consider the

possibility of lead poisoning in persons who have been exposed even slightly to ethyl gas fumes even though the evidence thus far is negative." For the complete report of the Surgeon General's committee see *Industrial and Engineering Chemistry*, Vol. 18, No. 2, pp. 193-196.

Hein, Agasse-LeFont and Feil in Paris Medical, Nov. 29, 1924, p. 445; see also *Journal American Medical Association*, Vol. 85, No. 2, p. 151, examined fifty-two workers who were engaged in making tiles for chimney pieces and other glazed work. Lead colic was absent in the men having the greatest exposure to lead—namely, the enamel makers. A characteristic lead line was present in 50 per cent of the workers and characteristic stippling of the red cells was found in all (100 per cent). Although the proportion of persons having lead signs was much less in other branches of the ceramic industry it was far from negligible.

What some regard as a novel case of lead poisoning is reported by the Paris correspondent of the *Journal of the American Medical Association* in Vol. 85, No. 25, p. 198. Bread, baked in an oven fired with wood coated with lead salts coming from demolished ships, poisoned thirty-five persons, making them very ill.

Details of Some Cases Reported

A rather complete monograph on Lead Poisoning has now been issued by J. C. Aub, L. T. Fairhall, A. S. Minot, and P. Reznikoff and comes from the Harvard University School of Public Health and the Medical Clinic of the Massachusetts General Hospital through the Williams & Wilkins Co., Baltimore, Md. Some of the material has been substantially noted in the committee's 1925 reports.

Carey P. McCord and A. Friedlander (*American Journal of Public Health*, Vol. XVI, No. 3, pp. 274-281) report what has occurred amongst the help in the galvanizing room of a sheet metal plant during the past three years. Of a crew composed of 20 men, 15 have been engaged at this kind of work for a period varying from six to 22 years. Twelve of these 15 exhibited the characteristic signs of severe gastrointestinal inflammation, culminating in a few instances in gastric or duodenal ulcers.

R. F. Lutz in the *Journal of Industrial Hygiene*, Vol. VII, No. 6, pp. 273-290, describes a method for determining small amounts of zinc in materials of an organic nature, utilizing the fluorescence produced by the action of zinc salts on urobilin. It is capable of determining, with an accuracy of 10 per cent, amounts of zinc ranging from 0.01 mg. to 0.5 mg.

Biologic material containing zinc in small amounts may be easily and safely ashed by incineration at 450 degrees C. according to P. K. Thompson reporting in *Journal of Industrial Hygiene*, Vol. VII, No. 8, pp. 358-370.

Manganese poisoning and its effects on the central nervous system, with a report of six cases is given by R. F. Gayle, in the *Journal of the*

American Medical Association, Vol. 85, No. 26, pp. 2008-2011. Manganese more often than is recognized causes symptoms in workmen handling this ore. All persons are not susceptible to the toxic effects of manganese, which explains why many engaged in the industry for many years show no untoward results. For other data on manganese poisoning see previous reports of the committee.

W. B. Castle, Katherine R. Drinker, and C. K. Drinker (*Journal of Industrial Hygiene*, Vol. VII, No. 8, August, 1925, pp. 371-382) report on cases of necrosis of the jaws of workers engaged in applying a luminous paint containing radium to watch dials. The investigations were begun at the request of the president of the company involved and were done in part at the plant and in the Harvard School of Public Health. In the work an analysis of other agents possibly toxic, was made with no positive findings, nor was the necrosis at all like the ordinary infections of the jaw which do occasionally follow the extraction of a tooth. The examination of the blood of the five workers, coupled with the use of photographic films demonstrated over exposure to radium. The over exposure was of a peculiar type since it also permitted the inhalation of particulate material containing a radium salt. While the evidence seems to point conclusively to radium as the detrimental substance the matter is not definitely proved. The safest course appears to lie in the direction of applying general and specific preventive measures which are stated in the original.

Dangers in the Use of Radioactive Substances

Under the caption of "Some Unrecognized Dangers in the Use and Handling of Radioactive Substances with Special Reference to the Storage of Insoluble Products of Radium and Mesothorium in the Reticulo-Endothelial System" H. S. Martland, P. Conlon, and J. P. Knef, report their findings with cases ranging in severity from mild ones showing only a slight necrosis of the alveolar borders (jaw bone) and without anemia or leucopenia, to severe ones showing profound anemia with extensive almost complete destruction of the upper and lower maxillae. The death of one of the patients allowed them to obtain accurate clinical and pathological laboratory data. In the organs after death amounts of radioactive substances were found sufficient to be determined quantitatively by alpha radiation and penetrative gamma rays, notably in the spleen, liver, and bones, which represent to a largest part of the reticulo-endothelial system.

In several cases radio activity was noted in the body and in the expired air, while pieces of necrotic jaw bone removed during life from a girl now dead over three years showed considerable alpha radiation. The organs, especially the lungs of a chemist and physicist who died with an acute leukopenic anemia of the pernicious type due to the inhalation of radioactive dust and emanation, showed the presence of radium, esothorium and their decayed products.

Frederick L. Hoffman also investigated unusual cases of necrosis *Journal of the American Medical Association*, Vol. 85, No. 13, pp. 961

965) among young women who at one time or another were employed at a radium plant engaged in the manufacture of luminous watch dials. At the outset of the investigation Hoffman was frequently confronted with the statement that the cases had been diagnosed as phosphorus necrosis. Through the elimination of wetting (pointing or tipping) the brushes between the lips the disease will probably disappear or become extremely rare.

The Paris correspondent of the *Journal of the American Medical Association*, Vol. 85, No. 20, p. 1571, reports on some cases in which principally leukemia followed either the use or preparation of radioactive substances. Two of the persons affected were civil engineers engaged in the same laboratory preparing radioactive substances of the thorium group. One of them succumbed to pernicious anemia and the other to a myeloid leukemia. The other cases occurred in roentgenologists. For other data pertaining to radium consult 1925 report of the Committee on Occupational Diseases A. C. S.

G. M. MacKee and A. C. Andrews (*Journal A. M. A.*, Vol. 85, No. 22, pp. 1715-1720) report, among other things, that the ultra-violet ray, regardless of how employed, is of no practical value as a preventive against acute or chronic radiodermatitis.

Experiments With Radium Upon Bone

D. B. Phemister (*Journal of the American Medical Association*, Vol. 86, No. 12, p. 902) gives data to show that the necrosis in bone produced by radium is different than the necrosis produced by other conditions. Bone killed by radium in the treatment of tumors (sarcoma) behaves in the same way as found in experiments made to prove the point.

T. Koniyama reports (*Klinische Wochenschrift*, Berlin, Vol. 4, p. 2012) an experiment for detecting the presence of heavy metals in the circulation. In a test, sulphur emulsion was injected in one leg of a subject while the other leg received an injection of an insoluble bismuth preparation. The fact that the tissues were stained black is taken as an indication of the entrance of the metal into the circulation.

G. F. Roberts and A. J. Hosmer (*California-Midwest Medicine*, Vol. 23, p. 636; abs. in *Journal of the American Medical Association*, Vol. 85, No. 8, p. 636) believe sodium thiosulphate to be the remedy of choice in acute and chronic poisonings by the heavy metals. Moist applications of a one or two per cent solution are very beneficial in the treatment of burns or dermatitis caused by arsenic and mercury. In acute causes of poisoning the original dose should be 1 gramme given intravenously, once, twice or three times daily, all depending on the symptoms.

Copper itch, a form of dermatosis which affects the arms and legs, causes itching, a red and somewhat scaly skin and has a tendency to become chronic, is reported by E. G. Shelley in the *Journal of the American Medical Association*, Vol. 86, No. 13, p. 971. Since the data are reported in the form of an inquiry to the periodical a reply giving directions for obviating the condition is included.

The result of an investigation on the poisoning of the stomach by K. Sick, (*Deutsches Archiv fur Klin. Mediz.*, Leipzig, Vol. 148, pp. 318-343) with mineral acids is reported. Emphasis is laid on the sequella.

Fluorin, in a vermin destroying composition, is recorded by Dryenfurth & Kipper in the *Medizinische Klinik*, Berlin, Vol. 21, p. 846. The treatment recommended consists in washing out the interior of the stomach with lime water followed by large draughts of the same. Calcium chlorid is then injected.

A dermatosis was produced in three blue print workers through contact with potassium dichromate solution. For persons susceptible to this substance H. J. Parkhurst recommends (Archives of Dermatology and Syphilology, Vol. 12, pp. 253-260) frequent rinsing of the skin with a saturated solution of sodium bisulphite, followed with rinsing by water.

Volumes 2 and 3 of "Skin Injuries from Vocations and Industrial Work" by K. Ullman, M. Oppenheim and J. H. Rille, published by Leopold Voss, Leipzig, are now available. It represents a serious attempt to bring within one compass material which heretofore has been much scattered. The first volume was mentioned in a previous report.

Report of the Subcommittee on Benzol

The third progress report of the subcommittee on Benzol, Chemical Section, National Safety Council, was presented at the Cleveland Safety Congress held September 28-October 2, 1925.

From a practical standpoint, the report here presented represents essentially a final one, although a much more extended survey of the entire investigation with reviews of literature and the full data of completed laboratory investigations will be presented to the National Safety Council later for publication. While no real canvass was made for cases of benzol poisoning for this third report at least seven fatal cases (acute and chronic) have been brought to the attention of the benzol committee. The data are handled under the following headings: The use of benzol in enclosed systems; the use of benzol otherwise than in enclosed systems; concentration of benzol in the air of workrooms studied; chronic poisoning of the workers as evidenced by blood examination; and a study of the toxicity on animals of the homologues of benzene (xylol, toluol, Hiflash naphtha) in comparison with benzol. The results of the animal experiments with xylol, toluol, Hiflash naphtha and benzol—all given either subcutaneously or intra-peritoneally; showed the first three to be relatively free of the specific affinity for the central nervous system and the blood forming organs characteristic of benzol. If this tentative conclusion is confirmed by inhalation experiments to be performed later, the serious attention of manufacturers now using benzol should be invited to the possibility of substituting one of these relatively harmless substances wherever the conditions of a given manufacturing process make it possible to do so.

Paint solvents are reported to be the cause of a troublesome dermatitis amongst the painters of an industrial establishment. J. A. Turner

in the *Journal of Industrial Hygiene*, Vol. 7, No. 7, pp. 293-343, incriminates principally turpentine, paint thinner and naphtha. As a preventive he recommends thorough washing of the parts—hands and forearms; with soap and water followed by thorough rinsing with clear, warm water and seeing that the skin is dried. The eruption appears as a dry skin but within 24 hours there may be blister formation. The blisters which contain a clear fluid have a tendency to coalesce and if broken leave an eroded surface with a red inflamed base. The chief symptom is itching and burning which may be promptly relieved by an application of a one to one-thousand potassium permanganate solution. This solution also promotes healing.

Anilin and Anilin Products a Source of Poisoning

Anilin, and anilin products, have been incriminated from time to time as a source of poisoning but in many of the cases on record other substances and conditions are undoubtedly at fault. In the past year C. W. Muhlenberger (*Journal of the American Medical Association*, Vol. 84, pp. 1987-1991) reports 10 cases of poisoning from shoe dyes containing brown or black dye stuffs dissolved in anilin or nitrobenzene; six were said to be due to anilin intoxication.

A. J. Patek (*Journal of the American Medical Association*, Vol. 86, No. 13, pp. 944-945) increases the number of poisonings from this source by three. Hearsay information is included in this article as follows—"I am informed that cases of anilin poisoning (with cyanosis as the principal symptom) are not infrequent in a large local chemical plant where anilin dyes are manufactured."

E. A. Oliver (*Journal of the American Medical Association*, Vol. 86, No. 12, p. 902) after eliminating every factor that could bring about an irritation of the skin (dermatitis venenata) in a certain patient comes to the conclusion that the ink used in the rotogravure section of a Sunday newspaper was the offender.

A fatal case of pyrogalic acid poisoning is reported by R. Pewney (*Medizinische Klinik*, Berlin, Vol. 21, p. 970). A patient affected with a skin disease (psoriasis) was smeared with an ointment containing pyrogallic acid and five minutes later became unconscious, spasmodic and cyanotic. Death ensued in 24 hours. The urine contained much pyrogallic acid, and albumin. It is estimated that about 10 grammes of the substance was absorbed. Autopsy data are included.

Liver necrosis and liver cirrhosis (J. Davidson in *Journal of Pathology and Bacteriology*, Edinburgh, 1925, Vol. 28, pp. 621-626 abs. *Journal American Medical Association*, Vol. 85, No. 25, p. 1996), were produced experimentally in rabbits whose ears were smeared with coal tar for the production of cancer.

Dorothy K. Minster reports 42 cases of occupational diseases in the tanning industry, in the *Journal of Industrial Hygiene*, Vol. 7, p. 299.

A fatal case of formaldehyde poisoning is reported upon by B. S. Kline, in the "Archives of Internal Medicine," Vol. 36, pp. 220-228.

Attention is invited to a book entitled "Industrial Poisons in the United States," by Alice Hamilton, A.M., M.D., published by the MacMillan Co. It deals with the poisonings that can arise in almost any industry, and as such it represents a digest of the literature including that of foreign countries. The personal investigations of Dr. Hamilton are incorporated.

In order to grasp quickly the extent of the field of industrial toxicology your committee urges reading a lecture given by Dr. Alice Hamilton, of the Harvard University, School of Public Health, before the School of Public Health and Hygiene of Johns Hopkins University. Although the paper is entitled "Recent Advances in Industrial Toxicology in the United States," it gives one a good view of the entire situation.

The policy of the editor of *Industrial and Engineering Chemistry* to include articles dealing with safety measures and industrial hygiene in that valuable journal is profoundly appreciated by the committee. It represents an open mind and clearness of vision which can only be of lasting benefit to the chemical industry.

Progress was also made with "Chemical Abstracts," but not enough. We can appreciate the difficulties which lie in the way of adding additional sections to our truly monumental abstract journal, but we can not gainsay that a section on Industrial Hygiene and Occupational Diseases is not of all import. The very nature of our profession calls for the section. The fact stands out blatantly.

Explosives in Transport Present Few Difficulties

THE CHAIRMAN: The next speaker on our program is Mr. B. L. Huestis, of the Bureau Explosives, New York City. I was notified by the War Department some time ago that I hold a Captaincy in the Chemical Warfare Reserve and my job in the next war will be looking after the transportation of poisonous gases and explosives for the Chemical Warfare Service, so I will be very much interested personally to hear this paper.

B. L. HUESTIS (Bureau of Explosives, New York City): Mr. Chairman, members of the Chemical Section: Before starting to read my paper I notice in the program the word "explosives" was tacked on to the title. That was not the way the request was originally tendered to me and I therefore left out all mention of explosives; but before going on to read I want to say that there is also a satisfactory reason for having done so other than that already stated, in that an explosive inspires such a wholesome psychological respect that the provisions made for its safe transportation have been and are pretty fully complied with. As a result, explosives in transportation have not presented any considerable difficulties for a long time. For example, a couple of years ago the loss and damage statistics in the transportation of explosives by rail (which includes some five hundred million of explosives at the very least) was $75 of property damage and one man injured. I think there is very

little opportunity to compare that with anything else in the transportation field.

SAFETY MEASURES IN THE SHIPMENT OF CHEMICALS

Bronson L. Heustis, Supervisor, Accident Department, Bureau of Explosives, New York City

Modern industry calls for a great variety of raw materials. Correspondingly, the finished products are almost without number. As it frequently happens that raw materials are not obtainable near the place where they are turned into salable commodities, and even more frequently the finished products are consumed at points far removed from point of manufacture, it is necessary that both raw and finished products be transported, often over considerable distances. In the chemical industry it is particularly true that many of the materials used or produced are inflammable, poisonous or otherwise dangerous. It has been found necessary to study these materials, to analyze their behavior under a variety of conditions, in order to determine methods of packing and handling which will permit their shipment with a minimum of danger to life and property.

Let us begin by a consideration of the substances classed as corrosive. This includes acids, anhydrous liquid, chlorides, bromine, etc. Of this class, undoubtedly more sulphuric acid is shipped than any other similar material, and in consequence, more cases of leakage, etc., are reported than of any other corrosive liquid. Despite this fact, the greatest actual damage has been done by nitric acid. In the fifteen years since 1910, for which the Bureau of Explosives has full records, the loss charged against nitric acid in process of transportation by freight or express amounts to nearly three-quarters of a million dollars, practically three times the loss charged against sulphuric acid, though the ratio of reported cases is over three to one in the opposite direction.

Roughly speaking then, nitric acid has proven itself nine times as dangerous as sulphuric acid. This brings before us the fact that the major hazard of corrosive liquids is not in their corrosive properties, but in the ability of many of them to cause fire on contact with ordinary combustible substances.

With the exception of concentrated sulphuric acid, most corrosive liquids cannot be shipped in ordinary steel drums. Glass carboys or small bottles are the most widely used containers for such materials as nitric acid. During 1925 there were shipped by the major companies 136,482 carboys of nitric acid, and 781,632 pounds in glass bottles. From these figures it is evident that a concentration upon the proper security of these containers would be a notable contribution to the cause of safety.

The regulations of the Interstate Commerce Commission for the safe transportation of dangerous articles provide definite specifications for the construction, cushioning and closure of carboys and of bottles in

boxes, and also methods of semi-annual test for the strength of the carboy package. In addition, specific precautions are set forth, the most important of which may be mentioned here.

Nitric acid must not be packed in the same outside package with any other commodity. At times this precaution is disregarded, this neglect usually also extending to the use of such cushioning material as excelsior or shavings. With this combination, fire is almost inevitable, a small leakage being sufficient. Nitric acid, bromine, phosphorous trichloride, phosphorous oxychloride, sulphur chloride, titanium tetrachloride, tin tetrachloride, dimethyl sulphate, and any other material having the power of igniting combustible material must be cushioned with fireproof packing such as mineral wool, sifted ashes, infusorial earth or other similar material capable of serving both as packing and as absorbent for any possible leakage. In some types of package, special wood cushioning is permitted. If it is desired to pack bromine with other commodities, the bromine bottles must each be cushioned in noncombustible packing inside individual sealed metal cans.

When Nitric Acid Escapes from the Container

When materials such as nitric acid and the others listed with it escape from their containers and come in contact with carboy boxes, car floors, etc., ignition does not, of course, take place instantaneously. The danger is that such leakage may be unnoticed or disregarded. In one such instance liquid was noted dripping from a box car as it entered a freight-yard. Neither conductor nor yardmaster thought it necessary to look into the matter, as the dripping was not great. A few miles further on, it was necessary to cut the car out of the train while it burned to the trucks. It was a solid load of nitric acid in carboys.

There are other tricks of corrosive liquids which will bear watching. Undoubtedly no chemist in his right mind would think of putting hydrofluoric acid in a glass container, but we have at least one case where a company, receiving a barrel of hydrofluoric acid in leaking condition, quickly transferred it to a number of empty carboys which chanced to be on hand. By the following morning, the carboys no longer existed as such, and the acid was all over the floor.

A simple precaution applying to liquid shipments generally, whether corrosive or not, is to avoid filling containers too full. Some space must be allowed for the contents to expand under a possible higher temperature than that at which the container was filled. This is just as necessary in a steel drum or tank car as in a glass bottle. In addition, many liquids give off vapors which may easily build up a considerable pressure unless expansion space is provided, or the vapors vented off. The best way of doing this with glass containers, such as the carboy, is to use the porous earthenware stopper developed for that purpose, which permits the escape of vapors or gases but keeps the liquid from splashing out.

An important point to be observed is that, after emptying, carboys

which have contained corrosive liquids must be thoroughly washed out with water and drained. Many cases have been reported to the Bureau of Explosives of burns suffered by freight or express employees by acid running out of supposedly empty carboys. The shipment of such containers without washing and draining is prohibited, but it is still done occasionally by those who do not realize the danger, and whose lack of understanding of the Interstate Commerce Commission's regulations on the subject is as complete as their lack of judgment. While the regulations do not apply this requirement to glass containers smaller than carboys, it is excellent practice to wash out bottles before returning them. In a recent case, a fire broke out in a car containing, among other things, a return shipment of empty nitric acid bottles. The suspicion is strong that leakage from these bottles caused the fire.

While, in general, corrosive liquids do not constitute an actual source of trouble unless they splash or leak out of their containers, it must also be remembered that some give off vapors so caustic in character that they form an actual menace to health, if not to life itself. Such liquids as bromine, tin bichloride, etc., if leaking vapors in any appreciable quantity, are extremely troublesome to handle unless gas masks are available or excellent ventilation can be secured. Fortunately, the presence of such vapors even in small amounts, is easily detected; but it is safer to prevent the escape of the vapors as fully as possible. The porous stoppers already mentioned do not pass objectionable amounts of vapor, as the pores are extremely small.

Not All Troublesome Liquids in the Corrosive Class

Not all liquids which cause trouble are in the corrosive class. If we were not confining our attention to materials of most immediate concern to chemists, inflammable liquids would certainly predominate as enemies to safety. There are, however, even with the limitation which prevents a discussion here of gasoline and many others, a sufficient number of inflammable "chemical" liquids to cause plenty of concern. Carbon bisulphide, "sweet scented" laboratory aid and insecticide, is one of the most notable offenders. With its low flash point, and igniting as its vapors will at a low temperature, carbon bisulphide has accounted for over $120,000 loss in transportation since 1910, not to mention personal injuries resulting from ignition of its vapor.

One safety rule to be remembered in connection with carbon bisulphide is that its shipment by EXPRESS is forbidden at all times and under all conditions. When it comes to freight shipments, we are fortunate in the existence of certain properties peculiar to all inflammable liquids. In other words, these liquids will not ignite, nor burn, while they are liquid. They must one and all be vaporized and the vapors mixed with a proper amount of oxygen, before either ignition can occur, or combustion continue. As long as the liquid is completely confined, with sufficient outage or vacant space to prevent bursting of the container from possible vapor pressure, it is safe.

If there is any leakage, even though slow, in time such an enclosed

space as a box car may become filled with vapor. When the proportion of this vapor in the air present reaches a certain value, the mixture is not only inflammable, but as far as the effects of ignition go, dangerously explosive. Should the concentration of vapor be just too high or too low to produce an explosion, the certainty of fire is nevertheless present, only a small spark or an instant's exposure to an open flame being required. With the need for using lanterns around freight trains at night, the danger of ignition is very real.

Some time ago, a box car was being loaded with carbon bisulphide in metal cans in wood cases. The car was moved that night before the lading had been completed or braced, with the result that the cans were flung around and a number of them damaged. A yardman came along to uncouple the car, and, of course, had his lantern with him. His chemical experience was evidently too limited to associate the perfume of the dripping liquid with any danger, and when morning dawned the car and its lading consisted of some blackened steelwork and a heap of ashes.

Many Liquids Owe Their Hazards to Inflammable Solvents

While the number of products, such as paints, cements, polishes, perfumes and so forth which form the output of some of our chemical industries is legion, most of these liquids owe what hazard they have to their inflammable solvents, such as alcohol, gasoline, benzol, acetone, ether, amyl acetate, etc., there are, of course, a number of other inflammable liquids used or shipped by the chemist, for example, ethyl nitrite, toluol, ethyl chloride. While most of these are less dangerous than carbon bisulphide, they make trouble on occasion in exactly the same way. To transport them safely, the containers must be free from leaks, spots thinned by rust, nail punctures, cracks and so on, and the protecting labels, certificates, car placards, etc., provided by the Interstate Commerce Commission's regulations must be used so that those who must handle the containers may know the hazardous nature of the contents.

When return shipments of empty inflammable liquid containers are made, it is important that each opening in the container be tightly closed. Vapor always remains after the liquid has been removed, and as a considerable amount of air is usually mixed with the vapor, the empty container may be a veritable bomb if the vapors escape and chance to be ignited.

One of the striking properties of substances giving off inflammable vapors is that they are dangerous, not only when close at hand, but, under proper conditions, at a considerable distance from the source of leakage. Where large leakages occur, the vapors may drift hundreds of feet before ignition takes place, with an accompanying flash-back that, on account of its element of surprise, almost always results in serious burns for someone.

A consideration of inflammable liquids by no means exhausts our chemical means of causing a fire. We do not ordinarily look for spon-

taneous combustion among them, for this is a property possessed largely by that class of materials known as inflammable solids. Here we find the substances which, on mere contact with air, or with moisture, will ignite spontaneously, or set fire to combustible material. The most familiar, of course, is yellow or white phosphorous. This material is forbidden in express shipment, except when consigned to certain government laboratories. By freight, it must be packed in water, or dry, in airtight steel grenade bodies, to prevent the slightest contact with oxygen. Sodium or potassium sulphide, when fused, will also ignite spontaneously on contact with air. Metallic sodium and potassium have so great an affinity for water that they decompose with sufficient evolution of heat to ignite the liberated hydrogen; so these substances must always be shipped in oil in sealed bottles, in cans or in hermetically sealed cans or tight metal drums to prevent contact with moisture. Calcium phosphide and phosphoric anhydride are other typical materials which give off great heat when in contact with moisture. As it is not practicable to pack them in oil, hermetically sealed containers are a necessity.

Hazards of Calcium Carbide and Ordinary Charcoal

Though not listed by the Interstate Commerce Commission's regulations as a dangerous article, let us give a bit of heed to the humble calcium carbide, a substance in itself harmless, but giving off, even in the presence of atmospheric moisture, highly inflammable acetylene gas. A recent importation of 400 drums of this material was packed in containers of such light gage material that about 20 per cent of the drums were punctured. As the weather was damp, a great deal of gas was generated, elaborate precautions being required to avert a fire or actual explosion.

One of the commonest, most inert-seeming, and yet mysterious of materials is ordinary charcoal, which is almost unique in its peculiar bent for spontaneous combustion. Tests have been made and logical theories expounded to explain why and how spontaneous combustion is set up in charcoal, but the case is not yet fully proven. We do know from experience what precautions have been effective in preventing charcoal fires, but at times even these precautions fail, due to unforeseen variables. Long air exposure after the charcoal comes from the airtight coolers, is used to reduce the possibility of future trouble from residual fire. Even so, if a large piece of partly burned wood, or brand, or a rotted knot is in the lot, sparks may be retained through and beyond the air cooling period.

Charcoal will often ignite spontaneously if it comes in contact with a moderate amount of water. In the past 16 years our records show close to 1,000 fires in the transportation of charcoal, with nearly a third of a million dollars loss; though the causes of these fires were various and in some cases indeterminate, water in the coal played an important part in many.

One theory for the effect of water on charcoal is based on the well-known property of charcoal for absorbing a proportionately enormous volume of any gas. When the charcoal is wet, absorption of the water drives out air and other gases from the pores of the material; when the liquid begins to dry out again by ordinary evaporation, the charcoal is then left in an unstable condition and begins to reabsorb air. This absorption, involving as it does a great reduction in volume of the air, is productive of heat exactly in the same way as heat is evolved in the cylinder of a mechanical compressor. This process is most dangerous when it occurs in a confined space, so that the developed heat cannot escape, gradually rising to the ignition point of the material. Whether or not this explanation is the true one, experience has amply demonstrated the value of good ventilation in charcoal shipments, particularly those consisting of bagged or fine material.

Ignition will not take place if the charcoal is thoroughly saturated with water. On the interesting theory that the absorption of water by charcoal may be stabilized, thus preventing fires by uncontrolled absorption of moisture from the atmosphere or equivalent sources, some companies have tried wetting down the charcoal and letting it dry out again until a sort of point of equilibrium has been reached. While this method has apparently shown good results, the fire records of the Bureau of Explosives do not seem to establish a definite superiority for this method.

Oxidizing Materials Are of Two Classes

In brief, those who must use or ship charcoal will do well to see that it has been adequately aired following manufacture, that it is kept from dampness, and that it is not shipped or stored in quantities containing the full range of sizes from large lumps to dust. Lump should be separated from screenings, and these from pulverized material, always bearing in mind that the finer the size of the material, the greater its susceptibility to spontaneous heating. Fine material, though containing a greater percentage of air space, has poorer internal ventilation, greater proportionate exposed surface of the grains, and is more easily ignited by generated or externally applied heat. Very fine material should not be permitted to accumulate as dust on beams and other parts of buildings where it is stored or used, because of the possibility of so called "dust explosions."

Another type of material somewhat allied to inflammable solids is found in what are classed as oxidizing materials. While it is true that nitric acid is an oxidizing material of great effectiveness, only solids are included in the classification given in the regulations, as nitric acid is already cared for in the corrosive liquid class. Oxidizing materials are of two general types: (a) those which may decompose in the presence of water or of combustible substances, with liberation of nascent oxygen in amounts sufficient to start fire; and (b) those which, while relatively inert in themselves, will in the presence of a fire already

begun, supply oxygen enough to accelerate the existing combustion seriously.

In the first class, examples to be noted are sodium peroxides and chromic acid crystals. The second class covers nitrates, chlorates and similar materials of high oxygen content. The alkali peroxides must be packed in tight metal containers in strong wooden boxes made in accordance with the Interstate Commerce Commission's regulations, while chromic acid in any form must in addition be in glass bottles of not over five pounds capacity, having securely fastened glass stoppers, the bottles being packed in non-combustible mineral packing in the metal cans already mentioned, in the outside wooden box. While this is the only packing allowed by express, when shipped by freight, certain less elaborate packing may be used.

Requirements for Packing Nitrates Less Stringent

The requirements for packing nitrates, etc., are less stringent, especially by freight. When shipped in this manner, ammonium or sodium nitrate may even be in bulk, provided the cars are paper lined to prevent sifting. The greatest hazard of many of these materials can be obviated if fire is kept away from the container, be it a barrel or a box car. It is not so long ago that a box car took fire, evidently from a hot-box; and because of the nitrate loading, both car and lading were lost, due to the resultant intensity of the blaze.

Not all of the second class of oxidizing materials are so relatively safe as these common nitrates, however. Chlorates are known for their kinship to explosives, as they can often be decomposed by friction, or by shock of high intensity. As even a moderate heating will cause chlorates to give off free oxygen, their chemical instability is evident. It may be considered as axiomatic that chemical instability and shipping hazards go together. A slight hint of this may be found in the fact that in only five incidents involving potassium chlorate, over $54,000 damage resulted.

Thus far, the principal danger attendant upon the shipment of such materials as have been considered, is that of fire, possibly accompanied by what may in effect be regarded as explosions. We come now to another large class of commodities which have a more insidious, though frequently not less serious hazard. This group contains the poisons of all sorts, solid, liquid, or gaseous.

It may be assumed without question by some that everyone knows the danger in a poisonous substance, and that all we need do is to place a label on the poison, bearing a good large red skull and crossbones, whereupon self-preservation will prevent danger to those who must handle the package. Such an assumption is convenient, but that is all. One would imagine a dry poison like calcium cyanide to be fairly safe, as no one is likely to swallow any of it even if it leaks from the package. Consider, however, the situation of the gang of stevedores who not long ago were working in the hold of a steamer, getting out drums of calcium

cyanide. Some of the drums leaked. Calcium cyanide may give off fumes of hydrocyanic acid at a slow rate. In this instance, fifteen men required hospital treatment, though fortunately there were no fatalities.

Other dry poisons, such as calcium arsenate and the many other common materials so widely employed as insecticides, may, if loaded in a car with food products or stockfeeds, cause serious trouble if sifting or leakage occurs. A few years ago a number of horses were killed by eating feed that had been shipped in a car previously loaded with a dry poison insecticide. Recently nearly a carload of flour and feed had to be dumped because someone loaded with it fiberboard drums of arsenate of lead, and the drums were not leak-proof. While the Interstate Commerce Commission's regulations do not specify the container for such poisonous solids or liquids, they do contain proper methods of packing, described at considerable length. Fundamentally, the packages must be sift proof or leak proof, and strong enough to withstand ordinary handling without opening up anywhere.

Ordinary Poisonous Liquids Under "Class B"

Ordinary poisonous liquids, which are placed with solids under the heading of "Class B" poisons, have the same hazards as the solids, except that liquids are naturally more apt to leak than solids. Tight, strong containers, handled with reasonable care, should obviate trouble with these materials, though as an added precaution, they should not be packed with or loaded near any foodstuffs. There is one poisonous liquid, however, which deserves special mention. This is aniline oil, a liquid which has staining and contaminating powers distinctly out of the ordinary. If it leaks, its characteristic yellow stains will appear on everything nearby, and should the leakage occur in a car much work is required to clean the car, so that staining and contamination will not affect future shipments of other materials. Even though the container does not actually leak, aniline oil spilled on the outside of the drum at the time of filling will produce serious trouble. Immediately after such a drum has been filled, closed and tested for leakage, it must be thoroughly washed all over the outside. Water will do, but dilute acetic acid is much better. Similar precautions are in order before an emptied drum is shipped back to point of origin. In addition to the foregoing, a special label or marking is required on the package, giving instructions for proper closure, and for the washing precaution.

Two other classes of poisons may be shipped, "Class A," poisons of a gaseous nature or which give off vapors of which even a small amount would be dangerous to life, and "Class C," those which on contact with fire give off intensely irritant or dangerous vapors, such as tear gases. Class C poisons are mostly intended for military or police use. Common examples are, brombenzylcyanide, chloracetophenone, and diphenylchlorarsine. Such materials may be safely transported in tightly closed metal cans, or in grenades, packed in wooden boxes.

Class A poisons on the other hand, which are extremely dangerous,

must in general be shipped in special gas cylinders made in accordance with Interstate Commerce Commission's Container Specification Number 33, which covers elaborate construction and testing designed to eliminate the slightest trace of leakage. Hydrocyanic acid in gas form, or in water solution stronger than five per cent, cyanogen, carbonyl chloride, are among the Class A poisons. Two of the Class A poisons, bromacetone and clorpicrin, may also be shipped in glass bottles, not over one pound per bottle, properly closed, cushioned and packed as detailed in the Commission's regulations.

The greatest hazard attendant upon the Class A poisons is not merely their deadly nature, but the fact that, like certain snakes, they literally strike without warning. Even the characteristic bitter-almond odor of the cyanide gases is not in itself offensive or unpleasant, and some of the other materials do not even give this much warning. It is therefore unsafe to place any reliance upon the ability of anyone to recognize his danger in case of leakage of a poisonous gas, hence the ultra-careful packing is mandatory under the regulations as already described.

Important Books of Regulations Should Be Secured

We must bear in mind that limits of space and time here have made it impossible to do more than name the individual hazards of certain substances, and the general dangers peculiar to a large number of substances as a class. The essential details of the entire field are, however, concentrated in the Interstate Commerce Commission's regulations for the Safe Transportation of Explosives and Other Dangerous Articles, to which a number of references have been made. This publication, the result of a vast amount of practical experience, laboratory research, and cooperation between industry and the regulatory powers, contains packing, shipping and handling instructions which are not only intensely practical, but which are also mandatory. They must be followed by all, which is tantamount to saying that no one, shipper or carrier, can keep out of trouble unless the regulations are known, understood, and applied.

The Commission does not publish the regulations for free distribution; their most-used forms are "B. W. Dunn's Tariff Number One," and "Bureau of Explosives Pamphlet Number Nine," a compact little volume containing, with amendment supplements, more than four hundred pages. Both of these books are complete and are published by the Bureau of Explosives, 30 Vesey Street, New York, being furnished practically at the printing cost. In whatever form they may be obtained, however, every shipper of chemical materials needs to have these regulations constantly at hand. They are not only law, but are in addition a veritable mine of information on the properties and packing of every type of substance which has dangerous properties from a transportation standpoint. Interpretations of anything in the regulations not fully understood are gladly furnished by the Bureau of Explosives; the chemical laboratory of the Bureau stands ready to aid in determining the transportation hazards of materials of all sorts.

THE CHAIRMAN: The paper which Mr. Huestis has just delivered is a very interesting one indeed and the amount of damage to both property and health is very great indeed. In my own personal experience, several years ago I had occasion to see some cases of bromine that were shipped from New York to Baltimore. They were shipped in glass bottles holding about two quarts. By the time the shipment arrived in Baltimore, half the stoppers in the bottles had come loose, the bromine had evaported and half the shipment was lost.

When we stop to consider the type of labor that handles our chemicals in shipment, we can readily understand why it is so necessary to ship chemicals properly. In my own experience, I find that smaller plants where they ship only small quantities here and there are the greatest transgressors of that particular code and cause the most amount of trouble. Is that right, Mr. Huestis?

Most Large Shippers Are Thoroughly Cooperative

MR. HUESTIS: That is apt to be the case. We have very few large shippers who are not thoroughly cooperative.

THE CHAIRMAN: In that connection I believe it would be very well worth anybody's while to investigate Commerce Commission regulations. As someone remarked a while ago, you have to be a Philadelphia lawyer to go through them, nevertheless I believe it would pay anybody to investigate the Code thoroughly before shipping any dangerous or inflammable materials.

I just wondered whether Mr. Huestis could tell us anything in connection with shipping liquid ammonia and chlorine in tank cars.

MR. HUESTIS: You mean, of course, the liquid ammonia and gas. Ammonia is not covered as a dangerous article by the regulations. These gases, ammonia, liquid ammonia gas or chlorine or carbon dioxide, and various other things, may be shipped in tank cars. There is a special type known as Class 5 under the American Railway Association tank car specifications which must be used. In the regulations will be found the loading rates, as I may call it, on those gases. It was primarily in tank car shipments that you were interested?

THE CHAIRMAN: Yes.

MR. HUESTIS: You see, the Chairman's remark about the Philadelphia lawyer is well evidenced by the fact that although I have been working with this book for years I never pretend to know what is in it or where to find it. Therefore, I should think others of necessity would have to do the same.

Now, ammonia is shipped in tank cars—chlorine, for example, may be loaded at a rate of 1¼ pounds for each one pound water capacity of the tank car. If the tank car will hold 10,000 pounds of water it will be 12,500 pounds of liquid chlorine, and in the same way sulphur dioxide may be loaded—that has its own loading rate. Anhydrous ammonia is a little over half pound per water pound capacity and chlorine 1¼ and sulphur dioxide the same as chlorine, so the regulations cover all the

points. If you have a copy you can tell how much you can ship in the cylinder or tank car. But the American Railway Association specifications are to be used for such purpose; that is, a tank car that has a special shell and without the usual bottom outlet or dome cover that ordinary tank cars have.

THE CHAIRMAN: I'd like to hear from Mr. Watson in reference to shipping chemicals. I understand his firm ships quite a few chemicals throughout the year and I think he will give us some very interesting information in connection with it.

A. L. WATSON (Personnel Director, Hooker Electro-Chemical Co., Niagara Falls, N. Y.): I have nothing special to say on this subject. Mr. Huestis has just mentioned the subject of cholrine in which the industry I am connected with is chiefly interested and we, of course, comply with all the regulations in regard to shipping chlorine both in tank cars and various sized cylinders.

One of the greatest difficulties we have had in handling cylinders has been in the cylinders which are returned supposedly empty. We have had some trouble and several accidents because the returned cylinders had been used for other purposes and contained small quantities of other chemicals. When the chlorine was recharged into the cylinder, chemical reaction took place and explosions have occurred. We have overcome that difficulty by making a very thorough inspection of every cylinder which is returned from the consumer. We introduce a special small light inside the cylinder and inspect it after it has been both steamed and washed with water. For the last four years we have had no trouble along that line.

Rubber Lined Tank Cars for Shipping Muriatic Acid

We haven't run into any difficulties with our tank cars so far. They are very thoroughly inspected and cleaned after they are returned and the only other chemical which we ship in very large quantities, of this nature I mean, chemicals of the nature which you are talking about, is muriatic acid and we have rubber-lined tank cars for the shipping of that acid and they are very thoroughly inspected upon return empty and all damage to the rubber lining is repaired immediately before it is reloaded.

THE CHAIRMAN: Is there anyone else who has anything to discuss at this time? Now is a good time to bring up your problems.

G. K. NICKEL (DuPont Company, Parlin, N. J.): I'd like to ask Mr. Huestis if the I. C. C. regulations cover the placarding of empty tank cars that have contained such liquids as gasoline or other solvents?

MR. HUESTIS: I might say in that connection that there has been more correspondence through our office on the subject of placards than on almost any other one subject. Not lengthy correspondence with any one individual but exactly the same inquiry from a large number of people.

The empty tank car which has contained any dangerous article what-

soever need not be placarded in any way under the regulations as they now are. The shipper of the empty tank has the option of applying thereto a special placard saying the tank car is empty and has previously contained thus and so, but it is not necessary under the regulations. The only statement in the regulations is that placards which have been previously applied to the car on account of its contents must be removed or defaced so they can not be read or painted over before the car is shipped back as empty.

MR. NICKEL: The reason I mentioned it was that I understood there were no definite regulations. I have heard the thing discussed along various lines and my own notion is that this Chemical Section could possibly investigate and see just what if any hazard exists. It is my understanding that the speaker touched on that and said that the car must be tight. Suppose the car is not tight or the car isn't empty entirely, as is the case in lots of returned cars? Wouldn't it be well for this Section to consider that particular hazard if there is any hazard there?

The Hazard of the Empty Tank Car

MR. HUESTIS: I think, Mr. Chairman, I can add a word. There is an actual hazard in an empty tank car. There is no question about that, especially when it is not tightly closed. It is particularly evidenced in tank cars with such material as gasoline. The chlorine tank car or acid tank car usually can't be entered readily by trespassers or unauthorized persons while the car is on the road and the openings in them are usually so small that no rapid rate of leakage is possible. But in the case of tank cars which have been used for gasoline or benzol or any other similar inflammable liquid and which are provided with 15-inch dome openings in which a man can get, there is a definite hazard.

Now, we have never had a record, for example, of actual explosion of tank cars which were full of inflammable liquid, the chief reason being that if the car is full and has no air in it to cause an explosion there is no possibility of one. But if a tank car contains 50 gallons of benzol, let us say, and the rest of the contents is a mixture of benzol vapor and air, there may be a possibility of such serious trouble providing the mixture is right. Anybody that drives any kind of motor vehicle knows what that means.

There is another hazard which has nothing to do primarily with fire and that is the asphyxiation hazard of unauthorized persons getting into these cars. It is surprising how many men don't realize that in order to breath they must have air. They get into a car that is solid full of unbreathable vapor and if nobody is at hand to pull them out it is the last of them.

I might cite a case that happened last year in the south where two tank cars, one of which had contained gasoline which is listed by the regulations as a dangerous article and kerosene which is not on account of its higher flash point, were in the railroad yard and apparently the

dome covers had not been screwed down tight. Anyway three boys came into the railroad yard and started to play around and got on the tank cars and found the dome covers could be removed, took them off and looked inside and they decided to climb in. Two climbed in one tank and the other in a spirit of fun laid the dome cover back on top of the tank. Then, not realizing what he had done, he proceeded over to the other tank and climbed in himself. Hours went by and night came and the parents missed them. A search was instituted and some small boy who was related, I think, to the Yard Master, remembered having seen the boys playing around the tank cars. They investigated and the two boys were found in one and the other boy in the other. It just so happened they hadn't been in long enough to be completely asphyxiated and subsequently recovered.

This Peculiar Accident Proved Fatal

That is not the principal feature of this one accident. In getting out one of the boys from the gasoline tank a man went down into the car. They were working, I might say, by the aid of a pocket flashlight and put a rope around him and hauled the boy out. Then it came time to get the man out. Of course, the man was beginning to be under the influence of the vapors himself. Just then the man who had the flashlight up above at the dome dropped it into the car in his excitement. Somebody on the ground in spite of the obvious hazard of doing so took up a lighted lantern and held it over the dome so they could see. The resulting explosion of vapors killed the man in the tank car and injured seven or eight around the dome badly. That one case which is unfortunately only one of a considerable number shows there is a definite hazard about an empty tank car.

MR. WHITING: I would like to inquire, Mr. Chairman, whether all the chemical experts here today who are responsible for safety in the plants are getting these Bureau of Explosives bulletins? How much will it cost to be on the mailing list; $1 or $2 a year?

MR. HUESTIS: They certainly ought to be if they are not. The bulletins I believe cost the enormous sum of two cents apiece.

MR. WHITING: You men can be on the mailing list if you spend a few dollars and I think you are missing a bet if you are not getting these bulletins as issued and turning them over to the foreman or whoever is in charge of the materials handled. Otherwise you may wake up with a bad accident at your own plant such as Mr. Huestis mentioned and such as has happened elsewhere. The Bureau bulletins are very valuable in keeping your men alive to tank car dangers.

MR. HUESTIS: I don't want to be accused of being an advertising or sales agent for the bulletins but I may say they are written primarily for the railroad employee but contain information just as good for plant employees in the chemical industries, and at the present time some 85,000 copies of this bulletin every three months are printed and distributed to the railroad companies who send them out to their station men, their yard men, freight train conductors, etc., who are supposed

to read and take heed. It might be a good idea if any of you who represent large industries having a number of plants to make some distribution of those bulletins in the suggested way because they are written not for the superintendent or president of the concern but for the man who handles the stuff.

THE CHAIRMAN: In connection with this topic I wonder if Mr. Nickel could give us any idea as to what a committee, if appointed, could do in the way of eliminating any future accidents connected with empty cars? You said an investigation by the Council—I wondered what suggestions you had along that line.

MR. NICKEL: My own suggestion was that probably the information could be circulated through the Council to bring out the hazard, the ultimate goal being the placarding of the empty containers, or tank cars. We can all realize that such practice would not cost much and it might save any number of serious accidents. I think that placarding is the ultimate goal.

Discussion on the Labeling of Empty Tank Cars

MR. RIEDERER: If I am not mistaken, in years gone by, acid tank cars had to be placarded "ACID" and the acid placard stayed on until the tank was absolutely cleaned out and steamed out until there was no acid in the car. That has been changed today and when the acid tank car is unloaded, so-called, the acid label is removed. I believe that the Bureau, if I am not in error, made a mistake in getting away from the old system. The unloaded tank car is not empty—I don't believe you will find five per cent of such tank cars which you could call empty. There may be anywhere from 10 to 50 pounds residue, in winter time, of acid contained in the car and the car is certainly not empty although the consignee returns the car empty. I can't understand why that label or placard "ACID" is taken off simply because the receiver claims it is empty. He may not have taken the dome cover off to learn if there may be a little acid left. I recall in about 1900 or 1901 that one chemical company was monkeying around a tank car and a man used a hammer on it. There was a spark and that was the last of two men. Now, in my estimation, unless a tank car is washed out and thoroughly cleaned and a person can go in the car, it is not empty. Certainly not if it contained nitric acid and mixed acid and I don't agree with Colonel Dunn changing the regulation.

THE CHAIRMAN: Have you anything to say in connection with that, Mr. Heustis?

MR. HUESTIS: I am not in a position to give an opinion for the Bureau on empty car handling. I may say that the Bureau of Explosives in the first place is not a government body although it has certain functions assigned to it by an Act of Congress, peculiarly enough. The Bureau is primarily supported by the railroad companies, certain steamship companies and express companies and certain industrial organizations of which Mr. Riederer's company is one.

The regulations were made up as far as possible in cooperation with the industries and, therefore, in order to have anything incorporated in the regulations it was necessary to enlist the cooperation of the industries as far as possible. Now, whatever the opinion may be in the Bureau as to the advisability or inadvisability of placarding empty cars, the regulations are as they now are because a majority vote of the greatest number of people who had to do with the matter was in opposition thereto. However, that doesn't mean that the situation is as fixed as the laws. If a sufficient amount of interest were aroused by all concerned to reverse that vote it would be reversed. The Bureau simply wants to arrive at the conclusion which appears by majority vote to be the most reasonable.

MR. RIEDERER: Mr. Huestis, wasn't that partly due to the tariff charges, that is, so they wouldn't charge for return acid instead of empty cars? Wouldn't that have something to do with it? The Bureau and the shippers got together and called return tank cars empty and forgot the safety feature.

Important United States Bureau of Mines Papers

MR. HUESTIS: That is only one of the points. Another important point is that a large number of shippers objected to the expense and trouble of applying these placards. I think that is to be considered.

A. L. THOMAS (Service Superintendent, DuPont Co., Wilmington, Del.): Wasn't it also due to the shippers objecting to washing the cars with water and weakening the iron?

MR. RIEDERER: You simply had to mark them empty. If the tank car wasn't empty the acid card stayed on it. You didn't have to wash it out before you returned it but the acid placard stayed on. Don't you remember, we had it painted on so you wouldn't have to tack it on every time and rip it off; so we had it painted on and wrote on it with pencil, "Empty." Now, when the tank car is blown out it hasn't any label at all and they do ship glycerine in tank cars now, too. You have to be mighty careful you don't get any acid in a glycerine tank.

MR. HUESTIS: As for my personal ability to make any comments on the condition, it was brought about before my time and I am not acquainted with the history of it.

THE CHAIRMAN: In connection with this discussion, Mr. Rice has tendered me a copy of instructions for unloading cars at their plant. Mr. Rice has kindly consented to let anyone who is interested have a copy.

Has anyone else anything to suggest or say in connection with this paper of Mr. Huestis?

HAROLD J. SEGRAVE (Mine Safety Appliances Co., Pittsburgh, Pa.): In connection with the question of tank cars containing gasoline and petroleum vapors possibly or residual amounts of petroleum or gasoline, it might be interesting to some folks in this Section who don't get the publications of the United States Bureau of Mines to know there are

two papers which contain considerable information about tanks and the toxicity of petroleum vapors. One, I believe, is a technical paper, No. 348, and the other is technical paper No. 352, both of the United States Bureau of Mines. Those papers will give more information, of course, than my comments could and you can easily send for them.

THE CHAIRMAN: In the Petroleum Section, I think, we can secure some papers delivered during this Congress having very valuable information concerning tank cars. They usually have a vigorous discussion on tank cars containing inflammable oils and liquids.

Owing to the absence of Dr. Fetzer I have secured a man who is familiar with respirators and gas masks. Although we have a discussion on that tomorrow and a paper by Mr. S. H. Katz on "Filtering Efficiencies of Dust Respirators and Gas Masks," I think Mr. Segrave can give us some very valuable information at this time.

TYPES OF GAS MASKS AND RESPIRATORS

Harold J. Segrave, Mine Safety Appliances Co., Pittsburgh, Pa.

Gas masks and respiratory protections can really be divided into four groups. The first group, self-contained oxygen breathing apparatus; the second group, gas masks of the filtration and canister types; third, fresh air apparatus such as hose type gas masks; and the fourth, respirators, so-called, in which we class all mechanical filters.

Self-contained oxygen breathing apparatus is a device which entirely eliminates the outside air. The apparatus as used nowadays consists of a supply of oxygen under pressure, a breathing bag from which and into which the wearer breathes and a regenerating cartridge. This regenerating cartridge is designed to hold a chemical substance which will remove the carbon-dioxide from exhaled breath. This apparatus is entirely free of outside conditions, insofar as protection to the respiratory system is concerned provided the apparatus is properly designed for the exposure.

I might explain that last statement by the fact that the exposure of a man with an oxygen breathing apparatus having rubber parts that will not keep out the substance to which he is exposed, such as benzol or gasoline, is a very hazardous apparatus even in the hands of an expert, which is evidenced by Mr. Daniels' going into a tank containing a few inches of gasoline to rescue a man who had been overcome. He dipped the breathing bag of his apparatus, which was made of a rubberized fabric, into the gasoline, the breathing bag became porous, he had gasoline filtering through the bag into his supply of air and oxygen, and due to the fact he was breathing through his mouth had no means of detecting the gasoline vapors by smell and he inhaled enough gasoline vapors to kill him and that is one of several cases.

The self-contained oxygen breathing apparatus, as I say, is free from outside conditions insofar as respiratory protection is concerned. The apparatus is heavy and cumbersome due to the fact you must have a

high pressure cylinder of oxygen with it. But when it is right it is safe in every gas.

The second class is gas masks of the canister type and in that class we include all types of the filter type which include chemical protection. Needless to say, the greatest demonstration of what gas masks of this type could do was during the World War where we had gas hazards in profusion and the gas masks as provided did a very good job. Since the war, gas masks have been adapted to industry, fire fighting work and are very widely used, indeed. Gas masks of the canister type, however, depend for their oxygen upon the outside air. That is, they do not add anything to the air that is breathed through the canister so that the first limitation of a gas mask is that there must be enough oxygen in the outside air to support life.

Another limitation is the length of life of the canister in the concentration of gas encountered and, of course, it depends also upon the breathing rate of the wearer. These are fundamental principles which do not have to be explained more fully. Gas masks are very widely used particularly in your industry.

The Third Class of Respiratory Protection

The third class of respiratory protection is the hose type gas mask. In the hose type gas mask we have an individual ventilation, let us call it, from a remote place where there is fresh air. Air is either drawn or blown through a hose into a mask and as long as the mask is tight and the remote end of the hose is kept in fresh air why the wearer is absolutely safe from the gases entering. Of course, the hose mask is limited to some extent by its cumbersomeness, by the length of hose you can use and by the tendency of the wearer of a hose mask, particularly of the blower type, to apply it in a very careless manner.

Now, I have been in contact with the illuminating gas industry for a great many years and nine out of 10 men, talking about gas masks, will say, "I like the hose mask because you can apply it to the gas and it doesn't make any difference whether it is tight or not as long as you have air going through." And that statement "as long as it doesn't make any difference whether it is tight or not" is where we find most of the accidents. The gas mask of the hose type should be applied properly, whether you are going to draw air in by the suction of the wearer or blow air in, because there are so many things that could happen to a person operating a blower that wouldn't have anything to do with the man wearing the gas mask.

Let us say, a man is working in a tank, another man is operating the blower and blowing air to him through a hose type gas mask, and somebody else says he needs a new broom or a new shovel or different type of shovel to shovel up that muck he is in—"go and get it." Well, the man operating the blower, knowing if he stops the blower the man can draw air through the hose, might stop turning the blower and go for the other shovel. It only takes a short while. But meanwhile if

the mask isn't properly applied the air the man is breathing will come from the place of least resistance and will go through the leaks around the gas mask face piece, and all this can be obviated by a very small amount of instruction and care.

The fourth type of respiratory protection, respirators, is the mechanical filtration type and there has been such a number of discussions in this Section on that subject I think it is needless for me to try to call on my small experience to give you any more on it. Moreover, I believe that Dr. Katz, of the Bureau of Mines, has made an extensive research into that and his paper tomorrow will probably give you the latest and best information along that line. I won't say anything further here except that respiratory protection of the mechanical filter type usually is made just as light as possible, to cover the nose and mouth. A man will not wear a full face piece in a job where he has to wear it all day.

In my opinion, whenever we have a job that is hazardous from a gas or corrosive dust problem and we allow a man to wear a respiratory protection which covers merely his nose and mouth, we are admitting a compromise between the efficiency of an apparatus and safety. I have observed that whenever you place any respirator over the nose and mouth any motion on the face is always relative to the respirator. Any twisting of the face, any talking is always a motion of the respirator relative to the face. That is mostly where these respirators fail, from my observation. Whenever we have really a lethal atmosphere to enter, therefore, I am uncompromising in the recommendation of a full face mask which will not move relative to the face.

Hydrogen Sulphide in the Petroleum Industry

I have an instance in mind, in the petroleum industry. Hydrogen sulphide, as you know, is very deadly. Men gauging the amounts of oil in tanks have been overcome over the manholes in tanks so that at least one company has instituted the practice of having tank gaugers on their rounds take a watcher with them. In other words, two men to do the work that one man could easily do, and they want to get rid of the second man naturally.

They are going to attempt to do away with the second man by providing respiratory protection in the form of a gas mask. But these men have to climb up and down stairs at night, be on the tops of tanks in all kinds of weather, and if they were to wear a full face mask their vision would be cut down and they sometimes gauge 30 or 40 tanks an hour, which involves considerable running around in a dark yard. Now there they are introducing another hazard. The men won't wear a full face piece. They either have to err a little along the lines of safety and give the men something they will wear or else continue with the watcher. Now, we have taken a respirator face piece and placed it on a mask, giving the men additional instruction in the use of the mask, and they are going ahead and using it for this tank gauging proposition.

A question was asked me recently by a fireman as to what was the

best apparatus, He wanted me to say that an oxygen apparatus was the best. So I thought a moment and I said: "Well, the best way I can answer that is, what is the condition?" He said: "All the conditions." I said: "There is no best apparatus for all conditions. Each condition must be looked upon and judged by itself, and the apparatus be chosen to take care of the condition."

It is just like a pair of goggles. You can get a pair of goggles that are made out of boiler plate and if you have port hole glasses in them no one will wear them. They are a protection but no one will wear them. But if you get a pair of goggles that give 95 per cent protection and the men will wear them because they are comfortable and light and they get 95 per cent protection, why we have a fair amount of exposure protected against. So that we must look upon each condition as a separate one and provide the equipment for that condition.

A New Type of Rubber for Gas Masks

THE CHAIRMAN: This question of gas masks and respirators has quite a bit of attention every year at this meeting and we learn something every time it is discussed. There is no question they are valuable in the chemical industries and such industries as the petroleum industry and they serve their purpose very well.

This concludes our morning program.

I will ask the chairman of the Nominating Committee to have his report by tomorrow.

Is there anything else in connection with any of the papers discussed this morning that you would like to take up right now?

MR. SEGRAVE: Mr. Chairman, last year you folks as usual gave the manufacturers an opportunity to show anything new they have and there was a little discussion about rubber used in gas masks. Our company didn't stop at what we knew then. We have gone further and we have a new rubber for gas masks which we feel is the latest and best and I know a great many of you folks are interested in that phase. I'd be very glad to go into that question in detail with anyone after the meeting or over at our booth.

Another thing, we have something new here. Mr. Lewis asked me to bring it over. Here is one of our compromises between efficiency and what a person will wear in the nature of a paint spray mask to take care of the solvents used in paint spray and I wish everyone would have an opportunity to see it.

THE CHAIRMAN: I think you can go right now into detail. I think there are members here that would like to hear about the new respirators and masks that you have.

MR. SEGRAVE: This is a paint sprayer respirator with a valve such as is used on the Army mask. But in paint spraying work the use of a mechanical filter falls short in that it doesn't give a protection against the solvents; it does the liquids but not the solvents. They are usually volatile and do give considerable trouble. We have a small canister

here which we fill with activated charcoal, but it is refillable and there is a filter at the bottom and top of the canister. The bottom filter can be replaced more frequently and the chemical content can be replaced as needed as the fumes start to go through. It is the old style nose respirator but a little better shape than the average one we think.

MR. KEPNER: What is the weight?

MR. SEGRAVE: I am a poor guesser. It is made out of copper. And it is used because we can't expect a workman doing that work to wear a full face piece.

MR. KEPNER: I'd like to say we have been using the large type bag covers for spray paint and we found so much trouble with them on account of the paint getting in the face piece that I think this would be a dandy thing. Can you get refills for those?

MR. SEGRAVE: Yes, you refill them yourself.

This rubber that we use in gas masks has been taken up with the best authorities we could find on the subject. I believe our Pittsburgh office has worked in close cooperation with the Chemical Warfare Service and others and we have a rubber here that is a little better, if anything, than the face piece rubber in the 1917 or 1918 type moulded rubber mask. Probably some of you know a good many of those masks are still in use and are giving good service. This rubber is at least as good as that and we think better. But we are still making the Cox type face piece so we lose none of the flexibility or fit that we had in the Cox type headpiece. We use a black rubber because that was recommended to us as being better protection against light and heat—they are enemies of rubber.

The Fit of the Gas Mask the First Consideration

We also used a stockingette on the outside to keep the light off. We have used as many precautions as possible and we feel we have a face piece rubber now that will please everyone.

The rest of the mask is the all-service gas mask that has been spoken of so much that I won't say anything further about it now.

MR. KEPNER: I'd like to know what the experience has been of the members with the stockingette on the outside. We used the stockingette type just referred to and we would get bleach on it or acid and this puts our gas masks on the bum in a short time. So the Mine Safety Appliance Co. very kindly made an all-rubber mask but we found in that type the head piece tears out. We are now back to the stockingette type again. I wonder what experience some of you boys might have had with your gas masks.

THE CHAIRMAN: The latest practice I think now is to impregnate the stockingette right into the rubber. It is almost an impossibility for the stockingette to come off any more. It is impregnated right into the rubber. I don't think you will find trouble in practice with the latest type face piece now being used.

MR. SEGRAVE: I might say, Mr. Chairman, the question of elastic

headbands is a very live question. If we could have a moulded rubber headband of just plain rubber we would do away with a lot of troubles as far as the corrosion and loss of headbands is involved. But when we use a moulded rubber headband, so far as we know now, it is very uncomfortable to wear and it does not give the necessary resiliency to give you a tight fit. You will all agree in the last analysis the fit of the gas mask is the first consideration; even if we have to change the headbands every two weeks. Let us have one that the men will wear and one that will fit. We are more anxious than any of you folks to get something of that kind and we are working on it continually. I hope I will have something at the next meeting possibly that will give us something better on that.

ADJOURNMENT

WEDNESDAY MORNING SESSION

October 27, 1926

The Wednesday morning session, October 27, of the Chemical Section of the National Safety Council, was held in the Henry II Room, Statler Hotel, Detroit, Mich., and convened at 9:50 o'clock. Mr. J. L. Kistner, Elliott Service Company, Chicago, Ill., presiding, and Mr. C. E. Rice, Director of Health and Safety, The Dow Chemical Company, Midland, Mich., acting as secretary.

THE CHAIRMAN: The first topic on our program is a paper by Mr. S. H. Katz, Associate Physical Chemist, Experiment Station, U. S. Bureau of Mines, Pittsburgh, Pa. Mr. Katz has been unable to get to the meeting and in his place he has sent Mr. J. J. Forbes who is Supervising Engineer. Mr. Forbes will give us the paper as Mr. Katz has outlined and any further information that we may require.

Mr. Forbes will show a few slides in connection with his paper.

I wish as many of you men as possible could stay for the round table discussion this morning since we hope to take your problems one after the other and try to reach a definite conclusion in reference to them. You are here for the purpose of obtaining specific information that is going to help you to eliminate certain problems in your particular industry and we hope this morning in this round table discussion to thoroughly thrash out those problems.

I have received a telegram from Dr. Greenberg, who is chairman of our Program Committee, stating that he would be unable to attend. Dr. Greenberg has accomplished some very excellent results in preparing the program for this Section this year, and I regret very much that he is unable to attend. He is one of our very active workers in the Section and his absence is greatly missed.

I take great pleasure now in introducing Mr. J. J. Forbes of the Bureau of Mines.

J. J. FORBES (U. S. Bureau of Mines, Pittsburgh, Pa.): Mr. chairman and gentlemen: I regret that Mr. Katz was unable to be here and as I am the only one from the Bureau of Mines coming to the National Safety Council Congress he asked me to present his paper for him. I don't profess to know very much about his subject but I will very gladly present the slides and read his paper to you and if you have any further questions in connection with Dust Respirators, if you will refer your questions or inquiries to Mr. Katz or let me have them before we leave here, we will see you are cleared up on them.

In addition, if you live near Pittsburgh or have occasion to stop in Pittsburgh, if you will come over to the Experiment Station I know Mr. Katz will be glad to clear up any questions. The paper is to be

published in the technical journals and also by the Bureau as a report on a technical investigation.

It might be interesting to tell some of you gentlemen that last June or July Congress passed a bill appropriating $2,000 for convention expenses for the Bureau of Mines. There are 20 sections in the Bureau. Each one of those sections got $100. Our Chemical Section's funds were used up six months ago. Hence the reason that Mr. Katz could not get here. It is regrettable but I am sure you will understand the situation. I am the only one coming to the Congress and I have three papers to read for various men in the Bureau.

FILTERING EFFICIENCIES OF DUST RESPIRATORS AND GAS MASKS*

S. H. Katz, E. G. Meiter, and G. W. Smith, Experiment Station, U. S. Bureau of Mines, Pittsburgh, Pa.

Dust respirators or filters to prevent inhalation of dust have been used in various forms for generations. Of course, it is best to prevent the formation of dust or remove it at its source before it arises into the air, but this is not always practicable and in some dusty processes the means for satisfactorily removing the dust is yet to be developed. The next expedient is the use of respirators, and, though the respirators have been imperfect, such protection as they do afford is beneficial.

The principal disadvantage of respirators is the discomfort to the wearers. A source of considerable annoyance in many types of respirators has been the resistance to air flow, as this imposes extra effort in breathing and may become excessive. Other discomforts may become pronounced, such as pressure at the edges in contact with the face; heat due to the face cover; the warm, humid exhaled air in contact with the face; and the prevention of cooling evaporation and radiation. In cold weather the heat effects are not discomforting. It is annoying if much exhaled air is trapped and rebreathed. Some respirators fit the face so poorly that much of the air is inhaled through openings between face and respirator without removing the dust. Ineffective check valves may permit breathing unfiltered air. However, despite the lack of perfection in any one type of respirator, the respirators on the whole have been of much value.

In the development of gas masks for industry at the Bureau of Mines, gas-mask canisters were made with two filters of cotton wool each ⅛ to ¼ inch thick between wire screens. These were found to give good protection against smokes such as those produced by ordinary fires in carbonaceous matter[1], wood, coal, cotton, paper, and the like. The fire-

[1]Fieldner, A. C., Katz, S. H., and Kinney, S. P. Gas masks for gases in fighting fires; Tech. Paper 248, Bureau of Mines, 1921, 61 pp.

*Published by permission of the Director of the Bureau of Mines.

man's gas mask[2] requires only the two cotton filters to protect against smokes so dense that the hand is invisible before the face (the cotton-wool filters do not stop passage of the gases or vapors; chemical absorbents are needed for them.) Laboratory measurements of the filtering efficiency of the canisters by the tobacco smoke method showed that only 50 per cent efficiency against tobacco smoke was sufficient as a filter test for gas masks that give good protection in general industrial

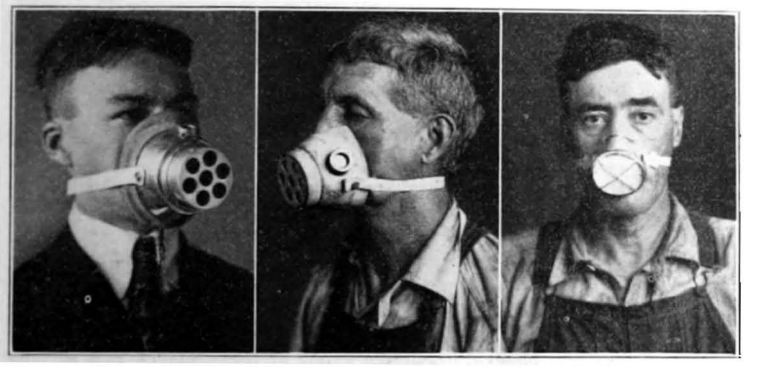


Plate I *Plate II* *Plate III*

use. Gas masks of this filter specification have often been used successfully for protection from very dense suspensoids in air or from those somewhat difficult to arrest, but they are too heavy and cumbersome for general or continuous use as dust respirators. For that reason attention was turned to the simpler and lighter dust respirators.

This paper describes some of the popular forms of dust respirators on the market; some results (Tables 2 and 3) of laboratory tests of the respirators are given, including filtering efficiencies against tobacco smoke and air-floated silica dust.

It is beyond the scope of this paper to describe more than a few typical respirators and to give their filtering efficiencies as determined by the laboratory tests. For this purpose representative types found in industry have been selected.

Respirators With Sponge Filters

Plate I shows a respirator with inclosed sponge filter. The body or frame is of sheet aluminum held in position by an adjustable band around the head. A pneumatic rubber cushion edge is in contact with the face; on the upper side is a metal disc check valve for passing out

[2] Katz, S. H., Bloomfield, J. J. and Fieldner, A. C. The Universal and the fireman's gas masks; Tech. Paper 300, Bureau of Mines, 1923, 22 pp.
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the exhaled air. The seven holes in the frame front are backed by a bronze-wire screen filter of fine mesh, and the sponge is stuffed into a pocket behind the screen so that it fits the pocket closely. The sponge may be wet if desired. The wet sponge can absorb small quantities of water-soluble gases such as ammonia or hydrochloric acid gas. However, the gas-absorbing properties of the small amount of water are so light, even in case of the favorable gases mentioned, that the respirator is in no sense a substitute for a gas mask.

Plate II shows a respirator of similar construction but molded of white rubber. The holes are backed by a gauze filter cloth sewed to a rubber ring. A sponge is held in the pocket behind the cloth. The edges of the rubber body itself lie against the face. The entire respirator may be washed in water or disinfectants without corroding.

Respirators With Paper Filters

Plate III shows a dust respirator which is fairly widely used. The body is made of molded white rubber with thin edges formed to lie parallel against the face. At the outer end is an adapter of sheet aluminum which crimps and binds a circular filter paper over an aluminum edge. An arch of stiff metal wire is attached to the rubber body in position over the bridge of the nose. The wire may be shaped by bending so as to grip the nose and conform the respirator into the contours between the nose and cheeks. Leakage of air at these places is a serious defect of many respirators. The filter paper is made of cotton fiber, loose in texture. There is no exhale valve on this respirator; the breath passes outward through the filter as well as inward. However, these respirators are made with exhale valves if desired.

Plate IV shows another respirator with paper filter. The body is of sheet aluminum with pneumatic rubber cushion adjacent to the face. The exhale valve is mica-disc type. The front has a brass wire screen in an adapter of aluminum. The paper filter is crimped over the circular edge of the frame by the adapter; this paper is gauzy, spruce-pulp tissue, and 4 to 10 thicknesses are used for a filter.

Respirators With Felt Filters

Plate V shows a respirator employing a felt filter. It has a sheet aluminum body and pneumatic rubber face cushion similar to those described. An exhale valve of rubber is attached at the lower side. The felt filters 6.4 cm. (2½ inches) diameter and about 4 mm. (3/16 inches) thick, are of cotton and wool mixture of loose texture. The felt is placed between two fine wire, close mesh, circular bronze screens which spring into the circular channel. The felt filters are to be changed when resistance to air flow increases through clogging with dust.

The respirators so far described are all similar in design but Plate VI shows a British make of respirator which introduces new principles. The body or frame work is a woolen felt about 6 mm. (¼ inch) thick. It is lined with a rubberized cloth to prevent the moisture-laden exhalations from wetting the felt cover. The inhaled air passes through the

felt to the space between felt and rubberized lining and then through a check valve (rubber-disc type) to the nostrils. Another similar check valve passes the exhalations out. A strip of lead metal is inclosed in a piece of fabric sewed to the respirator at position over the bridge of the nose. The lead may be modeled to fit the respirator closely to the lines of the face. This respirator provides a broader filtering area than those described, and resistance to breathing is accordingly reduced and



Plate IV *Plate V* *Plate VI*

clogging is also less rapid. The filter on this respirator can not be changed; if it becomes clogged it must be cleaned by heating, by vacuum cleaning, or by blowing air through it. The respirator covers only the mouth and nose and is called a "half mask."

Plate VII shows a "full mask" dust respirator made in England; it employs the same principle as that just described. The filtering surface is a loose woolen felt about 6 mm. (¼ inch) thick lined with a rubber sheeting (two layers of rubber with cloth vulcanized between) about 2.5 mm. (1/10 inch thickness). The air filters into the space between felt and rubber sheet, then passes through two rubber-disc check valves, one under each eyepiece, and to the nostrils. Exhalations are discharged through a "square" rubber check valve inclosed in the sheet-metal snout. This respirator covers and protects the eyes as well as the respiratory organs, plane glass eyepieces similar to those in a Tissot gas-mask face-piece are set into the respirator; in fact, the entire construction of face-piece and head straps is similar to that of Tissot-type gas masks. The full-mask respirator has a larger filtering surface than any of those described, and clogging is accordingly slower.

Plate VIII shows a respirator with cloth filters. The body is made of pyroxylin fabrikoid, impervious to air. The central portion of the fabrikoid is cut away and the filtering medium is sewed into its place. The filter consists of an outer layer of fine silk gauze and then three layers of cheese cloth. The outer edge of the fabrikoid is bound with tape, and

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at the position of the nose bridge is an extra tape inclosing a wire for bending to conform the respirator to the face.

Plate IX shows a cone-shaped respirator formed of fly screen, with a covering of two layers of cotton flannel. The flannel is bound over the basal edge of the screen and forms the contact with the face. Inhalation and exhalation pass through the flannel filter. The respirator may



Plate VII *Plate VIII* *Plate IX*

be conformed somewhat to the face by bending the screening. It presents its entire outer area for filter action.

Plate X shows a simple respirator of absorbent cotton quilted between two layers of cheese cloth. The makers designed this respirator primarily for use of painters who employ the air brush for spraying paint. The fabric material is gathered above the bridge of the nose to form a sort of nose-fitting pouch. About 5 grams of charcoal granules are sprinkled into the cotton wool for the purpose of absorbing the vapors of paint solvents, but the amount is insufficient and the spacing becomes too irregular to be of much value. These respirators are comparatively cheap and designed to be thrown away when soiled.

Plate XI shows a home-made respirator sent to the writers by an official of a large white-lead manufacturing company. It is made of 6 layers of cheese cloth by folding a strip 0.45 by 2.4 meters (1½ by 6 feet) into 6 layers; the upper edge is turned over 4 times, making a somewhat thick fold. The fold is then cut in two at the center and cut away from the upper edge for a distance about 18 mm. (¾ inch) on each side of the center. The severed parts are tucked under the adjacent folds and themselves are then gathered above and over toward the center, forming single pleats. The bunched folds or pads thus formed fit into the depressions on each side of the nose. A cotton tape 1 inch wide by 5½ feet long is sewed over the folded edge and all the folds are sewed into place by simple stitching. The correspondent who sent it says:

"In many years of endeavor to prevent dust reaching the nose and

mouth of our employees, we have experimented with most every kind of respirator. We have found that all are more or less unsatisfactory, because, when a respirator is successful in preventing dust reaching the nose and mouth—the respiration becomes so difficult that the men will not wear them. We have arranged one for our men that has been more satisfactory than any we have ever used. The two pads at the top of the

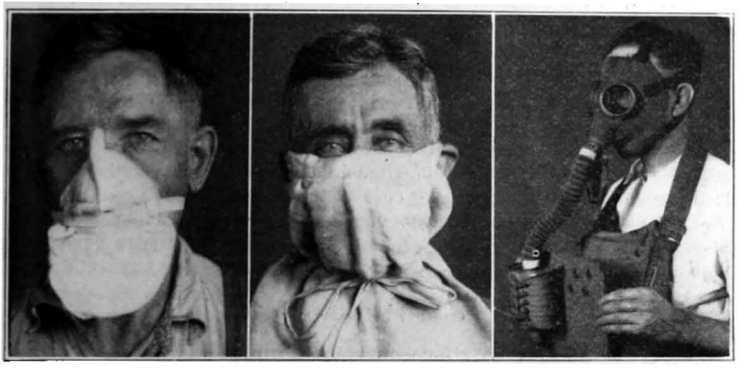


Plate X *Plate XI* *Plate XII*

respirator go, one each side of the nose. The tapes are carried around the head over the ears across the back of the neck and come forward and are tied under the chin. Pull the lower part of the apron to the right and left as far as it will go and the six layers of cheese cloth make a very satisfactory filter material, the large number of square inches of surface enable the working men to breathe with comfort. After a man has worn this for a short time and the material becomes saturated with moisture from his breath, it becomes a very satisfactory respirator. At any rate, our men seem to prefer it to any other and it has been very successful with us."

Another home-made respirator is described by the Department of Labor of the State of New York[3] as follows:

"This home-made respirator consists merely of ½ ounce of clean absorbent cotton pinned or otherwise fastened to a piece 5 inches wide of cheese cloth, or of coarsely woven muslin, and of sufficient length, about 33 inches, to tie about the head, or of a length if preferred to cover nose and mouth thoroughly, 7 or 8 inches, to which is attached tape, which can be fastened at back of head, and all dust is filtered out for a period of 4 hours or more. The absorbent cotton of the respirator should be covered with a small piece of muslin or cheese cloth to prevent particles of fire touching the lips or tongue of the operator wearing it; the total weight should be about 2/3 ounce.

[3]Anon. A simple and inexpensive respirator for dust protection: State of New York, Department of Labor, Special Bull. No. 90, Dec. 1915.

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"The tests conducted by the Division of Inspection as to the efficiency in filtering out and excluding dust by the use of absorbent cotton or clean cotton waste, covered periods of 4 hours each. Dust laden air containing a basic lead salt was drawn through the filtrating media of a respirator constructed as described, at a rate equal to the amount of air breathed by an average individual (about 15.6 cubic feet per hour). Careful analytical tests revealed no lead drawn through the filtrating material of the respirator.

"Respirators thus constructed are cheap, light in weight, do not obstruct vision, can be changed daily at little cost and be washed when necessary. There is less incentive for a workman to appropriate the respirator of another. They neither break, rust or wear out. They cause no excessive perspiration and absorb what is produced; cause no irritation of the cheeks, nose and chin, and can be more readily arranged to fit the face than the patented types. It is recommended on account of the properties possessed by this form of respirator and superiority described that this type be accepted in compliance with Rule 722 of the Industrial Code of the Labor Law of New York State."

Fogler Flat Felt Filter

During the World War, intensive thought, talent, and energy of numerous trained investigators was devoted to the problem of protecting soldiers, not only from gases but also from military suspensoids—minute solid or liquid particles distributed in the air as dust or mist clouds. A notably effective protective device developed at American University, Washington, D. C., first under direction of the U. S. Bureau of Mines and later under Chemical Warfare Service, is the Fogler flat-felt filter. Plate XII shows the filter together with an attached gas-mask canister and facepiece. The haversack that hangs from the neck of the wearer carries the filter and canister which are shown on the outside for purposes of illustration. While these highly efficient filters were not required by the troops, many were made and held in readiness. Later, some of them found their way into industry together with other army gas masks of well-known types[5].

The Fogler flat-felt filter consists of two rectangular pieces of specially dense woolen felt about 21.5 by 24.1 cm. (8½ by 9½ inches) by 3 mm. (⅛ inch) thick, with a crimped-wire screen separator, of slightly smaller dimensions, between. On the outside of the felts are two similar crimped screens and both of these are covered with canvas. The fabric and felt edges are all thoroughly rubberized and vulcanized together. Each canvas side is perforated by 5 holes 1 cm. (0.39 inch) diameter. A tube about 2.54 cm. (1 inch) diameter passed through one canvas and one felt, connects with the central space between the felts. The air filtering passes through the canvas or its perforations, then filters

[4]Major B. B. Fogler, in charge of Mechanical Research Section at American University, 1917 to 1919, which developed the Fogler flat-felt filter.

[5]Fieldner, A. C., Katz, S. H. and Kinney, S. P. Gas masks for gases met in fighting fires. Tech. Paper 248, Bureau of Mines, 1921, 71 pp

through the felt to the central space, passes through the exit tube to a canister attached and containing activated charcoal or other gas absorbents and then goes to the mask for breathing. If protection from dusts only is required, the canister is omitted.

The large filtering area of the Fogler flat-felt filter permits breathing through the highly efficient filter without excessive resistance to flow of air or rapid clogging. The Fogler filter is the most effective so far employed in industry for retaining the very finest suspensoids.



Plate XIII

Gas Masks With Filters

The U. S. Army gas masks used during the World War had canisters containing about 600 c.c. of mixed, granular, activated charcoal and soda-lime, and two filters of cotton wool ¼ inch thick between wire screens. These were effective in removing not only the military gases but also the suspensoids of fine dusts and mists of poisonous or asphyxiating solid and liquid particles distributed into the air by explosives. For instance, the so-called "squeeze gas," diphenyl chlorasine, is a crystalline solid without appreciable vapor. It was dispersed as minute solid particles through the air by explosive charges in the shells carrying sneeze gas. The two cotton-wool filters in the canisters were effective protection.

Masks similar to the army gas mask are now much used in industry to protect against ordinary smokes such as wood smoke[6], and they have been used successfully by painters using the air brush in especially difficult places.

Plate XIII shows a painting job where gas masks were employed. A large 5-story building was filled with bins for storage of pipe fittings. Painting the bins was difficult because of their depth, about 3 feet, and often small cross sections; for this reason the spray gun was used. The men had to work with their faces close to the bin openings and inhaled some paint spray and vapors of the solvents. They soon became sick. Gas masks were obtained and two other men working alternately in half-hour shifts finished the entire job without ill effects.

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The gas masks had canisters as shown in Figure 1. The granular filling is activated charcoal, 8 to 14-mesh size, which is the best absorbent for the vapors of benzene, turpentine, and other paint solvents. The two cotton-wool filters removed all of the paint mists. The canisters were changed for fresh ones once during the job.

Gas masks have been used also to protect from zinc fumes, but they usually clog too rapidly to be practicable.

Gas masks are heavier, have greater breathing resistance, and are more oppressive to wear than the respirators described. For that reason a person can do less work while wearing a mask than without, but he may work in safety. During the World War it was determined that soldiers forced to wear their masks were only 50 per cent efficient. Workmen who wear masks and their employers must recognize and consider this limitation. Alternate periods of work and rest enable work to be accomplished in safety and without hardship.

Helmets and Oxygen Breathing-Apparatus

An entirely different principle of dust protection is employed in the helmet covering the entire head, as pictured in Plate XIV. Dust-free air from a compressed-air line is supplied to the helmet through a rubber hose. Such helmets are used by sand-blasters, whose work creates dense concentrations of dust. An ordinary respirator with paper or sponge filter is often worn inside a type of helmet which has wire-screened openings in front; the screen is used instead of glass because the abrasion of the glass by the sand stops vision.

Winslow, Greenberg, and Reeves[7] investigated this combination for the protection afforded, and concluded that a respirator inside a helmet supplied with air from a pressure line will effectively guard against the sand-blaster dust.

Respirators alone are not effective in sand-blasting work, because as a rule they are too inefficient as filters to provide adequate protection and most forms clog rapidly in the dense dust.

Self-contained oxygen breathing-apparatus of the kind used in mines after explosions or during fires also protect against dust, but are entirely too cumbersome for men working continually in dusty occupations.

An efficient military dust mask was developed on the electric precipitation principle[8] but it was not employed in the field. Respirators have been used in South Africa that employ oil-coated, baffled passages to arrest dust; other respirators there caused the inspired air to bubble through oil held in a receptacle. Neither type was considered efficient.[9]

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[6]Katz, S H., Bloomfield, J. J. and Fieldner, A. C. The Universal and Fireman's gas masks: Tech. Paper 300, Bureau of Mines, 1923, 22 pp.
Fieldner, A. C., Katz, S. H. and Kinney, S. P. Gas masks for gases met in fighting fires: Tech. Paper 248, Bureau of Mines, 1921, 71 pp.

[7]Winslow, C. E. A., Greenburg, L. and Reeves, E. H. The efficiency of certain devices used for the protection of sand blasters against dust hazard: Public Health Reports, vol. 35, 1920, pp. 518-534.

[8]Strong, W. W. Electrical fume mask: Phys. Rev., vol. 14, 1920, pp. 176-7.

In testing the filtering efficiencies of these various types of dust respirators and gas masks, air that contained either tobacco smoke (particles about 0.25 microns or 0.00001 inch diameter) or suspended silica dust (particles mostly about 1 micron or 0.00004 inch diameter) was passed through respirators at the rate of 32 liters per minute, the rate



Plate XIV

of breathing of a man doing vigorous work. A small stream of the air that escaped from the respirator was viewed in a beam of light in a dark box. An equal stream of the unfiltered air was viewed alongside the first stream, and the unfiltered stream was diluted with measured portions of pure air until the two streams reflected light of equal intensity, in this way a measure of the filtering efficiency of the respirators was obtained. In conducting the tests the respirators were supported in such a manner that no leakage occurred at exhale valves or at edges, which, when the respirators are worn, are in contact with the face. The efficiencies stated are thus those of the filters themselves including any leakage between the filter and the supports.

Table 1 is a summary of the details of construction and physical characteristics of the respirators tested: the thickness of filters were determined by measuring with a micrometer, holding the material between two metal plates 1 inch square. Filter areas were determined by direct

[9]Final Report of the Miners Phthisis Prevention Committee, Union of South Africa, Johannesburg, Jan. 10, 1919, 110 pp.

In testing the filtering efficiencies of these various types of dust respirators and gas masks, air that contained either tobacco smoke (particles about 0.25 microns or 0.00001 inch diameter) or suspended silica dust (particles mostly about 1 micron or 0.00004 inch diameter) was passed through respirators at the rate of 32 liters per minute, the rate



Plate XIV

of breathing of a man doing vigorous work. A small stream of the air that escaped from the respirator was viewed in a beam of light in a dark box. An equal stream of the unfiltered air was viewed alongside the first stream, and the unfiltered stream was diluted with measured portions of pure air until the two streams reflected light of equal intensity, in this way a measure of the filtering efficiency of the respirators was obtained. In conducting the tests the respirators were supported in such a manner that no leakage occurred at exhale valves or at edges, which, when the respirators are worn, are in contact with the face. The efficiencies stated are thus those of the filters themselves including any leakage between the filter and the supports.

Table 1 is a summary of the details of construction and physical characteristics of the respirators tested: the thickness of filters were determined by measuring with a micrometer, holding the material between two metal plates 1 inch square. Filter areas were determined by direct

*Final Report of the Miners Phthisis Prevention Committee, Union of South Africa, Johannesburg, Jan. 10, 1919, 110 pp.

Table 1. Comparison of details of respirators.

Respirator illustrated by	Body material	Facial contact	Exhale valve	Filter Material	Thickness cm.	Thickness in.	Area sq.cm.	Area sq.in.	Weight gms.	Weight lb.,oz.	Remarks
Plate I.	Aluminum	Pneumatic rubber	Mica disc	Sponge	2.0	5/16	29.0	4.3	99	0-3.5	
Plate II.	Rubber	Rubber	Metal disc	Sponge	2.0	5/16	30.0	4,6	145	0-5.1	
Plate III.	Rubber and aluminum	Rubber	None	Paper	0.02	0.008	35.3	5.5	51	0-1.8	
Plate IV.	Aluminum	Pneumatic rubber	Mica disc	Paper	0.12	0.05	47.8	7.4	99	0-3.5	Thickness is for 10 sheets together.
Plate V.	Aluminum	Pneumatic rubber	Rubber (flutter)	Felt	0.20	0.08	18.3	2.84	63	0-2.3	
Plate VI.	Felt and rubberized fabric	Fabric	Rubber disc	Felt	0.6	0.25	240.0	37.0	77	0-2.7	Half mask.
Plate VII.	Felt and rubber fabric	Rubber	Rubber (square valve)	Felt	0.6	0.25	550.0	85.0	337	0-12	Full mask.
Plate VIII.	Fabrikoid	Fabrikoid	None	Silk gauze and cheesecloth	0.61	0.024	38.1	5.9	15	0-0.5	Thickness represents 3-ply cheesecloth and 1-ply silk gauze.
Plate IX.	Wire screen	Cotton flannel	None	Cotton flannel	0.10	0.040	142.0	22.0	20	0-0.9	Thickness is 2-ply cotton flannel.
Plate X.	Cheesecloth	Cheesecloth	None	Cheesecloth and absorbent cotton	0.19	0.074	.....	.....	20	0-0.7	Filtering area is indefinite, but not over 14 sq. in. (106 sq. cm.).
Plate XI.	Cheesecloth	Cheesecloth	None	Cheesecloth	0.13	0.051	.....	.....	51	0-1.8	Home-made. Filtering area is indefinite, but large. Thickness is for 6-ply cheesecloth.
Plate XII.	Felt	Tissot mask	Rubber (flutter)	Dense woolen felt	0.38	0.15	880.0	137.0	1560	3-7	Fogler flat filter, weight does not include gas canister of 300 grams, which may be attached. Weight of haversack 440 g. is included.
Plate XIII.	Gas mask canister	Tissot mask	Rubber (flutter)	Absorbent cotton between wire screen	0.56	0.22	68.0	10.5	1700	3-12	Gas mask. Thickness is for 2 filters.

measurement or by measuring patterns fitted over irregular surfaces; areas covered by obstructions to the air are not included; however, the filter areas must be taken as approximate. The thickness of paper filters may be increased by including two or more papers; the thinnest filters

Table 2. Efficiencies of industrial dust respirators filtering tobacco smoke. Determined with Tyndall apparatus. Rate of air flow, 32 liters per minute.

Respirator illustrated by	Filter Material	Resistance to flow of air at 85 liters per minute, inches of water	Number of tests	Efficiencies, per cent maximum	minimum	Remarks
Plate I.	Sponge	0.7	4	10	7	Wetting sponge had no effect on tobacco smoke.
Plate II.	Sponge	0.6	8	8	Less than 5	As much as 220 per cent weight of water added to sponge increased resistance to flow to 1.2 inches of water, without increasing efficiency.
Plate III.	Paper	0.5	10	15	7	Tested with one ply of paper Filter.
Plate IV.	Paper	0.25	1	9	...	Tested with 4-ply of tissue filter, 8-ply gave 15 per cent efficiency and 0.5 per cent of water resistance.
Plate V.	Felt	1.3	2	20	19	
Plate VI.	Felt	1.5	1	25	...	
Plate VII.	Felt	1.1	1	33	...	
Plate VIII.	Silk gauze and cheesecloth	0.4	4	Less than 5	...	
Plate IX.	Cotton flannel	0.6	3	19	16	
Plate X.	Cheesecloth and cotton wool	0.2	1	30	...	
Plate XI.	Cheesecloth	0.3	1	7	...	Filtering efficiency is taken from tests of cheesecloth held in flange exposing 100 sq. cm. and tested at rate of 10 liters per minute.
Plate XII.	Dense felt	2.25	1	97	...	
Plate XIII.	Cotton wool	3.6	2	65	63	Army canister type H.

used in any of the respirators are the single cotton fiber papers of 0.008 cm. thickness; the thickest filter is that in the army gas-mask canister where the absorbent cotton (pressed between wire screens) in two successive filters totals 0.56 cm. (0.22 inch). Filter areas range from 29 to 880 sq. cm. The weights range from 15 grams (½ ounce) for the lightest respirator to 1700 grams (3¾ pounds) for the gas mask.

Table 2 gives the tobacco-smoke filtering efficiencies of the respirators and their resistances to air flow. Efficiencies against tobacco smoke

range from about 5 per cent or less to 97 per cent for the Fogler flat felt filter. The army gas-mask canister, type E, had 63 per cent efficiency. This is enough to protect well against the suspensoids commonly met in industry; the canister gives very good protection against the ordinary smokes such as those arising from fires in coal, wood, paper, and carbonaceous matter. The Bureau of Mines has adopted as standard requirement a filtering efficiency (at 85 liters per minute flow) of 50 per cent or more by the tobacco-smoke test for gas masks to protect against smoke, as a requisite for approval,[10] in accordance with Schedule 14A.[11] Only the army gas-mask canister and the Fogler flat-felt filter among the respirators in Table 2 can meet this requirement. Some of the others show hardly 5 per cent efficiency but even so they are of considerable value in protecting from numerous industrial dusts, as is indicated by their use.

The multiple tests designated in column 4 of Table 2 were made either on different respirators or by replacing new filters in the same respirators. Sponge filters showed no advantage in filtering tobacco smoke, whether wet or dry. However, a dry sponge unused for a time may shrink and fit its compartment so poorly that leaks occur around the sponge without filtering. It is best to wet the sponge before using. There is considerable difference in texture of sponges; a fine, close texture is best.

Resistances of the industrial dust respirators were low, the highest being 1.5 inches of water at an air flow of 85 liters per minute. The Fogler flat-felt filter and gas-mask canister showed 2.25 and 3.6 inches, respectively. Four inches of water is the maximum acceptable resistance or gas masks and respirators approved in accordance with Schedule 14A. The respirators are well under this, the gas masks have only a small margin to spare. This resistance imposes extra effort on the breathing and causes very considerable breathing exertion during hard work. Thus more efficient respirator filters generally have high-resistance to air flow and filters with low resistance are less efficient. When the dimensions of a filter are fixed by a respirator size a balance or choice is necessary between a tolerable resistance and the attainable filter efficiency.

Tests With Silica Dust

Table 3 gives the efficiencies of dust respirators filtering silica dust from air. In general, these efficiencies are much higher than those given with tobacco smoke, and the effect of clogging which causes still higher efficiencies as dust is deposited on the filter, is apparent. Even respirator No. 8 with a filter of 38.1 square centimeters of fine silk gauze and

[10]Fieldner, A. C., Katz, S. H., Frevert, H. W. and Meiter, E. G. Gas masks for protection in air against all gases, vapors and smokes: Report of Investigations, Serial No. 2719, Bureau of Mines, November, 1925, 10 pp.

[11]Schedule 14A, Procedure for establishing a list of permissible gas masks: fees, character of tests and conditions under which gas masks will be tested: Bureau of Mines, August 25, 1923, 15 pp.

3-ply of cheese cloth clogged with silica dust until at 3½ minutes the filtering efficiency was 100 per cent. Larger filter areas generally clog more slowly, but this was not always the case; for instance, respirators No. 6 and 7 with larger filter areas of felt clogged to 100 per cent effici-

Table 3. Efficiencies of industrial dust respirators filtering silica dust. Determined with Tyndall apparatus. Rate of air flow, 32 liters per minute.

Respirator illustrated by	Filter material	Resistance to flow of air at 85 liters per min., in. of water		Number of tests	Initial efficiency, per cent		Highest efficiency after clogging, per cent	Time to reach highest efficiency min. sec.
		Before test	After test (max.)		maximum	minimum		
Plate I.	Sponge[a]	0.7	1.1	1	9	....	30	2 0
Plate 1.	Sponge[b]	0.8	1.6	1	22	....	55	4 0
Plate II.	Sponge[a]	0.6	0.9	2	17	8	28	3 15
Plate II.	Sponge[b]	0.8	0.9	2	23	9	30	2 30
Plate III.	Paper	0.5	10.2	4	63	30	100	0 50
Plate IV.	Paper	0.25	5.2	1	45	....	100	1 30
Plate V.	Felt	1.3	2.8	2	70	70	100	1 20
Plate VI.	Felt	1.5	2.2	1	37	....	100	3 0
Plate VII.	Felt	1.1	....	1	63	....	100	3 15
Plate VIII.	Silk gauze and cheesecloth	0.4	6.1	2	20	10	100	3 30
Plate IX.	Cotton flannel	0.6	6.0	2	61	54	100	5 0
Plate X.	Absorbent cotton	0.2	0.8	1	50	....	100	3 0
Plate XI.	Cheesecloth[c]	0.3	0.6	1	23	....	23	.. ....
Plate XIII.	Cotton wool[d]	3.6	6.3	2	99	93	100	0 10

[a] Sponge dry.
[b] Sponge wet.
[c] Filtering efficiency is taken from test of cheesecloth held in flange exposing 100 sq. cm. and tested at rate of 10 liters per minute. There was no increase in filtering efficiency during 2 minutes.
[d] Army canister type H.

encies in even less time than No. 8. This may be due partly to differences in density of the dust clouds, but the texture of the filter is also a factor. The silk and cheese cloth filter respirator, No. 8, showed 6.1 inches resistance when clogged to 100 per cent efficiency, whereas the larger area of felt in No. 6 had only 2.2 inches resistance. The paper filters clogged to 100 per cent efficiencies quickly and developed high resistance to flow.

Some tests of concentration of silica dust in the testing apparatus indicated 2.3 grams per cubic meter of air, or less. Such concentrations are about 100 times greater than dusty air in which men may work. Hence clogging of filters in actual service in respirators would be much slower.

The effect of texture is well shown in the case of the sponge filter respirators, No. 1 and 2. One of these respirators has a body of aluminum, the other of rubber, but they are otherwise nearly alike, and the different results are due almost entirely to the different sponges. The better sponge showed an initial efficiency of 9 per cent, which increased to a maximum of 30 per cent when the sponge was dry. When the sponge was wet the efficiency started about at 22 per cent and increased to 55 per cent. Inability of these sponges to clog to higher efficiency than 55 per cent must be due to presence of some relatively large channels through them, which allow the dusty air to pass without filtering. By wetting the sponges their effectiveness against the silica dust was materially increased. A comparison of the efficiencies against tobacco smoke and against dust shows that respirators generally remove about twice the proportion of dust or more as compared with tobacco smoke. Since many dusts in industry are less difficult to restrain than the suspensoids used for testing, the tests indicate that the respirators are of very considerable value in preventing inhalations of injurious dusts although they do not restrain all.

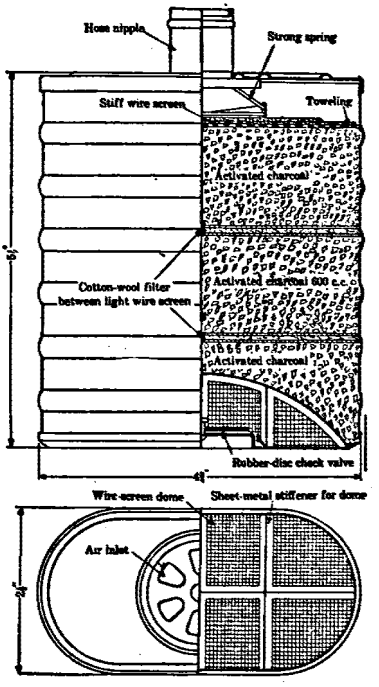


Figure 1

Details of gas mask canister with absorbent cotton filters.

Comparison of Filtering Efficiencies of Fabrics

The tests of dust respirators described heretofore are not well adapted to show the inherent filtering qualities of the filter materials, because no two of the respirators expose the same areas of filter, and structural differences also influence the test results. In order to compare the filtering qualities of the fabrics and papers better, other tests were made by exposing 100 square centimeters of each fabric to the smoke and dust

clouds in the Tyndall apparatus by means of a special holder. It is beyond the scope of this paper to present the detailed results of these tests, but they are being published in Technical Paper 394 of the Bureau of Mines, entitled "Dust respirators: their design and filtering efficiencies." The following considerations, however, are interesting.

The filtering efficiencies against both tobacco smoke and silica dust increase with the numbers of layers of fabric, but each succeeding layer produces less increase than the ones before it. It was found that, in effect, each layer in a multiple-ply filter develops about the same efficiency as every other layer; in other words, each layer in a filter removes about the same proportion of the smoke or dust which penetrates to it and the concentration of the dust does not affect the respective filter actions.

The Filtering Efficiencies Expressed in Equation

The relations between filtering efficiencies and the number of plies in a filter outlined above may be stated mathematically by means of the expression

$$Q=qp$$

where Q is the proportion of dust passing a filter of p plies, and q is the proportion passing a single ply.

From this equation the filtering efficiency of a filter of any multiple of layers or plies may be determined when the efficiency of a single ply is known.

The resistance to air flow increases uniformly with the number of plies (after the first ply). The relation between resistance and filtering efficiency of multiple ply filters is expressed by

$$Q = q^{\frac{(R-C)}{(r)}},$$

where R is the resistance of a filter of p plies.

r is increase in resistance of filter per ply, and

C is a constant.

By means of this expression the efficiencies of filters made of various materials may be calculated when a maximum tolerable resistance is specified. Results show that for any one resistance more efficient filters can be obtained from loosely woven materials such as cheese cloth in many plies than from tightly woven materials such as muslin in fewer plies.

THE CHAIRMAN: Mr. Whittemore, will you please leave Table No. 2 on the screen for a minute until we get through with the discussion on Filtering Efficiencies of Gas Masks?

There is no doubt a lot of you who have use for various types of masks and respirators in your particular industries and I'd like at this time to take up a discussion on some of the types used by the members here in order to determine the efficiency they are getting right now

with that particular filter or mask whichever it happens to be. I am going to call on a few men who have had quite a bit of experience in respirators and masks in order to get their opinion as to the efficiencies of certain respirators and masks.

Mr. Fellmer, while with the Monsanto Chemical Company, had considerable experience with home-made respirators. I think he can give us a few words on the efficiency of such a respirator and what the particular use of such a respirator is.

M. L. FELLMER (Elliott Service Co., Chicago, Ill.): The experiments with respirators at Monsanto were suggested to us at the Louisville Congress in 1924 when someone brought along a cheesecloth respirator made up by the New York State Department of Labor and tested by that department, which showed according to their figures a far higher efficiency than any of the commercial respirators on the market.

A Pronounced Dust Problem at Monsanto

We had at Monsanto in common with a good many other chemical industries a very pronounced dust problem, irritative dusts, chemical dusts, and we were spending a great deal of money for commercial respirators and when it was suggested at that meeting that those things were not quite as efficient as they might be we set about experimenting with this respirator, samples of which had been brought along to the Louisville meeting.

We found in the first place that a respirator in order to be worn by the men continuously must be so constructed that it can be worn with the minimum of discomfort. Just as the speaker said a while ago, men will wear respirators around the neck rather than around the front of their mouth and nose because they are cumbersome; they chafe their skin, they stop the flow of air, they are heavy, they are unsightly, there are a dozen different reasons why they won't wear them. We found that men in some of our operations preferred to take an ordinary piece of rag and tie it around their face because it was comfortable. We set about using this respirator which the New York State Department had tested and found that it had another little defect, which was that it wouldn't fit quite as nicely to the face as it might and that it took some adjusting. It had a one-inch tape by means of which it was to be fastened around the head, and if you take men with calloused hands why they are not very efficient in adjusting such things and the result was that the respirator didn't fit the face.

So we experimented with this thing and finally evolved a respirator which we put into general use made out of about eight thicknesses of cheesecloth with a pocket fashioned throughout the center in which pocket was put a large piece of absorbent cotton. This cotton was left protruding over the edge of the pocket so that the nostrils of the wearer were buried in the cotton and the cotton pocket covered his mouth so he inhaled and exhaled through this layer of cotton. We found that the men took to this respirator instantly and wore it

without any compulsion and we furnished new ones as they wanted them as they became soiled. We fashioned them in our own sewing room and they cost us about eight cents each and we had very good results.

I have been away from the Monsanto Chemical Works for almost a year but Mr. Clarence Nairn is here and I would like to have him tell us what the further experience with the respirator has been.

C. A. NAIRN (Monsanto Chemical Co., St. Louis, Mo.): All I can say is that we have just continued to use the respirator as I found it.

THE CHAIRMAN: Could you tell us what specific service these respirators are used for?

MR. NAIRN: We have used them over the entire plant in every manufacturing process we have.

THE CHAIRMAN: What are the manufacturing processes? You make certain specific chemicals?

MR. NAIRN: Yes, we manufacture "humorn," "manillan," caffeine, aspirin and several other different chemicals. We make heavy intermediates, different kinds of acids, and we use those respirators throughout the plant generally.

Respirators Must Be As Comfortable As Possible

IRA V. KEPNER (Penn. Salt Mfg. Co., Philadelphia, Pa.): We use a respirator very similar to what Mr. Fellmer has mentioned, in fact, it was copied from his and that of New York. We use it in the handling of dust in soda ash and also in our coal grinding, but no chemical.

THE CHAIRMAN: One thing I'd like to call your attention to, this is supposed to be a cotton wool filter in this particular mask that he talks about. The efficiency of cotton wool against any one of the other agents that are used as filtering mediums—

MR. FELLMER: (Interposing) Mr. Chairman, if you will permit me to call your attention that these two last represent what you might call gas masks; they are not like respirators any more and the resistance to breathing is so great that particularly in the climate of the Central Section (Missouri, perhaps a little bit below there) you wouldn't get a man to work with a respirator of that kind very long. We have to take into consideration that we have different climatic conditions from what they have in Europe and while the English respirator shown us here might be perfectly applicable in the climate of England, I submit to you it wouldn't do for us very much in any one of our climates here because the perspiration would soon make a man discard that respirator. One of the things we have to look for is to make the wearing of respirators as comfortable as they can be made and the filtering capacity as great as it can be made without increasing the resistance in breathing and then fashion a respirator in such a manner that it can easily be slipped on without any adjusting.

I would like to refer all of you gentlemen to the minutes of the Cleveland Congress of last year and you will find in the transactions

of the Chemical Section a full description of the respirator which we used and fashioned just like Mr. Kepner did at Pennsylvania Salt after the design of the New York State Department of Labor's respirator; and I have no doubt but what Mr. Nairn, if you address him at his works, will be glad to give you a full description as well as a sample perhaps.

THE CHAIRMAN: One of the great dangers of using respirators—I personally found this to be the case—is using a respirator, an ordinary respirator, in an atmosphere containing toxic gases. We have several men with us this morning that I think are fully capable of discussing the use of a mask where there are toxic gases present and I am going to call on Mr. DeBlois of the National Bureau of Casualty and Surety Underwriters, to say a few words.

L. A. DEBLOIS (National Bureau of Casualty and Surety Underwriters): I thought I knew a little about it until last week and now I have decided I don't know anything about it.

To Remove Dust or Fumes at the Source Is Safest

I want to call your attention, though, to the tentative report of the investigation of the Paint Spraying Commitee which will be given before the Joint Meeting of the Rubber Section and Chemical Section tomorrow, because I presume there will be further explanation of tests made by the Bureau of Mines covering in particular the use of respirators in fumes such as benzol and also in the use of dusty atmospheres, silica

Of course, it is perfectly obvious that the safest way to handle either dusts or fumes is to remove them at the source and get away from the respirator difficulties and problems in that way. If that isn't possible (and in most cases it is possible), obviously the next expedient is the air mask; that is, a mask supplied presumably from the compressed air system of the plant with an excess within the helmet and a leakage around the face so that you get away from all your trouble of cooling and condensation of perspiration and possible leakage of exhaust valves and so on.

We used to believe that the ordinary respirator without fresh air supply was no good whatever in a fume atmosphere. In the early days of the DuPont Company experience in acid manufacture, mixed acid fumes, there were some bad cases of fumes where men had worn respirators, thinking they were protected, and the company went through a long series of experiments wondering whether a respirator could be constructed to absorb fumes—I am not talking about gas masks, but respirators—and the DuPont Company came to the conclusion it couldn't be done and they'd have to rely on gas masks or fresh air supply masks.

Mr. Chairman, I'd rather not say anything further because as I say my opinions on it have been entirely reversed by the experiments that have been made very recently by the Bureau of Mines. I think they are extremely interesting, a contribution to our knowledge on respirators, and I certainly hope everyone here will attend the meetings and hear

that preliminary report of Dr. Smythe on the paint spraying investigations.

DR. COLCORD (Carnegie Steel Company): We have had quite a large experience with the protection of men who must enter chambers containing poisonous gases in the manufacture of the by-products of coke. Now, benzol was just mentioned by Mr. DeBlois. We made last year 18,000,000 gallons of benzol but that is so precious we don't let any get away. So the men about our benzol stills don't breathe enough benzol to hurt them so we don't have to use masks and we don't have benzol poisoning. But our principal use of masks for protection of men from poisonous gases is for men who must go into a tank and clean out the sludge or waste products.

There we have at least tried out the various kinds of masks. We tried the kind that have the chemical canister that filters out or absorbs the poisonous gas and then supplies oxygen, and two deaths in another plant of the same company occurred with the nose pinch type. Those have been entirely discarded and all masks of the chemical type we have practically laid aside and are using one mask only to protect the men. We find it efficient and that is the mask of the type in which the men wear a close-fitting kind of mask about the face connected with a rather large tube and the fellow at the other end turns the crank and pumps the air to the men.

A Bad Accident With a Man in a Tank

We had one serious accident with that type in which the man down in the tank took his mask off to spit out some tobacco juice and he got enough carbon monoxide to make him fall over and the man who went in fell over but they both lived. Since then we have taken the precaution of tying a rope around the man's waist and have a man handy to pull the man out of the tank if anything happens.

But we are finding that type of mask efficient; it isn't fool-proof, no mask is that we ever tried; but with good horse sense used with it and care, we find we can protect the man with that type of fresh air mask.

The case that got carbon-monoxide poisoning in the tank was rather interesting from a chemical standpoint because the tank had anthracene in it and you would naturally expect anthracene poison. I had the air in the tank analyzed at once and we found only carbon monoxide in the air but we don't know where it came from unless there was a decomposition in the sludge or perhaps other things besides anthracene as impurities.

Another one of our serious cases of gas poisoning, in which the man wore no mask and should have done so, was from naphthalene poisoning, from which the man almost died from convulsions and spasms of the diaphragm, very serious ones; and later he lost two or three toes from gangrene.

C. W. GREENFIELD (DuPont Viscaloid Co., Arlington, N. J.): This is a very interesting subject and a great deal has been said on it at

various congresses. It is a subject that I don't believe we can get enough knowledge on. There are three points involved, in my opinion, as to when, where and how to use the respirator and the gas mask. Where we have occasion to use a respirator it would not be suitable to use a gas mask. I have never heard it discussed as to whether the employee keeps the same respirator for his own particular use or whether he passes it along to the other employee on another shift. Individual respirator practice involves in some cases a considerable expense, we will admit. In the respirator where a paper filter is used I have known it to be used by inserting two or three layers of the paper instead of one, all in accordance with the convenience of the employee. I have also known where that particular type of respirator has been used where they have stored it in places whereby it has been impregnated with something that would injure his health possibly more than the material that he is trying to protect himself from.

Supervisor or Foreman Has Big Responsibility

I believe that the supervisor or foreman of the department has a big responsibility placed upon him in having the proper inspection made for each respirator to see that the filter is changed regularly, realizing that the employees in many cases are usually foreigners who do not know the difference between a proper filter and an improper one, and I believe that the foreman or supervisor in charge should properly inspect these to see that the filters are changed regularly.

Where you can use a respirator, don't attempt to use a gas mask, because in the first place the employee often resents the use of a gas mask all day long and in some cases you can't blame them where a respirator would do.

It is information that is instructive to us that we receive here on this subject and I would like to hear a discussion as to the proper inspection and how these respirators are inspected and when.

A. L. THOMAS (DuPont Co., Wilmington, Del.): We are as particular with our masks as we are with our goggles. In our plant we issue a respirator to the individual man and the Safety Department itself looks after the sterilizing of the respirator once in a while and cleaning it out and although the filters are changed often, we don't like two men to wear it on account of the rubbing coming in contact with the face. And in our weekly inspection we look over, as far as we can, the respirators.

THE CHAIRMAN: The next topic on our program is the treatment of chemical burns and it is one that I think you will be very much interested in. We know chemical burns, as a general rule, require treatment entirely different from the ordinary burn, inasmuch as there are always complications to look forward to and a secondary reaction due to the chemical changes that take place.

We are very fortunate in having with us Dr. E. C. Davidson, of the Henry Ford Hospital, who will talk to you on the subject.

THE TREATMENT OF CHEMICAL BURNS

Edward C. Davidson, M. D., Henry Ford Hospital, Detroit, Michigan.

A number of months ago your Chairman invited me to speak at this meeting on the treatment of chemical burns. Having had a reasonably wide experience with the management of such cases the invitation was promptly accepted. Had I realized how little of our information about such injuries was based upon established scientific facts my acceptance would have been given with considerable reserve and the subject would have been limited to certain special types of chemical burns.

The literature on this subject is quite extensive. The mass of it, however, consists of clinical reports of special methods, but no comparative data are given upon which an impartial observer might arrive at a conclusion. For a number of years, I have treated alkali and acid burns by the generally accepted method of neutralization. From the chemical point of view this seems rational. At your meeting in 1925 discussion of the paper presented by Dr. Wm. F. Boos, on industrial poisons, raised the question whether neutralization of an alkali or acid burn were the proper method. Most of the standard surgical text books advise neutralization, but some writers (See notes 1 and 2) have advocated the free use of water as a first aid measure and secondary neutralization.

It seemed obvious that the same question would again be raised this year and could only be answered by taking this problem to the experimental laboratory and under carefully controlled conditions determining the influence of different methods of treatment on the clinical course of such burns. In case some of your members are opposed to the use of animals in settling questions of such paramount importance to the workman, it may be stated that all experiments were performed on anaesthetized animals, and, with the exception of those with cyanide, were repeated on a minor scale upon volunteer laboratory workers and upon the speaker. From these observation certain conclusions may be drawn.

Trade Dermatosis

According to Fordyce (See note 3), cutaneous vulnerability is more or less an individual peculiarity, for while there are persons so sensitive to an irritant that they react after a short exposure by an acute dermatitis others remain entirely unaffected. Instead of acquiring immunity to the specific irritant an increased susceptibility appears to develop. The occupational skin lesion which is most frequently encountered is an eczematoid dermatitis. This is the dermatitis venenata seen so commonly in bakers, barbers, cloth handlers, flax workers, fruit handles, florists, grocers, linoleum workers, mechanics, woodworkers and numerous other workers in materials which are irritating to the skin. These are the problems of the dermatologist and will not be considered in the present discussion.

Only those lesions will be considered which are caused by escharotics, or chemical irritants which are characterized by their tissue destroying activity. Chemical burns are often considered analagous to heat burns. In each instance there is a coagulation necrosis and devitalization of tissue but there the analogy ends. In a heat burn the destructive agent, regardless of its temperature, soon chills and further tissue necrosis ceases, while with a chemical burn if the irritant is not removed penetration continues as long as the agent is present in sufficient concentration to devitalize tissue. Chemical burns differ in another respect in that absorption may rapidly take place and cause death.

From this it may seem that the successful management of such cases depends entirely upon one factor—that is the complete removal of the irritating agent or rendering the chemical inert. It is known that the severity of a chemical burn depends first upon the concentration of the caustic agent and secondly upon the duration of the contact. This second factor may be controlled and more good may be derived by the workman from proper first aid treatment than in any other type of industrial accident.

Classification

Most of the chemical irritants produce the characteristic reaction of inflammation by causing tissue necrosis through coagulation of protein. The degrees of tissue injury are identical to the changes seen in heat burns. First degree burns, or dermatitis erythematosa, are characterized by dilatation of the small blood vessels which gives the skin a red appearance and upon palpation, the surface feels hot. This congestion is accompanied by itching, burning sensation and pain.

When the irritation goes no further the superficial layers of skin separate as small dry scales. When the irritant continues to act after going through the above stage fluid collects in the tissue spaces more rapidly than it can be carried away by the lymphatic vessels and forms blebs or vesicles. This characteristizes second degree burns. If healing takes place without a complicating infection there is no scarring. Should the chemical continue to act after passing through this second stage the skin and deeper structures may be actually corroded or cauterized, which constitutes a third degree burn. In such burns there is loss of tissue and scarring takes place.

Acid Burns

According to Sollman (See note 4), the action of concentrated acid upon skin consists of the withdrawal of water to form acid albumins. The affinity for water is so strong in the case of concentrated sulphuric acid that the elements hydrogen and oxygen are split off from their chemical combination with carbon, leading to charring.

In view of the disagreement in the literature concerning prompt neutralization of acids, the effects of various concentrations of nitric sulphuric, hydrochloric, acetic and trichloracetic acids were observed

in experimentally produced burns. The technique consisted of immersing the hind leg of an anaesthetized rat for a given period into the acid which was to be tested. Three groups of animals were kept under observation for each acid and concentration tested. In the first group the excess of the chemical was carefully wiped away and was considered the control; in the second group the acid was completely neutralized with a five per cent solution of sodium bicarbonate; and in the third group the acid was carefully washed away either in a large tank or under running tap water. The results were uniform throughout in a large series of experiments.

Immersion of a rat's extremity in 70 per cent nitric acid for 15 seconds and immediately neutralizing it resulted in a burn which involved skin, subcutaneous tissue and muscle. The leg was rendered functionless within a few minutes and death invariably occurred in 10 to 15 hours. On the other hand, when such an experimental burn was immediately washed in water, a mild oedema of the foot developed, the leg remained useful and each of the rats survived. There was some late sloughing of skin, but healing took place without deformity.

A 50 per cent solution of nitric acid was tested for varying intervals up to 60 seconds. The rats which were immersed 45 seconds, whether neutralized or washed, revealed no striking difference; however, when immersed for 60 seconds, those which were neutralized died in about 18 hours, while those which were washed revealed only oedema, and all recovered.

Tests Conducted With Sulphuric Acid

Sulphuric acid acted quite similarly. Rats immersed for 15 seconds in 96 per cent sulphuric acid and neutralized showed extensive gangrene of the exposed tissue, while those which were washed revealed oedema and late loss of hair but no sloughing of skin occurred. Little difference was noted with hydrochloric acid except that its action on tissue is much less vigorous.

The sensory response of human skin was tested in three individuals to acids of various concentrations. There was invariably a sensory stimulation from 70 per cent nitric acid, 96 per cent sulphuruc acid, 37 per cent hydrochloric acid and 99 per cent acetic acid in five to 15 seconds. The same acids in 25 per cent concentration failed to give any stimulus in the above individuals in three minutes and in no instance caused a burn. This is of importance, for it is an index of how promptly first aid treatment must be instituted in acid burns of various concentrations.

The difference in the severity of the burns treated by neutralization and by thorough washing may be due to the additional factor of heat of neutralization. If the animals treated by washing, heat of dilution can scarcely be considered because this was carried away by the water. The experiments showed conclusively that washing thoroughly with water was more efficacious in the treatment of an acid burn than neutralization.

Carbolic acid is ocasionally the cause of an industrial burn. Unlike the acids just discussed, it is quite insoluble in water and can not be washed away. Phenol is rapidly absorbed through the skin and in cases where an extensive cutaneous area is covered with it death may occur promptly from its general toxicity. This is a genuine danger because carbolic acid has a slight anaesthesia effect upon skin and extensive application may occur and the importance of the situation not be appreciated until the individual collapses. Burns of this origin may be best treated by the liberal application of alcohol, in which it is very soluble. Another method of management is the application of sodium sulphate. This agent combines with carbolic acid and forms sodium sulphocarbolate (See note 5), which is non-toxic.

Alkali Burns

The action of alkalies on skin is due to their combining with the tissue elements to form alkaline albuminates or with fats to form soaps. They are also hygroscopic in action and this extraction of water from tissue further contributes to the necrosis. The compounds which alkalies form with tissues are quite soluble and accordingly deep penetration occurs.

In regard to the treatment of burns of this origin the question again arose as to the relative merits of washing in contradistinction to neutralization. This problem was subjected to various laboratory experiments. Fifty per cent solutions of sodium hydroxide, potassium hydroxide and 28 per cent ammonium hydroxide were investigated. It was found that the latent period was so prolonged that it was necessary to immerse the leg of the experimental animal one minute, then wait five minutes, giving a total contact of six minutes before proceeding with the treatment if a satisfactory burn were to be obtained. In those rats which were treated by neutralization with one per cent acetic acid tremendous disability of the leg with oedema and masceration of the skin resulted. The rats which were treated by washing reveled no disability of the extremity, there was no swelling, the skin was everywhere intact and the only evidence of the irritant action of the alkali was redness of the foot.

The long latent period of alkalies before burning actually takes place was checked on three individuals. Drops of the same chemicals were placed on the inner surface of the forearm and in no instance was there any sensory stimulation in a period of three minutes and when washed away with water no evidence of slightest irritation remained. This is of importance in first aid work, for it allows a sufficient interval to institute treatment and a serious burn may be averted.

Lime Burns

Burns due to lime are of considerable importance because of its widespread use in the industries. Such accidents generally occur during the process of slaking, and the lesion produced is both a heat and a chemical burn. Calcium oxide may be placed on dry skin, and no irritation results;

the same may be said of calcium hydroxide, which is not a very active alkali. During the process of slaking the factor of heat is introduced. The heat of solution of a single gram of calcium oxide is 18,330 calories.

To test the duration of this heat liberation a thermometer was placed in a beaker containing about five grams of calcium oxide, then water was added. In two and one-half minutes the temperature rose to 98 degrees centigrade and at the end of one hour had fallen to 35 degrees centigrade.

In addition to this heat evolution when activity has once begun on skin there is the avidity of calcium oxide for water. Burns of the eyes are perhaps the most serious except the occasional instance where a workman falls into a vat of slaking lime. A burn in this situation is particularly distressing because of the deposition of calcium salts in the cornea, which causes opacities. Barkan and Barkan (See note 6) have described a very satisfactory method of handling such injuries. They advise holding the eye open and irrigating thoroughly. Later if opacities occur the calcium deposit is removed by dissolving it in a neutral solution of ammonium tartrate.

Cyanide Burns

Cyanide burns are of relatively great frequency because of its use in electroplating, making coal gas, photoengraving, in dyeing, printing cloth, making phosphoric acid from bones and extracting gold. The action on skin is similar to that of alkali. The lesion most frequently seen is a dermatitis or an eczema-like eruption of the skin of the hands, arms and face. Occasionally a serious burn is caused by splashing of cyanide which is being fused. It is this group which is of particular interest, because of the danger of absorption. The lethal dose of potassium cyanide is three to five grains while that of hydrocyanic acid is only one grain.

A few months ago one of your members requested an opinion about the management of such an injury and the advice given was prompt debridement or complete excision of the burned area. In view of the fact that excision of the burn is not always practicable a number of methods of slowing absorption were tested.

It was first determined that the application of potassium cyanide on an open lesion in a rat caused death in two or three minutes. In order to produce an experimental burn similar to that of fused potassium cyanide a steel spatula containing some of the salt was heated and then applied to the thigh of an anaesthetized rat. A dry hard black eschar formed which tremendously slowed absorption but death invariably occurred in about 12 hours. Sollman recommended oxidizing agents when potassium cyanide was taken internally. It was found that hydrogen peroxide and sodium thiosulphate had no protective action and death occurred as promptly as in the controls. An alkaline solution of ferrous sulphate, although it did seem to form ferro-cyanid, did not prevent death. A 20 per cent solution of potassium permanganate dropped upon the burn, protected in 40 per cent of the rats.

It was then decided to try to form a thiocyanate by dropping ammonium

polysulphide upon the burn. This was done in a number of rats and in every instance gave complete protection against absorption of the cyanid radical. This observation has distinct possibilities as a first aid method of treatment of such burns, for it permits time for the industrial physician to make a decision about the indicated therapy. Should the burn be an extensive one less haste is necessary in preparing to do a complete excision, of if the burn involves only a small cutaneous area such a radical procedure might be avoided.

Sodium Burns

An accident which occurs in the chemical laboratory with relative frequency but rarely in the industries is that due to metallic sodium. When sodium comes in contact with water it reacts violently forming the hydroxide. Occasionally the sodium bursts into numerous pieces and splashes upon the skin of the laboratory worker. It immediately adheres and extracts water from the skin and burning continues until there is no more water available. This alone causes a serious lesion and the highly concentrated sodium hydroxide which is formed continues the action set up by the sodium.

It seems possible to stop this violent activity if some inert material could be found which would form a coating over the sodium and break the contact with water. When a beaker was half filled with water and a small piece of sodium dropped on it the sodium floated on the surface and reacted vigorously. If liquid petrolatum was then poured into the beaker it floated on the water as a layer and raised the sodium from the water and all activity ceased. This was then tested in anaesthetized rats and it acted similarly. After this it is quite essential to remove the sodium mechanically and then wash away all the sodium hydroxide which has been formed.

Phosphorous Burns

It is true that white phosphorus has been largely replaced in the industries, but burns of this origin still occur in chemical laboratories. When phosphorus comes in contact with skin it adheres and ignition occurs. Immersion in water immediately extinguishes the flame, but upon reexposure to air ignition again takes place.

Walton (See note 7) described an ingenious treatment for burns of this origin. He observed that copper sulphate combined with phosphorus forming inert copper phosphid. He advised the use of a one per cent solution for a period of three minutes, during which time the phosphorus turned black in color. The small granules were then removed, mechanically or by irrigations, and the lesion was subsequently treated as a burn of any other origin.

With the exception of chromium compounds the metallic salts which are most frequently the cause of burns are silver nitrate, copper sulphate and zinc chloride. The importance of zinc chloride as a source of burns has been emphasized by McCord and Kilker (See note 8) who observed 17

cases in workmen employed in the preservation of wood. They found that all gave a history of some previous injury to the skin.

The typical lesion was a small opening in the skin, usually corresponding to the size and shape of the antecedent injury. The adjacent skin appeared normal but on careful examination was found to be readily removable. Upon its separation the underlying tissue was found to be white and bloodless. In each of the ulcers observed a central mass of necrotic tissue sloughed away. The treatment consisted of sodium bicarbonate which was thought to form inoccuous zinc carbonate. Although the exact action was not known the treatment was effective.

Chromium Burns

Workers in dyestuffs, photoengraving, steel manufacture and tanning of leather, are subject to chromium burns. Chromic acid, which is usually the source of such burns, is a powerful caustic because it combines the action of a metallic oxide, an acid and a strong oxidizing agent. The typical lesion or "chrome hole" is well known and need not be described. In addition to this local action absorption may take place and result in a fatal issue as described by Major. (See note 9.)

It has been repeatedly observed in the tanning industry that after complete reduction of potassium dichromate the workmen handling the hides which are impregnant with chromium hydroxide rarely develop the characteristic lesions. Because of this observation sodium thiosulphate has been used to treat the early cases and lead acetate for those in which extensive damage has already occured in an effect to form insoluble lead chromate.

The problem was investigated in animals. It was first learned that dipping the leg of an anaesthetized rat into a 100 per cent solution of chromium trioxide was fatal in about 12 hours from absorption through essentially intact skin.

Experiments were then tried removing a piece of skin and applying crystals of chromium trioxide and potassium dichromate. The results again were uniformly fatal. Sodium thiosulphate was applied to such lesions but was absolutely without effect upon the outcome. Insoluable lead and silver chromates were formed on the lesions but this likewise was ineffective. It was then decided to test the toxicity of chromium hydroxide on such a lesion and in these instances the animals survived.

The problem then became one of forming the less toxic hydroxide on the lesion. Ammonium polysulphide was tested by pouring it upon lesions which had been treated with either chromium trioxide or potassium dichromate crystals. This resulted in adequate protection in the dichromate rats and protected 60 per cent of the rats treated with the trioxide.

From this study it would seem that a satisfactory treatment of existant chromium ulcers would be with a few drops of ammonium polysulphide in an effort to convert the chromic acid into the less active tissue irritant, chromium hydroxide. This must be tested out clinically before its acceptance.

So far, in this discussion of chemical burns, only the immediate prob-

lem of getting rid of the primary irritant or rendering it inert has been dwelt upon. The question may be asked as to the method of choice in the subsequent management. This is of relative unimportance, compared to the disposition of the original irritant.

It has been our custom to treat the minor chemical burns with some bland ointment. In the more extensive alkali and acid burns involving an entire arm or a leg in which hospitalization has seemed desirable, either tannic acid compresses or a spray has been used until complete coagulation of the tissue devitalized by the irritant has taken place. The involved area has then been exposed to air and left undisturbed until healing was complete or until the patient could be made ambulatory, at which time some bland ointment was applied and the closed method of treatment adopted.

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THE CHAIRMAN: The discussion on Dr. Davidson's paper, which was without a doubt very interesting, I think we will limit to a treatment of chemical burns such as occur in the industries which you men represent and best methods of procuring first aid for those burns.

MR. DE BLOIS: I want to compliment Dr. Davidson on a most excellent contribution and I want to ask him two questions. I'd like to have him tell us whether he has explained in his own mind the relative differenece in the effectiveness of flushing the acid or caustic out of burns as against the neutralization method. That is question one, and the other question I'd like to ask is this: in the case of, let's say, strong acids, will the relatively greater effectiveness of flushing with water decrease as the period that elapses between the application of the acid and the flushing increases? In other words, as I understand his experiments, the flushing was applied, I think, 15 seconds after the acid burn. Now, two things may happen in industry. We probably have a very much longer delay in many cases before water can be applied even where we have emergency shower baths. We have what I take as an equivalent condition in its effects in the acid burn with mixed acid, strong mixed acid, where the presence of the sulphuric acid in the mixture tends to take up the fluids and maintains the strength of the concentration of the nitric acid so long as the sulphuric acid

remains at strength. That is the principle of nitration and the value of the sulphuric acid in the mixed acid used in nitration. Evidently there you have a maintenance of the strength of the burning agent which you do not have to the same degree in the pure acids, either nitric or sulphuric, and I suppose in other words you are burning with a more concentrated solution, you have a deeper and thicker, faster burn. What effect then has the lapse of time on the efficiency of these two methods of treatment?

DR. DAVIDSON: In regard to the explanation of the difference between water and neutralization, I don't know of any explanation except in the neutralization of burns you have two factors, first due to the chemical irritant, and in the second instance you have the additional factor of the heat of neutralization which is liberated during the process of treatment. I know in the early experiments, instead of using sodium-bicarbonate, we used sodium-carbonate in a beaker that would hold 500 or 600 cubic centimeters. There was enough heat liberated from the small amount of acid on the skin of the animal actually to heat the beaker. Whether that is the explanation, I don't know.

Relative Efficiency of the Water Treatment

In regard to strong acids, as the duration of contact increases will the efficiency of water decrease? I am not in a position to say. Of the less concentrated acids as the interval increases the water is just as efficient. For instance, with the 50 per cent nitric acid, where we increased our time increment up to 60 seconds, at the end of the 60 seconds washing was still efficient in preventing a serious burn and preventing death, while with the same time interval in the neutralized rats, death occurred. Of course, long contact with strong acid does irreparable damage before treatment is begun. Does that answer your question?

MR. DE BLOIS: I'd like to ask one thing more. In neutralizing, was it the same mechanical procedure as in washing, would it simply require immersion in the beaker?

DR. DAVIDSON: It was immersion in the beaker, also some mechanical stirring, because it is impossible to anaesthetize a rat for more than a minute and a half or two minutes. During the neutralization in the beaker the anesthesia wore off and there was a stimulation which caused movement of the leg. It is of interest, a thing I didn't mention in the paper, that as the anesthetic wears off and we approach the point of primary anesthesia as when a person is just going to sleep, immersion of the rats in the neutralizing agent causes a sensory stimulation which is demonstrated by kicking. If an animal treated the same way is immersed in water the same stimulation is not seen.

MR. DE BLOIS: There was more in the neutralizing method?

DR. DAVIDSON: No, in the one case the animal reacted more energetically and in the other I did.

MR. KEPNER: Mr. Chairman, may I ask Dr. Davidson how long a time

from the time of these burns to men that you have shown were they given hospital treatment? How many hours or minutes?

DR. DAVIDSON: Which do you mean?

MR. KEPNER: The clinical burns.

DR. DAVIDSON: The time interval on those varied tremendously. All under 24 hours, practically none under five or six hours. Most of them had first aid treatment. A large compress, usually boric acid, had been used previously.

MR. KEPNER: They had first aid treatment?

DR. DAVIDSON: Yes.

A. L. ARMSTRONG (Eastman Kodak Co., Rochester, N. Y.): I think I can answer Mr. De Blois' question. We had two burns very similar, one where a fellow was entirely covered with acid and he dove into a tank and came out with nothing but his shoes and belt on. We had a similar burn a year later where a man didn't get to water for perhaps a minute and a half. That man lost one eye and he is scarred horribly. Althought he is living, the one arm is a little stiff and the neck, the skin in here pulls the eyes, although they have grafted skin under the eyes and have made a pretty good job of it now. Those fellows both had the same strength of acid. The one fellow didn't even need first aid treatment, he came out with nothing on. The neutralization of water, I suppose, did that.

The Shower Bath Not Considered Very Efficient

M. G. MILLIKEN (Hercules Powder Co., Parlin, N. J.): I would like to ask Dr. Davidson whether he thinks the efficiency of the ordinary shower bath, if he is familiar with the shower we have in the chemical industry, would be equal to the washing given to the leg of the rat? You speak of an "energetic" washing. I am just thinking whether we should not hold our men at the shower and do more work with the shower bath before we send them to the first aid, whether you think that would accomplish equivalent results.

DR. DAVIDSON: Mr. Milliken, I don't think the shower bath is very efficient. If it is a burn of a hand or an arm, I think the best thing that can be done is to hold it under a running tap. We have immediate contact and flushing of water. If you get under a shower bath with your clothes on there is a long period before the water can actually get through the clothing, especially if the man is working with clothes on that are all full of oil. In some instances I doubt whether water would penetrate at all. Although I'd be more inclined to think if the man were held at the shower bath and an effort made to remove his clothing that the ultimate burn would be of much less intensity than if time were lost transporting the man from his work to some remote part to the first aid station.

MR. FELLMER: Of course, in answer to Dr. Davidson's remarks regarding the shower, it depends a great deal upon the construction of the shower. If Dr. Davidson has in mind a shower with a circular ring with small holes the action of the water would be kind of slow

before it would penetrate the clothing. But an inch and a quarter or inch and a half pipe line equipped with a quick opening valve, giving a strong impact of an inch and a quarter of water will penetrate just as rapidly as your tap, and more so, because it will have a greater volume of water, a splashing of water on the part immediately and that is the kind of shower, as I understand it, that is in use in most chemical plants for that purpose.

CAPTAIN G. R. G. FISHER (Illinois Manufacturing Association, Chicago): Mr. Chairman, I wanted to ask Dr. Davidson whether the tests made with strong acids and alkalies on rats, on account of the hair, wouldn't it be less intense than on the skin of an idividual?

DR. DAVIDSON: I should think that is true except that on the paw there is no hair. The hair would be protective, and even though the rat is protected still we got these results.

DR. C. W. MUEHLBERGER (University of Wisconsin): I wonder whether Dr. Davidson's experiments are exactly in accordance with our present therapeutic measures of treating burns? I think it is at present the practice to flush an acid burn out first with water and then to use a mild alkali, very mild, so the reaction is in a neglible quantity, and to flush with water and use a mild acid. The heat of reaction would also be neglible. What I would be interested in is some data as to whether or not the neutralization of the last traces of acid which certainly must remain in the tissues, by using very small amounts of alkali would not hasten the recovery of the burn after the flushing out with the water?

Experiments to Determine One of Two Things

DR. DAVIDSON: Dr. Muehlberger's suggestion is a good one. In these animal experiments we are trying to find out one of two things: we are trying to find out whether neutralization is an effective method in contradistinction to mechanical removing by water. We have gone to extremes here to absolutely separate the one clinical method from the other. What you suggest about thorough irrigation first, that is effective but not always done. In many of the first-aid kits you find that there is the bottle of alkali there to be used immediately or the bottle of diluted acetic acid or vinegar to be used immediately. The actual washing may be done at the first-aid station but in many instances the neutralization with an acid or alkali is already done.

In regard to your question whether it is necessary to neutralize, the residual alkali or acid still present, I can't say that I can give you a direct answer, but from our experimental animals we found washing alone has been efficacious and we haven't gotten burns; however, there still may be acid or alkali present but not in sufficient concentration after vigorous washing to cause tissue necrosis.

MR. WHITING: I think many of us will recall that last year Dr. Boos sold us very thoroughly on the principle of neutralization and you remember how he criticised the medical fraternity. Dr. Boos was rough on doctors but Dr. Davidson is certainly rough on rats.

Now, it is a very practical point Dr. Davidson brings out that by thoroughly rinsing with water which is universally available we can eliminate the chemicals from the burned areas. And as the Doctor just said, his animals that were merely washed didn't develop later burns. That seems to be the complete answer to the necessity of neutralizing. It apparently is not necessary if you thoroughly wash the subject and that is a very nice practical point for us to apply in our plants, because if we have exposure to both acids and alkalies we are never sure the men will use the right neutralizing wash that is demanded in the emergency. If water is the answer, as it appears to be, it is a big help to us.

Another point to recall is this: Dr. Boos mentioned neutralization under another condition, the neutralization of fumes in the respiratory passages, nitrous fumes with ammonia fumes; and Dr. Davidson doesn't go into that question. He knows you can't flush the lungs and therefore he told me personally he was entirely satisfied with the neutralizing technique of the lungs. He also keeps away from the eye burns which is another story.

Origin of the Tanic Acid Treatment of Burns

There is one thing I want to say because I am not a doctor and medical etiquette does not prevent my stating it as it does prevent Dr. Davidson. The tannic-acid treatment of burns was originated by Dr. Davidson. It is a new method and I think you are thoroughly convinced, from looking at the mugs on the screen there, it is an effective method. My own company has taken it up. My own medical director, when he got the reprint of Dr. Davidson's original paper, thought so much of it that he immediately decided to adopt it on any serious burn case. We have one case right now, of extensive electrical burns that is getting along very nicely under tannic-acid treatment. I would like to get into the record the exact reference to the original technical paper of Dr. Davidson which appeared in "*Surgery-Gynaecology and Obstetrics*," in August, 1925. If the rest of you butt in on your doctors as much as I do you should get the reference and make your own doctor read it and be convinced of the real merits of the tannic-acid method. It is, of course, not a matter of first-aid but of hospital technique.

THE CHAIRMAN: Dr. Davidson, have you found that the use of tannic acid as a secondary treatment for such burns as nitric acid burns and alkali burns was very good in all cases?

DR. DAVIDSON: As I said in the paper, it is only to be used in the extensive burns which could be treated by the open method. In most of the acid and alkali burns tannic acid does cause a coagulation of protein, but if you treat it with boric acid, any of the ordinary compresses, or treat it with ointment it is but a matter of a very short time until there is tremendous masceration of the tissue. If you remove the irritant, as we think we have done, then use tannic acid; instead of having the soft mascerated surface, we have a surface which is

dry, absolutely impervious, is insensitive and is a definite protection against bacterial invasion. And if we then leave the surface alone, healing takes place beneath this covering. My experience with tannic acid, however, is not as extensive as with some of the older treatments, but the results have been satisfactory.

THE CHAIRMAN: I'd like to hear from Dr. Shoudy of the Bethlehem Steel Company.

DR. SHOUDY (Bethlehem Steel Company): Mr. Chairman, I with the rest, have listened with much pleasure to Dr. Davidson's paper. So far as the treatment by flushing goes, we have done that in the last five or six years, insisted on it, although some men said you ought to neutralize. I can say the results of the few cases we have had on humans was the same as Dr. Davidson has had with rats. It consisted of, first, absolute flushing, then the follow-up treatments. If you get into discussion of treatments recommended, you must consider that Radman has just brought out a treatment of novocaine and adrenalin, and then consider tannic-acid treatment and then listen to the claims for various ointments and you won't know where you are.

In Minor Burns the Closed Method Most Economical

A gentleman said, "Go home and get your doctor to do something." Let your doctor read Dr. Davidson's paper but let him use the treatment which in his judgment is best as the burn comes up. I can say every burn will not be able to be treated by tannic acid, some will have to be treated otherwise, and the various treatments that we have had by the men that have treated the burns, I am sure, have been found to be good. Let your doctor read the paper, yes, by all means. So far as the larger burns are concerned, the burns that require hospitalization, the results that are to be obtained from tannic acid are not disputed, but for the small burns coming up in the plant where the man has to go back on the job, I can say some of those have not gotten good treatment by tannic acid. To you men who have to go back from the standpoint of first-aid, to tell them something, I think one of the biggest things you can carry back is that all the burns from the chemicals and acids should be flushed and flushed and flushed with tap water.

DR. DAVIDSON: May I say a word? In no instance have I suggested using tannic acid in the minor burns, except for its analgesia property.

DR. SHOUDY: I don't want them to go home and say that.

DR. DAVIDSON: In minor burns I am convinced the closed method of treatment, regardless of what you use, is, from the employer's standpoint, the most economical and most satisfactory for everyone concerned, including the employee. In discussing chemical burns today I have said for only those extensive ones should tannic acid be used and, as soon as hospitalization was no longer advisable, that then the closed method should be used. I agree with you heartily but I don't want anyone to think that I am advising tannic acid on the minor burns because I am not; other methods are more practical.

MR. WHITING: May I ask Dr. Davidson to state the primary purpose in mind in very extensive body burns from any source whatsoever, the primary purpose of saving lives?

DR. DAVIDSON: Two primary reasons. First of all, saving of life. Most pathologists agree (although there are some that hold out), that there is a poison, an actual toxin formed in any devitalized tissue of the body regardless of the origin, (even in a crushed leg or a crushed muscle.) For that reason so much traumatic shock was seen during the war. In burns the condition is quite analogous. You have devitalized tissue and when the protein material breaks down into primary and secondary proteoses you have something tremendously toxic. The idea of tannic acid is to precipitate the protein and the secondary proteoses and in that way lessen absorption and hope there would be a few cases that previously died that would recover because of diminishing the absorption. That was the primary purpose of the work.

Most Scarring of Burns Due to Secondary Infection

A secondary consideration is that which I have shown here today. As a result of that original idea, we found out by making this impervious layer we formed a protective layer which was not readily invaded by bacteria. Most of the scarring by burns is due to secondary infection. Very often, if you have a denuded surface, if you put a piece of adhesive plaster across it the epithelium will grow out under it. It forms a bridge or scaffold for the new skin to grow out. In tannic acid treatment of burns the same thing holds. Your black insoluble covering acts as a bridge and if there is any epithelium around the hair follicles or sebaceous glands it grows out and in that way you get less scarring.

Those are the two things which we have been working on; first, the toxaemia and secondly, the minimum disfiguring.

MR. MEDALIA (By-Products Coke Corp.): There have been so very many valuable comments made and Dr. Davidson's paper was so good, can the members of the Chemical Section get a re-print of this entire proceeding this morning ahead of the regular proceedings of the Congress? The regular proceedings of the Congress don't reach us until many months, I believe, and we could do as was done in the Metals Section, get this paper out within a few weeks at the close of this Congress and by each member paying for as many pamphlets as he wants.

THE CHAIRMAN: (Interposing) I will answer that question as soon as we get through with the discussion here.

I want to hear from a gentleman from the United Lead Company. Mr. Wettstein has a peculiar type of burn at his plant. I think he can obtain some information here.

T. F. WETTSTEIN (United Lead Co., Keokuk, Ia.): Dry lime dust and calcium carbide dust—men would be working in the dust and get it adhering to the skin. Of course, when they perspire it will form a lime burn. Very often, however, the dust would be dry and especially

in the winter time when there would be no perspiration, after the men are off the job they wash with water and go home and sometimes during the night an itching would take place. It might become a skin burn. The next morning they would apear on the job with a nicely started burn which would probably become infected. So we provided each man with a small bottle of ordinary vinegar and a sponge and immediately after he finishes work, when he washes up, before he applies water he swathes his neck, wrists and ankles with vinegar. In the winter time when he is likely to go out with damp skin into the cold and get his skin raw, chapped and rough, it might crack and make the burn worse; so we provide cold cream, ordinary cold cream, which he uses to keep his skin soft. We found in that way we have almost entirely eliminated lime burns due to dry carbide and lime dust, which up to that time were very troublesome and in some cases caused infection.

THE CHAIRMAN: Can anyone give us any further information as to how to treat a burn of that type—such a burn as Mr. Wettstein just spoke of.

DR. COLCORD: I can't give any further information on that but I don't feel quite satisfied to go away without knowing Dr. Davidson's treatment for burn to the eye. He stayed away from that and I don't know why. If the rest feel as I do he leaves us curious. If he leaves that out we assume he has some other way of treating the eye than simply washing out with water.

Discussion of a Burn of the Eye

DR. DAVIDSON: I am sorry you raised the question, or subject.

A burn of the eye is something entirely different from a skin burn. The conditions are different, you are dealing with an organ which has no protection whatever except tears. Your skin is covered with a horny layer which is resistant against chemicals. We showed that by putting 25 per cent acid on the arm and having nothing happen in three minutes. Regardless of how carefully you wash, there is an oily secretion on the skin which is inert chemically and prevents reaction with skin.

Now in the eye, there isn't any protective horny layer, you are down to vital cells which may be damaged by your chemical irritant; your protective mechanism is tears. I am not an eye man but in this work in the control animals in which we wiped away the chemical, invariably the animal would scratch the area after we wiped it off and would get some of the chemical on his front paws and later it would wash its face and an eye burn resulted. Not knowing much about eye pathology, I got one of the men in the hospital interested and he is now following along and using the same technique that I used and his results to date have been quite similar. His name is Dr. K. W. Cosgrove. I'd like his name to go into the record because, although I am responsible for his taking up this problem, I want him to get full credit when his results are published. Of course, he has had to use much less concentrated chemicals in an effort to avoid complete destruction of the eye.

By using more diluted acid and alkali than I used, he has found he can reach a concentration of acid and a time increment where neutralizing will cause a steamy cornea, and washing does not form a steamy cornea. It seems to hold for the eye just as well in the case of acid and alkali burns as it does for the skin. The difficulty he has experienced is to get a record, a photographic record, of an eye and he has been working on that for quite a while. We are now using a microscope to get a pictorial record that will illustrate his work.

MR. KEPNER: Dr. Davidson, in those pictures you showed of men badly burned, what was the treating of the eyes, were they treated the same way that you mentioned for body burns? I noticed in two or three of them the eyes were first entirely closed but the final picture showed they were in good shape.

DR. DAVIDSON: When a man is burned from an explosion he immediately shuts his eyes and practically the complete intensity of the burn is on the eyelids. The conjunctiva may show a first degree burn but in many instances not even that. There might be a slight redness of the cornea. In the cases shown on the screen, I should't say any of them had actual damage to the eye proper. Practically the entire burn was limited to the lids and in those cases we used tannic acid right up to the eye. We would pull the lids apart and thoroughly flush out all the pus and after that you put in olive oil.

Relative Merit of Olive Oil and Castor Oil

MR. FELLMER: In regard to chemical burns to the eye, I would like to repeat what I have so often advocated: flushing of the eye with water over a tap or drinking fountain immediately after the chemical enters the eye. In our experience at the Monsanto Chemical Works during my last year of tenure of office, our oculist repeatedly assured us (we referred every case of eye injury to the oculist after attending to it at the first-aid room) he has assured us since we inaugurated this system of flushing the eye with water that he had practically no work to do after the case reached him.

CAPTAIN FISHER: Is olive oil preferable to castor oil?

DR. DAVIDSON: I don't know the relative merits of the two.

THE CHAIRMAN: Can anyone answer Captain Fisher's question, whether olive oil is preferable to castor oil which is so commonly used in the treatment of the eye?

MR. RIEDERER: I do know we always use olive oil, containing five per cent carbolic acid directly in the eye; while I believe the castor oil would become rancid in spite of the five per cent carbolic acid and consequently is not so beneficial. I have used olive oil with five per cent carbolic acid and put it directly in the eye. I thought the doctor was crazy when he first told me to use that but I found it was a remedy.

THE CHAIRMAN: I think Dr. Davidson has proved conclusively that washing all acid and alkali burns vigorously with water is the one best method of treatment immediately after the burn.

In connection with this, we might take up a little discussion as to the best methods for placing showers and means of washing burns in chemical plants. I think Mr. Rice might be able to tell us a little about what his company is doing in that connection.

THE SECRETARY: What I know about showers in chemical industries is very limited. We have made a practice of making use of our drinking fountains. The only objection I have to that is, where you have a man seriously burned you must expect shock, most drinking water fountains are connected up to coolers and I don't consider it advisable to use very cold water for the eye.

Our clinical experience has been along the same lines as Dr. Davidson's up to a certain measure. We make use of an immersion for acid burns and alkali burns, five or 10 degrees above body temperature to assist in taking care of shock. You can keep a man in an immersion of water, if you want to use some acetic acid, use one half per cent of acetic acid in it, the effect of which would be negligible. A man was burned in the legs with very hot caustic liquid. He filled a drum of the liquid and the right leg was seriously burned which if he recovered would have called for an amputation. In getting away from the scene of the accident he fell on his back and this case terminated seriously for the man. The occasion for that was that too large an area of his body was covered. The immersion treatment was applied and everything was done to save the life of the man but from the start we knew there was nothing to be done as far as his life was concerned. We went through the technique but nothing could be done. I am sorry I have no experience in showers.

Practical Experience With Quick Opening Showers

MR. KEPNER: We have been using quick-opening shower baths around our acid areas for a number of years. It is a quick-opening valve. You merely step on it and the water immediately flows. The pipe is about an inch and a half and there is a regular deluge when the man gets on. We have placed those around very, very close to all our tank filling stations and other places where a man is liable to come in contact with acid. Yet, not so long ago we had an accident, which might have been very serious—a man was fixing an acid pump and in some manner it blew up and the man was deluged with acid. The shower was probably 200 feet away and instead of running to the shower he jumped into a fire barrel which was nearby and pulled off his clothes and began rubbing himself very thoroughly and he kept washing and washing and finally all his clothing was pulled off him and the first-aid man threw a blanket on him and later he was sent to the hospital and three days later he was back at work.

Our physicians always instruct the workmen to thoroughly wipe off the acid before you get into the water. If you don't you are going to have a real serious burn when the water comes in contact with oil of vitriol or mixed acids. We have been very successful, we have

had a number of burns, but we haven't had a serious burn from acid or caustic for the past four or five years.

MR. ARMSTRONG: The gentleman just spoke of wiping off the acid—I would like to ask whether he has ever attempted to wash off a solution of oleum?

MR. KEPNER: That is what I mean, they have oleum and oil of vitriol. Take anything to wipe it all off.

MR. ARMSTRONG: Our experience is that if you get water on and get it on right sudden within 30 seconds, why a man can be covered, his clothes can be drenched in oleum which is probably the worst burning acid there is, and with no bad results at all.

THE CHAIRMAN: We will have to close the discussion on this particular topic now.

In connection with papers delivered at this Congress, if anyone desires any number of copies I think the Council will go to the expense and print those copies for them, although they do it at a loss. The Council, as you know, has not very many funds and it is quite expensive to print individual copies of all these papers. Unless we can get an order for several hundred or at least a hundred for a specific copy I don't think the Council would go to that expense. I would suggest that if you want a paper, go directly to the man and in most instances he will deliver a copy.

Stationary Platform for Unloading Tank Cars

REPRESENTATIVE (Seaboard By-Products Coke Corp.): I wanted the discussion and I thought if the chairman of the Chemical Section would write a note to each one who attended the session asking how many copies they wanted you will receive order for sufficient copies to cover the expense of the meeting. The discussion on papers and on the other matters that have come up is what I mean. I believe there isn't a company here that wouldn't want 100 or 200 copies of that for their men.

THE CHAIRMAN: Surely.

The remainder of the meeting I am going to throw open for discussion. Any problems that you want to discuss at this time will be perfectly in order.

I have several inquiries here concerning a few problems. One of them is: "Would like information on type of tank car unloading platforms." Is anyone here familiar with unloading platforms?

MR. ARMSTRONG: Is that a stationary platform?

THE CHAIRMAN: Stationary platform for a tank car unloading.

MR. ARMSTRONG: You mean something to be built on the tank car?

MR. NICKEL: That was my question. We have tank cars coming in with various size domes, some with no domes, some with hand rails, some with partial hand rails, some grab rails, and you know, I am looking for ideas to see if we can find something that is better than we have at the present time.

MR. ARMSTRONG: The best stunt I know of, although it doesn't work out so well in the winter time, is a platform which will slide in or out against the dome which will take care of the different size domes on a counter balance so after the car is placed the man can walk right out and his weight will pull it down and you can hook it down. You can have one on either side and push them up. Those placed at your regular unloading and picking up stations work out very satisfactorily. You can have them four feet wide and if you have them on each side you can run a rail across so it is practically impossible for a man to fall off the car. I imagine that is your problem, I know it was ours, especially in the winter time.

MR. KEPNER: We have exactly the same situation as our friend from DuPont here and we have a regular draw-bridge effect from the top of our tank cars to our filling tanks. It is so connected that you go up the steps to your tank, your filling tank, and you just merely push it over. The weight of the man, as he says, makes it fall. In fact it is a little heavier than what the ordinary weight of a man would be and when he steps off he has got to pull it in order to let it raise up, aways giving the cars clearance. It keeps all the snow off and it is very, very practical. We use them on our filling tanks. It drops right down on the rail.

MR. ARMSTRONG: You can get by the regulation of the eight feet clearance because the platform comes up, it is hinged and it drops down against your tank car.

THE CHAIRMAN: The rest of the questions that we have will have to be deferred at this time and we can advise the people that want the information by mail or at the Council office.

I will now ask the chairman of the Nominating Committee to submit his report.

REPORT OF THE SECTION NOMINATING COMMITTEE

A. L. WATSON (Chairman, Nominating Committee): Mr. Chairman, your committee respectfully submits the following nominations for officers and members of the Executive Committee for the Chemical Section for the coming year.

Chairman, S. E. Whiting. And the committee recommends that three vice-chairmen be selected for next year instead of the usual one; without entering into further details in regard to that, it was felt there were very good reasons for such an arrangement for organization and the following names have been submitted for vice-chairmen: C. E. Rice, E. C. Rogers, and Dr. Leonard Greenburg.

For Secretary:

C. F. Whittemore.

Members of the Executive Committee:

M. F. Crass, L. A. De Blois, Dr. H. E. Howe, I. V. Kepner, S. H. Kershaw, J. L. Kistner, H. L. Miner, Dr. C. L. Reese, A. L. Watson and J. S. Shaw.

News Letter Editor: E. W. Spencer.

THE CHAIRMAN: You have all heard the report of the chairman of the Nominating Committee.

(Motion was made and properly carried to adopt the report of the Nominating Committee.)

THE CHAIRMAN: I might say a few words in connection with the work that has been done over the past year in this particular Section. Several things are outstanding on which I will talk. One is the completion of the Benzol Poisoning report by Dr. Winslow's Committee and the commencement of work on the Spray Coating Investigation. One other important work that was undertaken this year was to get out material for a chemical monograph. We have at present, I think, about eight or nine papers that will be included in a chemical monograph which will be submbitted to the American Chemical Society. This work is being done at the suggestion of Dr. Howe.

I want to congratulate the new chairman, Mr. Whiting.

MR. WHITING: I ought to express surprise but instead of that I move we adjourn.

THE CHAIRMAN: I want to take this opportunity upon vacating the chair to express my appreciation to the members of the Section and the Executive Committee for their splendid cooperation that I have received in my work during the past year. I wish the incoming chairman success in his undertaking.

ADJOURNMENT

Chemical and Rubber Sections Joint Meeting

October 26, 1926

A. L. WATSON, Acting Chairman,
Hooker Electro-Chemical Company, Niagara Falls, N. Y.

THE joint Session of the Rubber and Chemical Sections of the National Safety Council was held in the Henry II Room of the Statler Hotel, Detroit, Michigan, on Thursday morning, October 28, and convened at 9:55 o'clock, Mr. A. L. Watson, Hooker Electro-Chemical Company, Niagara Falls, N. Y. presiding.

THE CHAIRMAN: Mr. Graef, of the Rubber Section, has been detained for a short time. The chairman of the Chemical Section, Mr. Kistner, asked me if I'd proceed to get the meeting under way, as I am supposed to have some familiarity with the two topics under consideration this morning.

This Benzol Report, as most of you know, is the result of about three years of work by a special committee of the National Safety Council, of which Dr. Winslow of Yale University has been chairman. The Committee has done an excellent piece of work and is making a real contribution to industry in submitting a report which is so extensive and well done.

Without further comment we will ask Dr. Winslow if he will proceed.

THE NATIONAL SAFETY COUNCIL STUDY OF BENZOL POISONING

C.-E. A. Winslow, Professor of Public Health, Yale School of Medicine, New Haven, Conn.; Chairman, Committee on Benzol of the National Safety Council.

The Committee on Benzol[1] was organized as a result of a discussion of the hazard involved in the use of the solvent in question which was presented at the 1922 National Safety Congress held in Detroit. The work of the committee was made possible through the appropriation of $5,000 by the National Bureau of Casualty and Surety Underwriters; through the assignment by the Surgeon-General of the United States

[1]C.—E. A. Winslow, Chairman; Leonard Greenburg, Vice-Chairman; W. S. Paine, Secretary; H. Bradshaw, J. W. S. Brady, A. C. Fieldner, C. F. Horan, L. E. Weber, J. M. Weiss.

Public Health Service of Dr. Leonard Greenburg to work on the problem for almost a whole year; through the loaning of professional personnel for shorter periods by the Massachusetts State Board of Labor and Industries (Mr. John R. Dexter) and by the Hood Rubber Company (Dr. J. N. Shirley); and through assistance or materials furnished by the Aetna Life Insurance Company, by Dr. N. B. Herman of Johns Hopkins University, by the Yale School of Medicine and by the Weirton Steel Company.

Progress reports of the committee were presented at the Buffalo Safety Congress in 1923, the Louisville Safety Congress in 1924 and the Cleveland Safety Congress in 1925, the final report of the committee was published last May as a pamphlet of 128 pages for the Chemical and Rubber Sections of the National Safety Council, by the National Bureau of Casualty and Surety Underwriters.

Before considering in detail the conclusions of the committee it seems desirable to point out two points in regard to its activities which seem to the writer to be of somewhat more than passing significance.

Points in the Activities of the Committee

The first point which may be noted is that we have here a somewhat exhaustive study of an industrial poison hazard which has been conducted primarily by and for an organization representing industry itself. It is true that the United States Public Health Service, the Massachusetts State Board of Labor and Industries and the universities have generously cooperated in the task. Yet the initiative for the whole study has come from the Safety Council, a group of industrialists federated for the safety of the worker on the ground that the human element is a primary factor in production; and the fact that this body with its long and splendid record of achievement in accident prevention should have now definitely entered the allied field of industrial poisoning is cause for profound satisfaction. In Europe the whole program of industrial hygiene is essentially a governmental one. In the United States, on the other hand, a major part of what has been accomplished for industrial safety and sanitation has been accomplished by the initiative of broad-minded employers of labor. The benzol study is a new demonstration of the readiness of industrial leaders to learn the facts and then to apply all available knowledge to the promotion of health and efficiency.

Next, I would call your attention to what I believe to be a second somewhat notable fact about this investigation—the method by which it was conducted. Nearly all previous work on industrial poisons has been of what may be termed a qualitative type. It has dealt with a relatively small number of instances of poisoning which have come, one by one, to the notice of physicians, and such cases, from the nature of the situation, have been as a rule of a more or less aggravated type. In this benzol study there has been for the first time a conscious

and definite effort to pick out a representative group of apparently normal workers in a given industry and to make a quantitative study of:

a. Mechanical conditions affecting a possible poison hazard.

b. Analytical data indicating the degree of atmospheric pollution by the poison in question, and

c. Physical findings including delicate chemical microscopic and physiological tests suitable for the detection of latent and incipient damage to the human body such as threatens the subsequent development of active clinical disease.

Since the benzol study was made, two other investigations in this country have been conducted along essentially similar lines; the work of the United States Public Health Service on tetra-ethyl lead, and the work on spray coating by the Pennsylvania State Bureau of Labor and by the Committee on Spray Coating of the National Safety Council. These three studies, all involving the principles outlined above, seem to embody a relatively new and highly promising contribution to the technique of industrial hygiene.

With these preliminary remarks we may proceed to a summary of the main conclusions reached by the benzol committee, while the body of supporting evidence must be sought in the full report of the committee itself.

Summary and Conclusions

Chemistry of Benzol. Benzol or benzene (C_6H_6) is a colorless liquid, boiling at about 80°C.[2], obtained from the distillation of coal tar and from the strippings of coke oven gas. It is highly insoluble in water, slightly soluble in alcohol, and completely miscible with ether, acetic acid, acid, carbon disulphide and a large number of organic substances. There are many substances commercially known as "benzol," some of which contain benzene while others do not. All of them are, of course, to be sharply distinguished from benzine which is a petroleum product (a mixture of C_6H_{14} and C_7H_{16}).

Benzol was discovered by Faraday in 1825 in the liquid produced by the compression of illuminating gas obtained from certain oils. In 1865 Kekule announced its structural formula. Mansfield studied its commercial production from coal tar in 1849 and 20 years later Caro Clemen and Engelhorn patented a process for its recovery from illuminating gas. Only, however, with the work of Carves, of von Hussener and of Brunck on the production of benzol from coke oven gas, between 1884 and 1887, did this substance come to play a really important part in industry.

Industrial Uses of Benzol. The commercial uses of benzol grew gradually and steadily from 1890 to 1915; but the development of benzol production during the war in connection with the manufacture of

[2] 80.2° is the usual figure given in the textbooks; but it may be noted that a sample of very pure benzol analyzed for the Committee showed that 70 per cent of the material came off between 79.5° and 79.9°. The International Critical Tables prepared by the National Research Council give 79.6°, which seems undoubtedly correct.

explosives led to an increase in the manufacture of benzol which has in turn opened the way for a rapid broadening of the field for the commercial uses of this substance.

In considering the practical problem of the use of benzol in industry it is important to remember that two very distinct types of processes are involved. In such industries as (a) the distillation of coal and coal tar in the production of benzol, (b) the blending of motor fuels, and (c) the chemical industries, including oil extraction, dye and dye intermediates, manufacture of paints, varnishes and stains, and of paints and varnish removers, benzol is used in large quantities, but the very nature of the industry demands that it be kept in a closed pipe line system, any openings representing a loss of valuable vapors, making the system an inefficient one with a correspondingly large financial loss.

In the second group of processes represented by the use of benzol (a) in the rubber industry, (b) in artificial leather manufacture, (c) in sanitary can manufacture, (d) in dry cleaning, (e) in connection with the handling of paints, varnishes and stains, benzol is employed chiefly as a solvent or a vehicle and as a part of the process it must be removed so as to leave the originally dissolved substances in place. The method of removal of the benzol is usually to permit it to evaporate; in most cases this is done cold; in some cases, however, the compound may be warmed, a procedure which naturally removes the benzol with greater rapidity.

Benzol Exerts Three More or Less Major Effects

Toxic Action of Benzol. Benzol introduced into the body (which in practice ordinarily occurs as a result of the inhalation of its fumes) exerts three more or less distinct major effects. It plays the part of an anesthetic or narcotic leading to dizziness, faintness, and coma. It is at the same time, however, a nerve irritant, producing characteristic spasmodic movements, and actual damage to nerve tissue. Coma and death may also result from this neurotoxic action as well as from the narcotic action of benzol. Above all, however, this substance possesses a definite and specific destructive power for the blood cells and those organs which produce these cells.

Actute Benzol Poisoning. As in the case of many other toxic substances used in industry, benzol poisoning exhibits itself in two quite distinct forms, acute and chronic,—according as exposure is brief and intense on the one hand or moderate and prolonged on the other.

Occasional instances of acute benzol poisoning may be found in medical literature extending back to 1862. In our review of the literature for both Europe and America we have obtained record of over 100 cases of acute benzol poisoning, of which about half were fatal (excluding a series of Russian cases complicated by hysteria).

Acute benzol poisoning generally occurs in one or two ways: either (a) by the sudden discharge of vapors through the failure to regulate a condensing apparatus or through the occurrence of a leak in piping in

the vicinity of stills and other forms of chemical apparatus; or (b) by the entrance of workmen into tanks or other confined spaces in which benzol has been stored or used.

The common symptoms of acute benzol poisoning are (a) dizziness, faintness and drowsines, culminating in unconsciousness and coma; (b) pallor of the face and cyanosis (blueness) of lips and finger tips; (c) feeble and rapid pulse; (d) breathlessness and a feeling of tightness in the chest, sometimes culminating in immediate death from respiratory paralysis; (e) visual disturbances, with nervous excitation, tremors and convulsions, and more rarely mania or delirium; (f) reddish spots on the skin and internal surfaces due to small hemorrhages in the tissues; and (g) where the substance has been taken in by the mouth, symptoms of acute gastro-intestinal irritation.

Death May Occur Quickly or Be Delayed

Death may occur within five minutes after exposure or the patient may apparently recover and succumb several days later. There appear to be marked individual variations in susceptibility to benzol; and the effects of a given atmospheric condition may probably be increased by vigorous muscular exertion, as suggested by the fact that a man first rendered unconscious by the inhalation of benzol vapors may often recover while those overcome while engaged in rescuing him may die.

The treatment of acute benzol poisoning involves, first of all, prompt restoration of the respiratory function by artificial respiration.

Chronic Benzol Poisoning. Chronic benzol poisoning, resulting from continuous or repeated exposure to benzol fumes in concentrations too low to produce marked narcotic effects is of course a condition much more obscure, and much more likely to be overlooked, than is the acute poisoning discussed above. It is particularly likely to occur in the second group of industries alluded to above, in which benzol is used as a solvent and to a greater or less extent evaporated into the air of the workroom. Chronic benzol poisoning was first described by Santessen in workers in a rubber factory in 1897, and in this country by selling in 1910, as occurring in the coating room of a tin can plant.

The more commonly observed symptoms of chronic benzol poisoning may be summarized as follows: (a) general systemic disturbance as evidenced by headache, dizziness, weakness, loss of appetite and loss of weight; (b) pallor, shown by blood examination to be due to true anemia; (c) marked reduction in white blood cells (revealed of course only by microscopical examinations; (d) bleeding from nose, gums, vagina and bowels with the development of purplish spots caused by small hemorrhages within the tissues; (e) sore and spongy gums and burning of eyes and throat; (f) shortness of breath and tightness of chest; (g) sometimes, abdominal pains, nausea and vomiting; (h) sometimes, slight tremors, visual disturbances and abnormal sensitiveness to touch, rarely convulsions and delirium; (i) rarely, rashes and skin eruptions.

Detection of chronic benzol poisoning in its early stages with prompt removal from exposure generally leads to complete recovery. If the case of chronic poisoning be a severe one, however, certain of these symptoms may persist for a long time after exposure has ceased; and nearly one in five of the cases reported in the literature has ended fatally.

Effects of Benzol Upon the Blood Cells

Of the three general effects produced by chronic benzol poisoning—narcotic, neurotoxic and blood-destructive—the last is the most universal and the most characteristic. In the very first stage, there may be a slight increase in white blood cells but this is really due to a destruction of the white cells in the circulating blood, over-balanced by the compensatory production of more white cells by the blood-forming organs (the lymph nodes, spleen and bone marrow). This condition is exceedingly transient, however. Very shortly the blood-forming organs themselves are injured, particularly in respect to their power to produce the special kind of white cells, known as polymorphonuclear leucocytes and lymphocytes. The total white cell count falls rapidly, producing the condition known as leucopenia. The tissues which produce the red cells of the blood are less readily affected and a normal or increased red cell count may persist for some time, parallel with a great decrease in white cells. Ultimately, however, the blood-forming organs are so seriously damaged that the number of red cells also falls off, producing a pronounced anemia.

A decrease in the white cells of the blood is therefore the first indication of early chronic benzol poisoning and the effect is so familiar that benzol has been used therapeutically for the treatment of diseases characterized by an excessive concentration of white blood cells. Our studies indicate that a fall from a normal value of 7,500 to 9,000 white cells per cubic millimeter of blood to 5,600 or less may be taken as a fair index of the presence of this disease. Of course, other conditions than benzol poisoning may cause leucopenia, but with a history of exposure to benzol and in the absence of symptoms of certain acute communicable diseases or of certain other industrial intoxications which may rarely be associated with leucopenia, the diagnosis may be made on this basis with reasonable accuracy. This reduction in white cell count generally precedes any other symptoms of benzol poisoning and may therefore exist in persons who would be considered normal by the ordinary clinical tests.

The seriousness of benzol leucopenia is emphasized by the observations made by a number of investigators that resistance to pneumonia and other bacterial infections is greatly reduced by such a condition.

Extent of Benzol Poisoning in American Industry

In order to gain some idea of the extent of the benzol hazard in American industry we sent out a questionnaire in 1923 to a group of 324 industrial establishments which, from the nature of their products, might be

expected to use benzol. Of these establishments, 140 replied; and of the 140, 84 were found to be making use of this substance in greater or less amount. The largest amounts of benzol were apparently used in the chemical industries, in the can-seal industry, in the rubber industries, and in the manufacture of artificial leather, but in the chemical trades the material is generally used in enclosed processes and the number of employees exposed is small.

From the results of this questionnaire and from our subsequent 1924 field studies we collected a list of 15 fatal and 83 non-fatal cases of benzol poisoning occurring during the years immediately preceding. Out of 23 establishments in which 10 or more persons were exposed to benzol, 11 or nearly half reported cases of poisoning, while of six plants in which 50 or more employees were exposed, all but one had had poisoning cases.

During the last year of our work we made no attempt to extend this survey of the extent of the benzol hazard; but at least seven fatalities from this cause were brought to our attention during the first nine months of 1925; and during the five years ending June, 1925, there were in the state of Ohio, alone, 29 cases of benzol poisoning, so clear and obvious as to receive the benefits of industrial compensation.

It is therefore clear that the hazard of benzol poisoning in American industry is a serious one and constitutes one of the major problems of industrial hygiene.

Field Study of Actual Conditions in Industries Employing Benzol

In order to determine the actual extent of the benzol hazard under various industrial conditions, we selected, after a preliminary survey of industrial establishments, 18 workrooms in 12 different plants for further intensive study. Most of these were rubber factories of various sorts, but dry cleaning, sanitary can manufacture and artificial leather manufacture were also included.

The workrooms were studied from an engineering standpoint, with regard to the conditions under which the benzol was used and particularly the type of exhaust ventilation provided; and analyses of the air were made under both summer and winter conditions, to determine the extent of the resulting contamination of the atmosphere. For air analysis, we used the charcoal absorption method which gave us, not benzol alone, but the total content of solvent vapors. For convenience, however, the results have been expressed in terms of benzol. Whether other solvent vapors were actually present or not is of course indicated in each instance.

With small amounts of benzol in use and with no ventilation, or general ventilation only (which our studies indicate is wholly inadequate to cope with the benzol problem), we found average concentrations of 100 to 1,360 parts of benzol per million parts of air. With large amounts of benzol in use, under similar conditions, we found average values from 220 to 1,800 parts per million. On the other hand, in plants using large amounts of benzol but with enclosed systems or local exhaust ventila-

tion, we found averages only between 70 and 500 parts per million. The plant which had the most efficient systems of local exhaust gave us average values lying between 70 parts in summer and 90 parts in winter.

It appears from this study that some of the workrooms investigated at times approached the concentrations of benzol which have been found to cause acute poisoning (Lehmann states that 4,700 parts may produce confusion in half an hour and we found 2,640 parts in a compound mixing room and 4,140 parts in a dry cleaning establishment). Five of the 18 rooms gave average figures above the value of 550 parts which Legge found associated with clinical poisoning. On the other hand, with efficient local exhaust ventilation, and careful management of all details of the processes involved, it seems sometimes possible to use benzol in coating and mixing rooms and in sanitary can manufacture with an atmospheric pollution amounting to less than 100 parts of solvent vapors per million parts of air. Our next step was to determine whether this degree of protection was sufficient to avoid danger to health.

Extent of Early Benzol Poisoning as Determined by Clinical Tests and Blood Examinations

The crux of our problem was the examination of workers exposed to benzol under various industrial conditions, using the white blood cell count as our index of early benzol poisoning. We were ultimately able to make tests of this kind on 81 workers in the 18 workrooms discussed above; and we found that 26 of the persons examined, or 32 per cent, showed clear evidence of blood cell destruction, as evidenced by a white count below 5,500 (or in one instance a borderline white count of 5,800 with a very low red cell count). In 17 instances the white count was below 5,000, in 10 instances below 4,000, and in three instances below 3,000. In only 10 instances, however, was the red cell count below 4,000,000. Control examination of some 50 workers not exposed to benzol failed to show any such abnormal blood pictures as the accompanying summary of blood findings discloses.

In only nine cases out of the 26 was it possible to obtain a fairly complete medical examination; and of these nine, five gave a history more or less clearly suggestive of chronic benzol poisoning (including two or more of such symptoms as headache, dizziness, pallor, loss of appetite, digestive disturbance, spongy gums, nosebleed).

The results of these blood examinations are distinctly disconcerting. Not only did about one-third of the 81 workers exhibit clear evidence of early benzol poisoning, but, what was still more serious, the evidence of poisoning was clear even with good exhaust ventilation and low atmospheric contamination. In the group of workrooms using large amounts of benzol without local ventilation, 10 out of 19 workers gave a positive picture; in the group of rooms where only small amounts of benzol were used without local ventilation 11 out of 36 workers were positive. In the group using large amounts of benzol but with local exhaust ventilation, only five out of 26 workers were positive.

Thus, local exhaust ventilation reduced the proportion of workers affected from nearly one-half to less than one-fifth; but even one-fifth remains a pretty high figure. Unfortunately we were unable (after repeated efforts) to make blood examinations in the can factory coating room which gave the best analytical results; but in a coating room with

Summary of Blood Findings on Examination of Workers Potentially Exposed to Benzol

Group	Room	Local Ventilation	Average Benzol in Air p.p.m. Summer	Winter	Blood Findings No. persons examined	No. positive
I-A	150 B	—	100	.....	9	2
Small amount of benzol	60	—	150	.....	1	0
No local ventilation	27 A	—	110	.....	2	1
Low benzol content in air						
I-B	27 B	—	700	.....	2	0
Small amount of benzol	59	—	150	210	9	1
No local ventilation	61 A	—	130	210	12	6
High benzol content in air	61 B	—	1360	580	1	1
II-A	78 A	+	70	90	0	—
Large amount of benzol	150 A	+	90	.....	1	1
Local ventilation	75 B	+	100	.....	3	1
Low benzol content in air						
II-B	91	+	180	400	5	0*
Large amount of benzol	50 B	+	.....	430	3	1
Local ventilation	50 A	+	.....	500	4	1
High benzol content in air	75 A	+	130	330	10	1
III	78 B	—	340	.....	1	0
Large amount of benzol	23	—	.....	.....	6	2
No local ventilation	83	—	620	.....	9	6
High benzol content in air	95	—	1800	.....	3	2
Total					81	26

* 3 clinical cases, 1 fatal since tests were made.

local ventilation, showing only 90 parts of benzol in the air in summer, the single worker exposed proved positive; and in a mixing room in an artificial leather factory, with only 100 parts of benzol in the air in summer, one out of three men proved positive.

We are forced to conclude that the control of the benzol hazard (except where the substance is used in completely closed systems) is exceedingly difficult; that in practice, systems of exhaust ventilation capable of keeping the concentration of benzol in the atmosphere below 100 parts per million are extremely rare; and that, even when this is accomplished, there remains a decreased, but substantial, hazard of benzol poisoning.

Conclusions in Regard to the Use of Benzol in Enclosed Systems

As pointed out above, benzol is used in industry under two more or less distinct sets of conditions. In the manufacture of benzol from coal and coal tar, in the blending of motor fuels and in the chemical industries, the solvent is necessarily handled in closed containers and pipe systems. Here, chronic poisoning is unlikely to occur and the chief hazard arises from acute poisoning due to carelessness in the cleaning of tanks, breaks in the apparatus, and similar accidents.

With regard to this type of process, it seems certain that with proper care in construction, maintenance and operation the use of benzol can be made sufficiently safe to warrant its employment. It is true that fatal accidents have occurred, and will no doubt continue to occur, in such processes, just as such accidents occur, and will continue to occur, from the use of steam boilers. The danger is, however, in both instances a controllable one to be met by careful attention to safety provisions and not by the abandonment of the use of the substance or device in question.

The chief measures of protection which should be enforced in industries of this type are:

a. Regular and systematic inspection of apparatus to insure against breaks or accidental leakage.
b. The greatest possible care in freeing tanks or other receptacles which have contained benzol from all traces of the substance before they are entered for cleansing or repairing.
c. The protection of workers entering enclosed spaces liable to contain benzol fumes by the use of positive pressure air helmets or hose masks; and the conduct of all such work by teams of two or more men who are familiar with the dangers involved.

Conclusions in Regard to Use of Benzol as a Solvent

In the rubber industry, in artificial leather manufacture, in sanitary can manufacture, in dry cleaning and in the use of paints and varnishes, benzol is employed as a solvent or vehicle under conditions which, almost of necessity, permit more or less evaporation of the solvent into the atmosphere. Here, there is relatively little danger of acute benzol poisoning, but very great danger of chronic poisoning, arising from prolonged or repeated exposure to the fumes.

In order to minimize such hazards as far as possible, there are two general types of precautions which should be taken, tending respectively to decrease the degree of exposure and to detect and control incipient poisoning in its earliest possible stages.

1. To diminish exposure, enclosed processes should of course be used wherever possible, and whenever containers are cleaned or apparatus repaired, the special precautions discussed in the preceding paragraph dealing with acute poisoning should be observed. Wherever employees are likely in the course of their work to be exposed to benzol fumes, as in the ordinary solvent and evaporative processes or in handling the products of such processes, they should be protected by the most effective local exhaust ventilation designed according to the following general principles.

(a) Where benzol is evaporated at room temperatures, air removal by local exhaust ventilation with down draft is recommended, although in certain enclosed processes direct ventilation (from the enclosure) with upward draft may be indicated.

(b) Where localized heat is applied in the evaporation of the benzol, hoods or enclosures should be provided with up-draft local exhaust. This

draft should be sufficiently intensive and applied so closely to the point of origin of the evaporating benzol as to insure the complete removal of all of the benzol before the heated surface is removed from the hood or enclosure. This recommendation deals with specific processes where sufficient upward air movement is created by the heated surface to overcome the natural density of the benzol vapor.

Masks and respirators should not be relied upon to protect the worker against ordinary routine exposure to benzol fumes, since such devices can not be made efficient without at the same time making them too uncomfortable to be worn continuously.

2. To detect incipient benzol poisoning at a stage when its effects can be minimized, it seems essential to the committee that all workers to be employed in processes where exposure to the fumes of this solvent is involved, should be given a thorough medical examination before employment and re-examined, with systematic blood counts, once a month thereafter. In addition to this routine re-examination absence from work should be promptly followed up by some person conversant with the symptoms of benzol poisoning; and the employees themselves should be made familiar with the symptoms which are most likely to occur.

No worker should be employed in a benzol process who shows signs of:

a. Organic disease of heart, lungs, or kidneys.

b. Hemorrhagic tendencies.

c. Anemia or any unusual blood picture.

Any worker who, on re-examination, shows any of the following symptoms should be promptly excluded from benzol exposure and transferred to some other department of the industry.

(a) Hemorrhages from the mucous membranes of the nose, mouth or other organs.

(b) Decrease of more than the following amount from the employee's normal blood picture (normal conditions will be obtained from previous examinations of the individual employees).

(1) White cells, decrease of 25 per cent; but in no case should an employee with a white cell count of less than 5,000 be continued in benzol processes.

(2) Red cells, decrease of 25 per cent.

(3) Hemoglobin, below 70 per cent.

(Note: Reduction in white cells is the most important condition to be noted.)

Relative Toxicity of Benzol and Its Higher Homologues

In view of the grave hazards involved in the industrial use of benzol we next proceeded to an experimental study of the relative toxicity of certain of the higher homologues of benzol in the hope that if such substances proved less dangerous they might be substituted in at least certain industrial processes."

4. This Laboratory study was conducted with marked ability and success by Dr. J. J. Batchelor of the Yale School of Medicine, Research Associate to the Commitee.

The results reported in the literature of the subject are somewhat conflicting, probably because of the uncertain composition of the materials used by certain workers and of the lack of clear discrimination between the various types of toxic action produced. In general, however, the more careful work has suggested that benzol is more dangerous than its higher homologues.

Our own investigation was conducted with adult white rats which were kept on a standard diet and subjected to preliminary study to determine the normal range of variation in the blood count of each animal. The substances used for our tests were four in number, pure benzol (boiling point 80 degrees). (See Note 2.) Toluol (boiling point 111 degrees), Xylol (boiling point 139 degrees) and Hiflash Naphtha (boiling point chiefly between 165 to 185 degrees). The influence of these solvents was studied in three different ways, by intraperitoneal injection (direct introduction into the body cavity), by subcutaneous injection (under the skin), and by inhalation in a chamber specially arranged so as to make possible a close control of the proportion of solvent in the atmosphere.

The method of intraperitoneal injection involves sudden exposure to a relatively intense effect of the injected substance. With benzol, all animals receiving as little as .5 c.c. per kilogram of body weight showed marked symptoms of a definite toxic action exerted primarily upon the central nervous system, manifested by tremors, twitchings, loss of equilibrium, lack of response to stimulation, and extreme weakness. With doses in excess of 1 c.c. per kilogram of body weight the temperature of the animal dropped from 3 degrees to 8 degrees below normal. At times paralysis of the extremities was practically complete. The animals always recovered from doses up to 1 c.c.; but 2 c.c. per kilogram of body weight always proved fatal.

In Animals That Recovered Blood Cell Counts Not Affected

It is of special interest to note that in the animals which recovered neither the white nor the red blood cell counts were materially affected. This is in accord with conclusions from the clinical study of human cases which indicates that acute and chronic benzol poisoning are quite distinct phenomena and that acute benzol poisoning which is due to violent irritation of the nerve centers and consequent asphyxiation, fails entirely to produce the effect upon the cell content of the blood which is characteristic of chronic poisoning.

The other three solvents studied, xylol, toluol and Hiflash naphtha, when injected intraperitoneally, showed a wholly different picture. Xylol up to 0.75 c.c., and toluol up to 0.75 c.c. per kilogram of body weight produced no symptoms whatever except slight apathy. Hiflash naphtha in doses of .5 c.c. produced some limpness and paresis and a lowering of body temperature. In larger amounts all these three substances produced deranged equilibrium and weakness, culminating in loss of power of movement and ultimately in complete narcosis with fall in temperature, but the effect in the case of toluol and xylol was

relatively lacking in the symptoms of toxic stimulation of the nervous centers and was of the nature of a narcosis, rather than of a nerve-irritation.

In view of the fact that the present study was concerned mainly with chronic poisoning, we have laid chief stress upon our subcutaneous injections. Here, doses of 1 c.c. per kilogram were injected under the skin of the abdomen or back (mixed with equal parts of olive oil to decrease local irritation and delay the rate of absorption). Injections were repeated daily for a period of four to 22 days. This mode of treatment leads to a gradual absorption of the injected substance, entirely comparable with what occurs in human cases of chronic industrial poisoning.

Effect of Injection of Various Solvents

Solvent	Daily subcutaneous injection of v. c.c. per kilogram of body weight[1]				
	Average No. of injections	Average loss in weight	Average reduction White cells	Red cells	Intraperitoneal injection. Lethal dose
Benzol	13	26	91	28	1.25-2.0 c.c.
Toluol	16	6	0	5	1.25-2.0 c.c.
Xylol	10	3	0	10	2.0 -2.5 c.c.
Hiflash naphtha	11	4	0	5	2.5 c.c.

[1] Five of the animals treated with xylol received two instead of one c.c. per day.

In the case of benzol it caused obvious constitutional symptoms, including apathy and weakness, loss of weight, and twitchings and tremors, indicating a toxic effect upon the central nervous system and culminating in death when the injections were long continued. The white blood cells were promptly affected, the red cells more slowly, as in human clinical experience, and ultimately white cells almost disappeared from the blood.

On the other hand the animals treated by subcutaneous injection with toluol, xylol and Hiflash naphtha showed no constitutional symptoms whatever, aside from slightly lessened activity and slight loss in weight. The white cells were not permanently affected at all and the red cells suffered only a slight and transient reduction. The relative effects of the four solvents studied are summarized in the accompanying table showing the "Effect of Injection of Various Solvents."

Finally, our inhalation experiments brought out the relative effects of the four solvents with even greater clearness, as summarized in the table showing "Effect of Inhalation of Various Solvents."

We see from this table that when animals were exposed for 18 to 20 hours a day for seven days to high concentrations of the four solvents, toluol and xylol were more toxic than benzol, since 1,600 parts per million of the former solvents proved fatal while 2,440 parts of benzol did

not. This is due entirely to the narcotic influence of the solvents in question and is in accord with the general fact that narcotic action often increases with added methyl radicles. On the other hand, toluol and xylol, even in this extreme concentration, are almost without effect on the central nervous system or on the blood-forming organs, both of which are seriously damaged by benzol.

In concentration of 1,000 parts per million or less the severe narcotic effects of xylol and tuluol are practically absent and in such dilution the superiority of these substances as compared with benzol is most obvious. Even 460 parts of benzol damages the blood-cell forming organs to such an extent as almost to eliminate the white cells from the blood

Effect of Inhalation of Various Solvents

	High Concentration[1]			Moderate Concentration[2]			Low Concentration[3]		
	Change in wt., Per cent	Reduction in white cells Per cent	Symptoms	Change in wt., Per cent	Reduction in white cells Per cent	Symptoms	Change in wt., Per cent	Reduction in white cells Per cent	Symptoms
Benzol	—28	63	Marked, neurotoxic	—14	81	Moderate	—15	91	Prac. none
Toluol	—21	0	Narcosis, Death	— 3	13	Slight	+ 1	15	None
Xylol	—10	9	Narcosis, Death	— 3	8	Slight	+ 3	4	None
Hiflash naphtha				—10	12	Slight	— 2	9	None

[1]Benzol 2440 p.p.m. Toluol 1600 p.p.m. Xylol 1600 p.p.m.
[2]Benzol 815 and 1035 p.p.m. Toluol 1100 and 1250 p.p.m. Xylol 980 p.p.m. Hiflash naphtha 567 p.p.m.
[3]Benzol 460 p.p.m. Toluol 620 p.p.m. Xylol 620 p.p.m. Hiflash naphtha 312 p.p.m.

and causes 15 per cent loss in weight; while concentrations of 1,000 parts of toluol and xylol produce only slight effects either upon cell count or upon the weight of the animals.

It is this latter condition which is of importance from the practical standpoint of industry, since with their relatively high boiling points toluol and xylol would never be present in concentrations of over 1,000 parts except as a result of some temporary accident and, if they were, their irritant action would serve as an immediate and automatically effective danger signal.

Desirability or Replacing Benzol as an Industrial Solvent by Other Related Substances

Our field studies have thus indicated that the use of benzol as an industrial solvent is attended with health hazards which can only be avoided by the provision of elaborate local exhaust ventilation and by the maintenance of a comprehensive system of medical supervision.

On the other hand, our laboratory investigations make it clear that certain of the higher homologues of benzene, such as toluol, xylol and Hiflash naphtha, are relatively free from the special hazards which attend the use of benzene itself. These substances, in large doses, are

even more powerful narcotics than benzol, but their low volatility and marked odors make it highly unlikely that they will occur in workroom air in sufficient concentration to produce effects of this sort. On the other hand, they are almost wholly lacking in those specific destructive effects upon the nerve tissue and, above all, upon the blood-forming organs so characteristic of benzol. Under ordinary conditions of use, and in any concentrations in which they would be likely to occur in workroom air, these substances appear to be relatively harmless.

We would therefore urge that the serious attention of manufacturers now using benzol should be given to the possibility of substituting one of these, or other relatively harmless substances wherever the conditions of a given manufacturing process make it possible to do so.

General Discussion Following the Benzol Report

THE CHAIRMAN: I am sure all you gentlemen will agree that this report of the Benzol Poisoning Committee is a very valuable contribution to industry. It indicates the very wide possibilities of the future work of the National Safety Council. We sometimes feel that our efforts along the lines of accident prevention have almost come to an end, but when we hear a report such as that presented this morning, it certainly shows us that there is a much wider field in accident prevention than most of us may have appreciated. There are many subjects of this sort which could be undertaken. Of course, it costs money and the Council would necessarily have to raise extra funds to carry on similar investigations along other lines.

I want to take this opportunity to thank Dr. Winslow publicly for the very great interest he has shown and the excellent work he and the other members of his committee have done on this investigation into the hazards of benzol.

Now we are going to throw the meeting open for discussion and I am sure that there will be a number of questions you would like to ask Dr. Winslow. He has covered the subject very briefly; I don't know that it was mentioned, this report has already been published by the Council and copies are available at the headquarters offices.

DR. J. S. MILLARD (Goodyear Tire & Rubber Co.): May I ask Dr. Winslow if you mix benzol one-half with gasolene, is the danger reduced one-half or more?

DR. WINSLOW: I haven't any definite evidence on that point. I should think it would be merely a matter of the amount of benzol present. That is, I should think the reduction would be in approximate proportion. Possibly Dr. Smythe has some views on that. If you mix gasolene with benzol would the reduction in the hazard be approximately in proportion?

DR. H. F. SMYTHE (University of Pennsylvania): I don't think it would. You must take into consideration the boiling points or vapor pressure of the two substances. Benzol being the lower vapor would come off in larger amounts; and you must take into consideration, further, that in mixed vapors, where you have the two substances in liquid, it

doesn't necessarily apply that you get them in the same proportion in vapor. We have had them more in the spraying study than in the benzol study. The lacquer solvents are legion. The high boilers meet with low boilers.

Now Dr. Winslow spoke of the intoxicating action of the toluol. Even though that is a fact and does introduce a hazard there, yet the hazard is not as great in proportion when you substitute these higher boilers for benzol because they won't come off in such great amount in the air. In the liquid you'd get the intoxicating action, of course, but not in the air. The higher boilers in lacquer we were working with do not come off until the material sprayed gets into the drying room.

THE CHAIRMAN: Is that question answered satisfactorily?

DR. MILLARD: We dilute benzol and we have always felt safe in diluting it one-half. I am not quite clear as to the answer to my question. We have equal amounts of benzol in two rooms. In one it is diluted one-half and in the other it is pure.

DR. WINSLOW: You mean equal amounts in the solvent? It would certainly depend on the amount of benzol in the air, and I should think the amount of benzol in the air, other things being equal, would be approximately the same. I don't think the gasolene would affect it, in other words.

Amounts of Benzol Would Remain Similar

DR. MILLARD: Would there be just as much benzol in a room that had 1,000 gallons of benzol and 1,000 gallons of gasolene as in another room that had 2,000 gallons of benzol, both rooms being of equal size?

DR. WINSLOW: I should think there would.

THE CHAIRMAN: Are there further questions on Dr. Winslow's report? Are there any questions on the benzol Poisoning Report? If not, we might have time after Dr. Smythe finishes his report on spray coating to open up this question again. In the meantime if you think of any questions you'd like to ask of Dr. Winslow on benzol why you can just bear them in mind.

Encouraged by the result of this benzol investigation the Council undertook an investigation of spray coating. Perhaps a good many of you are familiar with the investigation which was conducted by the state of Pennsylvania into the hazards involved in spray coating and that investigation, of course, was conducted only within the state of Pennsylvania. Consequently it was felt as a result of the findings of that investigation that there was a need for a national investigation involving industries, perhaps, that were not included in the Pennsylvania one. Consequently the National Safety Council organized a special committee, of which Dr. Winslow was again made chairman because of his excellent work on benzol, to investigate this subject. All summer there has been an exhaustive field investigation under way under the direction of Dr. Smythe of the University of Pennsylvania

and Dr. Smythe is going to make an informal report this morning on the result of that work.

Report of the Committee on Spray Coating

(Dr. H. F. Smythe, who had been engaged by the Committee on Spray Coating to study the problem during the past summer, then made a brief informal report on the progress of his investigation. It was requested by the chairman of the committee, Professor C.-E. A. Winslow, of the Yale Medical School, New Haven, Connecticut, that no formal publication of any results should be made at this time until the committee as a body has had the opportunity to study and carefully analyze the data at its disposal. Professor Winslow promises that a report of the committee will be forthcoming during the summer or early fall. Meanwhile any inquiries in regard to the progress of the work should be addressed to him.)

ADJOURNMENT

Construction Section

New Officers of the Section

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Ferro Concrete Construction Company, Cincinnati, Ohio.
FIRST VICE-CHAIRMAN: C. H. ALMSTEAD
Patent Scaffolding Co., New York City.
SECOND VICE-CHAIRMAN: J. F. CONNER
The U. G. I. Contracting Company, Philadelphia, Pa.
THIRD VICE-CHAIRMAN: J. W. DALZELL
Ferro Concrete Costruction Co., Cincinnati, Ohio.
SECRETARY: J. WILSON ROBINSON
Everett Winters Company, Detroit, Mich.

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Associated General Contractors of Amer., Inc., Washington, D. C.
W. F. AUSTIN
W. E. Wood Company, Detroit, Mich.
F. L. HURLBUTT
The Patent Scaffolding Co., Detroit, Mich.

October 26, 1926

W. F. AUSTIN, Chairman
President, W. E. Wood Company, Detroit, Mich.

THE Construction Section of the National Safety Council was called to order in the Reception Room of the Book-Cadillac Hotel on Tuesday Morning, October 26th, 1926, at 9:45 o'clock, by Mr. W. F. Austin, chairman.

CHAIRMAN AUSTIN: Gentlemen, the first business on the program is the report of the officers. Inasmuch as your chairman's report is scheduled for the last item on the program we will forgo that and will listen to the report of the secretary, Mr. J. Wilson Robinson, of the Everett Winters Company, Detroit, Michigan.

REPORT OF J. WILSON ROBINSON, SECRETARY, AND ALSO CHAIRMAN MEMBERSHIP COMMITTEE

As secretary of this Section and also chairman of the Membership Committee, this report is a combined report of these two closely related offices.

Your Executive Committee held one meeting this year, namely on November 5, 1925, in Detroit at which time all of the committee were present except three.

The following problems were recognized as the immediate and pressing problems of the Construction Section:

1. The problem of selling the executives of the member companies on accident prevention work.
2. The problem of keeping them sold.
3. The problem of increasing our membership and selling the idea of accident prevention through the use of voluntary codes before legislative codes are forced upon us.

I shall endeavor to answer these in their reverse order as the first and second are very closely related and dependent on the third. It was recognized from the beginning that to put on a campaign for new members was out of the question, as there has been a very apparent lack of success attending all efforts to secure new members either by correspondence or mass appeal at meetings.

To conduct such a campaign would require a person's full time; in other words, the crying need of the hour was a full-time secretary, one thoroughly acquainted with the construction industry and its accident problems. From a financial standpoint this was out of the question as it would require an appropriation of approximately $10,000 per year.

I did not feel entirely discouraged, however, as there was still work to be done before a successful direct result campaign could be launched.

If you will go back to the years 1916 and 1917 you will recall how a deluge of propaganda was broadcast throughout the country, educating and preparing the minds of the people for our entrance into the World War. Likewise, our immediate problem was a problem of broadcasting and creating a "Safety Conscience" in the minds of the construction industry. Before any product is put on the market for the consumer, an extensive advertising campaign is put on for the purpose of educating the minds of the people and preparing the road for the actual selling campaign.

Looking at it from all sides I believe that more has been accomplished this past year in awakening this safety consciousness than has ever been

accomplished before. Let us see what has been done and what the results are.

In the December, 1925, issue of *Forbes* there appeared a three-page article on accident prevention work, as carried on by the Bell Telephone Company of Pennsylvania.

In the *American Contractor* of October, 1925, there appeared a very timely four-page article by the general superintendent of the Turner Construction Company on material hoist accidents.

Several articles by our chairman, Mr. Austin, appeared in various magazines during the past year.

I prepared and had published six articles of two to three pages, in the *American Contractor*, the *Constructor* and *Building and Contracting*. Several of these were re-printed in A. G. C. sectional magazines and I could go on and name a dozen or more articles published on this work.

Likewise, the editors of our various engineering and building journals did their part not only in publishing these articles but by lending their pens to the cause. The following are a few of the editorials appearing this past year.

Further Details of Published Safety Articles

In the *American Contractor*, November, 1925, appeared a half column editorial on safety work and its result in cash dividends.

In the *Engineering News Record*, July, 1926, appeared a half column editorial referring to the work done by the Detroit contractors and the action taken by the Texas branch of the A. G. C.

In the *American Contractor*, January, 1926, appeared a half column editorial on progress made in safety education in Milwaukee and Detroit.

In the *Engineering News Record*, September, 1926, appeared a full column editorial on safety work among contractors, stating that "In no very great time the constructor, who was no agency for systematic accident work is going to be handicapped in his competitive race with constructors who have."

In the *Bulletin*, August, 1926, appeared a full column editorial commenting on the Safety Forum organized by the New York Building Congress to decrease accidents in Greater New York and referred to the New York Department of Labor report that in the state of New York 1,300 industrial accidents occurred each month and in the year 1925, 374,000,000 industrial accidents occurred to which the Building Construction Industry were the biggest contributors.

We must take cognizance of the efforts being put forth by organized labor through state legislation, and its far reaching results.

The Building Trades Unions in Newark, New Jersey, have organized a safety committee on every good sized building job. These committees have been linked up through the city and inspections are made by the unionists to see how the job safety work is progressing on every operation.

An editorial in the *American Contractor* commenting on this action said: "Undoubtedly such work is legitimate activity on the part of the

unions. The unions are undoubtedly doing the right thing in instituting efforts to eliminate accidents, since so many contractors have not given this work the attention it deserves." It went on to sound the warning that "If the contractors do not assume the initiative in such work their position of leadership will be undermined to the extent that the work will be carried on through other agencies."

As another example, the Bureau of Inspection of the Department of Labor and Industry of Pennsylvania has notified the contractors of that state that the number of accidents on building operations during the first three months of 1926 increased 26 per cent over the same period last year, and last year the increase amounted to 18 per cent over the year previous. The various Bureaus of Inspection in Pennsylvania have been instructed to have inspectors spend a large portion of time looking over the jobs of contractors.

In the last general election in Missouri, organized labor submitted by initiative petition a very radical compensation act which was defeated because of a very sharp campaign on the part of the Associated Industries of Missouri.

There recently appeared in the *American Contractor* a full column editorial on the situation in California where a contractor must take out Compensation Insurance or make a $20,000 bond deposit with the state, according to a state law that became compulsory last year.

There is the handwriting on the wall. It is aparent that the contractors who have failed to interest themselves in this sort of activity will have only themselves to blame if they find that their employees have stepped in and are doing some dictating.

Growth of the Section During the Year

We must take this fact into consideration, that through our efforts to awaken the safety conscience of the building industry of the country through the numerous articles and editorials appearing in the builder magazines we have no doubt also sown the seed to some extent in the minds of organized labor. It would be fool-hardy for us to think they would overlook such an opportunity as our own acknowledgment of our failure to cope with this problem of the hour in the building industry. Now that the seed has been sown there is but one thing left to do and that is, rise to the occasion, cultivate the seed already sown and reap the benfits therefrom before we are forced through further drastic employers' liability legislation to follow instead of lead.

Commenting on the Construction Section of the National Safety Council, the *Engineering News Record* in a half page editorial states that "For eight years a little group of contractors have gathered at the yearly Safety Congress of the National Safety Council and kept going the Construction Section of that organization. The Section has grown gradually in membership and activity; still in view of the urgency and importance of accident prevention in construction, the membership is pitifully small. It contains only a handful of real workers for the Section and the Coun-

cil. Indeed, it would be discouraging if we were compelled to believe that their meager representation in the Construction Section of the National Safety Council was truly indicative of the progress of safety thinking and accident prevention among constructors. We need not believe this. There has been in these eight years since 1918 a revolution in the attitude of the construction business towards accidents."

The number of members in this Section, September 25, 1925, was 78.
New members added during the year, 17.
Memberships cancelled during the year, 9.
Net increase in members, 8.
Total number of members to October 9, 1926, 86.
Net increase over last year, ten per cent.

This does not tell all the story. During the past year I have received numerous requests from contractors all over the country for data on accident prevention work, showing us that the seed we have been sowing is going to be cultivated in some sections of the country at least.

Poster and Statistical Committee Reports

CHAIRMAN AUSTIN: I believe it has been the custom not to take formal action on the reports of these meetings. We will proceed to hear from the Committee on Posters.

J. M. DALZELL (Ferro Concrete Construction Company, Cincinnati, O.): I think it is pretty well conceded that posters on safe practices are good things on a construction job.

During the year your Poster Committee has formulated some 32 scenarios for posters. Only a very small proportion of those have been published. However, the scenarios that have been prepared are still in the hands of the National Safety Council and undoubtedly will be used.

This year there have been published 22 Construction Section posters which have appeared in the NATIONAL SAFETY NEWS.

CHAIRMAN AUSTIN: We will hear the report of the Statistical Committee by its chairman, Mr. C. H. Almstead.

C. H. ALMSTEAD (Patent Scaffolding Company, New York City): While I have nothing new to report, so far as statistics are concerned, I would like to thank the members for their splendid cooperation. I believe there are something like 36 concerns reporting this year, 13 more than in 1924, and 27 more than in 1923.

As in previous years, handling material and falling objects caused the greatest frequency of accidents. There were approximately 700 accidents, causing 7,000 lost days.

Falls from scaffolding and lattice caused the greatest severity, and 76 accidents caused 32,000 lost days. But I don't think we ought to be alarmed. We have more members concentrating on sending in statistics. I feel sure that, even though our figures are high, we ought to spend more effort upon getting at the real cause and eliminate these hazards. I think when 1927 comes around all members should be 100 per cent, so far as reporting their statistics are concerned.

CHAIRMAN AUSTIN: Some uniform method of keeping tabulations of statistics upon accidents is one of our important problems. It forms perhaps the proper basis for intelligent safety work, and I think that the Section would do well to undertake, in so far as possible, to keep records of accidents on construction work, which can be prepared and tabulated.

Mr. Robinson gave you a consolidated report of the Membership Committee with his report of the secretary.

I will now appoint the Nominating Committee: Mr. F. W. Herbert, Mr. Leo Woedke, and Mr. Wm. F. Tubesing. You will please bring in your report tomorrow morning.

We have with us, gentlemen, one of the youngest contractors in Detroit, a man whom we all love, a contractor who has had longer years of experience, I think, than any but one. Perhaps, Mr. Albright and Mr. Misch have been engaged in construction work actively in Detroit approximately the same length of time. At the same time Mr. Misch is one of our youngest members, one most highly thought of, and one who enters into all of our activities with remarkable zeal. Mr. Misch is a real honest-to-goodness contractor, he builds buildings, and he will welcome you to this meeting at this time.

ADDRESS BY OTTO MISCH, PRESIDENT, DETROIT BUILDERS' ASSOCIATION, DETROIT, MICH.

It is a pleasure and a privilege to give the Construction Section of the National Safety Council a welcome to Detroit.

No city in the country has been as much interested as has Detroit in the development of the Construction Section since its organization in 1918.

I can sincerely say that it is gratifying to leading contractors of Detroit, the general contractors at least, to note that within the past few months certain other sections of the country threaten to run us a close race in action on the prevention of accidents in the construction industry.

There has been a growing interest among the contractors, but with few exceptions it was simply a preliminary thought. That thought is now beginning to crystallize into definite action on a large scale. For instance, in May of this year the Associated General Contractors of Texas, one of the greatest states in the union, adopted a group insurance plan, and while insurance is not accident prevention that insurance plan carried with it a state-wide plan for the prevention of accidents.

Now, gentlemen, I just want to say a few words in regard to your convention. I honestly and sincerely feel that the work you have undertaken to do is just as important as anything that a human being could undertake. I make this statement without fear or favor. I sincerely believe that your efforts, if successful, are the most laudable from any angle, because the saving of life and limb is undoubtedly everybody's first duty.

If our efforts in prevention of accidents are the means of saving only one life or one injury, I believe that these efforts will have been well

repaid. Therefore, I hope you all realize, and I believe you do, that your undertaking in the prevention of accidents is unquestionably the greatest; and in order to get this idea across to our fellow contractors, we must of a necessity, urge, plead, beg or threaten to get them to fall in line and do all they can to save life and limb.

I want to thank each and every one of you for leaving your business to come from far and near to attend this convention, which proves to me that you all have your heart in the right place.

I also wish to say a few words in regard to your chairman. I personally want to congratulate him in so far as his work is concerned in the prevention of accidents. I have the highest regard for him, not only as a man but also as an executive. I have heard many favorable comments in regard to his ability. Only recently I had the privilege to be present at a meeting where the president of the General Builders of the U. S. A. gave us a talk and he very emphatically stated that if we had such a man at the head of the accident prevention bureau, as he called it, we would get the results we are trying to accomplish. At the same time he mentioned that such a man would necessarily have to give up all of his time to this important job, and I personally know that this is impossible for your chairman. Therefore, I again want to thank him and I feel that the whole convention is indebted to him very greatly.

As it is customary to turn over the keys of the city to a convention, in your particular case I feel that this would not be advisable because you are safety men. I hope that your stay in our city (called the dynamic city of the world) will be of great benefit and that when you go home, you may have the satisfaction of knowing you really have done something worth while.

Before I close, last but not least, your secretary should not be overlooked in so far as being recognized for his good work. He certainly has been faithful and efficient 100 per cent. It is no more than fair that this convention should recognize such services.

I again wish to thank each and everyone of you and I sincerely hope that your deliberations will be of the greatest benefit, not only to yourselves, but the contrary at large.

CHAIRMAN AUSTIN: The next thing on our program, gentlemen, is the privilege of listening to another contractor, Mr. Neal D. Harris, president of the Toledo Chapter of the Associated General Contractors. As I say, Mr. Harris is also a contractor and his remarks probably will be from a very practical standpoint.

CURTAILING ACCIDENT COSTS

Neal D. Harris, General Contractor, Toledo, Ohio

This subject surely ought to interest everybody connected with the building industry. In the face of the mounting number of accidents in all branches and the increased cost of carrying proper protection, the problem needs careful study.

Why I should have been selected to handle this subject, I am at a loss to know, as I am and always have been by comparison a small operator. However, I have had a most marvelous record of never having had a man killed or seriously injured on any work during the 27 years of my contracting.

I account for this principally because of the fact that my operations have never been so numerous that I could not give them a great deal of personal supervision. Then, too, you all know safety comes only as the result of eternal vigilance.

In agreeing to say something on this subject, I said that I should confine myself more particularly to what the Industrial Commission of Ohio and the Ohio chapter of the Associated General Contractors are doing along these lines. The Inudstrial Commission of Ohio has had in operation an accident prevention division; known as the workshop and factory department, for a number of years. Last year, it was thought, there was room for still further development along these lines, so a division of safety and hygiene was started, with T. P. Kearns as superintendent and D. F. McMurchy as safety engineer.

It has been my pleasure to hear both of these gentlemen on several occasions tell what they are endeavoring to do to prevent accidents. Accident prevention is a self evident fact in the lessening of costs as well. It is the purpose of this division to survey every construction project of major proportions and fill out a report sheet. This sheet of recommendations made from the results of the safety engineer's survey is submitted to the constructor.

Too Close to the Problem to See Its Hazards

It is the belief of Mr. McMurchy that often-times a contractor or his engineer is too close to his problem to see its hazards as well as a man trained to look for them. It would seem that if this program is followed, accidents should be materially lessened.

The Ohio branch of the A. G. C. has arranged a series of meetings so that men interested in this work can be brought together. It is hoped that through these meetings there will be brought about a more thorough understanding of problems of this nature. Our last meeting was held in Dayton, Ohio; the next is scheduled for Cleveland.

I believe it good practice after each accident to acquaint all men working on the job with its cause and have them told by the superintendent in charge who was to blame and how to avoid similar accidents in the future.

Costs can only be materially lessened by reducing the number and severity of accidents, and this can only be brought about by more intensive education in accident prevention and the exercise of greater precautions.

The first approach to the problem of safety should be from its humanitarian side; we should all want to reduce the number of accidents so

as to lessen the loss of life and suffering of those injured and the hardships to the dependents.

Costs should be secondary and only should be considered as a good business means to the greater end.

CHAIRMAN AUSTIN: We will at this time, gentlemen, devote ten minutes to the discussion of any questions which Mr. Harris' paper or talk brought to your minds, bearing in mind that this is a national problem that we are considering.

OTTO MISCH (Detroit General Builders' Association, Detroit, Mich.): It seems to me that if we would all familiarize ourselves with this form it would be of very great advantage to everybody. If I am not mistaken what we all particularly have in mind is to prevent destructive legislation on accident prevention problems. At least what we are trying to do is prevent accidents voluntarily and not have anybody come and say that we must do so and so. And if you follow out these suggestions on this safety instruction you will prevent that.

Get Thoroughly Acquainted With Conditions on the Job

The thing to do is to familiarize ourselves with the conditions on our jobs and put in as much time as we can—I mean the chief executive of any concern—in trying to educate our employees, our superintendents and foremen in preventing accidents. That will pay you very, very well, and this form is a thing that strikes me very forcefully. If we would get these printed and put them on our jobs and let the men follow this thing out, you would never have any laws in your state forcing you to do certain things.

MR. HARRIS: I just want to correct one impression; the compulsory part of our safety requirements is set forth in a bulletin which is called "Specific Requirements for Building and Construction Work." But this work under Mr. McMurchy is not compulsory; it is along the line of help; he surveys the job, makes out his recommendation, and hands it to you to make the corrections yourself, for your own protection.

D. F. MCMURCHY (Construction Engineer, Ohio Industrial Commission, Columbus, O.): In order to clear up any uncertainty about these survey blanks of which Mr. Harris has just told you, the Industrial Commission of Ohio has in the last year instituted a division of Safety and Hygiene whose duty it is to investigate and prevent industrial accidents in all industries. They attempt to do that first by taking the claims presented to the Industrial Commission for compensation and from these claims they get the information as to how the man was injured; where he was injured, something of his social condition, his age and family, his wages and all the details pertaining to the accident that the report contains; and in that connection I might add that some of them are rather meager in their information. They take these claims, code them and compile their statistics from them, and give this information to the technical branch of the division. The technical branch is composed of safety

engineers who are not technical graduates, but who have had long years of experience in their respective lines, and there are three technical graduates who have more or less had experience in their respective lines.

There is a force of six safety engineers and four special investigators. The investigators' duties are to supplement the work of the safety engineer. He confines his activities to the making of these safety surveys. The division of safety and hygiene is purely an educational proposition. Its recommendations are not mandatory. While they use the safety codes of Ohio, of which there are eleven now, the construction code being one of them, they use those codes as guides for this inspection and make their findings, or record their finds on these inspection sheets, or survey blanks, as we call them.

A survey blank has listed on it the various locations of accident hazards and as the inspector, or investigator or safety engineer makes his survey of the plant, he notes down under the various headings the conditions that he finds hazardous. At the completion of his survey he makes a sheet of recommendations, that if complied with will eliminate these hazardous conditions.

The Inspector Turns in His Recommendations

The division of factory inspection of which Mr. Harris spoke, is the mandatory side of the Ohio law. They have the police power to issue orders which have the force and effect of law. The division of safety and hygiene doesn't have that, nor does it attempt to use that authority, but it feels that it can reach the employer and employee alike, much more easily by moral suasion than coercion, thinking it easier to lead a man than to drive him.

I will be pleased to send any of you copies of the construction survey blanks if you so desire.

MR. ALMSTEAD: I would like to ask whether such survey is made at more than one stage of the job? We have one at the inception of the job, the foundation, then we have other hazardous conditions existing as the job goes along, so there should be more than one survey.

MR. MCMURCHY: In view of the fact that we only have three men on construction work in the entire state, we can not hope to get over every job as often as it should be surveyed, but in the larger cities, in Cleveland and Cincinnati (that doesn't cast any aspersions on Toledo and Dayton), our man in the northern part of the state makes his circuit as frequently as he can, and revisits the job just as often as he can get to it.

WM. F. TUBESING (President and Treasurer, the Wm. F. Tubesing Company, Milwaukee, Wis.): In our state this year we are under experience rating. Experience rating means that if your reports for the last five years have been such that your number of accidents has been greater that some other firms, you are likely to pay twice the rate of compensation that the other contractor does who has been taking care of his safety work. So you can see from Mr. Harris' talk that it is very important for you men all to get right after safety. If you don't do it

you are going to have a law in your state like we have and then you are going to be up against it.

Here in Detroit, through the General Builders, they have foreseen these things; they have been ahead of them, and as a result are already enjoying the tabulations, and if experience rating does come, are going to be at the forefront.

So I take this opportunity of urging you all to take it home to your various cities, to get busy and help us all you can.

CHAIRMAN AUSTIN: The time is up, gentlemen. We had two questions sent in. Mr. Warfield, Supervising Engineer of the Hartford Accident and Indemnity Company, may I ask of whom you were asking this question?

MR. WARFIELD: I was addressing that to the committee in general.

CHAIRMAN AUSTIN: "What disciplinary measures are taken to enforce safety rules and regulations?"

That question would be answered differently in different locations. In Detroit it is a matter of contest, a matter of friendly contest, and a matter of record as between one member of the association and the other. The poor record penalizes the good one, and the natural desire on the part of each member is to keep his record as good as possible. Those are the only measures we take. In other states there are others.

MR. WARFIELD: What I inferred there was what disciplinary measures on the job, on the particular work, not necessarily among the members of the committee.

Riding on Hoists Must Absolutely Be Stopped

CHAIRMAN AUSTIN: In Detroit only in very exceptional instances is there a discipline exercised. In the matter of riding on hoists, we have finally gone the limit of posting notices on the job and issuing instructions to the superintendent that riding on hoists must absolutely be stopped, or as a penalty the superintendent and the engineer both lose their jobs. That is about the extreme limit that we have gone in disciplining our men here in Detroit.

We have another question from Mr. Hurley of the Detroit Edison Company, "What is the best practice for inspection of chains, and chain falls?" Can anyone answer the question?

If not, I will be glad to refer that to the National Safety Council, and they will consult their records and their membership and get the very best answer possible for you, Mr. Hurley.

C. P. FISK (New Jersey Zinc Company): I might say that we are going through that very thing in Palmerton, and the American Chain Company has some pamphlets that they will gladly send, that are of some help in that very thing.

Our inspection division has made a study for six or eight months of what other concerns are doing and the opinion varies from no inspection at all to inspection once a month.

R. McKINLEY (General Builders Association, Detroit): I might add that in Detroit we try in the construction industry to discontinue or discourage the practice of using chain slings wherever possible, and we have found that the cable sling is far more satisfactory than the chain.

We have also found that chains, especially where they are used on construction work, are subjected to a lot of undue stress and strain, and we find where they are lying around a job for a long time that superintendents and various men in charge of the work are very lax in seeing to the inspection of the chains, and seeing that they are annealed properly.

I therefore think that on construction we ought to get away from the chain sling wherever we possibly can. Of course, where you are lifting steel material or stuff of that type sometimes it is necessary to use them.

CHAIRMAN AUSTIN: The question was not as to the use of chains, but the best practical method of inspecting chains, assuming that you have to use chains sometimes.

MR. HURLEY: Where we are compelled to use chains we have adopted an inspection which is generally conducted by the rigger on the job or someone who knows chains; and the main thing that we look for is, in examining the links, to see if they are stretched out of shape, or have started to pull. We do that at least once a month—that is compulsory where we are using chain slings. Where we find that the links are drawn into a lock we immediately discard the chain, because it is a plain indication that some unnecessary stress has taken place and the chain is no longer good for heavy work, or can no longer be trusted. In addition to that we try to have the chains annealed at least once every three months, where we use them on steel work.

A Plan for the Inspection of Chains

N. H. LORETZ (Louisville Gas & Electric Co.): We have recently adopted a plan in our construction department and we inquired of some of the foundries and steel mills as to the best plan to inspect chains. We have adopted the plan of when we buy a new chain of any description to measure it off in three-foot lengths and at each three feet we make a notch with a chisel, so that we do not injure the chain in any way, but it is noticeable. We don't use chains a great deal, as a steel mill would, and we don't have any set time for inspection, but we inspect them as often as we deem it necessary; and they have given us the idea that whenever this chain wears or stretches one-third of one link, that chain is discarded. We do not try to take out a bad link and put in another, or anything of that kind, but we discard the chain wherever it yields to the extent of one-third of one link. We find that is about the shortest and best solution of test in chains.

CHAIRMAN AUSTIN: Mr. W. S. Smith, Safety Engineer, the Mutual Liability Company of Milwaukee, will address us on "Putting the Job in Order"; and Mr. Smith, I understand, has recently been made manager of safety activities for the Milwaukee Association of Commerce.

PUTTNG THE JOB IN ORDER

Walter S. Smith, Safety Engineer, Mutual Liability Company, Milwaukee, Wis.

All the great undertakings of the world's history were first conceived in the imagination, so I believe it follows that any great success in making the world safe for humanity must first be conceived in the imagination of the people who are to do this noble work.

Each of you has an ideal—and constantly you are working toward it. You conceive in your imagination just how things ought to be.

We like to flatter ourselves at times into believing that we are a civilized race of beings. Yet when we scan the list of terrible accidents that presents itself yearly, we may conclude that after all we are not so much superior to the uncivilized savages.

The savage kills with whatever weapon he may have at hand, for the mere pleasure, the thrill of killing.

We have no desire to kill. We would get no pleasure or thrill from it. Yet the records show that we do kill through carelessness, and carelessness is a most terrible weapon. But we are not discouraged. The star of hope shines brighter every day, and it is because men like you, by your untiring efforts along safety lines, are adding lustre to that star.

Putting the job in order is a very simple-sounding title but full of significance. Order is said to be Heaven's first law.

Let us see what can be done about putting a job in order. First of all, before we can have a building there must be a dream. Someone must pass his ideals through the alembic of his imagination.

But unless he couples definite action with his dreams, nothing will come of them.

After the dream comes the plan. There is much going over and checking of the plan. Why? Because stress and strain must properly be figured. No building can endure that has not safety for its foundation stone.

The specifications call for certain materials and as a rule good quality is demanded.

Then comes the selection of the men to do the work.

Do we carefully check the men who are to go on the job? I don't think so. Generally we are too eager to get the work started to find out if they are careful men, or just careless louts who will endanger other men on the job and thereby put our safety work in jeopardy.

The man who risks his life unnecessarily is not fearless. He's just foolhardy. He's a menace to any construction job.

To test men by an elaborate psychological plan very likely would be out of the question—at least, for the present. But a simple test might be devised that would help wonderfully.

Perhaps you men have done something along that line.

Do you remember the story of the merchant who wished to hire a

careful clerk? He tried out a number of boys by asking them how near they could go to a curtain, with a lighted candle.

One said he could go within six inches. Another said a foot, while a third said he wouldn't go near it at all, but would maintain a *safe* distance. The last-mentioned boy got the job.

Our old friend of pioneer history, the scout, Davy Crockett, said: "Be sure you're right! Then go ahead."

And it strikes me that Davy would have made an excellent safety man. He had an abundance of nerve but he kept it always under control.

He always kept his eye on a tree behind which he could hide if an unfriendly arrow came his way.

You see, he anticipated the accident. I like that word "anticipate" because it means to preclude or prevent by prior action. It means to forestall and to have a previous view.

That's what we're trying to do with safety in construction—trying to anticipate the accidents and forestall them by proper methods.

But a man can not anticipate an accident unless he has imagination—unless he can picture the circumstances that might combine with existing hazards to produce the accident.

Where hazards exist there should be no such word as "tomorrow." Knock them on the head today.

The Contractor Who Wanted His Foremen Disciplined

I got a telephone call a while ago from a carpenter contractor. He said, 'I want you to come out and give my foremen hell about safety." So I went out. I'm always glad to get an opportunity to give anyone a chance to make good.

All it needed was a few minutes of personal talk with each foreman to change his attitude toward safety. I believe I made each one see his personal responsibility. I brought danger right home to him.

When I saw that these foremen allowed their men, when building scaffolds, to drive nails straight in, thereby subjecting them to a straight pull, I didn't think of contributory negligence. I thought of manslaughter. And to see those nails driven only part way in so that it would be easy to get hold of them when the time came to take the scaffold down, made the offense first degree manslaughter.

There is an old saying that "to save time is to lengthen life." That's fine. But I want you to change that slogan to read: 'To save time safely, is to lengthen life."

Men want to be happy. They want to laugh and to enjoy life. So let's take that word apart and change it from manslaughter to "man's laughter." Then we'll all be happy.

When I see a workman on a job making a ladder and using for the stringers pieces that are as full of knots as lumber possibly can be, I scarcely can control my wrath. Two of the hardest things with which we have to contend are stupidity and indifference.

I saw a workman doing this on a job. Outside on the fence was a big safety placard stating that all were working for safety. But in my opinion that ladder cancelled safety on that job.

I've looked over quite a number of blue-prints, but I never saw one with the word 'Safety" on it.

Perhaps this wouldn't look so bad on a blue-print:

1. Use only strong, rugged ladders.
2. Make all scaffolds safe.
3. Guard all floor openings.
4. Don't leave tools lying where they may fall and injure someone below.
5. Use only first-class cables on hoisting apparatus.
6. Keep the job clear of protruding nails.
7. Safety is a part of this contract and every man on the job must carry out its provisions

I hope some day to see blue-prints of that kind.

Several years ago my company sent me to supervise the wrecking of a flour mill that had burned. You can imagine the hazards—protruding nails, everything slippery with wet grain, charred planks, and timbers.

The Dangerous Job Calls for a Hard-Boiled Attitude

I questioned the men as to their experience. Two young, physical giants were in the crew. I asked these two, who were brothers, if they had ever worked in high places. One replied: "My brother and I painted crows nests on battleships during the war." That was assurance for me so I sent them to the highest and most dangerous places. Both were single men. You may say, "What has 'single' to do with the matter? Well, in Wisconsin it costs some insurance company $5,800 when a married man is killed. It costs $1,200 when a single man is killed. It may be hard-boiled to look at things in this way, but it's practical."

Have you ever noticed how pigeon-toed men seem to stumble a good deal? Then why put them to work on scaffolds where they may stumble and fall?

This brings up the question of physical condition. Making medical examination a condition of employment, I believe, will have great effect in reducing accidents. Would that not reduce the chance of a workman being attacked with a strangulated hernia?

The city in which I live has a Turners' society with a large membership. These members are trained to perform numerous physical feats. They become experts in equilibration. I believe it is a fine thing. And with this equilibration comes dexterity and agility. A person so trained is likely never to have an accident. His body is readily responsive to his active mind. He keeps out of trouble and does not get in his own way.

Perhaps this is looking a long way ahead, but I believe it would be

quite a factor in accident reduction to have training of this sort. Maybe we ought to encourage it.

Mentality tests for foremen are coming. If a foreman was given a number of illustrated hazards with the request to show "what's wrong with this picture," if he couldn't show a fair average, why, it would indicate that he was deficient in observation and certainly not a man to be entrusted with any safety supervision.

Just how safety should be handled on a job is quite a problem. If it's everybody's job, it is likely to be not well done.

There should be someone on a job of any size whose duty it is to see that safety rules and practices are carried out.

He should be deeply interested in safety and should know the state safety laws and see that they are not violated.

I believe special safety bulletins tacked up in conspicuous places are a great help.

Safety meetings of all those who act in a supervisory capacity, ought to produce good results.

Here's a good slogan to go with the work: "Eternal vigilance is the price of safety."

We are not so unwise as to believe that all accidents can be done away with. But we do believe they can be very materially reduced.

One of the foundation stones upon which our nation rests is the right to life, liberty and the pursuit of happiness.

No Man Can Be Happy Who Is Disfigured or Maimed

No man can be completely happy who is disfigured or maimed. And his life is his most precious possession. Let's all strive to help him keep it.

Perhaps you would like my idea of what other things go to make up a good safety man.

Well, I'd say he was just a Boy Scout grown to manhood.

He loves his fellow men. He tries to do a kind act every day. He says, "I'll do it," not "Am I supposed to do that?"

He has strong initiative. He believes he is in this world to do good, not merely at Christmas time, but all the year round. He doesn't expect to be thanked for all the good he does. If you find such a man, don't let him get away. He'll help you to reduce accidents.

Let us remember that it is thought that will put the job in order —thought will make the job safe for men—your thought and my thought —your imagination and my imagination—our ideals, desires, our continuity and efficiency.

In order more thoroughly to impress upon your memories the necessity for the work of safety, I wish here to show a picture.

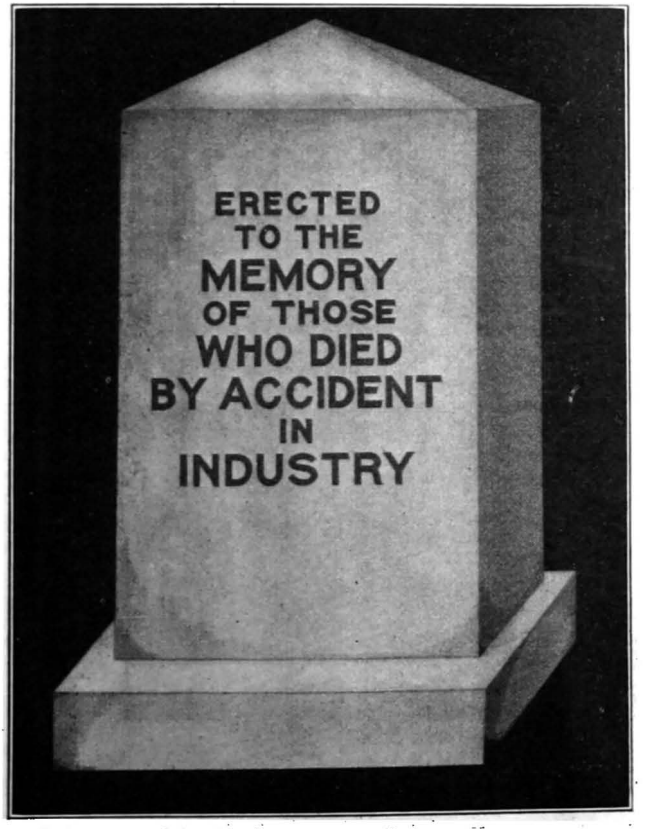
This monument represents the deadly work of thousands of ladders—ladders with loose and crooked rungs.

It represents poor cables on hoisting apparatus.

It represents the floor openings that should have been guarded but were not.

The harvest of poor material—the rotten, poorly-erected scaffolds are here.

In imagination, I can almost hear those thousands of victims of care-



They Ask Us to Teach Safe Practices to Employees

lessness crying out to you and to me, begging us to *think* and to *warn* and to be *sure!*

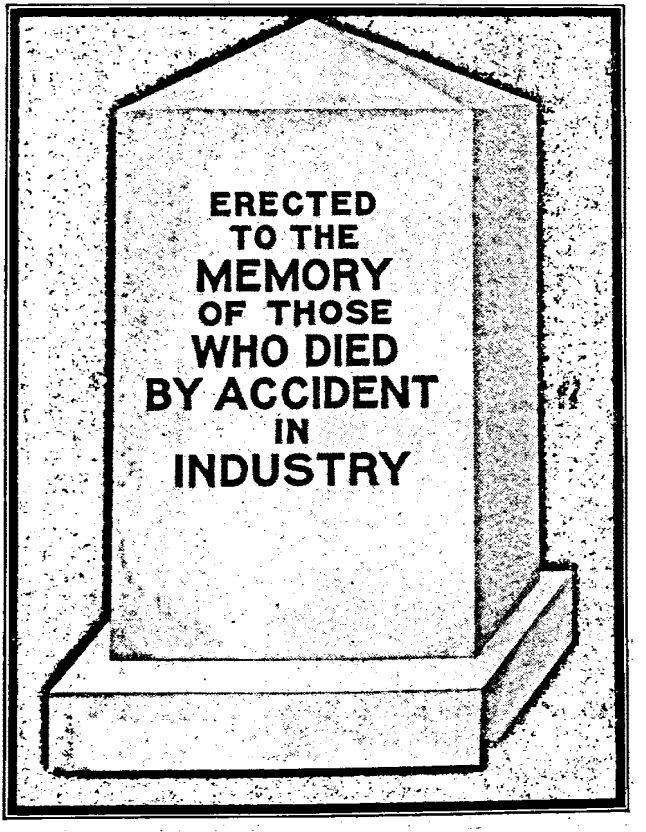
Asking us to teach safe practices for our own good and the good of others.

There ought to be a bright side to every picture and I believe there is to this one.

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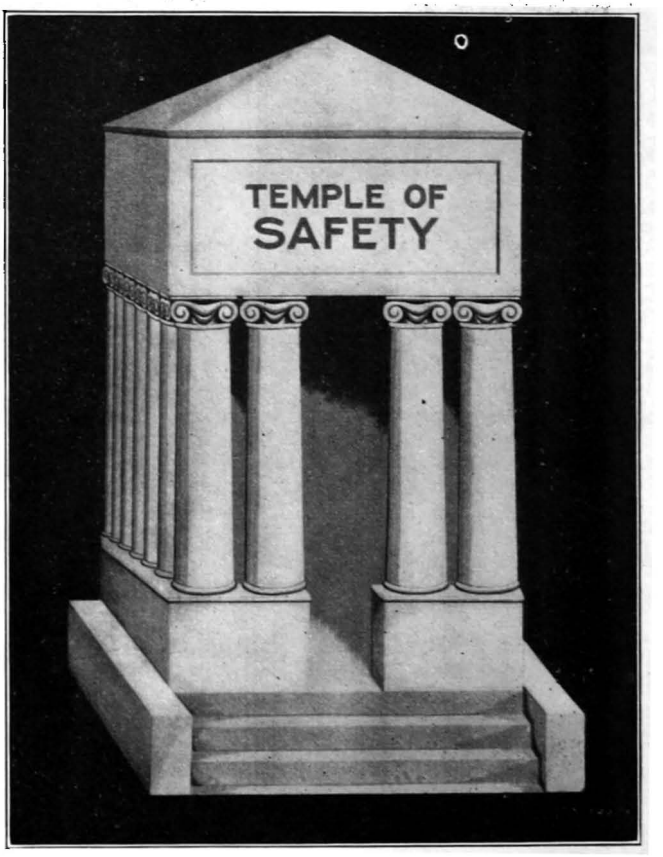
Asking us to teach safe practices for our own good and the good of others.

There ought to be a bright side to every picture and I believe there is to this one.

The safety movement had its inception in the imaginations of a fe sturdy souls who were trying to work out an ideal.

They have handed down to us a splendid heritage, asking us to carı on the ideal that has now become a reality.

We shall build, men, a new type of memorial—a new type of mon



Each Person Has a Portion of This Temple to Build

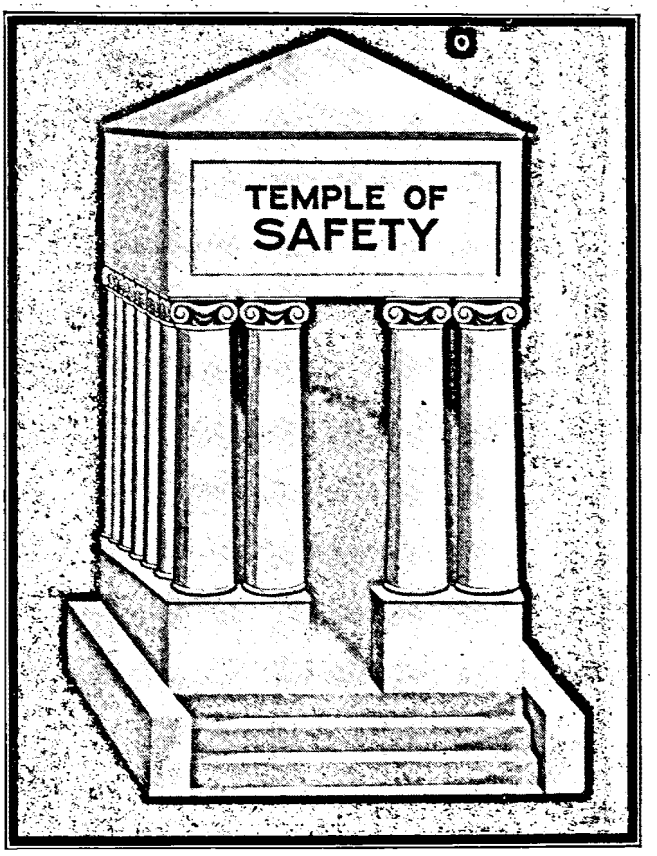
ment—one that shall be a constant inspiration to mankind. It sh be called the Temple of Safety.

This picture is but the germ of the idea. You and I will make excavation. You and I will carry the stone.

The safety movement had its inception in the imaginations of a few sturdy souls who were trying to work out an ideal.

They have handed down to us a splendid heritage, asking us to carry on the ideal that has now become a reality.

We shall build, men, a new type of memorial—a new type of monu-



Each Person Has a Portion of This Temple to Build

ment—one that shall be a constant inspiration to mankind. It shall be called the Temple of Safety.

This picture is but the germ of the idea. You and I will make the excavation. You and I will carry the stone.

Our ideals shall be the foundation and the corner-stone.

Our thoughts shall be the mortar to hold together the brick and the stone.

They shall be the strength of its steel beams.

They shall be the rivets that shall hold them firmly together.

And it can be done!

Every accident prevented will be a block of marble for its walls.

Every life saved will be a pillar to give it strength.

And whether we build this temple in reality, or only in the ideal of our dreams, we shall make the world a happier and safer world in which to live.

CHAIRMAN AUSTIN: I am sure I speak for all of you gentlemen when I say that Mr. Harris and Mr. Smith have very ably presented these topics and we thank them.

Now we have a few minutes for discussion of any questions which Mr. Smith's paper brought to your mind.

The Experience of a Contractor in New York City

MR. CRAWFORD (New York City): If there are no questions I would like to say something on this question of safety. I wouldn't think that I had done anything if I didn't say something about safety here. You know I am from the big city. I haven't come here to ram the big city down your throats, but we are the city of big things, and we are awfully small on safety—awfully small.

In the building industry, of course, we have many men going around. We have inspectors galore. Some superintendents whom I meet tell me that it would take the time of a man who did nothing else but look after the inspectors who come on the jobs. Now some of you superintendents know that is true.

A year ago there was a safety forum started in New York on construction work. I don't know how it is, but I have never heard anything more of that safety forum. I gave my name to the secretary, offered my assistance to do anything, to give my time, but I never heard any more about it. Maybe I was rotten when I got up and spoke, nevertheless I am a safety man, and I am going to keep on being rotten and if I keep on long enough I will be good.

I am a bridge man, I am a working man, I am a shop man; and, fellows, I make my appeal to you not as a safety engineer or an inspector; I make it to you as a bridge man, one of the boys on the job who does the work.

I want to tell you that when I worked on the bridges and on the steel work I never thought of safety, but since I got charge of the construction inspection work of my company and have access to the accident records, and I see the number of accidents that happen and how they are caused, it makes my heart stand still when I think of the things I used to do. I shudder at the things I used to do, and I am going to tell you men that the man on the job has a heart, if you will go after him. Every man has a heart, be he iron worker, blacksmith or banker; he has a heart,

and if you go after him in the right way you will touch that safety spring.

It has given me a great deal of interest to go after the causes of these accidents and study them and try to find a solution for them, to combat this evil.

I started this way (I wish you fellows would make note of it, take it away with you.) I started, first of all, by making up a plan to be pursued in combatting accidents. I took 12 superintendents, I submitted the plan to them, and in about three months—you don't convert the superintendent to safety in one day—in about three months I had every one of them converted to safety, all of them going hard at it. I then proceeded to talk to the men, got them all around me and I talked to them. I made up "Ten Commandments" which they had to live up to, and the superintendent saw to it that they were lived up to. He formed a safety committee on the job and if there was anything wrong on that job, any dangerous hazards, somebody got hell. That is just the plain truth of it.

It Was Easy to Sell the Idea of Safety

When I got them around me and appealed to them, appealed to them as a worker, it was the easiest thing to sell these men on the construction job the safety idea, much easier than it was to sell it to the men on the job. Maybe that will surprise you, but it was.

Here are the results I got inside of a year—I will let you fellows be the judges whether it was good work or not. Some of you who are contractors might be interested in this: inside of a year we had reduced the lost time ratio more than half, and the number of accidents more than half, and our operations were about twice as great as they were the previous year.

Do you think that is a good record? I do. And not in any time during that campaign did I submit a physical recommendation, I simply put it up to the men to see that this safety work went over. I encouraged competition among the various superintendents, and, say, they are all pulling to get on top. I get more suggestions from these men—I ask them for suggestions, and I get them. It is only the man in the field who knows, who can give you suggestions. These are the men you have got to go after; these are the men who get hurt. Go after them, appeal to them, show them that you want to take the sorrow out of their lives; show them what happens to them if they do get hurt, and in that way you will get them.

Now, Mr. Chairman, if the secretary of the safety forum is here, I would like to say this: that the safety forum in New York has got to be more active. Call a meeting; make it important; get everybody there; see if we can not get volunteers—volunteers who are real safety men, that is the thing—you have got to be sold on this idea yourself. Be a crusader in saving lives, that is what you men are, and that is what I am, and I am proud of it, and I will go anywhere at any time to help along this work.

Let me tell you how these men got interested: if you were to ask a man on a construction job or a foreman on a construction job, and even a superintendent, to write an article on safety, how much response do you think you would get? You wouldn't get a whole lot, I know. But after six months, when we got this thing going and got results—that is the thing you have got to go after, results—in six months I asked every superintendent, every foreman and as many men as I could, to write an article on safety, and the response was 100 per cent. The articles were written in their own language, and were understood by them. We got an article from every one of them and we got an article from many of the men right on the job, men you would not think could sit down and write a line about anything. They had been sold on safety and they wanted to do what little they could.

If these men will do it why can't everybody? Why can't we all go up and help them along? Men, they look to us to do it, and if we show them the way they will follow us.

I have data galore that I could show you and tell you about, but it would take too long here.

Now if I can be of any assistance to any man in putting the safety campaign across, take my name and address and write to me or come and see me. I know there are some of you fellows in the audience who will not get up and ask a question, but if you have a man's name and address you will write to him. I will do anthing possible to put this safety work over, and as an iron worker I am making my appeal to you; get right back of it and shove it over. You can!

CHAIRMAN AUSTIN: I am sure we all appreciate Mr. Crawford's spirit—Mr. W. E. Crawford, care of the General Accident Insrance Company, 100 Williams Street, New York City.

Handling the Statistics on Construction Accidents

CHESTER WRIGHT (Wright & Kramer, Niagara Falls, N. Y.): Why does the Statistical Committee feel that the names of the contributors to their data should be kept secret? It seems to me that if we get a value from competition among groups of employees we could get value from competition among the contractors who report to the Statistical Section. I am a contributor to that data and I would be very pleased to have anybody know where I stand, and I would like to have my competitors know.

MR. ALMSTEAD: That is a thing entirely governed by the National Safety Council, and some members perhaps don't want their statistics known.

CHAIRMAN AUSTIN: Perhaps the committee which worked very diligently and very faithfully for a long while in formulating the statistical arrangement for our Section, so that it would tie in with the United States Department of Labor Bureau of Statistics, had some erroneous ideas in regard to that, but as I remember at that time the committee felt that in spite of their very best endeavors, the plan offered did not put the reporting members on absolutely the same basis.

Of course the purpose of the statistics is to put them on as nearly as possible the same basis, but I think all of you gentlemen realize that there is a difference between operators, contractors who handle jobs say up to $100,000 and constructors who handle jobs from $500,000 to $2,000,000 or $3,000,000. There is a differential there that is very hard to take care of in the matter of reporting statistics. We have run into that in the National Safety Council in the matter of awarding trophies.

The American Railway Association had to face that problem in awarding the Harriman, or the Hill Trophy for the best record; they had to differentiate as between railroads, Class A are different from other, smaller operators. In other words, the cold figures are not always true indications of the relative results, and I think for that reason the statistical committee thought that it would be well to keep the identity of the reporting members confidential, together with the reluctance on the part of some of us to have our statistics made public at all times.

There are years when some of us would feel very proud of our record, and then there are other years when we wouldn't feel so proud perhaps.

Your question is entirely fair and in the last analysis perhaps your feelings in the matter are entirely right. The National Safety Council, of course, has always undertaken to consult the feelings and wishes of the members in all of these matters, and in this particular matter they did decide that the identity of the reporting members would be kept confidential in making this report.

Executives of Companies in Three Classifications

COLONEL D. H. SAWYER (Secretary, Associated General Contractors, Washington): I haven't anything to say with reference to those two papers, although I heartily support everything they contain.

I do want to make a little statement with reference to the Associated General Contractors. That organization, as you probably know, is the mouthpiece of the general contractors, and a good many of us heard within the last three or four years that the organization has been more or less apathetic in its treatment of the subject of accident prevention.

I think there has been some justification for those charges; I think there is a little justification in the room this morning. I know very few people here, but as I look the crowd over it seems to me that we have some contractors around the table and around the fringes, but by and large possibly more of you people represent insurance companies and the building departments of great manufacturing institutions. We are disappointed that there are not more contractors in the organization. The secretary's report of the total membership after 15 years of effort, of 83, is disappointing to me, and it must be disappointing and possibly a matter of chagrin to the other contractors in the audience.

There must be a reason for it. Either the membership department of this division is lax in its methods, or else the general contractor is not fully cognizant of the necessity for accident prevention measures.

We had a meeting of the Executive Board in Kansas City and during

the sessions the privilege of the floor was given to Mr. Harvey, the local director of the National Safety Council. During his discussion he had recourse to the statement that within his own observation the executives of companies fell into three classifications with reference to accident and prevention work: there was the man that he called the scoffer, and the man who speaks possibly with derision of any methods that are destined to prevent accidents; the man who probably is obsessed with commercial pursuits and has not given recognition to those things which contemplate a better understanding of the conditions of the men, and the means to ameliorate conditions that face them. The second classification was the man who was sold on accident prevention work, but through lack of initiative had not put his beliefs into operation in his own organization. And the third classification was the man who was sold on the idea and went to work on it. Certainly Associated General Contractors does not fall into the first class, probably today it is in the second class. But tomorrow it is going to be in the third class.

An Avalanche of Problems and Difficulties to Solve

Please understand that the Associated General Contractors is about one-half as old as the National Safety Council. Your program states that this is the 15th Annual Meeting. Within 15 years, an organization, if it continues in business, has found itself, but it has to go through the trying period of organization and financing and membership and things of that kind before it does find itself. The general contractor of the country is a peculiar individual. He has been a solitary figure in American business life, who has hesitated too long, we think, to join with his fellows in studying the things that perplex him and the difficulties that occur.

When the organization was founded, very quickly an avalanche, almost, of problems and difficulties and enterprises was forced upon the staff for consideration and starting on the way to better conditions. It has taken some time for the Associated General Contractors to find itself, to absorb that program, to arrange its finances, its personnel and its committees to treat all of these subjects. The demands of one of our members, or group of members, have been insistent on some things and we have had to recognize those and attack the difficulty that they presented.

Something like three or four years ago a man named Austin came before the Executive Board and broached the subject of accident prevention in terms which were easily understood; and he almost issued a challenge to us to get busy and do something in accident prevention measures, otherwise forces in the construction industry would no longer remain inactive. He has been aided and abetted by others in Detroit. At that Kansas City meeting that I spoke of, Mr. Austin's presence in Philadelphia precluded his being with us; but he sent along a man by the name of Otto Misch, and he gave us a good time; and Mr. McMullen

has given us a good time. And so I say through almost the individual efforts of this group of contractors here in Detroit, the Associated General Contractors, as an organization, is getting up to speed in accident prevention work.

What does that mean? Is it an idle statement or is it something that we will give life to, and not disappoint this movement? We propose to do this: to employ a man within the next few months who, in collaboration with the National Safety Council, will devote a large part, if not all of his time, to inculcating ideas of accident prevention in the various chapters of the Associated General Contractors. Those number something like 80 and our membership is in 45 states, I think.

The contractor never does a job twice in the same place, the men who work are often transients who expect to be on the job only a few hours or days; none of those men work today where they did yesterday; none do today what they did yesterday, the scenery is continually shifting; so please understand that there is a distinction in educating those men as well as foremen and superintendents to the things we are talking about. In factory procedure, where a man is steadily on the job week in and week out and month after month, his work is more or less routine. Of course, routine work has its handicaps, men become careless; but even so in the factory it is probably easier to discover the means which should be employed to prevent injury to life than it is in the construction operation, which is extra hazardous, and where the operation continually changes.

Cooperation With the National Safety Council

I don't say that in extenuation of general contractors, by any means, but it is a practical thing that should be given consideration, and we will do the best we can in trying to adopt a procedure entirely satisfactory to the National Safety Council. It would be surprising if the ratio of losses in construction industry eventually could be compared to those of many other lines in American industry. I don't think we should be deceived in comparing accidents, and visit too great a charge on the construction industry, when we discover that their accidents apparently are out of proportion to other branches of American business.

Throughout the last three or four years we have never had a board meeting or a convention where the subject of accident prevention has not been stressed by capable speakers. Through that slow process of education our members have finally become concerned over it and we expect to get actively into the work. It is our purpose within the next few weeks to prepare a manual, possibly entitled "Accident Prevention in the Construction Industry," which will be a guide to chapter officials and contractors across the country inaugurating means for accident prevention. We hope to elicit the active collaboration of the National Safety Council in the preparation of that volume. With that will go practical suggestions as to how to start the thing going.

In conclusion, I simply want to fasten in your minds, if I can, the

fact that the construction industry, we believe, at least as represented in the Associated General Contractors, is fully awake to the possibilities of accident prevention work, and proposes to pursue it.

CHAIRMAN AUSTIN: Mr. Sawyer, I certainly am gratified that you took the opportunity to say what you have said. I know that the Construction Section is very highly gratified to learn that such an organization as the Associated General Contractors is going to get into safety work, because we know that it is one of the biggest things, and one of the best things, that the Associated General Contractors can do. I can not refrain, however, from putting you right on one or two points.

The National Safety Council is 15 years old, but the Construction Section of the National Safety Council is just eight years old. It wasn't until 1918 that six individuals, in St. Louis, interested in construction, got together and organized the Construction Section of National Safety Council; so that, just exactly as has been the case with the Associated General Contractors, a slow process has taken place in the Construction Section and these eight years of activity have been devoted almost entirely to an awakening of proper interest on the part of those engaged in construction in safety work, to really make a start; and some of the boys who have been in the Section the entire eight years have at times felt discouraged. Our activities and results should not be measured by our membership in the Construction Section.

We are highly gratified at the increase in interest generally that is being shown all over the country in accident prevention work by constructors and those other agencies in the construction industry, and are particularly gratified at the determination on the part of the Associated General Contractors to take up this work.

ADJOURNMENT

WEDNESDAY MORNING SESSION

October 27, 1926

The second session of the Construction Section of the National Safety Council was called to order by President Austin on Wednesday morning, October 27, at 9:40 A. M., in the Reception Room of the Book-Cadillac Hotel, Detroit, Michigan.

CHAIRMAN AUSTIN: The first item on the program this morning is the election of officers. We will hear the report of the Nominating Committee, of which Mr. Hurlbutt is chairman.

MR. HURLBUTT: Mr. Chairman, Mr. Woedtke arrived and we were able to get together and present a slate to you which we think is representative of the Section. For Chairman we suggest Mr. E. C. Harding, of the Ferro Concrete Construction Company, Cincinnati, Ohio; for First Vice-Chairman, Mr. C. H. Almstead, Patent Scaffolding Company, New York City; for Second Vice-Chairman, Mr. J. F. Conner, Safety Supervisor of the U. G. I. Contracting Company, Philadelphia, Pa.; and for Third Vice-Chairman, Mr. Dalzell, of the Fero Concrete Construction Company; for Secretary, the present incumbent, Mr. J. Wilson Robinson, of the Everett Winters Company, Detroit, Michigan.

MR. HARRIS (General Builders Association, Detroit): I move the nominations be closed and the secretary be instructed to cast the unanimous ballot for the election of the gentlemen as named.

The motion was regularly seconded and unanimously carried.

PRESIDENT AUSTIN: The slate as presented by the Nominating Committee is declared elected.

We are very sorry of course to be obliged to report that Mr. Harding has been detained in Cincinnati by illness in his family. He intended to be here up until the last minute, and we are disappointed in not having him here.

In Mr. Harding's absence I will ask Mr. Almstead to take the Chair.

C. H. ALMSTEAD: Mr. Chairman, I would ask that you continue in the chair which you so ably filled yesterday morning, and I am sure the rest of the members feel the same way.

CHAIRMAN AUSTIN: I was in hopes that I was going to be relieved, Mr. Almstead, but if it will be of any assistance to you I will be glad to continue with the program this morning.

MR. ALMSTEAD: I will appreciate it very much.

CHAIRMAN AUSTIN: For the reason, gentlemen, that sickness has made other inroads on our expectations, this morning, Mr. Chewning, of the U. G. I. Contracting Company, of Philadelphia was, as you see by the program, slated to deliver an address or paper to us on "Why Everybody Should Lend a Hand in Safety Work. But unfortunately he has been detained and at the same time has done us the honor to send Major Lamphire to take his place on the program. I am quite sure that the

Major will fill Mr. Chewning's place in a very able manner, and we will hear from Major Lamphire at this time.

COLONEL LAMPHIRE: Mr. Chewning, our Vice-President, prepared this paper and meant fully to be here to read it, but he was taken ill Monday and was unable to leave yesterday, so he sent me to substitute on the program.

WHY EVERYONE SHOULD LEND A HAND IN SAFETY WORK

W. L. Chewning, Vice-president U. G. I. Contracting Company, Philadelphia, Pa.

There are two main reasons why everyone should lend a hand in safety work.

First: It is the humanitarian thing to do.

The human being has a great variety of ambitions and objectives but they all may be summed up in these two—to live and to be happy. Anything which operates against either of these is contrary to the interest of mankind. Accidents destroy life and cause unhappiness. I cannot do better than repeat the comments on accident prevention by J. E. Davidson, past president of the National Electric Light Association, as follows:

> "I do not view accident prevention from the standpoint of dollars, but from that of 'sense'—humanitarian sense. I had occasion to visit a power plant in a small Nebraska town recently, and I was introduced to a young man—a fine looking chap—who was minus both of his hands. The accident which brought him this great misfortune could easily have been prevented by caution, officials told me.
>
> "When you meet a man like that, the millions of dollars in savings, the result of accident prevention, becomes a secondary reason. His blasted life is more important to him, his family, our industry, and the Commonwealth, than all the money we can save by eliminating accidents. But nevertheless, there is an enormous saving of money that is to be taken into consideration.
>
> "Accident prevention will not only pay good dividends in money; but, more important, it pays dividends in lives saved, tragedies and misfortunes avoided, happiness assured."

The second main reason for lending a hand in safety work is because accidents cost money. They also cause loss of time, but in industrial operations time is money. From the records of one of the larger construction companies, I find that the cost of insurance against accidents is approximately 1.09 per cent of the total cost of the job. In other words, when we invest a thousand dollars in plant, $10.90 of it is used for paying the cost of accidents which occur in its construction.

And this does not include the cost of time lost by and demoralization to workmen not directly involved in the accident. This cost can not be determined and therefore its extent is unknown; but I have no doubt

it is a close second to the one shown on the books. It is evident that, from a strictly selfish standpoint, it is to the interest of each man, from the president of the company down to the sub-foremen in charge of workers, and even more to the interest of the workers themselves, to reduce this cost of accidents, because the lower the cost of work done by the company, the more work it will be called on to do and therefore the greater will be its need for the employee's time. Also, lower cost means more money available for higher salaries and wages.

The reasons why everyone should lend a hand in safety work are so apparent that it is unnecessary to spend your valuable time discussing them. I am therefore going to depart somewhat from the theme covered by the title of this paper and say a few words about the causes of Construction Accidents, and suggest some means of reducing their frequency.

Reliable statistics indicate that the accident frequency rate is higher in construction than in any other of the larger industrial groups, and there are unquestionably very good reasons why this is so. It is undoubtedly true, however, that had the same efforts to prevent accidents been applied to construction as have been given to other industries, a much lower accident frequency rate would have been reached.

Accidents in construction work have been increasing at such an alarming rate in the state of Pennsylvania that early in 1926 all the safety inspectors of the Pennsylvania Department of Labor and Industry were called off from other work and assigned to construction jobs for an indefinite period, in an endeavor to eliminate as far as possible the physical hazards common to construction operations.

Fatal and Non-Fatal Accidents in Pennsylvania

The report of the Pennsylvania Bureau of Statistics for the first three months of 1926 states that there were 31 fatal and 3,128 non-fatal construction accidents in Pennsylvania alone.

These are typical of construction accidents in other states and are listed according to causes as follows:

Causes	Fatal	Non-Fatal
Falls of Persons	9	723
Handling Objects	0	685
Falling Objects	4	344
Stepping Up or Striking Against Objects	1	299
Hand Tools	0	292
Motor Vehicles	5	144
Hot and Corrosive Substances	0	133
Machinery	1	120
Miscellaneous Causes	0	100
Cranes and Derricks	6	92
Cars and Engines	2	56
Hand Trucks	0	40
Pumps, Compressors and Prime Movers	0	26

Elevators	0	23
Explosives and Explosions	1	19
Horse Vehicles	0	15
Electricity	1	11
Water Craft	1	3
Boilers	0	2
Transmission	0	1
	31	3,128

We have become very proficient in the designing and installation of safeguards and in the elimination of hazards generally in factories and production plants where stable conditions hold for long periods of time; but anyone who has come into intimate contact with construction operations can not fail to realize that safety work as applied to that branch of industry presents difficulties which are probably greater than those to be met with in any other field. It is practically impossible to eliminate hazards such as nails in loose boards on the ground, and unguarded edges of platforms and elevated floors, but in spite of these conditions, I believe that more accidents on construction work are caused by unsafe practices than by unsafe conditions.

Need for More Careful Supervision of Men

It is difficult to stop such practices as throwing form lumber and other construction material over the edge of an upper floor without being sure there isn't some one in the yard who might be struck, careless climbing and walking on scaffolding and unfinished floors, inserting the head in the construction elevator shaft to see why the elevator doesn't appear when signalled for, and the use of inferior lumber as braces or supports for lifting tackle.

It will be noted that the three major causes of accidents in the table above, falls of persons, handling objects and falling objects, accounted for 62 per cent of all the fatal and 56 per cent of all non-fatal accidents. This is of peculiar significance and shows clearly our greatest need is unquestionably for more careful and intelligent supervision over the men on the job. Among those usually employed on construction work, and especially in the unskilled class of labor, are to be found workmen who have neither the intelligence nor the initiative to be careful or to guard themselves against hazards arising from conditions that change as the work progresses. There are also over-confident workmen who will take undue chances, as well as inherently reckless men. These two classes need special supervision and training, if retained.

Carelessness and unsafe practices can be reduced only by the most intensive educational program and by securing the cooperation of the foremen and especially the workers. The ideal condition is reached when we have trained the worker to the attitude where he protests against working in a gang with an habitually careless man.

The ordinary safety inspector, who has been trained in the detection

and removal of unsafe conditions and makes occasional visits to the job, can not alone accomplish this educational program of elimination of unsafe practices. He can not be with each thoughtless man all the time and furthermore, the man soon forgets the cautions given by this inspector. On the other hand, with a man constantly coaching him and drawing unsafe practices to his attention in a forceful way, the unsafe man, by degrees, reaches the frame of mind where it becomes natural for him to do his work in the safe way.

The ideal inspector, for this purpose, is the man who, having been a worker and a foreman, knows from experience the workman's weakness and his point of view and talks his language and whose opinions are respected by the men we wish to reach. In the ranks usually will be found such a man, with ambition and a strong influence over his associates and capable of development. His interest in safety work will be easily developed.

Safety Must Be Sold on a Fair Basis

Let us have periodic meetings of the foremen with these inspectors, and offer weekly or monthly rewards to the gangs with the best accident records, and keep a daily record of each gang posted where the men may watch it. Get the foreman to feel his responsibility for the record of his gang.

William Feather in *Nation's Business* for July says:

> "The 100 per cent American believes in the doctrine of selfishness, although he is often ashamed to admit it. a fact which leads him into bleary sentiment when he undertakes to define service. The American idea is that every man is out to promote his own interest and he has discovered that the best way to do this is to make himself useful to others. In the ratio that he helps others he will prosper."

The idea of safety must be sold to the men on an entirely fair basis. It must be put to them that as they benefit so also does the company benefit. It should not be put on the basis that it is all done for them. They know it isn't. The best results can only be obtained by having the men with you. It is decidedly a cooperative proposition, not only between the men and the company, but between the individual workers themselves. It is a matter on which everybody can, and should lend a hand. The men are willing. They don't want to get hurt themselves, and they don't want their fellow workers to get hurt. The desire for self-preservation is there. All they need is guidance and education along lines of safety.

Hoping to be of some assistance to you who are undertaking to reduce construction accidents, I offer a pamphlet, published by the company with which I am connected, entitled "Suggestions for the Safety and Welfare of Persons and Property During Construction Work."

CHAIRMAN AUSTIN: My attention has been called to the fact that I have made the usual mistake of the man who has never been in the

army. In introducing Colonel Lamphire I introduced him as Major. I am glad to make that correction, Colonel, and I apologize. We certainly are thankful to you for coming this distance and presenting this paper which contains so much valuable information.

LEO D. WOEDTKE (Fred T. Ley Company, Springfield, Mass.): I noticed, Colonel, in your remarks that you made reference to rewards for the best gangs, for the jobs having the best record. Have you had any experience in the matter of rewards, and can you tell me what the rewards consisted of?

COLONEL LAMPHIRE: I think I had better ask Mr. Conner to answer that question; he is starting to organize that program.

J. F. CONNER (U. G. I. Contracting Company, Philadelphia, Pa.): I would say that we have done nothing along that line just at the present time, but we have it in mind.

MR. WOEDTKE: The reason I raised the question is that that gets to be a very sharp thorn in the side of a safety man in the construction game. After you have gone the usual paces for five or 10 years you get pretty hard-boiled. I have never been able to solve that, but I got to the point after coming to the last safety convention, that when I got back home we cut out all contests and rewards; and we have been conducting for one year a contest between the company and the men, instead of the men in groups among themselves.

What to Do When the Enthusiasm Begins to Weary

We experienced, in greater Boston, a number of contests for six months at a time, 21 groups of gangs of linemen competing against each other. We gave them dinners and banquets and knives and forks and medals and pencils that cost us $4 and $5 each, and it got to the point that I found they were very much calloused.

I do agree, though, that the contest idea is all right for a while.

The National Safety Council has recently issued a pamphlet on contests and I have been watching for the appearance of that with quite a bit of interest. I often wonder just what we can do in the construction game to reward the job or gang on the job who maintains a better safety record than all the rest. It is done in industry where the people are housed within four walls. It has been going on for 10 years or more.

We get to the point where we are dealing either with union or nonunion labor, it doesn't matter much, except that the union labor element watch this a little more closely and the question comes up continually after you have plugged along and gone through all the a, b, c as to what reward if any ought to be given to the superintendent, or the superintendent plus his foreman, a straight time man, or beyond that to the gang on the job, for maintaining a better job than the other.

I think it is something that we have got to face, especially those of us who have been doing safety work for five years or more—there comes a time when the ballyhoo gets worn out and the men get a little bit fed up on safety propaganda, and they begin to wonder what is in it for

them. I noticed when you made reference to award, your company had apparently reached about the same conclusion. If it isn't imposing on your time, Mr. Chairman, if there is anyone in the room who has had any experience with the reward idea in the construction safety work, I should like to hear about it.

COLONEL LAMPITE: I want to say that the thought is injected into the paper solely for the purpose of getting some discussion on that point.

MR. CRAWFORD: I might say something along that line. If you have a number of jobs, pit them against each other, have competition. Where you have a job with 100 or more men, go to the men at the beginning of the month, tell them what a great thing this safety is; what they are going to derive out of it by working safely; what they are going to get out of it if they get hurt, and give them a pennant at the end of each month and see how many they can get during the year.

I have found that worked very successfully.

Men Are Eager to Know Their Gang Safety Standing

I want to say on some work that we did in Philadelphia, where we worked for a number of months with as many as 250 men on the job, we had the shanty plastered over with pennants which the men had won, and those fellows certainly did warm up to the work. I never went over the job but I was asked, not once, but many times, by nearly every man who came in contact with me: "How about the pennant this month, do we get it?"

That is something that they all work for, it goes over. At the end of the year, if you have a number of superintendents, get a prize for the superintendent who has the best record and maybe a second prize for the second superintendent. In that way I think you will get results; but once you start to hand around something to each and every individual, there is somebody on that job who is not going to get it and that fellow sows a little seed of discontent. Make them all work for one thing—that pennant.

MR. TUBESING: Mr. Chairman, last evening I put up a proposition to the contractors assembled at the meeting. I said that as soon as the A. G. C. is ready to have all its chapters go to the mat on this safety proposition, I would put up a cup for which the chapters could work. I think if the chapters go into this work in that spirit that you won't have to give the men anything, and you won't have to give the companies anything, but you will have this local chapter working to win this cup.

Out in Wisconsin this year we had three of the largest paper industries in the state tied for the cup which is to be given. They have gone through the whole year without an accident in an industry that has one of the biggest hazards in the state. I believe the contractors can do the same thing, and if all the chapters of the A. G. C. go into this safety proposition we will have some contest, and I am sure there will be enough spirit so the men will go into it and fight for it just like the fellows in the paper mills.

MR. WOEDTKE: The Electric Railway Section has given a great deal of thought to this question of rewards and they have been divided among themselves for the last four or five years. Some of the street railways are giving bonuses. When I spoke of rewards, I thought the Colonel had in mind something of material value. Some of the street railways give money in the form of a bonus, or they give vacations with pay, and things of that sort. I didn't know but what some of you fellows got to the point where you were considering that.

It is my personal opinion that that is treading on dangerous ground, that no man should be paid for safeguarding his own life. I would hate to see the time come when any members of the Construction Section would offer a monetary reward to a superintendent, foreman, timekeeper, skilled or unskilled laborer. It is their duty to take that precaution to preserve life and limb.

P. H. BROWN (Niagara Falls, Canada): I am glad Mr. Woedtke brought that up. It is hard to see why a man should be paid for protecting his own life or the lives about him. For years we have been urging that the men get the greater part of the benefits out of this safety work and in offering them rewards we certainly sell the idea that the company is expecting something of them for the company, whereas the reverse is true.

I would like very much if we might be polled on that to see whether any real benefits have been derived from offering rewards. We find that when we put it up to the men from the standpoint of business that safety is a part of our business, and every man who doesn't conform to our standards in that way isn't a part of the organization.

Sometimes the Reward Idea Can Be An Evil

SECRETARY ROBINSON: While I was in Pittsburgh about a year ago, I was inquiring how safety work was handled in some of the mills, and this reward proposition was one that struck me as an evil, due to the fact that it is handled in this way: the foremen and superintendents in the mills are paid a bonus at the end of the year, that is, on the basis of the least number of accidents, lost time, and so forth, and they even go so far, as I know of in one instance that was called to my attention where a man had been injured and sent to the hospital, they allow a certain number of days. After a certain number of days it is charged against him. They went to the hospital, got that man out of the hospital, brought him down from Milwaukee and kept him sitting in a chair there in order that he would be on the job. A case like that is certainly working against what we are trying to accomplish.

CHAIRMAN AUSTIN: One of the difficulties in the award system for accident prevention in our industry would be to set up a yardstick by which to measure the records. We have found in Detroit that the nature of the job, the size of the job, the location of the job, and all of those things make it necessary to set up a differential in trying to set up a contest. In other words, all of the work we have can not be measured by the

same yardstick. Of course when you commence to make allowances in a matter of contest you open up a realm of possibilities that is quite extensive.

MR. MISCH: I don't quite agree with the brother to my right. I think you should give just a little recognition to the superintendent, at least on a job, not necessarily dollars and cents, but some sort of a recognition; at the end of the year you might hand him a box of cigars or something like that and give one or two little prizes. But you ought to start some sort of a contest?

MR. WOEDTKE: May I say a word in self-defense on that matter? This may sound hard-boiled but it isn't; it is just plain straight from the shoulder business. The superintendent's value to a construction firm should depend upon his production, on his cost, and on his safety record. The minute you talk safety record you talk insurance cost. The Colonel quoted what it costs, the average cost, for insurance. Your insurance costs are tremendous, and it is up to the superintendent as an individual, or as a class, to produce as low a cost for insurance as it is possible for laying brick or putting up forms or sticking in a sewer or whatever the work may be in hand. And I believe it is the superintendent's duty to be just as responsible for his insurance cost record, which means his accident record, as his production record or cost record on the job, and he can be rewarded by increase of his salary, being kept on full time where other men are let go in the winter, and in a hundred and one ways.

Cost of Accidents Continually Before Superintendents

When bonus is given to superintendents for cost of production record or something of that kind, they single out the men who have had the most to do in making that year successful, and at that time their safety record comes in. We keep a record sheet all year, then they get a summary twice a year. At the end of the year they are shown where they stand. We don't wait until the year is over. Every month our cost department lets them know where they are heading, on the cost, and our production department lets them know where they are on production, and the same is true of the accident record.

I have known of cases where some of our superintendents fell by the wayside because of their safety record; and others have gone up the ladder. From being put on small jobs with medium pay, they have climbed up and they have done that on their safety records.

CHAIRMAN AUSTIN: We will proceed with the program. We have a telegram from Mr. Eigel to the effect that he is not able to be with us on account of sickness, but we are fortunate in having Mr. Tubesing of Milwaukee, who has a copy of Mr. Eigel's paper and he will address you at this time.

MR. TUBESING: Mr. Chairman and gentlemen, it is too bad that Stanley can not inject his personality into his paper. I know I won't be able to, but I will read it and I hope you will pass that by.

HOW MILWAUKEE IS PUTTING THE SAFETY MOVEMENT ACROSS

S. H. Eigel, Manager, Milwaukee Chapter, Associated General Contractors, Milwaukee, Wis.

Surely one way in which Milwaukee is putting the "Safety Movement" across is the fact that I have been sent to this Congress. Not because I have been sent, but because enough interest has been displayed to send anyone who can come here and be inspired and learn from you gentlemen the great work which you have undertaken, and which you are carrying out so successfully.

I have the pleasure of representing the Milwaukee Chapter of the Associated General Contractors of America, and I attended the Executive Board Meeting of that body recently at Kansas City where ways and means are being earnestly considered to place accident prevention as a foremost activity in the construction industry. Now, that will eventually aid Milwaukee in putting the safety movement across in the construction industry. It will push out much further this great humanitarian activity of accident prevention, which is at this very moment giving 85 chapters in the A. G. C. food for thought and inspiring them.

There is in this city of Detroit the General Builders Association, which is the Detroit Chapter of the A. G. C., a body of men who have developed a plan for reducing accidents to a mimimum, and while it is essentially and primarily a great humanitarian movement on their part—as a secondary consideration it is instrumental in saving considerable money for the contractor and produces increased efficiency among building workers. Now that is also aiding the Milwaukee Chapter of the A. G. C. considerably in putting the safety movement across.

About a year and one-half ago the Detroit Chapter of the A. G. C., Messrs. Austin, Wallbridge, MacMullan and several others, very generously came to Milwaukee and met with our Milwaukee contractors for the purpose of showing us the way in which to put into effect a detailed plan of accident prevention; and Milwaukee is thankful to these gentlemen for helping to start an accident prevention campaign in the construction industry, and helping Milwaukee put across the safety movement.

We have since then appointed an Accident Prevention Committee. This committee in its early stages functioned rather slowly. This committee has had a number of meetings and accident prevention has taken a very much more important part on our monthly meeting program. Our committee has prepared a series of bulletins, some of which have already been placed on every contractor's job. Monthly letters have been sent to the foremen and superintendents. We now have under consideration a comparative data chart listing accidents monthly. But perhaps of greater importance than that is the fact that our committee is reaching out, earnestly seeking ways and means to better our local conditions in the construction industry. Our committee meetings are being more regu-

larly conducted. Our entire interest is becoming more pronounced, and eventually we hope to measure up to a very high standard of results.

We need help and we are looking for it.

If you can stretch your imagination and view with me the panorama of Milwaukee's safety movement you will agree that Milwaukee's efforts are well directed and carefully detailed. To dwell on this subject without giving due credit to the originators of Milwaukee's safety movement would be perpetrating a gross injustice to the fathers of it. We cheer the Milwaukee Association of Commerce in their splendid, unceasing activity in behalf of humanity and may the echo of this cheer resound to the far corners of our country.

An Inspiring Picture of the Milwaukee Auditorium

Picture, if you will, Milwaukee's auditorium—with a seating capacity in the main arena of three thousand—and again visualize an attendance which occupies every seat, sending its overflow into the balconies, aggregating an attendance of over 5,000 foremen. On the stage is a personnel of 19 committees consisting of 128 members, all serving in a voluntary capacity. There were also numerous captains of Milwaukee's industries. This will give you a fair idea of the interest displayed at every monthly meeting of the Foremen's Safety School, directed under the auspices of the Milwaukee Association of Commerce.

Upon entering the auditorium you are welcomed by the music of a fife, drum and bugle corps—or some band of one of Milwaukee's numerous industries—all safety workers, men who set aside their own pleasures and help tremendously in the work of safety.

Someone has well said, "Safety with a Smile;" Milwaukee says, "Safety with Music."

This vast assemblage of foremen safety workers, all with the thought foremost in their minds of helping their fellow workers, gathers every month in the Milwaukee auditorium, from December to June, and are inspired by speakers of qualified ability who carry a message with a "Punch" along the lines of safety and efficiency, creating in the minds of the foremen a realization of their responsibility.

Safety along these lines may be termed "Inspirational." To inspire stimulates action, and its effects are written boldly on the right side of the ledgers of our industries.

Our picture is not complete. You have yet to behold the detail of safety work. This splendid array of safety foremen, before receiving inspirational messages from professional speakers, convene in 40 sectional meetings, divided as follows: woodworking, foundry, sheet metal, packers and tanners, electrical, building construction, machine shops and all trades. Each section has its committee and chairman, and its own meeting room under the same roof in the auditorium. In these sectional meetings the problems of each trade are carefully considered. Speakers are chosen who know the problems affecting the several trades, and clearly analyze to the foremen the pitfalls and dangers with which they are confronted.

A short period of time is allowed for discussion. The sectional meet-

ings convene at 7:45 p. m., continuing until 8:30. The general meeting in which all sections congregate convenes at 8:45 and adjourns at 9:30 p. m. To carry out this very complete program means the enlistment of 47 speakers.

The Safety Division of the Milwaukee Association of Commerce was organized in 1920 and is the outgrowth of the Safety Sanitation Committee of 1913. A few comparative figures will show our progress. The Foremen's Safety School was organized in 1920 with an enrollment of 78 leading companies and 750 foremen representatives comprising the various sections. Its growth has been tremendous, and today we are proud to tell you that Milwaukee is "Putting the Safety Movement Across with a Bang." The registration shows an enrollment of 288 leading companies and 5,606 foremen representatives. An increase of 210 companies and 4,756 foremen representatives.

You gentlemen who are serving in an executive capacity will readily realize the very great amount of detail which is necessary to successfully carry out an undertaking of this nature, including the numerous committee meetings and the earnest and sincere effort of the management and its staff.

All of the foremen are given attendance cards with the meeting dates on them. These cards are checked by a committeeman, at each sectional meeting and at the general sessions. Foremen who have attended faithfully are given diplomas, stamping them as workers in a great humanitarian movement of which they may well be proud.

I am not able to furnish you with a great array of statistics as to the extent Milwaukee's safety movement has prevented accidents and aided safety; but on the other hand, through Milwaukee's splendid effort, the work of safety last year was carried through over 8,000 foremen to the homes and to the job, and to practically every nook and corner of our city; and by the city's example safety enthusiasm was carried into other sections and communities.

The Milwaukee Record of Industrial Casualties

But Milwaukee has a record of industrial casualties, as follows: 1923, 89; 1924, 73; 1925, 58. The last shows a decrease of 34 per cent over 1923.

In addition to the Foremen's Safety School, the Milwaukee Association of Commerce developed its great work in 1923 and organized a First Aid School, enrolling at that time 117 companies with 650 representatives. In 1926 its operation enrolled 178 companies and 1,786 representatives, with an average attendance of 725, showing an increase of 44 per cent. The school meets on alternate Thursdays and provides definite practical instructions in first aid, sanitation, health, hygiene, and similar subjects.

Addresses, demonstrations, lantern slides and pictures comprise a large portion of the lectures. A banquet is tendered to all graduates and this year there were in attendance 550 earnest first aid workers.

A very necessary aid in the prevention of accidents and safety is a Fire Prevention School. Our Association of Commerce organized an efficient and systematic school to cope with this red demon. It was organ-

ized in 1924 with an enrollment of 50 companies and 650 representatives. The year 1926 swelled the registration of enrolled companies to 128 and 1,605 representatives.

The school meets on alternate Tuesdays with an average attendance of 750. It provides practical, non-technical instruction in principles and practices of fire prevention by means of addresses, demonstrations, slides, motion pictures and exhibits.

It is well to say a word in connection with Milwaukee's activities in the Fire Prevention Week campaign, conducted throughout the nation. Incidentally there are distributed about 320,000 pieces of literature; speakers are furnished to the various civic, fraternal and business organizations, and to all public and parochial schools, radio stations, etc. The cooperation of 100,000 homes and 2,400 industries is enlisted through home and industrial inspection blanks.

Fire alarm instruction to all industrial employees through the cooperation of Milwaukee's Fire Department is provided. In recognition of its accomplishments in fire prevention, Milwaukee has received sixth honor place among first class cities competing in the annual Fire Waste Contest.

Accomplishments of the Safety Schools

A comparison over a three-year period shows remarkable strides in the service and acomplishment of Milwaukee's Safety Schools, as follows: 1924, 308 companies, 4,559 representatives; 1925, 577 companies, 6,982 representatives; 1926, 588 companies, 8,997 representatives.

In addition to the activities described which safeguard life and limb and aid in the protection of our homes and industries, we have seasonal campaigns against the hazards of Fourth of July, Christmas and our Dry Cleaners Campaign.

It would be quite unfair if I did not dwell for a moment on the association created here in 1925, to further the activities of the Wisconsin delegates to the National Safety Congress, known as the "On Wisconsin Association" of the National Safety Council. We sincerely believe that the "On Wisconsin Association" will acquire great credit by spurring on activities in accident prevention in the construction industry. As I understand it, Bill Tubesing has been partly responsible for it, and Bill is a construction man, and we look to him for ideas in developing the best that the construction industry can contribute along the lines of accident prevention.

CHAIRMAN AUSTIN: One of the criticisms of our industry that we hear quite often is that we do not tie in to the civic movements. There isn't any reason why local groups of contractors should go off in a corner by themselves somewhere and undertake to solve their accident problems. There isn't any reason why contractors shouldn't be just as vitally interested in public safety and in fire prevention in their communities as manufacturers. We are all hoping for the time when the construction industry and those engaged in it will find more time to

enter into these civic activities along broader lines and get away from a feeling of self-sufficiency, particularly in this matter of accident prevention. There isn't any reason why a tie-in between local safety councils in our large cities and the construction industry in those cities should not result beneficially to both.

P. J. PRUITT (Birmingham Safety Council, Birmingham, Ala.): I would like to know if the Milwaukee Safety Council gives the contractors who are members of the Council and who participate in your industrial school there, any kind of periodic safety inspection, either weekly or monthly?

Problem of Safety Inspections in Birmingham

If there are any others here in the same boat I wish they would throw something into the pot for consideration. The A. G. C. Chapter in Birmingham has asked us for membership and requested that we furnish safety inspection, put a safety engineer on the job, or something like that, and we are turning that matter over now to see what we think is the best thing to do.

MR. TUBESING: In our state the thing is probably a little different than yours, in that the state and the city have the inspectors who come around and tell us just exactly what we have to do. But we are going at this thing in a different manner now. We don't want all this inspection. We want to do it ourselves, and we want to follow the Detroit Chapter's ideas of having a well-regulated working unit that goes out and not only does the inspection at the beginning of the job, but as soon as something happens they are right there to find out all the details. So probably you didn't get your chapter right, probably they aren't after the fact that you should have a whole staff in the shop, but they are probably going to create it.

MR. PRUITT: They expected us to do something of the kind if we thought it was practicable, and I would like to know, also, what the Milwaukee Council gives the contractors in the way of a service.

MR. TUBESING: I think Stanley made it plain here. You see, the Association of Commerce has been functioning for a long time. The Milwaukee Chapter for the last three years has had a section in this association known as the Construction Section. I have been the chairman of the Construction Section these last three years and we are just about finding ourselves; in fact, we come to these meetings, and every time we leave here we go back with some new idea we attempt to drive home.

Last year I got back to Milwaukee and said to them, "The Association of Commerce is all right, but what we have got to do is get Austin with his gang to come up here some night and sell our fellows." That was what we did. We got them, as stated in the paper; they came over and we got all of our principal contractors to the meeting and then we had Detroit tell us just how they did it, in spite of the fact that we had this whole big safety organization. The contractors need this work

and your chapter—anything that you can do. I don't know how big you can organize, but everything that you can do to help your chapter down there is going to be just one more help to this safety movement. The very fact that you have come to this meeting shows us that you are interested.

CHAIRMAN AUSTIN: If I understand the situation, Mr. Pruitt, the main thing that the Milwaukee Council has done for construction is to set up the machinery through which these foremen's schools are conducted, along with foremen's schools for manufacturers, foremen's schools for tanners and other foremen's schools.

Gentlemen, we will now have the pleasure of listening to Mr. McMurchy, of the Ohio Industrial Commission.

CHECKING PLANS FOR SAFETY

D. F. McMurchy, Construction Engineer, Ohio Industrial Commission, Columbus, Ohio

The subject assigned me is one on which two comprehensive papers have been given previously, namely Mr. Kershaw's paper before the Ninth Safety Congress in 1920, entitled "How to Check Plans and Specifications for New Buildings and Equipment," and Safe Practices Pamphlet No. 53, "Checking Plans and Specifications for Safety," which is an enlargement on Mr. Kershaw's paper by the Safe Practices Committee of the Council.

The meat of these papers is contained in "check lists" which furnish clues as to the location of various common accident hazards, and although not all-inclusive, they contain a great number of leads by which a safety engineer may locate the hazards of his particular industry. To enlarge further on these lists would be to add the special hazards of particular industries which would be, in a great or less degree, uninteresting to those of us not particularly concerned with the hazards of industries other than our own.

In the construction industry these lists are less applicable than in others, due to the progressive and varied nature of construction work. A set of plans may be checked for the method of constructing a given project but the job superintendent generally erects his equipment as needed, much of which is temporary and must be guarded each time it is erected. Therefore, on construction work, the safety engineer's field lies largely in educating the workmen and in guarding the hazards as they appear, whether in temporary structures, such as scaffolds, or in the uncompleted permanent construction such as vertical openings. There is but little advantage to be gained from a check of the plans and specifications of the structure by the safety department of the contractor, as generally his hazards are easily detected as the work progresses and are just as easily guarded.

The contractor, then, is concerned, in a safety sense, with the hazards he creates and over which he has direct control. He has little voice in the preparation of the plans and specifications of the projects he con-

tracts to build. The greater value of a safety check of the plans lies outside the construction field.

The various states and municipalities through their building departments have been checking building plans for safety since their inception. They are guided by laws which cover only the more evident hazards affecting group safety and loss of life or property by fire in buildings of a public character. These departments generally are inadequate to handle the volume of work required of them and the codes, where such are in effect, are in most cases very lenient in their requirements pertaining to safety of the individual.

Except in cases of very apparent error the strength of the structure is rarely checked; to do so on every set of plans submitted would occasion a force of engineers prohibitive in size and requiring more time than would be tolerated by the owners. As a result the plans when checked receive an inspection for the more evident fire and accident hazards such as type of construction, number and location of exits, size and material of walls and other items affecting the safety of groups in case of fire or panic; but the hazards of a less evident nature are not checked nor in all cases are they provided for in the building codes which must be used by the building departments as guides for inspection.

The Designing Engineer To Be Also a Safety Engineer

In view of the paucity of adequate inspection facilities on the part of government and possible inefficiency brought about through changing administrations, this work, if done at all, falls to the safety department of the concern for which the structure or layout is designed. The safety engineer detecting the more common hazards can use known methods of guarding them. He may be able to foresee conditions which might prove hazardous which have never been encountered previously and may even devise adequate guards for them but he can not be expected to find all such conditions nor is he in a position to suggest radical changes in design or operation to eliminate hazards, unless thoroughly trained, because of the technical problems involved.

Mr. DeBlois, formerly of the Dupont company, who was acting chairman of the Ninth Congress at which Mr. Kershaw gave the paper referred to above, in discussing this paper, presented a very significant thought. Realizing that our work is educational and our field practically unlimited, including not only the plants in operation but extending to the drafting rooms where such plants are created, he visualized the designing engineer of the future as being a safety engineer as well.

Such a combination, it seems, would be ideal from a mechanical guarding standpoint, as known hazards would be guarded before they enter the field of operation as integral parts of the machine, structure or plant. Further, the designing engineer, trained also in accident prevention, is better able to eliminate the inherent hazards of industry which are now stumbling blocks for safety engineers. The designing engineer, having been thoroughly trained in the technical phase of his industry and well informed of the accidents which have occurred

therein, is in a better position to change his design or operation to eliminate the hazardous operations and guard others. He is also in a better position to foresee hazardous conditions which have not been encountered previously and devise means for their elimination.

As to the economy of such a program, none can gainsay that more efficient guards can be provided at less cost at the time of manufacture than when attached or applied as an after-thought or as the result of safety check of the plans and specifications after they are completed from an engineering or design standpoint. While it might be said that the safety check is made during the preparation of the drawings, or at any rate before actual construction begins, would it not be a more nearly ideal condition if safety were incorporated in the machine, structure or plant design during the preliminary stages rather than to apply it, insofar as safety is then applicable, after the drawings are completed?

"The New Leadership in Industry"

I was intensely interested in an article appearing in the September issue of *Survey*, being an excerpt from Sam A. Lewisohn's recent book, "The New Leadership in Industry." Mr. Lewisohn, talking on "Management," regrets the fact that engineer graduates of technical schools are given to the industrial world with an excellent technical education, well prepared to handle almost any situation from a technical standpoint, but sadly unprepared in developing the human beings who will later come under their supervision or direction. He deplores the fact that financial and technical problems are too often given the place in the sun, subordinating human organization and other phases of efficient production as of less fundamental importance. Lastly he urges that more management be taught in the professional colleges that society in general be benefitted.

Mr. Lewisohn might well have inserted the words, "Accident Prevention" in the instances in which the term "Management" is used in the last few paragraphs of his article and presented as sound an argument. Few of the technical schools of the country today graduate engineers with even a passing education in the prevention of accidents. The subject of safety is one of the vital constituents of the human side of business which must be considered if true efficiency is to be had, but as yet is touched upon but lightly in most engineering schools.

A report of the Committee on Safety Education in Engineering Colleges of the American Society of Safety Engineers, presented to the Congress in Cleveland last year, was the basis for a pamphlet, "Accident Prevention and the Engineer," published by the Council, which gives, under the subhead, "Practical Methods," a list of colleges and universities giving safety instruction to their students.

Of these perhaps Pennsylvania State College is foremost, in that it has inaugurated a safety course as part of its engineering extension curricula, reaching a large number of extra-mural students who are actually in the production field as executives or workmen. The safety courses

on the campus involve lecture courses on safety subjects, the discussion of safety laws and codes, the theory and practice of compensation insurance, the compilation and analysis of statistical records, sanitation, health, safety inspection, and insurance ratings. Dean A. E. Holbrook, who originated the course, states that 32 class periods devoted to the above topics do not by any means exhaust the subject nor the student's interest. In the design courses the student is taught the design and application of guards on machines. Lighting and ventilation are studied in relation to plant layout and design. The electrical engineers are given a full period for the discussion of safety and practically all departments of the School of Engineering have courses so arranged that the students may become familiar with the fundamentals of safety.

This represents a significant step in the right direction, to the ultimate elimination of many accident hazards so that humanity in the future may profit by past experience; however the work is only started. A complete course of safety instruction should be incorporated in every engineering school today. The engineers have given us practically every comfort and convenience, in a material sense, that we enjoy, but in so doing have created conditions from which arise 23,000 deaths, 570,000 accidents involving a time loss of four weeks or more and 3,000,000 no-time-lost accidents every year in the United States, according to the results of a survey given in "Waste in Industry." These involve a time loss of some 50,000,000 days and a loss in wages alone of $1,184,000,000.

The Effect of Accidents Upon the Homes Incalculable

This does not and can not include the heartaches and suffering attendant to these injuries—the effect of these accidents upon the homes and families of these injured workers; this loss can not be reckoned in dollars. Surely, gentlemen, this is a problem of sufficient size to warrant the attention of our educational institutions, yet so little is being done toward the elimination of this unjustifiable waste! A check of the plans for safety, where facilities for such a check are to be had, is certainly productive of good results, but is not the problem one which requires and deserves investigation and revision from both engineering and safety standpoints to a much greater degree than is possible through a safety check?

Let us then think of an engineering curriculum in which the student engineer is given a background of economics and sociology, insofar as these subjects bear upon his profession, so that he may better grasp and more fully appreciate these problems, the solution of which rests in his hands. He is given training in compilation and analysis of accident statistics, workmen's compensation legislation, safety regulations, etc. He is informed of the accident situation in his chosen branch of the profession, giving as much time to inherent hazards as the course will permit. He is taught the design and application of guards so as to include them as integral parts of the machine, structure or plant he is later to design. He is given sufficient training in management and in-

dustrial relations to better coordinate his organization in the event that he is to fill an executive position in the future.

An engineer who receives this instruction, along with his technical training, not as elective subjects but as requirements for graduation, has then a fair conception of his responsibility. If the engineer created the hazards, the engineer must eliminate them, to the end that all men may live to enjoy the fruits of their labor. Then, if ever, will the problem of accident prevention resolve itself into a matter of human engineering—educating the worker in the safe operation of the ideal machine in the ideal plant. When both are accomplished we can see the beginning of the day when our accidents are not counted in thousands, but in hundreds or less.

An Old Sacrificial Custom in Construction Industry

CHAIRMAN AUSTIN: I am sure we all appreciate Mr. McMurchy's interest in coming here and presenting this very enlightening paper; and while he was reading I was reminded of one of the meetings we had last winter at which our building commissioner of Detroit made an address, and particularly of his closing remarks. He called attention to the fact that as late as the Seventeenth Century, and in no less a country than England, it was customary to make a human sacrifice and bury the body under the corner of the structure to insure stability. And he called attention to the fact, of course, that the mere statement of that to any audience in this time of ours and in this advanced civilization would strike horror into their hearts and souls, and that the first reflection of almost any human being would be to say that it was horrible, barbaric, awful. He closed his address by saying that the strange thing about it is that the construction industry is making the same sacrifice today that it did in the Seventeenth Century.

MR. PRUITT: If I may say this, I don't feel like a member of this Section, exactly, but I have a suggestion to make to you and the rest of the gentlemen, for consideration about the papers that have been read here today and the discussion. The speeches and discussions will be available in a large book about the size of the World's Almanac, but not many persons get that book. I think the community councils buy them, and some few companies, but the average person who attends the Congress doesn't get it. I think, though, there have been some mighty fine things said here this morning that would be of interest to all of us, and I wonder if it would be possible for the officers of this Section to see that certain parts of this, or the best parts, are mimeographed and made available to those who have registered here for these sessions. I know that I would be greatly interested in having 15 or 20 of those copies to give to the A. G. C. contractors in Birmingham, that is, those who are members of the chapter.

CHAIRMAN AUSTIN: I think that we can make arrangements for the distribution of the proceedings of the Construction Section through the people interested in those proceedings.

MR. PRUITT: So far as we are concerned, any nominal charge that will be made we will be glad to assume for our part.

CHAIRMAN AUSTIN: I think that can be made through the National Safety Council. I will take it upon myself to see if it can, and if it can we will do the necessary thing.

MR. CRAWFORD: For the benefit of those from New York who possibly do not know it: the New York University has a safety course this year, for the first time. I think this is a mighty good time to put this safety work over. You fellows, I feel, are all enthused; you have come distances to attend this Congress. I appeal to you men, don't forget it, don't forget what you have heard here, broadcast it; be a good broadcaster, that is the stuff that we need. We keep too much of this stuff to ourselves. Broadcast it, let the men know what you are doing, what you have come down here for, and take them back something.

Contractor Should Be Selected for Safety Influence

MR. KARSNER (Pittsburgh Plate Glass Company, Kokomo, Ind.): I am not connected with the Construction Section but I always manage to sit in one or two Construction Sessions. It means a whole lot to an industrial plant when there is an outside contractor if he is connected with an organization that is interested in the safety movement. We do missionary work in our plant every day and if we get a small contractor into the plant who makes no effort to protect his men he does more harm to our safety program in the short time that he is in the plant than we can do good in several months by the example that he sets. I think that any manufacturer who has a contract to let should consider the contractor from the standpoint of the interest he takes in safety, for the benefit of his own safety program.

CHAIRMAN AUSTIN: I think all the contractors here will agree with you perfectly, if you can just get the manufacturers to coincide with you on those views then we will all be happy.

MR. SPRINGER (Detroit City Gas Company, Detroit): I want to add my word to the last statement made. As a maintenance foreman in the plant, who has to cooperate with the contractors who are doing work in the plant, I find I have lost more weight, my nerves have gone to pieces more, at the work of the contractors in those plants than anything I have ever had to deal with. The contractors certainly can do a lot in promoting safety work there, about a gas plant where we have the hazards to deal with.

We rarely have fires occasioned by our own people; practically never do we have a contractor in but we do have one.

A contractor has to pick up his men in a short time to get the work done, he picks up the best men he can get available in the neighborhood where he is working; we realize that. We have maintained in our particular plant a very good accident record, so far as the city is concerned; considering the number of employees, we have the best record of any gas plant in the city. We have first aid men and we have a man who

is after that work all the time, looking those things over, but whenever there is a contractor, or especially where there is a sub-contractor, and two of them get together, we put every man available on his toes to keep track of the conditions there.

MR. CARMICHAEL (Hazel-Atlas Glass Company, Washington, Pa.): I must say that you fellows are very fortunate here in having a Congress of your own. Six of us are here representing the Hazel-Atlas Glass Company and we have dodged around here trying to find something that has to do with the glass industry, but we haven't found it. I will say that these papers here, particularly the last one, have appealed to us, not from a contractor's point of view but from the standpoint of industry, and we have gathered quite a bit.

Now a word about our local congress in Washington County, Pa.

We have a class numbering about 300 and we are meeting within the next few days to plan our winter campaign. We work in conjunction, too, with the Pittsburgh District. We sit down to a banquet in Pittsburgh with 2,000 men, it is a great Congress, but we are very glad to be here in connection with this contractors' conference.

MR. SMITH (Pullman Car Works, Chicago, Ill.): It seems to me that you have an ideal arrangement there to educate your contractors, these chapters, if each of them would have a form to report their accidents on, for instance. This man who looked down the elevator shaft—that could easily enough have been boarded up so he couldn't have got his head in there.

I also know of an accident not long ago where they were building a structure that happened to come up to the alley where the power lines went through, and one of the men got in contact with a line and was killed. Such accidents as that could be sent around to all the members of this chapter showing how accidents happen and how they could be prevented. That could be taken up with the electric company and those wires guarded where your contractors are working.

SECRETARY ROBINSON: For the benefit of those who are not acquainted with the Detroit method, I might say in connection with the point brought up by the last speaker, that in our quarterly meetings that we hold here with our superintendents and foremen, one part of our program which we always adhere to is to have a report made on the most serious accidents that occurred during the past three months, which is complete in every detail as to how the accident happened, and so forth. That is done with the idea of giving the men on the job, the superintendents and the foremen, all this information so that they may avoid a repetition of such accidents in the future.

We also keep in touch with the public writing commission in Detroit when new jobs are started. We see that men are sent out and superintendents are instructed as to taking care of existing power lines, and so forth, that are adjacent to this new work.

ADJOURNMENT

THURSDAY MORNING SESSION

October 28, 1926

C. H. ALMSTEAD, Chairman
Patent Scaffolding Company, New York City

The third session of the Construction Section of the National Safety Council was called to order at 10 o'clock, Thursday, October 28, 1926, in the Reception Room of the Book-Cadillac Hotel, Detroit, Michigan, by the First Vice-Chairman-elect, Mr. C. H. Almstead, of the Patent Scaffolding Company, New York City, who acted as chairman.

CHAIRMAN ALMSTEAD: Members of the Construction Section, unfortunately your newly elected chairman, Mr. E. C. Harding, General Superintendent of the Ferro Concrete Construction Company of Cincinnati, due to illness in his family, is unable to attend.

We always like to know just how the fellow in direct charge of construction operation feels about accident prevention; so it gives me great pleasure to introduce our next speaker, Mr. A. G. Butler, General Superintendent of Construction, of the Louisville Gas & Electric Company, Louisville, Kentucky.

SAFETY AND EFFICIENCY IN DAM AND OTHER CONSTRUCTION

A. G. Butler, General Superintendent of Construction, Louisville Gas and Electric Company, Louisville, Ky.

The demands of a growing city for prompt, continuous and satisfactory gas and electric service, call for an extensive and very thorough type of construction work.

Louisville, a city of 311,000 population, is served with gas and electricity by the Louisville Gas and Electric Company which is under the supervision of the Byllesby Engineering and Management Corporation. Since this property was taken over by the H. M. Byllesby Company in 1913 there has been continuous construction work on power houses, substations, gas plants, gas holders, office buildings, storehouse buildings, garages and all of the property necessary for maintaining service to meet the exacting demands. This construction organization has never been under 50 men and now numbers about 2000.

Much of the construction work is done in plants which are in operation and a great deal of it is done regardless of weather. It is for that reason more hazardous than the general run of building work, but to offset this we have the advantage of being able to plan our work so as to keep at least the nucleus of a large organization steadily employed.

All of the construction work, such as foundations, tunnels, conduit lines, wrecking, concrete work, structural steel, smoke stacks, pipe work,

machinery setting, machinery moving, railroads, electrical work, etc., is done with our own forces. A great deal of the electrical work is done in stations that are alive. Continuity of service is the first consideration so that construction work is done at all hours, much of it in hours not meant for man to work in.

We, as a public utility, are subject to supervision not known in private business. We must be prepared at all times to justify ever dollar invested so that when rates are fixed they will allow a return on that dollar. For that reason we must secure full value for each dollar. Each dollar must begin earning as soon as possible, so speed is important. High speed, whether it be with automobiles or on construction work, is not conducive to safety of life and limb.

From 25 to 40 cents out of each dollar we spend on construction work is for labor. You have all experienced the cost of training a man for any work, and no doubt you have experienced the cost of attempting to do work with a man not well trained. If a man is off on account of accident or for any other reason, it is sometimes necessary to do work with men not so well trained, and this is expensive. It is not only expensive, but it increases the danger of accident to the man not properly trained and to his fellows. In addition to the loss of a trained man, if his lost time is caused by accident we are penalized sooner or later by the insurance company. So you can see, if proof is necessary, that we are forced to look to the safety of our men.

Sketch of the Safety Organization

We continually have this subject before us in one form or another and attempt to have it always before our superintendents, foremen and workmen.

The operating company has a safety committee that meets monthly and is composed of the heads of departments. Accidents and methods of preventing accidents in the future are discussed by this committee.

On our construction work we have a safety man to keep on the lookout for hazards; to keep the question of accident prevention before the foremen and the men by word of mouth and by the bulletin board, and to investigate each accident that does occur. Every time I visit a job I take up some form of accident prevention with the superintendent and with the foremen.

No cost is spared to keep the construction plant safe. This means not only safety to the men but continuous operation of the plant. A great many of our foremen have attended the Foremen's School held periodically under the direction of the Louisville Safety Council. We have had schools in first aid work and on one or two occasions this has been the means of saving a life that might otherwise have been lost before a doctor could reach the scene of accident.

The slightest scratch or bruise is reported as an accident, but, strange as it may seem, the more serious ones happen on work that is considered not particularly hazardous. We have more accidents than we like to

have but we are continually preaching safety and at times it looks as though we are making progress. In the last two years we have had as low as one lost-time accident in a month with over 300 men employed. Our frequency rate has been as low as one accident per 1,000 man days and as high as 3.95 accidents per 1,000 man days.

I believe that it is generally accepted that the best accident prevention work can be done through the foremen. This, of course, after the job has been well planned and properly equipped. If foremen can be secured who are true sons of Martha and "Wary and watchful all their days that their brethren's days may be long in the land" and these men are properly trained to think and work safely, there will be little to do on safety work or accident prevention, and efficiency, so far as the payroll is concerned, will take care of itself.

The very nature of construction work is such as to cause peaks and valleys in employment. With sufficient foresight and by carefully planning the work in advance, a great many of these peaks can be cut off and the valleys filled up.

A Great Power Plant at the Falls of the Ohio

We are now building a 108,000 horse power hydro electric plant to develop the power at the falls of the Ohio River at Louisville. The dam is to serve both for navigation and for power purposes and is being built as a contract by the Byllesby Engineering and Management Corporation under the supervision of a corps of engineers of the U. S. Army. The project will total approximately ten million dollars and is being carried on as one job.

The working season in the river is short and uncertain, and for that reason when the river permits work must be carried on continuously 24 hours a day and seven days in the week. Surprising as it may seem with the rapid expansion necessary for this work, neither the frequency rate nor the severity rate on accidents has increased materially. In fact in the months of May and June when this expansion was taking place there was a decrease.

The same careful study was given to the construction layout on this job as was given to the economics of the project and the design of the permanent structure. These studies covered a period of nearly two years and all of the different possibilities of handling the work were considered. The studies included even methods of handling visitors safely.

Of course, we were fortunate in having a rather large organization ready for this work and probably this has been the greatest factor in the prevention of accidents.

CHAIRMAN ALMSTEAD: I am sure we have all enjoyed hearing the wonderful progress made by the Louisville Gas & Electric Company, and in the hope that there will be some questions we will set aside ten minutes for discussion.

H. W. HEINRICH (Travelers Insurance Company): I agree so heartily and so wholly with the thoughts so ably presented by your speaker that

I can not refrain from supporting his arguments with the more or less limited experience of our own company.

I recall that one of the things he brought out very forcibly was that it was unnecessary to have any further incentive to carry on accident prevention in the construction work than existed in his explanation of the necessity for training men, the delays incidental to accidents, and other incidental costs of that kind.

I think that it may interest your speaker and others to bring this point out: that while it is true you do not need any other incentive than perhaps the humanitarian incentive, nevertheless if there is a business incentive that exists in addition to the humanitarian incentive, so much the better, and it will help us to get quicker and better results in accident prevention.

Cost of Accidents to Employer Can Be Closely Gauged

There is another incentive. That is the direct cost to the employer of accidents in the construction industry. Based upon an experience covering thousands of construction risks, including dams, steel constructed buildings and miscellaneous construction work, the cost of accidents can be measured very, very closely by this comparison—the cost to the employer is exactly four times the cost to the insurance carrier. Now if in your own experience you happen to recall that your accidents have run to the extent possibly of $5,000 per year, which the insurance carrier has paid, you may make up your own minds that your own cost included in your overhead paid out of your own pockets as employers has been $20,000 a year.

Now that has been proved again, as I say, from a limited point of view, but I would not dare say it unless I felt that it was pretty close to being an average statement for all types of accidents. On the average your cost is four times the cost that the insurance carrier pays, and that cost is tied up in construction work largely by property damage. When things go wrong, whether it is on a building, or what it is on, if an accident occurs property damage is tied up in that. The compensation cost may be $5 or $10 for one man injured to a minor extent; but the cost to the employer when something like that happens, first of all is in property damage, second in the delay in carrying on the job, third perhaps in forfeits or lack of bonuses for not keeping the job up on time; and having to train men, time of the foreman, time of the superintendent, all put together, all added up, amounts to four times the cost to the insurance carrier. This is a business incentive to do accident prevention work.

Just one more point, your speaker also mentioned this: that to hit at the crux of the accident prevention situation you must get at the foremen. That is true, I agree with him heartily; the foreman is the key to the accident prevention game from our experience in construction work. But it isn't enough just to say that the foremen can cure the situation. and then proceed to talk generally about safety organizations,

about educating the foremen, about doing this, that and the other thing. Suppose you had a specific thing to do that would cure the situation through the foremen, what would that one thing be that you could lay your hands on? In other words, how can you make the foremen cure the accident prevention situation in construction?

Then, too, there is a specific answer from another limited point of view, but it has worked; it is working now in dozens of huge construction jobs; and that is the principle of holding the foreman directly and personally accountable for all accidents that happen under his supervision. You couldn't have failed to be impressed by the fact that out of the whole bunch of accidents shown by the speaker three were due to falling material and a whole host of others due to slips, falls, stumbles and other miscellaneous and minor accidents, some of them serious and costly, of course, but largely the little minor accidents.

Those are the things that in general experience are causing the losses in construction work, and they are controllable by the foreman and by holding the foreman personally responsible and accountable for what goes on. He can be held fairly accountable for even the tom-fool unnecessary exposure accidents; the accidents that are due to ignorance and carelessness, those can be controlled by the foreman. It is too long a process to explain why, but I make that statement as the result of an experience of our own company and it is working in construction jobs now.

MR. AUSTIN: I would like to ask Mr. Butler what the basis of measurement of lost hours is. For instance, how many lost hours are counted for a death?

Status of the Construction Safety Code

MR. BUTLER: On the same basis as the National Safety Council, 6,000 man days, 60,000 hours.

MR. PARIS (General Builders' Association, Detroit): It didn't seem to me that Mr. Butler's nomenclature of accidents was true to the classifications that we use here, and that have been generally used. I wonder if that is so or if it would mess up his figures too much if they might be made so.

MR. BUTLER: No, we took that from statistics of the operating company as a basis of comparison with theirs. It could be switched over without much trouble.

CHAIRMAN ALMSTEAD: Mr. Keefer is here from the Council and wishes to make a short announcement.

W. DEAN KEEFER (National Safety Council): During recent months I have been impressed with the number of articles that have appeared in your various trade journals referring to safety and I think it is a fine tribute to this Section that trade journals are beginning to recognize your efforts. A great deal of space has been devoted to the discussion of the Construction Safety Code, some of these statements, however, are somewhat misleading so your chairman has asked me to explain briefly the main points about the code.

For some years, individual states throughout the country have been adopting and enforcing safety regulations applying to all sorts of industries. This is working a hardship on those employers operating in two or more states, for they are forced to comply with a different set of regulations in each state, so one reason for the organization of the American Engineering Standards Committee was to formulate standard codes for state adoption and enforcement, leading to national uniformity. In addition, the codes of this organization are suitable for voluntary adoption and enforcement by the individual concerns in the industries for which these codes are prepared. Fifteen safety codes have been completed and 45 others are under way.

Ten Years Behind the Times in Safety Work

When a Construction Safety Code was first suggested about four years ago, the American Engineering Standards Committee asked the National Safety Council to undertake sponsorship. We agreed and organized a code committee including 27 men representing six different interests; the manufacturers of equipment, employers, employees, insurance company representatives, governmental and state representatives, and independent experts; the last named group comprising the representatives of engineering societies, and the National Safety Council.

This committee has criticised and revised four drafts of a Construction Safety Code, but we have now come to the conclusion that the construction industry is about 10 years behind the times in safety work, and that it is undoubtedly necessary to do considerable educational work among construction company executives before they will be willing to give any reasonable consideration to the whole subject of accident prevention in general and to any safety code in particular.

Fortunately, the Associated General Contractors of America has expressed its willingness to add a paid man to its staff to promote accident prevention among its members. This is a big step forward and certainly we should congratulate the A. G. C. upon that splendid undertaking. We have considered the work this man will be called upon to do, particularly as it relates to the code. His big job will be to call on individual contracting companies and get them to undertake organized accident prevention work; not to sell them a set of rules and regulations, but to influence them to undertake a real organized effort to prevent accidents.

This man will have an exceedingly difficult job, and the officials of the A. G. C. feel that we would complicate the situation if we were to set up two objectives instead of one in the minds of the construction executives. If we proceed with the immediate development of a code, the A. G. C. will be asking construction executives to organize for accident prevention, and simultaneously the Construction Code Committee will be asking the same executives to consider the voluntary adoption and enforcement of a set of rules and regulations.

The National Safety Council, as sponsor for the code, has therefore

accepted the recommendation of the A. G. C. to postpone immediate action on the code pending an evaluation of the work of the A. G. C. safety man.

This agreement, of course, does not at all commit the American Engineering Standards Committee to any definite line of action. We must realize that there are many people and many interests desiring the immediate formulation of a Construction Safety Code, and if this opinion prevails in the A. E. S. C., it may be necessary for the Safety Council to withdraw as sponsor, permitting the adoption of some other procedure to bring about the desired result.

MR. CONNER (U. G. I. Contracting Co., Philadelphia): I would like to ask Mr. Keefer what is going to be done by the A. G. C. in reference to taking care of the promulgation of a state code? Should we not in the light of this delay that is going to be experienced in the promulgation of the American Standards code, approach the state departments and request them to hold off until we get the results of this other action?

MR. KEEFER: I don't believe that is within our province. The National Safety Council tries to keep out of legislative problems and discussions. Perhaps the state of Pennsylvania is considering the promulgation of a state code for the construction industry. There will be state hearings and those of you who operate in Pennsylvania will be given an opportunity to appear before the committee that will formulate the code to criticise and amend the suggested rules and regulations. If you have an organization of Pennsylvania contractors, I imagine that will be the organization through which you will want to work.

Accident Prevention Is a Matter of Education

MR. AUSTIN: Mr. Chairman, I would like to make a few remarks. In the first place I don't think the question of uniformity between states is important at all. Maybe some of the other gentlemen who operate in different states would feel differently about it, but I don't believe it is an important consideration in this matter. We have different laws in different states; we always will have. When corporations go from one state to another they know of certain things they have to do, and to acquaint themselves with the particular requirements of the safety code or industrial accident commission is just one of the numerous things that we have to do, and probably always will have to do. So I don't attach the importance to uniformity that some others do. In fact, I take the opposite view.

To a very great extent, just in so far as the construction industry is nationalized, just so far the construction industry is going to suffer. I do not believe in nationalizing to the extent that has been done in the past, and I don't believe in nationalizing in such a detailed document as a construction code.

It so happens that accident prevention in the construction industry is not a matter of legislation at all; it is a matter of education, and those of us who believe thoroughly in that fundamental principle think it a

grave mistake if the legislative feature of the problem is emphasized and the educational feature submerged. We want very much to see the construction industry awakened to its responsibility in this matter to the extent that they will enter upon a voluntary, educational, cooperative, accident prevention program before a legislative compulsory program is thrust upon them by outside interests.

MR. BUTLER: I might add a word to what Mr. Austin had to say about legislation. I question very much if it is possible to prevent accidents by legislation. It is a question that each contractor has to work out for himself. It is a responsibility that is laid on him, and it is just as much of a responsibility as getting the work done. All the legislation in the world will not prevent accidents.

MR. MCMURCHY: I agree with Mr. Austin and Mr. Butler that you can not prevent accidents by legislation. I don't think the purpose of any code is to do that. The A. G. C., fine organization as it is, in order to maintain its individuality and its high place in the industry, must of necessity limit its membership to the more ethical contractors. Now it can not be said that all the work is done by A. G. C. contractors. If it were the problem of accident prevention might be a different proposition, because I believe the A. G. C. is awakening to an appreciation of moral responsibility to the workers. If all contractors were aware of their responsibilities in accident prevention, the code would be the most unnecessary thing in the world. But there are some contractors, not members of the A. G. C., who do not realize their responsibility in this matter, and in order to protect themselves the labor side has asked for state regulation as a means of combating negligence on the part of employers generally—not all employers, thank goodness, but of those who otherwise won't make any provisions for the safety of their men. It is questionable what good it does. In Ohio it does some, as evidenced by the cooperation secured by the division of safety and hygiene. We present the thing not as policemen, not from a coercive standpoint at all, but we use codes as guides for our inspectors in educating the employer and the employee alike to the hazards of their industry.

CHAIRMAN ALMSTED: We come now to the last paper on our program and it gives me great pleasure to present our esteemed former chairman to you, Mr. W. F. Austin, president of the W. E. Wood Company, of Detroit.

PROGRESS OF THE CONSTRUCTION SECTION

W. F. Austin, President, W. E. Wood Company, Detroit, Mich.

The progress of the Construction Section can not be measured by membership. All movements of importance, and particularly those national in their scope, require time for their maximum development. The Construction Section of the National Safety Council was organized in 1918 at the Congress in St. Louis, with less than a dozen constructors in attend-

ance, but these were sincere and determined to see our industry take its rightful place in accident prevention work.

For eight years our Section has been struggling (and the word is used advisedly) to interest the construction industry in accident prevention and to build up the Section to a point consistent with the magnitude and importance of the industry. This has been a slow process for numerous reasons. The construction industry is difficult of organization, and methods are changed and improved rapidly; there are frequent changes in personnel; and the work fluctuates in volume and exposure. These and other factors combined seem to make accident prevention in the construction industry more difficult than in some other industries.

It seems to me, however, that the principal difficulty has been that in all the United States there is only a handful of construction men who have devoted any great amount of time personally to the national phases of this work. To some extent we have been struggling along as a "Nobody Responsible Club." Most of the constructors of the country, because of the lack of organization, have been too busy with their own problems; constructors have been the "'football" for every other element in the industry, so none have been in a position to give accident prevention the time and thought it requires.

Construction Section to Have a Paid Secretary

About a year ago some of you gentlemen, who have been active in this section for years, deliberately and thoughtfully came to the conclusion that until we could secure a man who would make accident prevention in the construction industry *his job*, and devote his whole time to this work, our Section would be standing still, if not actually losing ground. So, at your suggestion, your chairman presented this matter to the Executive Committee of the National Safety Council and was given a very sympathetic and encouraging reply, with the result that we now have a full-time, paid secretary for the Construction Section.

Surely, we are justified in feeling proud of our accomplishment and thankful to the National Safety Council, our parent body, for their encouraging assistance. But I can not refrain from sounding a note of warning. Through the employment of this Field Secretary, we must not permit ourselves to lie back and imagine that all of our problems are solved. Safety in the construction industry is too complicated and too big a job for one man to tackle single-handed, and if any success at all is to attend the efforts of our secretary, he will need more cooperation, more assistance, and more work from us than we have ever displayed before. The eyes of the safety world are focused upon us; we dare not fail; we must succeed.

Everything is in our favor. The construction industry, through the efforts of the Associated General Contractors of America, is organized and beginning to take its rightful place in the life of the nation. It is unqualifiedly going to promote accident prevention as a resul of action taken by its Executive Board which met at Kansas City early in October.

The trade journals, including the *American Contractor*, the *Engineering News Record*, and the *Constructor*, are pounding away in an effort to awaken constructors to their responsibility in this matter. Progress is being made slowly but surely, and this is largely through the efforts of this Section. More general interest has been shown, and more actual active work has been accomplished in our industry along the line of accident prevention in the past year than in all preceding years combined, and those of us who have had the success of this Section at heart are gratified.

With the full-time secretary for your Section, supplemented by the continued good work of you members, and stimulated by the insistent demand of the public, the press and the government agencies, there are almost unlimited possibilities ahead of us. There is no reason why the Construction Section of the National Safety Council should not be the largest, the strongest and the most active of all the Sections. The construction field presents the greatest possibilities for the reduction of accidents, and now that we are assured of the cooperation of the Associated General Contractors, and the very tangible help of the National Council, there is no reason why we should not continue on to greater things than any of us have yet dared to anticipate.

Continued Interest Asked for the Section Work

In conclusion, I bespeak your continued interest in the Construction Section, to the end that we may yet enlist the industry to such an extent as in time to avoid an avalanche of hasty legislation and restrictive measures which are questionable in effectiveness as far as a reduction of accidents is concerned, and to the further end that our industry may enter upon this work voluntarily on the basis of cooperation between employee and employer, along educational lines of sane, reasonable, and commonsense prevention methods, which we know will result in maximum efficiency and develop all of the possibilities.

I wish to thank the members of the Section (and particularly the members of the Executive Committee) for their generous support and response to every call made upon them, and I shall always look upon the past two years of service as chairman of your Section with a great deal of pleasure and satisfaction.

CHAIRMAN ALMSTED: Mr. Austin has covered his subject so well that I am somewhat reluctant to hold a discussion.

On behalf of the Section I want to thank the officers and our good friend Mr. Robinson who has worked so hard, for this splendid cooperation to make our sessions a great success.

On behalf of the Section I personally want to thank the General Builders of Detroit and others for their splendid hospitality. We have enjoyed our visit here and I can assure them their hospitality is very sincerely appreciated.

To our retiring chairman, I offer my personal and the Construction Section's heartfelt appreciation of his wonderful achievements in making

the Section what it is today. His sincere leadership has instilled in us the spirit of cooperation which makes me believe that we are not standing pat but sure-stepping. I know we will have his assistance in the many knotty problems which will be presented to us during the coming year. Gentlemen, I move we give a rising vote of thanks to Mr. Austin.

(The Section gave the rising vote of thanks amid loud applause.)

ADJOURNMENT

Electric Railway Section

New Officers of the Section

CHAIRMAN: R. W. EMERSON
The Cleveland Railway Company, Cleveland, Ohio.

VICE-CHAIRMAN (MOTOR BUS OPERATION): A. W. KOEHLER
The Milwaukee Electric Railway & Light Co., Milwaukee, Wis.

VICE-CHAIRMAN (INTERURBAN TRANSPORTATION): H. K. BENNETT
United Electric Railways Co., Providence, R. I.

VICE-CHAIRMAN (URBAN TRANSPORTATION): E. K. EASTHAM
United Railways of St. Louis, St. Louis, Mo.

SECRETARY: J. J. CONNORS
The Tennessee Electric Power Company, Chattanooga, Tenn.

Committees

PROGRAM: SAMUEL H. REID, Chairman
Bureau of Safety, Chicago, Ill.

POSTER: J. E. STOTT, Chairman
Georgia Power Co., Atlanta, Ga.

MEMBERSHIP: W. H. BOYCE, Chairman
Pittsburgh Railways Co., Pittsburgh, Pa.

PUBLICITY: BUELL W. NUTT, Chairman
The Safety Equipment Service Co., Cleveland, Ohio.

RECOMMENDATIONS: A. L. HODGES, Chairman
The Brooklyn City Railroad Co., Brooklyn, N. Y.

COOPERATING WITH CLAIMS ASSN. A. E. R. A.: G. T. HELLMUTH, Chairman
Chicago, North Shore & Milwaukee Railroad Co., Chicago, Ill.

ENGINEERING REPRESENTATIVE: CLINTON D. SMITH
Beaver Valley Traction Company, New Brighton, Pa.

October 26, 1926

A. W. KOEHLER, Vice-Chairman
Superintendent of Accident Prevention, The Milwaukee Electric Railways & Light Co., Milwaukee, Wis.

THE meeting convened at 10:00 o'clock in the Adam Room of the Hotel Tuller, Detroit, Michigan, Mr. A. W. Koehler, Superintendent of Accident Prevention, The Milwaukee Electric Railway & Light Company, Milwaukee, Wisconsin, presiding.

VICE-CHAIRMAN KOEHLER: We regret, gentlemen, that our worthy chairman, Mr. Hellmuth, has urgent business which has made it necessary for him to leave very suddenly and go back to Chicago. So in his absence, I shall attempt to take his place.

It is therefore my privilege as Acting Chairman, to greet you and bid you welcome to this first meeting of the Electric Railway Section of the Fifteenth Annual Congress of the National Safety Council. It is very gratifying and inspiring to find so large a number of men in the electric railways present at this meeting. I recall distinctly when the Congress was held in Boston we had just a bare handful, and in the few years that have elapsed since that time this Section has grown to where we now have a very much larger number of enthusiastic members.

I realize that you didn't come here to listen to a long-winded speech from the chairman and you are not going to get it. We are going to get down to business right away and try to make this meeting just as interesting as we possibly can.

It has been suggested that we call upon each man to rise and give his name, his town, and his connection, so that we may all have an opportunity to look him in the face, know who he is, and break the ice. (This was done.)

Mr. R. C. Bush, of the Boston Electric Railway Company of Boston, has requested that he be permitted to make an announcement at this time.

Introduction of Groups Meriting Recognition

R. C. BUSH (Boston Electric Railway Company, Boston): I welcome this opportunity to introduce to this assembly a group of 14 men from the Boston Elevated Railway Company, who came here to attend this convention. The names of these men are Mr. Carroll Finn, Mr. Paul Reitchell, Mr. George Auld, Mr. Oscar Thorpe, Mr. Chester Landers, Mr. Godfrey Gwinneath, Mr. Alfred Johnson, Mr. Leo Lennon, Mr. John Walsh, Mr. John Dwyer, Mr. John McKenna, Mr. William White, Mr. George Pratt, and Mr. Harlow Miller.

All of these men have earned the right to be here by their own effort. Briefly, I will explain how these men happened to be chosen out of a group of 9,000 employees.

Last year a series of printed lectures was sent out to every employee in the Transportation Department, with an announcement that at the end of the tenth lecture any, or all, of the employees in that department could take an examination on the context of those lectures. There were many men who took those examinations and their papers were carefully corrected by two sets of officials, one from the transportation department and the other from the legal and claim department. It was the unanimous opinion of both these departments that the men here today are the men who passed the highest marks and had the best safety records during the preceding year, and they are therefore entitled to be here.

VICE-CHAIRMAN KOEHLER: Will the gentlemen from the Boston Electric Railway Company please stand?

(The men arose and were applauded.)

MR. BUSH: I have also been requested to announce that the Milwaukee Electric Railway and Light Company has eight men who also deserve the right to be here by some peculiar effort on their part. Mr. Charles Johnson, Mr. John Sack, Mr. William Geiszler, Mr. Edgar W. Boldt, Mr. H. Rendler, Mr. Nathan Buckspan, Mr. William F. Keller, Mr. E. B. Schley, I believe those are all. That is another sizeable group of men who have been sent here by the company as its representatives. I feel sure that they will be well repaid for coming here.

VICE-CHAIRMAN KOEHLER: Will the gentlemen please arise?

(The men arose and were applauded.)

SECRETARY EASTHAM: Mr. Chairman, I believe one of the first companies that sent any of its platform men to a National Safety Congress is the United Railways of St. Louis. While our delegation is not so large and while they are not selected for individual merit but through the operation of their car sheds, which in turn win the right by merit of reduction in accidents, I would like to state that we have three from the United Railways of St. Louis. These men are Mr. James, Mr. Walker, and Mr. Hacker.

VICE-CHAIRMAN KOEHLER: If those gentlemen will stand up that will complete the introductions.

(The men arose and were applauded.)

U. B. BAILEY (Nashville Railway & Light Company, Nashville, Tenn.): I want to state that the Nashville Railway and Light Company has one man who has just been taken off the platform to be here. His name is Mr. A. C. Totty. (*Applause.*)

Reports of Section Officers and Committees

VICE-CHAIRMAN KOEHLER: Now that we have all been properly introduced, we will proceed with the regular order of business. The first thing on our program will be reports of the officers and committees. Owing to the absence of our chairman, Mr. Hellmuth, our secretary, Mr. Eastham, probably has something for us and I will call on him.

SECRETARY EASTHAM: I am not prepared to make any report for Mr. Hellmuth. I took lunch with him yesterday just before he had to leave, and he said that he felt that things would go right along under the leadership of Mr. Emerson and Mr. Koehler.

I would like to say for Mr. Hellmuth, however, that my contact with him throughout the year, his efforts for this Section, have shown that we have never had a chairman who has given any more wholehearted industry and intelligence to the work of the Section than Mr. Hellmuth. He has called a number of meetings throughout the year of different committees, the Program Committee and others. He has gotten the committee chairmen to do valiant work. I haven't the figures before me, but I think it will be found that the membership of this Section has been considerably increased in net during the past year. Many plans have been discussed as to what shape our activities should take.

During the course of the year between our annual Congresses, we attempted to get out a news letter and we got out about six or seven of them. I think that while we are gathered together this time that there should be some expression from the membership as to whether news letters are worth while or not. I know I found in getting up those news letters that after the first half dozen of them I had about run out of ideas, and while I tried to get the ideas of you gentlemen, I wasn't very successful.

Now if we are to continue news letters during the next year, I would like to impress on the membership that it is up to them to help whatever secretary they may have during that year. The secretary himself can't get you out a news letter of real interest to all members, which will touch on the vital problems that we safety men have to meet, unless we get your ideas; and you'd be surprised at the few letters and replies that come in from a membership of something like, I believe, 150 or more, with reference to the work that all of us should be vitally interested in.

Letters Read From Busy Corporation Executives

VICE-CHAIRMAN KOEHLER: I wish to say that our secretary, Mr. East ham, has also worked hard and faithfully during the past year, and much of the success of the Section is due to him. His efforts have been untiring and he has done a worth while job, and I wish to take this occasion to thank him.

Our next order of business is the appointment of the Nominating Committee. Mr. Hellmuth has appointed as chairman of that Committee Mr. S. H. Reid, Mr. Glenn Shaw, and Mr. H. M. Kiser. Their report will be made at one of the later meetings.

We will now call on the chairmen of the Committees and will ask that they make reports of their activities Mr. Samuel H. Reid, Bureau of Safety, Chicago, Illinois.

S. H. REID: We have met with a few disappointments in the program this year in that those who consented to write certain papers were prevented from doing so by reason of other emergencies arising. The first of those I have reference to on our program this morning is Mr. James P. Barnes. He was to have read the first paper this morning and just a few days before the time of the convening of this Congress he notified us that it would be impossible for him to be present. However, sometimes a disappointment is followed by something that is equally satisfying. Mr. Barnes has sent to us Mr. Neil Funk and another gentleman from his company, Mr. Powell, whom most of you know, and they are to discuss the subjects on the program this morning.

The work of preparing a program for a congress like this entails considerable work and I want to take this opportunity to thank those who have consented to write papers and have promptly sent them in.

Just to show you how some of the folks are interested in the National

Safety Council in general, and the Electric Railway Section in particular, I have two or three letters that I want to read to you.

"I thank you for your kind invitation to attend the annual Safety Congress at Detroit, October, 25-29. I will be glad to do so if conditions permit at that time, as I know it is a very valuable and interesting occasion. If I can not go, however, others of our officials will attend.

"Wishing your every success in the Congress, I am yours very truly, Charles W. Chase, Gary Railways."

Here's another from the Georgia Railway and Power Company: "I am in receipt of your letter of October sixth in reference to attending the National Safety Congress at Detroit. Glad to advise that we will have six delegates at this convention. We feel that the National Safety Council is doing a very essential work and that the company will be fully repaid for sending those delegates to the convention."

I have another letter from perhaps the busiest railway executive in the United States, so far as I know. He is president of the Chicago Rapid Transit Company, the Chicago North Shore and Milwaukee Railroad, the Chicago South Shore and South Bend, the Public Service Company of Northern Illinois, and some others. He is Mr. Britton I. Budd.

"I have your letter of October sixth inviting me to attend the annual Safety Congress at Detroit October 25-29. I shall be glad to keep this in mind and if at all possible will try to attend."

I want to say that Mr. Budd is well represented at this Section. There are numerous others here from prominent men who have shown their interest in this work by sending delegates, but I will not take your time just now to read them.

Report of the Chairman of the Membership Committee

VICE-CHAIRMAN KOEHLER: Mr. John J. Connor, chairman of the Membership Committee.

J. J. CONNORS (Tennessee Electric Power Company, Chattanooga, Tenn.): Mr. Chairman, I took the electric railway directory and checked that against our present membership. I found that out of some 800 companies in the United States 150 did belong to the National Safety Council, and by an intensive campaign of soliciting the other 650 companies we did manage to get 16 new members. I believe it is proper at this time to extend our welcome to these new members. I want especially to mention the Birmingham Electric Company of Birmingham, Alabama, a large company, which has come into the fold during the past year; the Portland, Oregon Company with 3,500 employees is now a new member, and I would suggest, Mr. Chairman, that we recognize any representatives of those companies. I notice Mr. Prabson is present. I would like to have him stand up and get acquainted.

(Mr. Prabson arose and the members applauded.)

VICE-CHAIRMAN KOEHLER: Is Mr. Young here of Portland?

(Mr. Young was not present.)

VICE-CHAIRMAN KOEHLER: Mr. Paul Hodson, Safety Engineer, East St.

Louis & Suburban Railway Company, East St. Louis, Illinois. Mr. Hodson is chairman of the Poster Committee and I will ask him to prepare to give us his full report.

PAUL HODSON: This is always the committee that has the long story of grief to hand out. If any of you are prepared to cry with me, get ready. The Poster Committee is always in my estimation the hardest committee to get any action out of. The idea of the Poster Committee is to solicit ideas from member companies, and that was some job. Mr. Connors tells me there were 150 members, but from answers to my correspondence I found about 15.

Suggestions of the Poster Committee Chairman

Now I didn't come to reprimand or even suggest that, but I do wish that during the coming year that you men who are interested in safety and interested in poster work would assist your chairman of the Poster Committee in preparing pictures, cartoons, or other features which might go well in our posters. We all use the posters, we want them, but we feel that the other fellow ought to make them. Now I know that a good many of you men have valuable ideas. If you can't draw the idea or have a photograph of it taken, write it down and send it in to the chairman of your Poster Committee and it will be his job to see that it is put into some sort of a picture.

I especially want to commend about 10 of my good friends for the valuable assistance that I have received. We have been in a position to supply at least two definite electric railway posters each month, but now that our Electric Railway Section is bigger than it has ever been, we should have at least four.

VICE-CHAIRMAN KOEHLER: I will now call on Mr. G. H. Shaw, chairman of the Publicity Committee.

G. H. SHAW (The N. O. P. & L. Co., Akron, O.): I have not prepared any special report. I found that being chairman of the Publicity Committee of this Section is some job. It is not a one-man job or a committee job. I just wanted to suggest that during the coming year that articles be contributed from various members who have accomplished something worth while. They may possibly have used some new method which would be of great interest to others. I think that these ideas should come unsolicited and I know they would be a great help to the Publicity Committee during the coming year.

VICE-CHAIRMAN KOEHLER: Mr. H. K. Bennett, safety manager of the United Electric Railways Company, Providence, Rhode Island, has something to say to us of the cooperation of the Claim Division of the A. E. R. A.

H. K. BENNETT: That report will be necessarily brief. As indicated by the committee, it was to pave the way perhaps so that the Claim Division of the A. E. R. A. will be in closer touch with the National Safety Council, and help the Membership Committee of the Electric Rail-

way Section. Mr. Scott, President of the National Safety Council, addressed the Claim Division at the convention in Cleveland two weeks ago, and I believe that is going to pave the way for a closer connection between the two bodies and will also increase the membership.

It was sort of a feeler when Mr. Hellmuth and I got together one day, and both being most interested, of course, in A. E. R. A. we thought it possible that through such a committee there might be closer cooperation. We have paved the way for that and we look for greater success in the years to come and in the Congresses that are going to be held in the future.

VICE-CHAIRMAN KOEHLER: Is Mr. Melvin Bridges in the room? (Mr. Bridges was not present.) We will proceed then with the next order of business. The subject "Accident Prevention—Why and How from the Standpoint of the Executive" was to have been presented, as you have already been told by Mr. James P. Barnes. Mr. Neil Funk and Mr. Powell are here prepared to handle that subject for us, and I take pleasure at this time in introducing Mr. Neil Funk of the Louisville Railway Company, Louisville.

ACCIDENT PREVENTION—WHY?

Neil M. Funk, Louisville Railway Company, Louisville, Ky.

I want to apologize. I dislike very much to start these introductory remarks with an apology, but Mr. James P. Barnes, who is connected with the company I represent, was so anxious to be at this convention that he did not tell us until train time that he would not be here. We received a wire that he could not possibly be here and so he asked Mr. Powell and myself to discuss the subject he was to have presented.

We will handle it extemporaneously in this way: I will handle the "Whys" and I will let Mr. Powell handle the "Hows," and if he takes any of my "Whys" or I steal any of his "Hows," as long as we are in the same company we will have to make it up anyhow, so no one's feelings can possibly be injured.

Now, to speak extemporaneously to men who have come as far as you have is a great responsibility. I did feel a little awkward this morning, but when the platform men were introducing themselves, somehow or other it seemed to inspire me. I wish I could live up to the inspiration I feel in my heart in seeing these men here.

My work has been practically, totally, I should say, in talking to platform men. I love them. They have accepted our program better and all our property better than anyone else outside of the main executives. I have always said that you need not worry about the rank and file when it comes to putting over a safety program. They are the first men who respond to this great civilizing influence that has come into our lives, so now I feel at home.

My subject is, "Accident Prevention—Why?" I will leave off "from the executive standpoint," if you please. First, accident prevention on a safety program put a soul and heart into industrialism. The most remarkable thing about history to me, from the beginning of time up until just a few years ago, is how cruel we have been to each other. History recounts men as individuals, not as people. It is a history of the Pyramids built by Pharoah at the sacrifice of hundreds of thousands of lives. Why? They were men, even as you and I, but sacrificed on useless things like a pyramid to extend one individual's immortality.

History Is Filled with Disregard for Human Lives

Then Caesar, we have histories of Caesar, and there were men that were for Caesar and against him. Then Napoleon Bonaparte, and practically a large part of the history of France is the history of this individual, whose only ambition was to make France a Napoleonic kingdom. Then our Puritan forefathers arrived and they actually burned women at the stake and called them witches. They seared with red hot irons scarlet letters on the faces of gentle women. Then we come on down through the ages to the industrial period, and find that dollars had absolutely no ideals behind them.

I try to talk straight from the shoulder. We had practically an industrial civil war in this country. We had a class consciousnes in free America and labor and capital fought each other as they would a common or a foreign enemy. We fought each other and we were both wrong; we fought each other to exhaustion and then we commenced to see the light. Sometimes it takes a crucifixion to make men see the light.

Then we began to say, "Why, these people who work for us are men. They have ambitions, they have families, they are entitled to a square deal." And then we quit burning them over unguarded furnaces for a dollar a day, and we realized that we must meet on a common ground. We started welfare associations, group insurance, and all sorts of things that were good; but these people were not convinced yet. To some of them we were like Greeks bearing gifts, and so finally we met on a common ground, and it happened at about the birth of the National Safety Council that we at last came together.

I believe nothing has done more to keep down the strife between labor and capital in this country than for the executives and the men to meet on a common, unselfish ground, for the high ground of saving human life and human suffering. Where yesterday our president, myself, and the other officers in our company knew only 12 or 14 men outside of the office, now there are over 1,000 in our organization whom we can call by name. We are coming in contact with our men. We have learned to love them and I do not believe that there is a man here today who would say that they haven't an affection for us.

My friends, there is another "Why." You know whenever someone does us wrong, generally we have wronged them, and you know there was a time once when big industries were not willing to play the game

always on the square and lay the cards on the table. You know as well as I that those were the days when we grabbed franchises, those were the days when our ideals were not high, and we had mostly water in our stock. Now we wanted to meet the public. The new spirit had been a spirit of honesty and helpfulness, but the people were not convinced, so we had to find a contact and we found the contact again through this unselfish program of accident prevention, which is one of the few questions that can not be debated nor controverted.

Therefore, today we talk to the public in this way: I know you gentlemen will excuse me if I mention personal things, because naturally, I know my own property better than any other. We talk to the public through the press on safety and we have been doing it for about four years. We have 22 billboards, eight by ten feet square. We have one of them electrically lighted over every property that we own and we blazon our messages from them. For instance, when St. Louis and New York fought for the world's championship, the same day that the series started we had on the 22 billboards in the city of Louisville, "The greatest World Series: Carefulness versus Carelessness." The one we put up before I left was this: "As in golf, concentrate while driving." Some of you golf players know what that means.

A Sincere Safety Program Influenced Public Opinion

That last sign might be a little highbrow, but we are trying to get a message of some kind across to those folks who are careless. We are not different from any other company. All of us, I say, were under suspicion and lots of us rightly so, but now through things such as that, through newspaper publications, we are convincing the people that we have met them on a common ground and that we are trying to prevent every accident we can in the city of Louisville, not only on our street cars but in our factories, or wherever else it may be. We had great trouble before in getting our rights, and every time we wanted anything there was bad feeling against it, because before we started the safety movement we had 400 lawsuits against us in the courts of Jefferson County. You can imagine what sort of antagonism that would create in a community, with juries every day constantly trying your cases and with able, eloquent lawyers appealing to the lower emotions of men. You can imagine how much sentiment there was against the company created in our courts through accidents.

Then we started the safety program and we advised the Claim Department to keep out of court as much as possible and today, in four years, we only have 22 lawsuits on our dockets in that court.

So, my friends, we have found this is another "Why" which is for accident prevention. We find that it has placed a new spirit in the heart of nearly every man that is with us. We find that where the boss on the track or the car house foreman used to feel like bullying the men, that there is now a different feeling, a feeling of comradeship. Why, I can remember the time and you can, too, when a man couldn't hold a job

unless he could whip every man in his gang. Those days are gone and they are gone forever, I hope, and nothing has brought that around more than the spirit of humanity that permeates an accident program, because those fellows have learned, are beginning to learn the foundation stone, the foundation of all real safety is, after all, "Do unto others as you would have others do unto you." You ask me on this program "Accident Prevention—Why;" and I say, "Accident Prevention—Why Not?"

VICE-CHAIRMAN KOEHLER: We are greatly indebted to our good friend, Neil Funk, for this stirring and eloquent address. I am sure that Mr. Funk's address has stimulated many thoughts. Doubtless there are many who would like to have the privilege of asking questions of Mr. Funk, and while those thoughts are still fresh in our minds, I think it would be an opportune time to ask them.

W. H. BOYCE (Pittsburgh Railway Company, Pittsburgh, Pa.): I would like to ask Mr. Funk what percentage of your gross receipts is paid out in the settlement of claims?

MR. FUNK: Four per cent.

MR. BOYCE: How does that compare with four years ago?

MR. FUNK: About seven and one-half per cent.

J. D. BARR (Pittsburgh Railway Company, Pittsburgh): Mr. Funk, do you have any safety meetings in your organization?

MR. FUNK: Mr. Powell and myself addressed last year 250 such meetings. We do not believe in bulletins. We believe that you must constantly talk and meet the men face to face.

A. L. HODGES (The Brooklyn City Railroad Co., Brooklyn): I would like to ask if there is any money incentive to the men or is it merely competition between the various depots?

Favors, Not Money Bonuses, for Safety Efficiency

MR. FUNK: We do not believe in money bonuses, although we believe in lots of individual awards. We have safety captains elected by the various properties. For instance, platform men have iron car houses, and the winning captain for the men whose car house shows the best record is our special guest at a banquet. Mr. Barnes, our president, is always present at that banquet. The captain's men are of course invited, and in addition to that we give him publicity in our papers, and not alone in our own little company publication but in our other papers; and in addition to that we present him with a complete new uniform, including the cap.

MR. BOYCE: I would like to know, Mr. Funk, on what you base the competition, whether on the number of car miles ridden, or the number of passengers carried?

MR. FUNK: I would like to answer that question, but Mr Powell is taking that part of it.

J. J. CONNORS (Tennessee Electric Power Co., Chattanooga, Tenn.):

You mentioned something about selecting the most popular men in your organization; does that, Mr. Funk, apply to safety?

MR. FUNK: We have what is known as the "Conley" award. It carries $75 in a gold prize, a beautiful medal, and trip to the American Electric Railway Association convention. He is selected by the president, the two vice-presidents, and the safety director. He is primarily selected because he has done more than any other member in the rank and file for the cause of safety. He is selected, too, because he has done more extra work and he has given up more of his time. Lots of times the men on our property organize these meetings themselves. We give them the privilege. The men at one car house will give a dance. They collect a dollar and a half from each member of that house. They will not let us contribute a cent, and the first thing they usually have at the dance and social is three speeches on safety.

J. M. LOFTIS (Pittsburgh Railway Company, Pittsburgh): These captains that are elected, how long do they serve?

MR. FUNK: Just one month. They are not eligible for a year if they win.

C. K. THOMAS (Chicago North Shore & Milwaukee Railroad Co., Highwood, Ill.): I would like to ask Mr. Funk if he used any of the rank and file of the employees to carry the safety message to the public?

The Rank and File Carry the Safety Message

MR. FUNK: We change our safety work every two or three months. We often use this plan at the safety dinner. For instance, the last time one of our motormen from the Portland car house made the safety speech for that particular car house, but frequently we take a man around with us. We have these little group meetings right on the property. We don't make the men come up to the office or go through any great inconvenience, and we frequently take a man that has shown an unusual interest in safety and can shoot it from the shoulder in a practical, straightforward way. We will take him around to talk to all the men on the property. We have met with great success along these lines.

HERBERT P. SMITH (Indiana, Columbus and Eastern Traction Co., Springfield, O.): I would like to state at this time, and I would like everyone present to know, that about three and one-half years ago our company considered starting a safety organization. I canvassed different organizations in different companies and then we took a delegation and went to Louisville. We studied the plan they had in force at Louisville and adopted that plan to apply to our property, and if there are any gentlemen here present that have no safety organization in their company, I feel certain they would do well if they would study the Louisville plan. We have met with very good success since we have had that plan on our property, and I can safely say that our accidents have been reduced 50 per cent in the last year and a half.

S. N. HENNINGFELD (Milwaukee Electric Railway & Light Co., Mil-

waukee): I would like to ask Mr. Funk whether anything is done to educate the men in your rank and file, for instance in the public schools?

MR. FUNK: We haven't done a thing along these lines. I know in some cities they go around in the various schools. We don't find our men responsive to that, and they would rather talk to the fellow on his property.

MR. HENNINGFELD: Do you find it advisable or necessary to put the first-aid equipment on your cars for the platform men to use in case of public or personal accidents?

MR. FUNK: We do not do that. I guess, however, it depends altogether on your experience with first-aid men. We have had some rather unfortunate experience. For instance, a man with a broken limb should not be moved, and we have had some of these first-aid fellows move them. All of our stuff, first-aid stuff, is in sight, but we do not emphasize first-aid any place except in the power house and in the shops. We are just a little afraid that the man on the road might do something that isn't right because he is not experienced. We don't want our platform men to do any first-aid work. We teach them a little respiratory, however, but outside of that we would rather they would not try any first-aid treatment.

VICE-CHAIRMAN KOEHLER: The discussion is very interesting and I wish it might go on indefinitely, but we have some more speakers on our program. I will now ask Mr. Powell if he will not tell us about "Accident Prevention—How?"

ACCIDENT PREVENTION—HOW?

G. B. Powell, Superintendent, Transportation, Louisville Railway Company, Louisville, Ky.

The "Why" section of this subject has been so thoroughly and vigorously presented by my esteemed colleague, Mr. Funk, that should I even mention it to you in my feeble way would be to waste your valuable time.

Having fallen heir to this place on the program by the forced absence of one who is a leader in his community in safety work, I ask your indulgence for the few crumbs you shall receive when you had every right to expect a feast.

My interpretation of the subject "How" in accident prevention is "how to prevent them" and even to presume that I am casually or remotely acquainted with all the "How's" in this connection would be to expose my ignorance, because there are as many ways "How to prevent accidents" as there are flappers in Detroit, flivvers in America, or oysters in the Delaware Bay. So my few remarks shall be confined to how we have prevented accidents on the property with which I am connected.

I shall leave out safety devices, education of the public, traffic control and all the other wonderful advancements made the past few years under

the able leadership of the National Safety Council, and tell you about one which is the cream of the lot, the very foundation upon which rests the whole structure of accident prevention on your property or mine—"Cooperation," cooperation of the entire force. Gentlemen, there is no substitute for it. Education, technical or academic, four wheel brakes, and collapsible, folding, disappearing steps fade entirely out of the picture when under the control of men who do not cooperate with those about them.

Recently my attention was attracted to the fact that a college graduate drove his car into a telephone pole at 60 miles per hour, and the floral designs were beautiful; while near my home a bus with four wheel brakes went over a 200 foot embankment, producing one order for the undertaker and the sale of one cork leg.

The Record of An Accident Prevention Campaign

Cooperation can be obtained, but it will not start at the bottom. Those at the top of the organization must be sold first and sold so thoroughly that they will spend their time, money, authority, influence and every facility at their command to weld together a force, working as one unit, for the prevention of accidents because they know in their hearts it is the right and the big thing to do. To wait until safety devices have accomplished the desired result is too indefinite a postponement, likewise, it will be some time before pedestrians are forced to take refuge on elevated sidewalks, all trolleys be placed underground or automobiles legislated to the rural districts. So the big thing to do right now is to produce men who can and will prevent accidents under present day conditions.

A campaign to develop this idea was started on our property five and one-half years ago and we know that results have been produced. Committees, meetings, posters, bulletins, contests, prizes, every known means was used to bring to the individual the knowledge of his importance and responsibility in the accident prevention machine we were building. For the benefit of those who may be technically inclined, I submit the following figures as proof. The average miles operated per accident for the whole system in 1921 was 2,004; in 1922, 3,323; in 1923, 3,380; in 1924, 6,389; in 1925, 7,432; and for the first nine months of 1926, 9,903.

These records show results and of course must be kept as markers to guide our way, but we believe that the changed attitude of the force as a whole shows more clearly the success obtained. When you see an old employee finish his day's work and then spend hours of his own time assisting a buddy who is new in the game; when you see meetings of the local Safety Council packed with your own employees who lose their sleep to attend, and when you see in the actions of their daily life that the standard of morality and citizenship has been raised, then you need not fear to compile comparative records.

When the cooperative spirit has been developed to the point where

the whole force, or at least the great majority, are pushing the program along by their concerted efforts, we found it necessary to prevent lack of interest, by keeping constantly before our employees the object, "Accident Prevention." This we have done by division contests, which produce friendly rivalry, and by keeping the records, "Miles per accident," posted daily at each division, showing the progress made in an imaginary race from Louisville to California, or a trip around the world, etc.; changing these often enough to keep the interest of all centered on the main objective.

In conclusion, allow me to say, give me all the safety devices the brains of mechanical engineers can produce, give me legislation which will help untangle the present traffic blockade, give me the benefit of our splendid Safety Council; but with or without all these, if I succeed in the fullest measure in "How to Prevent Accidents," it will be because the whole force from the highest executive to the most humble employee realize the importance of this work and are willing to be keenly alive to the responsibility which rests upon each individual in this age of slaughter in which we live.

What Should Be Counted As An Accident?

VICE-CHAIRMAN KOEHLER: If Mr. Powell has sounded the keynote in this matter of accident prevention, and I am sure he has, many of us will have questions to ask him. Let us have a snappy discussion.

SECRETARY EASTHAM: I notice, Mr. Powell, you said that for the first nine months of 1926 you averaged 9,903 miles per accident. What do you count as an accident?

MR. POWELL: We count against a man everything as an accident which is a result of his carelessness or disobedience of a rule, or anything which he could have prevented whether it is his fault or not.

SECRETARY EASTHAM: We don't count as accidents automobiles that run into our cars.

MR. POWELL: If an automobile runs into the front end we presume our man should have seen it before he got there.

SECRETARY EASTHAM: That is what I wanted to get at. That is one of the things that this Section should do. It should have a system of reporting accidents that will be uniform for all companies, so when figures are given we may know just what they mean.

On the United Railways of St. Louis, our maximum number of miles per accident is about 3,200 miles, but that is based on every accident, miscellaneous or otherwise, whether the men are to blame or not. Compared with 9,000 miles that makes a very poor showing. On the other hand, if our accidents were brought down to your basis, I think it would be very similar to your own. I think we ought to get at that.

DR. C. P. SEGARD (Third Avenue Railway System, New York City): We are counting everything as an accident, whether it happens at the shop, on the track, electric department, or any other place, and we are getting about 1,300 miles per accident.

MR. POWELL: Dr. Segard, there is such a multitude of ways of keeping accident records. Mr. Eastham pointed out that of course our method would not compare with his, and it also would not compare with yours. We separate the various department accidents. I was speaking of the transportation department, that is, the operation of the cars. Our shops, power house, and tracks are kept in a mechanical group, and that of course can not be compared with yours.

G. H. SHAW (Northern Ohio Power & Light Company, Akron, O.): I would like to ask, Mr. Powell, if in 1921, 1922, and 1923 you sub-divided your accidents at that time?

MR. POWELL: We sub-divided at that time, but perhaps not quite so closely as we do now, but we are charging accidents against our men now that we would not have charged at that time, because now we feel we might be too lenient and hinder the progress of prevention of accidents.

Akron Counts Every Unusual Disturbance An Accident

MR. SHAW: I might say with my company that we charge everything as an accident, even though it is a street disturbance and does not involve the company itself, its employees, or its property; if it is an unusual occurrence, a collision of two automobiles, it is reported as an accident. This brings our record to about 3,000 miles.

MR. POWELL: I would like to say right here, for the benefit of all, that we don't think that is fair. That is why we don't count it if two automobiles run together on our streets at Louisville near our cars. It is reported, however, and we are prepared to defend ourselves if that man says we hit him, but we do not think of counting that against our men.

H. K. BENNETT (United Electric Railways Co., Providence): Is there any discontent among the men for chargeable accidents? That seems to be one of the most delicate questions to be arrived at. One man might have an accident today and might be charged with it, and another man might have a similar accident and he might not be charged with it.

MR. POWELL: We find that the policy we have dates back a long time, as Mr. Funk said in his speech. There was a time when perhaps 99 per cent of the men on the property had no use for the transportation superintendent, and I didn't blame them. But we have built up a system of confidence so that there is very seldom a question as to when an accident should be chargeable or not, and when the question does arise, the men themselves and their safety captain, and perhaps the local committee, will come down and have one of the finest safety meetings that you have ever seen in the office of the director of safety, and they will all leave with the case settled one way or the other. We don't fear that at all.

W. F. HANNA (United Railways of Baltimore, Baltimore): How do you deal with boarding and leaving the car accidents?

MR. POWELL: Those cases must have substantiating evidence that the car was standing still. There are some cases where people fall from a standing car and there are a few of those that are not counted against

our men. However, with the gates and doors that we have on our cars, mostly all boarding and leaving accidents are chargeable accidents.

E. K. MILES (New York State Railways, Syracuse): What has been your experience with the so-called blind accidents?

MR. POWELL: There has been a decrease in blind cases, or unreported accidents, due to the fact that the discipline for unreported cases is quite severe. I am not taking credit for the accident prevention campaign curing that condition, but there has been a reduction over the past four years.

H. E. MASON (General Engineerings & Management Corp., New York): I would like to ask Mr. Powell who determines whether the accident is chargeable or not? Does a man know that it is charged against him and then does he have any appeal?

MR. POWELL: The director of safety classifies the accidents each morning and I might state, in that connection to back up our assertion of cooperation, that he does so in the transportation office and the man himself has a perfect right to appear personally if he thinks the accident is not charged correctly. We have had so little of that, it is absolutely negligible.

MR. FUNK: I would like to answer that question about blind reports a little fuller. At all times we are talking to our men of that and we are trying to educate them to know that there is nothing more disastrous, or more like a Benedict Arnold, than the idea of not reporting an accident. It is a matter of educating them by talking to them, and I believe that is why we have less blind reports now than we did formerly. Through educational methods and through speaking to the men personally we have gotten them to realize the importance of reporting accidents. We have made them realize that that is one of the unforgivable sins in our program.

A Fall in the Car is Charged Against Motorman

N. BUCKSPAN (M. E. R. & L. Co., Milwaukee): I would like to ask whether an accident involving a passenger falling in a car, regardless of whether the car is moving or standing still, would be an accident charged to the rear or front end?

MR. POWELL: The falling in a car is a classification we have charged against the motorman, because we assume that he made a rough start or stop. It is quite a delicate question you call on me to decide, because if the car was standing still the question would be, how long? He might have made one of those down stops and just about the time he stopped the party fell down. All of our falling in cars is charged against the motorman for the rough handling of the car.

JOHN L. FAHEY (Scranton Railway Co., Scranton): In Mr. Funk's remarks I understood him to say that their lawsuits four years ago were 400 and today they have been reduced to 22, and the percentage paid four years ago was seven per cent as against four per cent today. How were

those 378 lawsuits disposed of, by amicable adjustment or action in court?

MR. FUNK: We settled those cases and got on the right sort of footing and had to start all over again. We cleaned it all up. We got the claim department to realize that even if it were not our fault, where there was a child with a leg or an arm off, that that child must be provided for, and we have found that we can settle eight or 10 time more claims now than we did settle, and still save money by keeping out of court. We have gotten to look at the human side of the proposition.

MR. FAHEY: None of your accidents were settled in court?

MR. FUNK: We used to fight everything, but now we settle everything.

A. L. HODGES (Brooklyn City Railroad Co., Brooklyn): I would like to ask Mr. Powell since the inception of this campaign, whether or not you have received the cooperation of the public in that you get more witnesses to accidents now than you got before?

MR. POWELL: There is not so much change in the public of Louisville as there is in our own employees, but it's safe to say that it is 10 times better than it was before we started this campaign.

Car Men Stay or Leave on Their Individual Records

W. J. ROUNTREE (Georgia Railway & Power Co., Atlanta, Ga.): My question may become better at a later time. I want to get new experience on it. Do you use in the education of your employees statistical methods to any extent?

MR. POWELL: No, sir.

RALPH M. READE (Quebec Railway, Light Heat & Power Corp., Quebec): I would like to ask whether you charge up every accident to the individual man and does that accident go on his record?

MR. POWELL: The men in my department, motormen and conductors, stay or leave on their records. Our accident department has absolutely succeeded by reason that out of 900 motormen and conductors, 875 of them believe in what we are doing.

A. J. VAN BRUNT (Public Service Corp. of N. J., Newark, N. J.): Mr. Chairman, I don't want to ask a question. I know the two fellows very well and I want to say that they are doing good work down there. I do want to say that it is very desirable that the committee you appoint to attend to that matter get in closer touch with the Claims Association of the American Electric Railway. An effort has been made to establish a bond of that kind. If it continues and we can systematize our methods, we will be almost as successful as Louisville. Unless we do systematize our methods (and that we haven't is plainly evidenced by the questions that have been asked), we are not working together. We are not getting the results we should get.

Some of their methods would not be entirely applicable to my organization, for instance, but many of them would, and if we can all work along the same lines we are going to get results. But we can't unless we work with the Claims Association of the American Electric Railway.

We have just heard that all claims used to be fought and now they are settled. I don't know the percentage we are working on, but I should imagine it to be about 50.

One more thought and I am through. The day has gone by when we are using the plea of contributory negligence. You might just as well forget it, and if you are not ready to forget it now you are behind the times. That is demonstrated very clearly in almost all the states by the fact that no matter how badly a man is injured in any mechanical claim the consumer pays for it. The railroads have got to do that thing in years to come. I plead for standardization of our methods of keeping our records of our accidents.

R. M. READE (Quebec Railway, Light, Heat & Power Corp., Quebec): I would like to ask Mr. Powell how many of their motormen go through the year without an accident, that is, what percentage of those men have no accidents?

A Life Saver's Club Started in Louisville

MR. POWELL: We have started in Louisville in the Courier Journal, one of our largest newspapers, a life saver's club. To be eligible for that club you must be a motorman or a driver of a public vehicle and run through the entire calendar year without an accident. We have approximately 900 trainmen, 600 of whom are motormen. Last year we had 175 life saver motormen without an accident of any kind.

E. J. KREH (Pittsburgh Railways Company, Pittsburgh): I would like to know about what percentage of reports are chargeable and what percentage are not chargeable?

MR. POWELL: I haven't the percentage figures. More than half of the reports are not charged, however, due to the fact that a large number of reports are things which do not happen on the cars. Our men report everything that occurs on or near the car and necessarily there are a large number which are not accidents, as far as we are concerned; so more than half of the reports which come to my desk each morning are not charged.

DENNIS C. KING (Pittsburgh Railways Company, Pittsburgh): Is there any way to get rid of these demerits when you get rid of these reports: If there isn't, doesn't a man automatically expel himself from the company in a short time?

MR. POWELL: We don't believe in the demerit system. We keep an individual record of each man with dispensations on one side and accidents on the other, and if a man has a chargeable accident and he has a previous good record we feel like he is naturally ashamed of himself and nothing is said to him. If, in a short time, he has another chargeable accident, he pays a visit to my office and we have a nice talk about accident prevention and I try to determine in my own mind whether he has lost interest or not; and then it is put squarely up to him, the fact that if he remains he must create a better record. I have had numerous cases

of men who have had three chargeable accidents within 30 days and then haven't had any more for over a period of six months.

VICE-CHAIRMAN KOEHLER: I would like to say that we have just made a summary of the men in our company who have had no chargeable accidents for over a period of one year, and we found that 622 had been able to operate an entire year without a chargeable accident out of 1,594.

W. H. BOYCE (Pittsburgh Railways Co., Pittsburgh): In Pittsburgh, with our narrow streets and our numerous routes which traverse grades of seven and eight per cent and one route of 13 per cent grade, each year about one-third of the motormen and conductors who comprise that territory don't have anything charged to their record. We don't have any claims nor accidents of any kind. I would like to ask the gentlemen of Louisville if they have anything that approximates this condition. We have one division that will run, say, four to five times as many thousand car miles per accident as another division, due to the difference in the type of territory served, one of them running through open territory and another through very heavily congested territory. How would you pit car house against car house in a case of that kind?

MR. POWELL: Very fortunately, sir, our divisions in that respect are fairly evenly divided. We don't feel that there is very much difference in conditions under which they operate. We had some cases where the car house made a poor record for two or three months, and when those conditions do arise we concentrate our efforts on that division; and we therefore have been able to bring a car house from the bottom to a 100 per cent record with no man of that car house having an accident within a month.

Honors for Safety Efficiency Given in Birmingham

T. G. BRABSTON (Birmingham Electric Co., Birmingham, Ala.): I don't know whether I am in order at this time to mention something of what we are doing in Birmingham, but I believe it might be of interest to the members here. We have a system of handling this accident business in Birmingham on an individual basis rather than on a division basis. For the individual man we have what is called a distinguished service class, based on six months periods. The man who has no accidents goes forward each six months. To the man who has an accident we not only charge the accident to him but also the amount that has been expended by the claim department on account of the accident that he has had, regardless of whether we considered it chargeable or not.

In the transportation department about 50 per cent of our men, of which we have 600 in the platform service, qualify each six months, a little more or a little less, for these various distinguished service medals or buttons. They go from bronze for six months to gold for two years and longer. For the first six months of 1926 we had 256 men, I believe, who qualified, and out of that number, 40 of them had gone three years and a half without an accident and without having anything charged up

or expended by the claim department on account of an accident in which they might have been involved.

This individual system on this problem overcomes conditions such as the gentleman from Pittsburgh mentioned, where divisions were not operated through an evenly distributed territory. We believe that the individual man gets a little edge on it if he happens to be in a dull territory. The men shift from line to line or move around so that one fellow has constantly got the edge on it for two or three years.

VICE-CHAIRMAN KOEHLER: The next thing on our program is a formal investigation of a grade crossing automobile accident. The personnel of the Inquiry Board consists of Mr. S. H. Reid, chairman, Mr. Ralph C. Bush, Mr. Robert M. Jeffries, Mr. R. J. Williams, and Mr J. Harmon. If these gentlemen will now proceed we will be very glad indeed to listen to what they have to say

A BOARD OF INQUIRY IN ACTION

A Formal Investigation of a Grade Crossing Automobile Accident

S. H. REID (Bureau of Safety, Chicago): In preparing this part of the program we recognize the difficulty of any sort of plan of investigation that would fit all of the properties represented in this Section. What we do today might not fit in an ideal situation like Louisville or some of the others that have been mentioned.

There are three or four types of investigations, or rather several purposes for which investigations are made. One is from the viewpoint of the claim department, in order to determine the legal liability in the event of an accident, and that is necessary and all right. Sometimes an investigation is made by the mechanical department in order to determine whether or not the equipment on the car involved was in first-class condition, and nobody can question the wisdom of that procedure. Sometimes an investigation is made by the operating department in order to determine whether or not there were any violations of well known and well established rules. Nobody can find any fault with that.

But it has been found that if we should go a little farther in investigations, whether these that I have mentioned, particularly the last two, are superficial or otherwise, it certainly is necessary to make an investigation in order to determine the cause of the accident, which may not be brought out in the kind of investigations already mentioned, and in order to apply the remedy for the prevention of a recurrence.

Now that is the purpose of the sort of investigation that we want to conduct this morning. The accident that is going to be investigated happened on a high speed interurban line, a double track, with trains operating in both directions every hour for the greater part of the day, which is perhaps 16 hours, and there were extras in between. The accident happened in this way:

A northbound train, a three or four-car train, passed a crossing and was met by a southbound train perhaps 600 or 800 feet north of the crossing. An automobile was approaching the crossing from the east and evidently did not see the southbound train. At any rate, he drove onto the track and was struck by the southbound train, resulting in death of one person and very serious injuries to two others.

That is the accident that we are going to consider for a few minutes this morning, and the first witness we have will be the motorman on the southbound train, Mr. C. K. Thomas. It is proper to announce that this is not the man who was the motorman of the train that was involved in this wreck. This is Mr. Thomas of the Chicago, North Shore and Milwaukee Railroad Company, a man of long experience as a motorman, as well as other duties to which he has been promoted recently.

Now, Mr. Thomas, you understand the purpose of this investigation. It probably has been investigated by the claim department in order to determine the legal liability of the company. It has been investigated by the mechanical department to determine the condition of the equipment. Now the purpose of this investigation is to bring out, if possible, some of the underlying or fundamental causes of the accident, and determine if we can what may be done to prevent a recurrence. In order that our records may be clear, we will ask you to give your full name to the stenographer, your age, and the length of service on this road.

MR. THOMAS: My name is Chester K. Thomas, age 38. I have been with the road a little over seven years.

The Motorman Describes the Fatal Accident

MR. REID: Now, Mr. Thomas, with this understanding of the purpose of this investigation clearly in your mind and ours, we want you to tell the Board of Inquiry in your own way the details of this accident as you saw it and as you understand it.

MR. THOMAS: Well, we left Highwood about 11:09 in the morning and when we approached this crossing in Kennilworth it was about 11:40. As nearly as I can judge, about 800 feet north of the crossing I met a three-car express train and, of course, as soon as I passed the three-car express I saw that a Ford car ahead was standing on the east side of the crossing. It was moving very slowly, so I knew that the pilot light was already cut indicating that the wigwag was working and as soon as I got by the express I could see that the wigwag was working.

Then I started on the same rate I was traveling, which was about 35 miles an hour along there, and this automobile proceeded to move up slowly toward the crossing. When I got within 200 feet of the crossing the automobile darted forward and then I set the emergency brake with one hand and grabbed the whistle with the other, and just about this time I hit him with the front end of the car. The right part of the front end of the car hit the rear end of the automobile and knocked it over to the west side.

I ran about 300 feet further before I could stop. Jack and I came out

and we found the automobile laying on the west side of the track about 20 feet off the track. Two ladies were lying on the outside of the car and the driver was lying across the steering wheel, and apparently they were all unconscious.

MR. REID: In order that we may have this clearly before us, Mr. Thomas, you say that there was a three-car train going north and your train was coming south. Here is the street and here are the railroad tracks. After this train went north you observed when you were about 600 feet from the crossing an automobile approaching slowly from the east. Is that right?

MR. THOMAS: That is right.

MR. REID: Did you blow your whistle as you saw that car approaching?

MR. THOMAS: No, sir. About a year before this accident the company put out a bulletin stating that we were to refrain from blowing whistles in that locality except in case of an emergency.

Possibly the Motorist Was Confused by Passing Train

MR. REID: Taking into account the fact that this train had just passed the crossing, did it occur to you that this motorist driving west might be confused by reason of this train that he saw pass, thinking that the wigwag was running because of this train and might not be looking for any southbound train? Did that occur to you?

MR. THOMAS: I never thought of it. I didn't think anyone would be crazy enough to drive on the tracks with the wigwag running. Maybe I should have thought of that.

MR. REID: How much crossing of cars is there on that road?

MR. THOMAS: There is a lot of them.

MR. REID: Had you ever observed motorists doing the same thing that this man did on any other occasion?

MR. THOMAS: It is a common occurrence. You never know, a motorist is liable to cross in front of you any time.

MR. REID: In this case you forgot the circumstance about this northbound train.

MR. THOMAS: If you want to call it that. I never thought it had anything to do with it.

MR. REID: How far in that locality does a train have to go before the wigwag is cut out?

MR. THOMAS: About 200 feet out.

MR. REID: Shortly after he cut that wigwag out you cut it in?

MR. THOMAS: I cut it in about the same time he cut it out?

MR. REID: It is quite possible that this wigwag was wagging continuously from the time that it was cut in by the northbound train until after you passed.

MR. THOMAS: I suppose it was. I know it was cut in the first time I saw it.

MR. REID: You say you have been a motorman about 15 years altogether. Have you ever had any accidents previous to this one?

MR. THOMAS: I have had accidents, but this is the most serious one that I have had.

MR. REID: You say that a bulletin was issued prohibiting the blowing of the whistle. Were there any exceptions to be made to this rule?

MR. THOMAS: Except in case of emergency, we were instructed never to blow our whistles in any of those towns down there.

MR. REID: Who determines whether an emergency exists?

MR. THOMAS: I suppose that is a case of leaving it up to the motorman.

MR. REID: Did the superintendent who issued this bulletin ever discuss this matter with you, or did he just simply issue the bulletin and let you draw your own conclusions as to when an emergency existed?

MR. THOMAS: He never discussed it with me. The bulletin had been from service.

MR. REID: There was nothing ever said to you about what he might consider an emergency?

MR. THOMAS: No, sir, that was left up to the motorman.

MR. REID: Mr. Harmon, are there any questions you would like to ask Mr. Thomas?

The Accident Occurred in a Suburban Community

MR. HARMON: Mr. Thomas, did this accident occur in a small community?

MR. THOMAS: It is kind of a suburban district.

MR. HARMON: Is there any way in which you could advise me with reference to the villages and towns that have speed ordinances?

MR. THOMAS: The time table is all full of speed regulations.

MR. HARMON: Did you ever pay any attention to it?

MR. THOMAS: We are given a schedule to make and we have to make it.

MR. HARMON: I asked you if you paid any particular attention to it.

MR. THOMAS: Well, I can't say that I did any more than the rest of them. We try to get through these towns as carefully as we can and make time.

MR. HARMON: How far was this automobile from the crossing when you first realized that an accident was going to occur?

MR. THOMAS: When I first saw it it was about 60 feet away from the crossing.

MR. HARMON: How fast was it moving?

MR. THOMAS: About three or four miles an hour. I thought he was slowing down for the wigwag and that he was going to stop.

MR. HARMON: How did you come to make up your mind that that was the case?

MR. THOMAS: Well the wigwag was there, it was working, and I didn't think anybody would be fool enough to go ahead.

MR. HARMON: You have been a motorman 15 years and you have come to the conclusion that you don't think that the average automobilist driving a car approaching a crossing would proceed?

MR. THOMAS: It all depends on the circumstances.

MR. HARMON: Under these circumstances, didn't you have a right to believe that you should use a little precaution in this case?

MR. THOMAS: I didn't see why I should. He was going not more than three or four miles an hour when he made a sudden dart forward onto the track and when he was on the track I could not do anything.

MR. HARMON: Can you quote this bulletin the superintendent sent out with reference to what you should do?

A Bulletin That Limited the Blowing of Whistles

MR. THOMAS: Well, I don't know that I could quote it verbatim, but it stated that the motorman should refrain from blowing his whistle except in case of an emergency, and listed the towns where this should apply.

MR. HARMON: In this case you didn't think there was any emergency until it was too late?

MR. THOMAS: Yes, sir.

MR. HARMON: If a similar happening occurred at a crossing similar to the one where this accident happened and there was a bulletin issued whereby you were not supposed to blow your whistle only in case of emergency, would you now consider this an emergency case?

MR. THOMAS: Yes, sir.

MR. HARMON: Didn't it say in the bulletin that you should use great care by slowing down your train at a crossing similar in character?

MR. THOMAS: No, sir.

MR. HARMON: Would you now slow down your car?

MR. THOMAS: After an experience like that I think I would slow down. It taught me one thing, that I can't depend on an automobilist.

MR. HARMON: What kind of equipment were you operating?

MR. THOMAS: I was operating a circle car, wooden coach.

MR. HARMON: Light car?

MR. THOMAS: About 50 tons.

MR. HARMON: How far would it take you to stop a car runnng at that speed?

MR. THOMAS: It all depends on the circumstances.

MR. HARMON: If the car was in first-class condition.

MR. THOMAS: Well with everything working right you might stop it at 400 feet one time and 500 feet another. It is never the same in two cases.

MR. HARMON: On the day of this accident was your equipment in first-class order?

MR. THOMAS: It was working pretty good.

MR. HARMON: Did you test your equipment before you took the train out?

MR. THOMAS: I relieved another man. It is a rule to test it to see that the brakes are working.

MR. HARMON: The only thing you did then was to test those brakes, did you not?

MR. THOMAS: I tested them to see if they were working.

MR. HARMON: Did the brakes take a hold all right?

MR. THOMAS: Yes, sir.

MR. HARMON: Did you think you made a good stop under the conditions?

MR. THOMAS: As good as I could make.

MR. HARMON: In your judgment, what is a good stop?

MR. THOMAS: It all depends. I have made better ones on some roads, but that was a good one for that road.

MR. HARMON: Was this automobile a closed car?

MR. THOMAS: No, sir, it was a touring car.

MR. HARMON: Did it have the curtains up?

MR. THOMAS: All except one.

Close to Crossing When Automobile Was Observed

MR. HARMON: Did you observe what the driver of that automobile was doing before the accident?

MR. THOMAS: I didn't have time to look at the driver. I was looking at the car in general.

MR. HARMON: You can't remember seeing the driver of the car?

MR. THOMAS: You know I had a lot of things to look for there. I didn't even know whether it was a man or a woman driving it.

MR. HARMON: You say you were 60 feet from the crossing when you first saw the car?

MR. THOMAS: The car was 60 feet.

MR. HARMON: How far north were you from the crossing?

MR. THOMAS: About 700 or 800 feet.

MR. HARMON: How far were you north of the crossing when the emergency existed?

MR. THOMAS: I was about 200 feet.

MR. HARMON: How far south of the crossing did you run?

MR. THOMAS: I went about 275 to 300 feet.

MR. HARMON: I think that is all, Mr. Reid.

MR. REID: Have you any questions, Mr. Jeffries?

MR. JEFFRIES: You say you have been with this road seven years. Whom did you work for before you came to this company?

MR. THOMAS: Illinois Traction System.

MR. JEFFRIES: How long did you work there?

MR. THOMAS: Between eight and nine years.

MR. JEFFRIES: You have been operating a train 15 years?

MR. THOMAS: Yes, sir.

MR. JEFFRIES: How much rest did you have the night before this accident?

MR. THOMAS: I was off duty about 15 hours.

MR. JEFFRIES: How much sleep did you get?

MR. THOMAS: As much as I ordinarily get.

MR. JEFFRIES: How much rest did you get?

MR. THOMAS: You mean how long was I in bed? I was in bed seven hours, possibly a little longer.

MR. JEFFRIES: Do you think you did everything that was possible to do to avoid this accident?

MR. THOMAS: I thought I did at the time.

MR. JEFFRIES: Do you still think so?

MR. THOMAS: There was only one thing I might have done. I might have slowed down a little bit.

MR. JEFFRIES: How far were you from the crossing when you first saw this car?

MR. THOMAS: I was about 700 or 800 feet.

MR. JEFFRIES: Mr. Thomas, what was the reason that brought about this order prohibiting the blowing of whistles in these towns?

MR. THOMAS: I don't know just what it was, but I heard that the residents of those districts were sort of high-class people and they didn't like to be bothered with a lot of noise and they raised a kick about it, and so the company put out a bulletin preventing us from blowing our whistles.

MR. JEFFRIES: Have you observed that rule?

MR. THOMAS: Yes, sir.

Lack of Sympathy with the Safety Organization

MR. JEFFRIES: Do you have a safety organization in your company?

MR. THOMAS: Yes, sir.

MR. JEFFRIES: Do you ever attend any meetings?

MR. THOMAS: I attend them, but not regularly.

MR. JEFFRIES: Why not?

MR. THOMAS: You know we have other places to go once in a while.

MR. JEFFRIES: How often are these meetings held?

MR. THOMAS: Once a month.

MR. JEFFRIES: Do you attend every month?

MR. THOMAS: No, sometimes I have something else I want to do at time that prevents me from going there.

MR. JEFFRIES: How long do these meetings usually last?

MR. THOMAS: From a half hour to two hours, and once in a while they last three hours.

MR. JEFFRIES: What do they do at these meetings?

MR. THOMAS: Well the usual thing. There are two or three dozen fellows there and a bunch of company officials that do the talking and a fellow gets tired listening.

MR. JEFFRIES: Do you ever do any talking?

MR. THOMAS: Sometimes I do.

MR. JEFFRIES: Are you active?

MR. THOMAS: About as active as the rest of the fellows.

MR. JEFFRIES: Do you think the meetings are a good thing?

MR. THOMAS: Sure, if they are run right.

MR. JEFFRIES: Well, why don't you attend more regularly?

MR. THOMAS: Just as I told you, sometimes there are other things to do. My wife wants me to take her out once in a while. Then there are other meetings they want us to go to.

MR. JEFFRIES: Do you belong to any lodges or other clubs?

MR. THOMAS: Yes, sir.

MR. JEFFRIES: Do you attend those meetings regularly?

MR. THOMAS: Sometimes I get there and sometimes I don't.

MR. JEFFRIES: You attend the lodge about the same as you attend the safety meetings. Have you attended any more meetings than in the past since the accident?

MR. THOMAS: I like to go for one reason, I like to tell some of the boys what I think I learned as a result of this thing.

Lack of Understanding of the Word "Emergency"

MR. JEFFRIES: In reference to that bulletin, Mr. Thomas, did it ever occur to you that if you didn't thoroughly understand when an emergency exists to consult somebody and find out?

MR. THOMAS: Who are you going to consult?

MR. JEFFRIES: Your superintendent.

MR. THOMAS: Do you think he would know about it?

MR. JEFFRIES: Who do you work for?

MR. THOMAS: The superintendent

MR. JEFFRIES: Well he would know what to tell you.

Now is it a fact, Mr. Thomas, that as you were watching that automobile, having in mind that an emergency did exist, that you would have blown the emergency whistle as that automobile approached toward the truck?

MR. THOMAS: I would have blown it if I was aware that an emergency did exist.

MR. JEFFRIES: The automobile was barely moving along; it wasn't stopped?

MR. THOMAS: I thought it was stopped.

MR. JEFFRIES: Do you think it was a good policy for a motorman to think at the front end of the car?

MR. THOMAS: Well, I don't know what else you can do unless you want to slow down at every crossing you come to.

MR. JEFFRIES: Has any man ever been penalized for failing to make the time when he tried to prevent an accident?

MR. THOMAS: No, not on account of that.

MR. JEFFRIES: If you had used that explanation in your delay report would you have been called about it?

MR. THOMAS: If you are a motorman you like to make the time and you don't want to be late.

MR. JEFFRIES: You know as a fact that it is the policy of the company to avoid accidents, regardless of speed, isn't it? You disregarded that.

MR. THOMAS: I wanted to get the trains over the road.

MR. JEFFRIES: You say the wigwag was working?

MR. THOMAS: I figured that the wigwag was working and that it was going to stop that automobile. I feel he should have had sense enough to stop.

MR. JEFFRIES: Then you wanted the automobile driver to do all the thinking?

MR. THOMAS: I figured that it was up to him to do a little of it.

MR. JEFFRIES: Don't you think you should have done a little?

MR. THOMAS: I did. I was thinking about the wigwag. I saw that machine and I thought he was stopping for that wigwag. That is what I had in mind.

MR. JEFFRIES: Hasn't the bulletin been reissued from time to time and wasn't there always in the last paragraph of that bulletin words to the effect that the motorman was to be allowed to blow the whistle in case of an emergency?

MR. THOMAS: It didn't say what an emergency was. That was left up to me.

The Automobilist is Not Always a Half-wit

MR. REID: Mr. Thomas, I just want to say a word with reference to what I said in the beginning of the investigation, about the purpose of this investigation. I am inclined to think that your attitude, the way you answered the questions that had been put to you, indicates that you didn't catch what I said about the purpose of this investigation. In other words, it looks to us as though you were trying to manufacture an alibi to absolve you from any blame in this accident. Now that is a matter that is entirely out of the hands of this investigating board. It is not our business to penalize anybody. It is our business to determine the cause of the accident and see what can be done to prevent a recurrence.

Now let me go back a little bit. Here is the train going north, a three-car train, and you met this train very near this crossing. Now let me ask you this: as an experienced motorman, don't you think that it is quite likely that an automobilist coming from the east, having seen this car clear the crossing, will quite likely think that it is all right to go across? Isn't that reasonable? An automobilist doesn't have to be a half-wit either to arrive at that conclusion.

MR. THOMAS: I never thought about this other train having the wigwag cut in. I see the point all right. I never thought about the wigwag having been running at the time.

MR. REID: What suggestions have you to offer as to how accidents like this could be prevented? Now, you must remember that we can't be all

over this property. We can't sit in an office in Chicago and direct the affairs of a large corporation like this and provide the necessary finances to operate the line and all of the other things that enter into it, and be on the front end of the car at the same time. Therefore, we have to depend upon such men as you to operate this car safely, and if you can't tell us how to do so, having had all these years of experience, where in the name of Heaven are we going to get this information! That is the reason we are questioning you, to tell us how this accident could have been prevented, or how a similar accident could be prevented.

Now give us the benefit of your experience as a motorman. Having been up and down that line for seven years or more, and working on other lines, you ought to be able to give us some suggestions. Now, let us keep in mind these two trains meeting near this crossing, keeping in mind this bulletin about blowing the whistle within the village limits, and just tell us what you think we ought to do to prevent this sort of an accident.

Suggestions to Prevent a Recurrence of Accident

MR. THOMAS: There are several things which can be done to prevent such an accident. One thing might be to move the cut-out for the wigwag closer to the crossing. Then the people would soon learn that if it didn't ring for quite a while after the train passes that the wigwag don't cut out right away. That prevented that particular fellow from looking up; he thought the wigwag was still working on the train going north.

Another thing would be, when you are passing another train, for the motorman, regardless of whether he is late or not, to slow down and make absolutely sure that there is nobody ready to cross. In this case I never thought of that. I thought that the signal was working for me and I never thought about the other train.

Another good thing would be that if there is any question in the motorman's mind about what is an emergency, he could forget the bulletin. I believe that is what I would do the next time.

MR. REID: We appreciate your coming here and giving us your views on the question. I am sure it is going to be helpful to us.

If no one has any further question to ask Mr. Thomas, we will excuse him.

MR. HARMON: With reference to the cut out on the bell signal, Mr. Thomas, do you know why those cut outs were placed so far away from the crossing?

MR. THOMAS: No sir, I do not.

MR. HARMON: Has it been your experience, or have you known of accidents where the cut out was right at the crossing and the moment the rear end of the car crossed the crossing the bell stopped ringing, and then after the accident the injured party, if he was able to talk, would say the bell wasn't working?

MR. THOMAS: That could happen all right, but I never thought about it.

MR. HARMON: Isn't it a fact that the reason the cut-out extends 1,800 feet beyond the crossing is if an accident should happen the train would stop within the range and the bell still continue ringing to show that the bell was ringing?

MR. THOMAS: It seems reasonable to me. I don't know whether that is the reason or not.

MR. REID: That is all, Mr. Thomas. We thank you.

We will next have the conductor on this train, Mr. Oliver. Mr. Oliver is the safety engineer of the Chicago, North Shore & Milwaukee Railroad Company.

In order that our records may be complete, Mr. Oliver, will you please give your full name, age, and length of service with the company?

MR. OLIVER: Jack Oliver, conductor; age 34; service nine years.

MR. REID: Now the accident that we are investigating today is one that occurred on this line at an intersection known as Kenilworth, where a southbound train hit an automobile, killing one person and seriously injuring two others. This happened in the morning at 11:40 o'clock. Now, you were the conductor on that train, were you not, Mr. Oliver?

MR. OLIVER: Yes.

MR. REID: I wish you would be good enough to tell this board what you know about this accident. You have been in investigations before and you understand the purpose of this sort of investigation. It is not to criticize anybody or try to get anybody in bad, or to have anybody disciplined, but to determine the cause in order that we may be able to prevent such accidents in the future, if possible. Will you just be good enough to tell the board what you know about this accident?

The Conductor Was Busy Collecting His Fares

MR. OLIVER: I don't know anything about the accident. I was working in the back end and about eight or ten passengers got on at Winnetka. I was having some argument with some bird back there about paying a dime fare. Finally I got tired of fooling with him and I walked up to the front end of the car and a fellow up there didn't have a ticket and I had to cut a seven cent duplex; then he and I got into a jam, and then just as I looked up I saw this black thing come out of the train and Jack hit him in the rear. Of course, Jack and I jumped out, took care of the injured, got all the witnesses I could, and that is all I know about it.

MR. REID: How long had Mr. Thomas been operating as motorman with you?

MR. OLIVER: We have been together for the last three sign-ups.

MR. REID: What length of time would that be?

MR. OLIVER: About a year and a half.

MR. REID: Have you ever noticed a tendency on the part of this motorman to recklessness in speed at dangerous places?

MR. OLIVER: No, I never paid attention to it.

MR. REID: Would you consider him a competent motorman?

MR. OLIVER: Yes.

MR. REID: As conductor of this train, what are your responsibilities?

MR. OLIVER: To get the passengers on and off the car and to collect the fares.

MR. REID: Do you feel that you are responsible in any way for the safety of the people that ride on the car?

MR. OLIVER: Yes.

MR. REID: We would like you to tell us just what your responsibilities are?

MR. OLIVER: I have got to collect the fares, see that the passengers get on and off the car, and that they don't get hurt.

A Little Lesson Upon Public Relations

MR. REID: What would the patrons of that line know about the Chicago, North Shore and Milwaukee Railroad except as they see that railroad through you?

MR. OLIVER: I don't know.

MR. REID: Are you in the habit of arguing with passengers?

MR. OLIVER: With some you can't help but argue.

MR. REID: Did you ever have any arguments with your motorman?

MR. OLIVER: No.

MR. REID: Do you consider him cool-headed?

MR. OLIVER: Yes, he's all right.

MR. REID: Do you attend safety meetings held on the property?

MR. OLIVER: Some of them.

MR. REID: What do you mean, some of them?

MR. OLIVER: Well, whenever I get up there in time to go in for a few minutes.

MR. REID: How often do they have these meetings?

MR. OLIVER: Once a month in Milwaukee and once a month in Highwood.

MR. REID: At which place do you attend?

MR. OLIVER: If I am in Milwaukee I attend there, and if I am in Highwood I go there.

MR. REID: What sort of a program do they have at those meetings?

MR. OLIVER: I don't know, they do too much talking.

MR. REID: Have you ever offered any suggestions as to how those meetings should be conducted?

MR. OLIVER: I sent in a recommendation one time and then I quit. They said something about it at one of the meetings but I wasn't there.

MR. REID: Then apparently you take just about as much interest in the safety work on your property as you do in the safe operation of your train. I mean so far as the education of your part of the work is concerned.

MR. THOMAS: They want you to go to safety meetings of the E. M.

C. A., union meetings, and other meetings. That is all there is—meetings.

MR. REID: Do you realize the question of human life is involved in this discussion?

MR. OLIVER: Yes.

MR. REID: Any questions, Mr. Harmon?

MR. HARMON: You say your safety meetings are not interesting?

MR. OLIVER: I have been to some that were and others that weren't.

MR. HARMON: Is that the reason you don't take an interest in the safety movement?

MR. OLIVER: They want you to go on your own time. Why don't they pay us if they want us to attend regularly?

MR. HARMON: Aren't the meetings for your own benefit?

MR. OLIVER: Partly, yes. It isn't all one-sided.

MR. HARMON: Did you ever have an accident on the rear end of your car?

MR. OLIVER: Yes.

MR. HARMON: What is the worst accident you ever had?

MR. OLIVER: I had a fellow fall off the rear end and break his leg. It was his own fault, though.

The Motorman Had Been in a Card Game Last Night

MR. HARMON: Did you notice any unusual action on the part of this motorman on the day of the accident, and was he acting normal?

MR. OLIVER: I thought he was all right, except that he was a little excited because he won five bucks in a card game.

MR. HARMON: Did he tell you that?

MR. OLIVER: He told everyone in the barn.

MR. HARMON: Was that the only conversation you had with him that morning?

MR. OLIVER: I asked him when we were going to get into Chicago.

MR. HARMON: How long did you remain in the front vestibule of the car?

MR. OLIVER: I wasn't in the front vestibule. I was in the front of the car about four seats from the front vestibule.

MR. HARMON: This was your regular motorman?

MR. OLIVER: I had him for three sign-ups.

MR. HARMON: Do you know anything about this bulletin that has been posted with reference to speed ordinances in towns?

MR. OLIVER: I know there is a bulletin that these fellows can't whistle through certain towns. It is not an ordinance, it is an order.

MR. HARMON: Why was this order issued?

MR. OLIVER: It was requested by the people in those towns because they did not want to be disturbed by the whistle.

MR. HARMON: How do the motormen take that bulletin?

MR. OLIVER: I never heard much jabbering on it. It looks as though they make them so they could hang something on the motorman.

MR. HARMON: Do you think that was a good bulletin?

MR. OLIVER: I don't know. You take those towns that come out with an order such as that. They want crossing protection and we have any number of those wigwags down there. They don't want any noise and yet they want protection. They want the guys on the cars to do all the protecting; they won't do any themselves.

MR. HARMON: You don't like those people in those towns very well, do you?

MR. OLIVER: They are not reasonable.

MR. HARMON: Do you ever think the passengers you are always arguing with are unreasonable?

MR. REID: Any questions, Mr. Jeffries?

MR. JEFFRIES: Mr. Reid asked you whether you thought the motorman was competent and your answer was that he was a good man?

MR. OLIVER: He is a good motorman.

MR. JEFFRIES: Do you think him competent enough to operate his train?

MR. OLIVER: Yes.

MR. JEFFRIES: Do you ever have any arguments?

MR. OLIVER: Not about operating.

MR. JEFFRIES: What do you argue with him about?

MR. OLIVER: About the world's series.

MR. JEFFRIES: You are on friendly terms with him.

MR. OLIVER: Yes.

MR. JEFFRIES: Do you think that you could contribute in any way to the promotion of safety on this road? Do you think you could do anything?

MR. OLIVER: Well, I think after this accident that I will probably attend more meetings and jump into some of this discussion that they talk about.

MR. JEFFRIES: You have plenty of time to attend these meetings.

MR. OLIVER: No, I don't have.

MR. JEFFRIES: What do you do with your time?

The Conductor Also Did Not Attend Safety Meetings

MR. OLIVER: We leave Highwood at 11:09 and our call time is 10:50. I have half an hour to get my lanterns and to get my trip slips, take a look at the car to see that it is cleaned of any papers, and then I have about ten minutes to slip into the meetings. Why don't they hold them when a fellow can get to them? Let them hold their meetings earlier in the morning.

MR. JEFFRIES: Do you do everything on your road that you should do for the benefit of the road and for the improvement of the service?

MR. OLIVER: I do all they pay me for.

MR. JEFFRIES: You are not underpaid, are you?

MR. OLIVER: Well, it is a good road to work for.

MR. JEFFRIES: Do you like to stay with this road?

MR. OLIVER: Yes.

MR. JEFFRIES: Do you ever have an idea that you would like to have another position with the road, a promotion or something?

MR. OLIVER: I never thought of that.

MR. JEFFRIES: Don't you think that if you offer a few suggestions and take an active part in these meetings that you might have an opportunity to get into a better position?

MR. OLIVER: I think you are right.

MR. JEFFRIES: How would it be for you to take an active part in the next safety meeting?

MR. OLIVER: That would be all right.

MR. JEFFRIES: I think you turned in a report with only one witness. What was the reason you didn't get any more witnesses?

MR. OLIVER: They wouldn't give me their names. I had plenty to do to take care of the people that were hurt.

MR. JEFFRIES: Don't you think that attiude of the three or four arguments that you had with the passengers had something to do with your not getting your witnesses?

MR. OLIVER: No. There was one man that I argue with regularly once a month.

A Suggestion About Conducting Safety Meetings

MR. REID: Mr. Oliver, we appreciate your coming out here. I trust that you understand the purpose of this investigation and that you are going to look at this effort that the Chicago, North Shore and Milwaukee Railroad Company is making to prevent accidents, in a different light. I hope you appreciate that you have some responsibility, not only with respect to the operation of the train you are on, but in helping to create a strong public sentiment in favor of accident prevention. Now, I say a strong public sentiment is very essential if you are going to help in reducing the accidents on this property. We thank you for coming out here.

MR. OLIVER: Can I make a suggestion? It is about this investigation that you fellows hold. Of course there are only a few of us that have been in it, and I think that the safety director ought to work up something like this and put it in a safety meeting. Sometimes I sit there for three hours and hear nothing but supervisors and department heads talk. Why don't you put up something like this at a safety meeting?

MR. REID: I think it is a good suggestion and we will recommend that to the safety department.

MR. OLIVER: Well, can I go back to the barn?

MR. REID: Yes sir, thank you.

If it were not so near 12:30 we would put the superintendent on the stand and interrogate him with reference to this bulletin that has been issued forbidding the blowing of the whistle in certain places, but I think we will have to dispense with that.

(The audience indicated that they wished the investigation continued.)

All right. Mr. Burke, we will ask you to take the chair. Mr. Burke is the superintendent of the Milwaukee Division of the Chicago, North Shore and Milwaukee Railroad, and as such he knows something about bulletins; he knows something about supervision; he knows something about what the men should do to prevent accidents, as shown by his good record. I don't know how much he knows about the attitude of the people in this community in regard to the blowing of the whistle. At any rate, we are going to find out what he knows about this bulletin.

Now, Mr. Burke, will you be good enough to tell us about this bulletin which was issued around the time of this accident?

The Public Is Quick to Criticize Whistle Blowing

W. H. BURKE: Some years ago when we started the effort of reducing grade crossing accidents we impressed upon our motormen the importance of proper crossing signals being blown, and the majority of our motormen took it very well and used plenty of whistle; but in these small suburban towns the public was ready to criticize the unnecessary noise that the interurban railway was making through the village. The city managers of these small villages got together and appointed a committee. The committee met the management of the company and requested that the whistle not be used while operating through one, two, or three of these small villages. It was necessary for us to meet our public relations and meet them right, and so we advised the people in these communities that some instructions would be issued to eliminate some of the nuisances, so-called.

A bulletin was issued on the unnecessary blowing of the whistle in these different towns named, and it stated that the whistle was only to be used in case of emergency. That would go on very well for a short period and then we would get some more complaints that our motormen were using too much whistle, so another bulletin would have to be issued calling their attention to the fact that there had been some complaints about the unnecessary blowing of the whistle and that the whistle should be used only in case of emergency. From time to time it was necessary to re-issue that bulletin. Even though we have had accidents at those crossroads and the management has met the city managers of these different villages and talked it over, yet we have been unable to get permission from them or get them to agree that we can use plenty of whistle through the villages.

MR. REID: Let me ask you this question: If you hadn't issued this bulletin about blowing the whistle and this man had blown his whistle back here, 600 feet, when he first saw this automobile coming from the west, and there had been a complaint from some of the citizens in this case, would you have reprimanded the motorman for blowing that whistle when he explained to you that he considered this an emergency?

MR. BURKE: No.

MR. REID: Would you have made any effort to explain to the citizens

of that community that the blowing of this whistle meant the saving of somebody's life? If there was a complaint made, would you have made an appointment to meet the city managers and lay the facts before them and show them the reason why it was necessary to blow the whistle and the good work on the part of the motorman in saving a life? Has that ever been done?

MR. BURKE: It has. Still it is a hard thing to get them to agree that the whistle is absolutely essential through those small communities.

MR. REID: Which do you think is the more important—a few minutes' sleep of some fellow that lives along here or the life of this fellow that is going over the crossing?

MR. BURKE: The life of the man going over the crossing. We are attempting in our safety program in our schools, in our civic organizations where we have motormen and other men, to put the message over to the public.

Bulletins Are Thoroughly Explained to the Men

MR. REID: Let me ask you another question. When you issue a bulletin of this kind do you explain to the men who get it, either individuals or in groups, just what is meant by an emergency and how they are to determine whether or not there is an emergency?

MR. BURKE: Yes. Probably the motorman and the conductor of this accident have said that they didn't get it at the safety meeting.

MR. REID: Are these things explained at the safety meeting?

MR. BURKE: Any bulletin is open for discussion.

MR. REID: But it is not discussed unless somebody asks a question with reference to it?

MR. BURKE: No.

MR. REID: Don't you think it would be a good idea to explain to the men just what is meant by such bulletins as this and others governing speed of trains, and so on?

MR. BURKE: I do.

MR. HARMON: What do you think of the attitude of these trainmen in this investigation?

MR. BURKE: I did not think very much of their attitude. The motorman is not a motorman anymore, and the conductor has since changed his attitude.

MR. JEFFRIES: Have you ever taken it upon yourself to check up on the men who attend these safety meetings? Have you said anything to Thomas or Oliver about attending these meetings?

MR. BURKE: It is a matter of record.

MR. REID: Thank you, Mr. Burke.

Now, my friends, one of the things an investigating board should do after an investigation of any kind is to arrive at some definite conclu-

sions. Now, it goes without saying that these conclusions had to be arrived at previous to the meeting because we could not take your time. Therefore, these conclusions have already been prepared beforehand, but our idea is that when an investigation of this kind is being made and the witnesses have been here, that the members should then get together and consider everything and arrive at some definite conclusions as to the cause of the accident and what might be done to prevent a recurrence.

Now, the conclusions that we have made may not be entirely in keeping with the testimony that was brought out by these three witnesses, but it will serve its purposes and give you some idea of what is meant by coming to some conclusion when you do investigate an accident. So I am going to ask the secretary to read these conclusions.

Conclusions of Board of Inquiry

1. The motorman should have taken into account the possibility that some motorist would take it for granted that it was safe to cross the tracks after the northbound train had cleared the crossing. When he saw the automobile approaching the crossing he should have recognized the existence of an emergency and therefore would have been justified in blowing the whistle and reducing the speed of the train. In this instance if it had been a fraction of a second later the accident would not have occurred.

2. When two trains meet so near a highway crossing the motorman should be on the alert, ready to blow his whistle and reduce speed if necessary in order to prevent an accident.

3. When complaints are made by village authorities or neighborhood authorities that there are times when the blowing of a whistle is necessary in order to save the lives of the citizens.

4. When operating officials issue such bulletins as the one involved in this accident they should take such steps as may be necessary to inform motormen just what is expected of them and what is meant by the word "emergency."

5. Thousands of people are killed annually at grade crossings. There is one sure and immediate remedy. That is for all motor vehicles to come to a full stop at all railroad crossings. No effort should be spared to educate the public with respect to this greatest of all hazards.

W. H. Boyce (Pittsburgh Railways Co., Pittsburgh): Mr. Chairman, I would like to know if any representatives here can tell us whether on their property they give an explanation when a bulletin is issued for the issuance of that bulletin?

R. M. Reade (Quebec Railway, Light, Heat & Power Corp., Quebec): In our company no man is permitted to take his car out unless he is thoroughly conversant with the bulletin that has been issued. He has to sign his name if he does understand it and if he doesn't understand it he applies to the superintendent to give him an explanation of the

bulletin in question. He is not allowed to take his car out unless he understands it thoroughly.

MR. BOYCE: We tell our motormen and conductors why a certain bulletin is issued.

MR. BURKE: In all our bulletins issued the first paragraph tells why it is used and underneath that, in the second paragraph, is the order.

VICE-CHAIRMAN KOEHLER: Gentlemen, this has been a most interesting demonstration. I know that you all feel as I do, greatly indebted to Mr. Reid and the other members of the board, and to the motorman conductor, and superintendent for this feature.

ADJOURNMENT

WEDNESDAY MORNING SESSION, OCTOBER 27

R. W. EMERSON, Vice-Chairman
General Manager, Cleveland Railway Co., Cleveland, O.

The meeting convened at 10:00 o'clock, Vice-Chairman R. W. Emerson, general manager, the Cleveland Railway Company, Cleveland, Ohio, presiding.

VICE-CHAIRMAN EMERSON: In the first place I wish to apologize for my failure to arrive yesterday morning in time to take charge of the meeting. I heard Mr. Hellmuth was unable to preside. I was in Canada and my train connections went bad, but I think this Section is very fortunate in having a man such as Mr. Koehler to step into the breach as he did. The enthusiasm, the pep, and the interest that we all got out of yesterday's meeting were due in no small measure to the manner in which Mr. Koehler handled the meeting.

The secretary has a communication which I will ask him to read at this time.

SECRETARY EASTHAM: The communication is as follows:

Members of National Safety Council,
Electric Railway Section.
Gentlemen:

In order to record ideas which may be suggested at any session of the Electric Railway Section conference, the 30 representatives of the Pittsburgh Railway Company meet for one-half hour after each session.

At the noon gathering, Tuesday, October 26, the favorable opinion expressed by many of the delegates was so spontaneous that it was suggested a minute be made in the official record concerning the value of the idea presented through the playlet, "A Board of Inquiry in Action."

This little sketch sparkles with safety thought and suggestions and tells the story in a manner new and interesting. It holds the interest of all present until the very end and gives each something concrete to develop on our respective properties.

It is resolved therefore that the members of the committee which

developed and presented the idea be commended for their successful effort; that the delegates be urged to avail themselves of the unique method and give it wide publicity as a recommended means of stimulating cooperation and in keeping interested both employees and executives in accident prevention work.

Respectfully submitted,

W. H. Boyce, Chairman,
Central Safety Committee of the Pittsburgh Railways Company.

VICE-CHAIRMAN EMERSON: I am sure we all appreciate the spirt in which the communication was sent and it will be made part of the record of this conference.

The first paper this morning is to be presented by John J. Connors of the Tennessee Electric Power Company, Chattanooga, Tennessee.

SUCCESSFUL METHODS OF SAFETY

J. J. Connors, Assistant Safety Director, The Tennessee Electric Power Company, Chattanooga, Tenn.

The ordinary methods of conducting safety work, such as bonus plans, awards and safety committees have all been used to good advantage by The Tennessee Electric Power Company in Chattanooga.

We do not claim to have reached a state of perfection in Chattanooga, but we have made great progress in safety work and accident prevention. The total accomplishments can not be accurately compiled, many advantages, such as improved morale, individual efficiency and public relations, are incalculable, but with the aid of a few tabulations and statistics I will attempt to show what improvement has been achieved in the way of reductions in accidents, and in cost of damage suits.

For several years prior to 1918 the number of accidents occurring on the street railway lines of Chattanooga and the resulting expenditures had been constantly increasing. The maximum was reached in 1918, when as a result of 2,793 accidents and held-over claims we expended $152,604, or 17.7 per cent of our passenger revenue. Late in 1918 our safety first organization was founded and intensive accident prevention work actually started about the middle of October of that year.

A study of the records shows that the average cost of our claim department for the ten years preceding the organization of safety work was 12 per cent of the gross revenue earned. The cost of the claim department for the years 1919 to 1925 inclusive shows an actual saving of 6.68 per cent of the gross revenue, in the street railway division. Our safety first efforts reached their greatest efficiency in 1925. In that year only 2.95 per cent of gross revenue in the railway department was expended for accidents.

In my opinion, no methods of safety work can be successful without the whole-hearted cooperation of the platform men. The safety director must win and also merit the confidence of these men or no methods offered will meet with success. Considering the hazards existing on city streets today, it is my sincere belief that during each period of eight or nine hours that a car operator is on duty, he will undoubtedly save a human life.

With a 100 per cent increase of automobiles on our streets during the past five years, the problem of operating a street car safely has become extremely difficult. Also there is hardly a property that has not, because of public demand, increased its schedule speeds during this period. So the successful street car operator must possess a double track mind and a couple of switches and cross-overs additional, in order to meet present day conditions. The safety director's job is to keep the operator's train of thought on the track of safety, and all switches and cross-overs well lubricated with safety first methods.

Show the Operator His Daily Responsibility

A survey made during a nine hour run showed that the operator of the car actually prevented 35 and possibly prevented 516 accidents. The foundation for safety work must be laid on the front platform of your street cars, and any method formulated which does not consider the human factor can not be successful.

If you can increase the operator's stock of patience, if you can bring home to him the realization that he is truly a servant of the public as well as a non-commissioned officer of the company, if you can convince him that the only solid foundation for him is his safety record and if you can impress upon him that this safety record is the wedge that will some day open a breach wide enough for him to step down off his platform into a better position where his virtues will win their just reward, you are using successful methods of safety.

Let your operator know that you believe there are scores of people in your city who owe their lives to his alertness and watchfulness; also picture to him the results of a moment of thoughtlessness—perhaps a child crushed under the wheels of his car—and I can testify that he will respond to both thoughts.

How often do you ride on your street cars? When you go back home make a tour of inspection; ask some operator at nine o'clock in the morning about the operating condition of his sand; you will probably be informed that he has not tested it yet.

Step on the front end of another street car and study the countenance of the operator. Perhaps he has a haggard look, denoting a sleepless night by the bedside of a sick wife or child. You will rise up in your seat as he barely misses the automobile that drives on the track from a blind intersection. The operator's body is on the car platform. but his mind is in the sick room which he left a short time before.

Board another car, and you may find this operator has a sullen coun-

tenance. You gasp as an aged passenger fumbles and grabs for hand strap or seat back, almost thrown down by the rapid acceleration of the car. Watch this operator as he passes children playing on the sidewalks, with never a thought as to whether or not they will dash upon the tracks. Anger is an ally of accident. Of course, the types of operators I have referred to are exceptions, yet they can be found on any property.

The new employee is a fertile field in which to sow the seeds of safety. Upon him depends tomorrow's accident record. Every platform man employed is sent to our safety department and there receives instructions on safe operating practice.

In the beginning of our safety work, employees were selected from different departments and banded together as a safety committee. Heads of all departments became ex-officio members of this committee. The committee has continued to function down to the present time, with meetings held once a month. They last but an hour; they are snappy and business like and are never allowed to become tiresome. In addition to the regular committee meetings, the entire transportation department meets once a month for exchange of safety ideas and to receive new suggestions for further improvement in their work. When a particular group or department appears to be slipping or lacking in enthusiasm, special meetings are the order of the day.

Safety contests are held regularly to create added enthusiasm, in fact everything is done to arouse the interest of the individual. The willingness of every single worker to make an effort to prevent accidents and maintain eternal vigilance is first solicited and then demanded.

Applicants for Platform Jobs Pass Rigid Tests

Careful selection of men is given great attention. Applicants for platform jobs are subjected to rigid physical tests. We assume that all accidents can and should be prevented, but this ideal condition will never be reached, due to man's failure in a crisis. The man of jumpy nerves and similar weaknesses is no longer added to the payroll. In this manner accident hazard is diminished at the source.

The recent abolition of the folding step has proved to be another improvement in accident prevention. With closed vestibules came the folding step and with the folding step came more minor accidents in boarding and alighting. We soon returned to the rigid step and similar accidents have steadily decreased.

Nor have we stopped with our employees; we have not failed to enlist the interest of the public in safety work. Various methods have been employed for this purpose. We have found that simple and inexpensive advertising gets the desired results, provided the material is pertinent to the subject and directed in the right channels.

A series of poster cards was placed in the cars; these cards embodied cartoons depicting various hazards of the motorist, pedestrian, careless child, etc. The cards were a combination of good, sound advice with a touch of humor and human interest. They were changed at intervals

and subsequently superseded with a set carrying simple safety slogans, unillustrated but printed in a variety of colors. Dash signs with safety texts are also used. The latest move in this direction is a series of signs warning against the danger of swinging or riding outside the cars. Still other methods of impressing the public mind with the need of safety have been promulgated through instructions to school teachers, public addressees and the distribution of literature among school children.

It seems that everything possible is being done to promote safety on our property today, and yet we know that there is room for improvement. We still have "accidents" that can and should be prevented. Maybe some day every employee will be vitally interested in safety work, every motorist and pedestrian educated to the value of "Safety First." Then and then only will we truly be able to say that we are using successful methods of safety, because these methods have borne fruit.

Figures on the Cost of Safety Campaigns

VICE-CHAIRMAN EMERSON: Mr. Connors has proved himself to be a versatile young man. He has not only given us a very inspiring talk but he has injected a sales talk on membership at this Safety Congress. At this time I want to commend Mr. Connors as chairman of the Membership Committee, for the very competent work he did during the past year. Mr. Connors reported yesterday that he had taken 16 new applications for membership in the National Safety Council in the Electric Railway Section. That is an increase of over 10 per cent in the membership of last year. It is a very excellent showing and I hope we can do as well or better during the coming year.

A. D. BROWN (New York State Railways, Syracuse): I would like to know, Mr. Connors, what safety organizations you have on your property and how much it costs the company to conduct this campaign?

MR. CONNORS: We have a safety organization and safety committees. In order to answer your question as to the cost of conducting this campaign, I am sorry I haven't the figures with me. I want to say, though, that we spent $171,000 on this property in 1920 for claims and safety work; in 1925 we spent $46,000 for claims and safety and $14,000 of the $46,000 was for safety work. I hope that answers your questions.

VICTOR T. NOONAN (Chicago Surface Lines, Chicago): Mr. Connors spoke of successful methods of accident prevention. In addition to organizing, Mr. Connors, in addition to commendation talks to the trainmen, one must in these days do something more scientific. I would like to know the method you use in investigating accidents, the methods you use in making inspections of hazards, and the manner in which you bring to the attention of the human organization the causes of accidents.

MR. CONNORS: We have organized a class in safety education. We take and analyze the operation of the motorman's job. A motorman

stops to take on a passenger. We analyze the operation he has to perform to take on a passenger and we bring out a blackboard and illustrate the operation. On one side of the blackboard we bring out the hazards or the way a passenger may be injured in boarding a car. I want to say that there are eight operations that a motorman goes through in picking up one passenger, and there are nine ways a motorman can hurt a passenger.

MR. NOONAN: Don't think for a moment that I am trying to pick at your paper. We have come here to learn something about accident prevention and the more we can pin this discussion down specifically (getting down to the question asked by Mr. Brown, which is very important), the more we will get out of it. I didn't get clearly what you said in regard to safety organizations in your company to prevent accidents. Organization is one of the principles of success of a safety engineer, and I would appreciate your telling us just exactly what you are doing, whether you have safety committees, just how often they meet, and what they discuss.

MR. CONNORS: We have safety committees. These safety committees do not inspect. We have an entire organization divided up into committees and sub-committees. In addition to that we have these schools. We have 15 men in each group, but not more, because if you take over 15 men, a man in the group may have an important idea that he wants to bring out and may be afflicted with stage fright, so I believe that that is the best way I can answer that, Mr. Noonan.

We are using safety committees. In addition to that we have a school of safety education where the platform men go through a course, one hour each day of the week, for eight hours, and the hazards of the various operations of the street car are brought out on the blackboard. The operation is brought out first and then the men themselves bring out just how they may have an accident in performing the various operations which do constitute the operating of a street car.

Reasons Versus Emotion in Teaching Men Safety

DR. C. P. SEGARD (Third Avenue Railways, New York City): I'd like to make a comment or two with regard to the talk that was given. I took the place of a conductor or motorman here in this audience today, as I have done in a number of street railways, and to me this talk on safety divides itself into two very large groups. One is the emotional group which is very transient and temporary, and if we talk from the emotional side to the conductors and motormen you will find it will last just about as long as it is given.

The side of reason, a little bit colder perhaps, but one that will last considerably longer, is the better way. In the safety talks that I have listened to on various street railways, I find that when reason is presented to the men perhaps 90 to 95 per cent of the talk will last a good many times longer than when we assume the emotional side,

and lastly, may I say this: psychology has recently come into the realm of science and has passed out of the realm of philosophy. May not accident prevention do the same thing?

MR. CONNORS: I would like to answer that in a way. It depends altogether upon the audience. In Tennessee where the people are emotional, I find that the best way to get under the skin down there is to picture those things. We have a population of 99 per cent native born and that is a condition you don't have in New York. Our talk wouldn't suit at all before an audience of New York platform men.

A. L. HODGES (Brooklyn City Railroad Co., Brooklyn): What is your labor turnover, Mr. Connors?

MR. CONNORS: Sixty-five.

MR. HODGES: That is something we don't have in New York or Brooklyn.

Appeal to a Man's Heart When Talking Safety

MR. FUNK: I don't exactly want to ask Mr. Connors a question; I want to agree with him and disagree with the gentleman who was talking against appealing to a man's emotional side. I believe as my friend, Mr. Connors, does, that there are lots of things you can talk about from a scientific standpoint. I think that safety is a question after all of human engineering. I believe if we are going to put this thing over as we want to, we must talk to a man's heart rather than his head. I come from south of the Mason-Dixon line too, but I don't know that that has anything to do with it, at least I don't think so. Perhaps I am prejudiced like Mr. Connors, but I know that you can talk scientific things to the men in the ring and those are the things that don't last long, but picturing these tragedies as my friend, Mr. Connors, did this morning, I believe those are the things that stick in the men's hearts, and I don't care whether they live south or north of the Mason-Dixon line.

J. HARMON: What part do the heads of the various departments take in the safety work?

MR. CONNORS: They are all active. The general superintendent down to the platform men attend our safety meetings. In our organization the general superintendent is a man of pretty high station.

A. D. BROWN: (New York State Railways, Syracuse): I'd like to ask Mr. Connors if in holding a safety meeting the men are paid for their time and if their expense is considered part of the accident prevention campaign? Also, I'd like to ask about the zero day proposition, if the zero day is based on no reports sent in. We ask our men to send in reports of things which the men may or may not be responsible for. It may be an accident occurring near the street car line or it may be something when the car was standing still. It is merely a matter of chance in those cases and not a matter of judgment.

MR. CONNORS: We have a bonus system. This bonus is distributed at quarterly periods. At the end of every three months the bonus is

paid. A man that misses a safety meeting has one dollar deducted from his bonus amount, and this was brought about by a unanimous vote of all the employees. They used to say, "Bill Jones only attends a few meetings and he gets as much bonus as I do." So they decided to deduct a dollar from the man's bonus for every meeting he was absent from, this dollar to go into the pot and be divided among the men that attended the safety meetings. We get about 90 per cent attendance at our meetings.

In regard to the zero days; I came across a report before I came here where the trolley rope broke and the pole hit the main wire and a report was made out of this occurrence. That would eliminate a zero day.

Another report that came to my attention recently showed the operator of a car was waiting for a man to come down out of a flat and one of these signal lights had the man blocked. The man fell coming down the steps and a report was made on that. That would eliminate a zero day.

In regard to the question whether the men are paid for their time when attending a safety meeting, we do not pay them for attending these meetings. In fact, as I stated previously, there is a penalty for not attending. If a man misses a safety meeting and if the bonus during that period is $18 he only gets $17, and the extra dollar goes back into the pot and is divided between the entire group.

Points of the Bonus System Are Brought Out

R. M. READE (Quebec): I'd like to ask if medical expenses are included?

MR. CONNORS: That is separate.

E. K. MILES (New York State Railways, Syracuse): I'd like Mr. Connors to explain briefly what the bonus system is?

MR. CONNORS: I could not do it briefly. We put aside $1,500 for each one of the three-months periods, and if our accidents run over what they did last year for the same period, $10 is deducted for every accident over the corresponding period of last year; and if the accidents run less, $10 is added to the $1,500 for any accidents less than the same period of the preceding year.

S. W. HENNINGFELD (M. E. R. & L. Co., Milwaukee): I'd like to ask Mr. Connors whether there are any prize awards or contests in this safety work. I don't believe that just commending the men on the work they do, or calling them down for work they don't do, hits the average man on the platform or on the bus, and I want to ask Mr. Connors if there is anything else they do?

MR. CONNORS: There is quite a bit of competition among the bosses. We have a contest on among our five divisions and the division superintendent who leads during any one year with the greatest miles per accident gets a trip to the National Safety Congress. We happen to

have Mr. Bailey here as the man who won both the 1924 and 1925 contests between the divisions.

W. F. HANNA (United Railways, Baltimore): During their talks to the men, do they inform the men of the status of accidents?

MR. CONNORS: The first order of business of our meeting is to let the men know just how they are doing. In other words, we have these charts posted around where the men can see them. These charts are kept up from day to day. About 8:00 o'clock in the morning the entire personnel will know how many accidents we have had. We have got competition between the day and night men on each division, and it is especially keen on account of the bonus system.

W. J. ROUNTREE (Ga. Railway & Power Co., Atlanta): I want to ask Mr. Connors if there has been any increase in the blind claim reports after installing or beginning this bonus system?

Reports and Suggestions to Safety Committees

MR. CONNORS: Yes, but it is not alarming. The only way I have found to gag blind claims is on a percentage basis. In Nashville, six per cent of the report are blind claims. In Chattanooga, only one per cent. One out of every 100 is a blind claim and that is increased from about three per cent before the competition to six per cent at the present time. I don't feel that six per cent is a very alarming rate.

W. F. HANNA (United Railways, Baltimore): Do you have a system of reports and suggestions for the safety committee?

MR. CONNORS: We have suggestion boxes all over the property.

MR. HANNA: Are your meetings open for discussion?

MR. CONNORS: Yes, we try to get the platform men to talk. In a mass meeting I find that an inspiration meeting is the best thing, but you get some real suggestions on safety work in these groups of 15 men in the safety education schools. I have learned more about safety since I started that school than I thought I ever would know. That one plan, I believe, is the best thing we have to show results—the safety education school.

J. W. OLIVER (Chicago, North Shore & Mil. R. R. Co., Highwood): Who does the talking at your mass meetings?

MR. CONNORS: I do. I think it is mighty hard to get them to talk at a mass meeting. I find the best way to get those men to talk is in small groups of 15 each.

MR. OLIVER: Last year we tried out a plan on our property. We hold our meetings with all the employees. All employees are asked to attend, and last year in the Transportation Department we had 42 papers presented by the men on the job. One I recall was by one of the switchmen. He has been on that job for the last four or five years. We got him to get up on his feet and tell us about the hazards of coupling and uncoupling cars and we got more out of that than anything I know of, and after the meeting he came to me and he said, "This job of mine is more important than I realized. After I sat down last

night, before coming to this meeting, I tried to dope out what I was going to tell the fellows; and I learned more about my job last night than in the six or seven years I have been with the company."

We had 42 such papers, including a debate as to the operation of the day and night lines. I wondered if your men took any particular part at meetings?

MR. CONNORS: I just want to say this, when you start to analyze a man's job this is what happens: You tell a platform man that he has eight different jobs to perform in taking on one passenger and there are two things going to happen. He is going to say you are a liar or he is going to ask for a raise. Now, gentlemen, this is what happens. I get up there with a blackboard and go to analyzing a man's job and then he is going to find out that he has got a great big thing there and didn't know he was doing so many different things. I can't break this job into small parts and bring out the operation and get the details before the men. He sees it through his own eyes and he takes a pride in what is brought out. I feel it is one of the best methods in analyzing a man's job.

J. L. FAHEY (Scranton Railway Co., Scranton): Is there any penalty for the failure of the men to make the reports in the case of blind accidents?

MR. CONNORS: Yes, if a blind claim does come in that report counts as two accidents against this man's record. In other words, he cuts his bonus to two-thirds.

Methods of Disciplining Refractory Employees

MR. NOONAN: Talking about the reports, there is a difference of opinion here in the room as to these reports. I would like to know what you would call a report in your company? If a person loses a dozen eggs or sits down on a case of eggs in a car, does that come in an accident report?

MR. CONNORS: Everything is considered an accident with us. Even in the case of where the rope breaks, a conductor makes a report of that.

MR. NOONAN: I see; you call everything an accident.

J. M. LOFTIS (Pittsburgh Railways Co., Pittsburgh): What are the methods of disciplining on your property?

MR. CONNORS: We suspend the men. That is the best and most successful method of safety. If a man strikes an automobile and there isn't any doubt about negligence on his part, he is suspended.

MR. LOFTIS: Going on the theory you advanced in your talk what you tell the man about the good things he does, don't you believe that you can get away from suspending a man on that same theory?

MR. CONNORS: I do, but the superintendent of transportation doesn't.

MR. LOFTIS: No employee of the Pittsburgh Railways Company has been suspended since December 31, 1925, and our results are very gratifying. Our accidents have been cut down, our unreported accidents have been cut down, and on the whole we think it is the best system

that we ever tried out. Of course it is young yet, but we have got great confidence in it and that confidence comes through the confidence of the men, and we believe it is one of the best ways to prevent accidents.

VICE CHAIRMAN EMERSON: We will now have election of officers for the ensuing year and I will call on Mr. Reid for his report.

S. H. REID: In making up this report, the committee recognized the fact that we have three various, separate, and distinct problems confronting this part of the industry, or this Section. One is the bus transportation which is comparatively new, another is the urban or city transportation, and still another is the interurban transportation. All three of these have their separate and distinct problems, so we are recommending at this time the election of three vice-presidents, in keeping with the other Sections which have found it necessary to do that; one to have charge of the motor bus problems, another the urban problems, and another the problems confronting those who operate interurban systems.

REPORT OF THE NOMINATING COMMITTEE

For chairman your committee recommends Mr. R. W. Emerson, vice-president and general manager of the Cleveland Railway Company, Cleveland, Ohio.

First vice-president in charge of Bus Operation, Mr. A. W. Koehler, superintendent of accident prevention, The Milwaukee Railway and Light Company, Milwaukee, Wisconsin.

Second vice-president in charge of Interurban Transportation Problems, Mr. H. K. Bennett, safety manager, United Electric Railways, Providence, Rhode Island.

Third vice-president in charge of Urban Transportation Problems, Mr. E. K. Eastham, safety director, United Railways of St. Louis, St. Louis, Missouri.

For secretary, Mr. J. J. Connors, safety director, Tennessee Power & Light Company, Chattanooga, Tenn.

VICE CHAIRMAN EMERSON: You have heard the recommendations of your committee, what is your pleasure?

J. H. COX (Cleveland Railway Company, Cleveland): I move the nominations presented by the committee be accepted and they be declared elected.

(The motion was duly seconded and carried.)

VICE CHA'RMAN EMERSON: The chairman will assume his duties tomorrow. Today he is the vice-chairman substituting for Mr. Hellmuth. I am very sorry that Mr. Hellmuth can not be here to see the wonderful results of his year's work as chairman of this Section. He has been untiring in his efforts and has done wonderful work. I have had a good deal of correspondence with Mr. Hellmuth. I know of the correspondence he has had with others, and it is regrettable that he can

not be here today to see the culmination of his efforts in behalf of this Section.

H. M. READE (Quebec): May I ask Mr. Connors if the men have given the bonus system their full and hearty cooperation?

MR. CONNORS: I would say about 90 per cent have. Of course you will have this condition sometimes where a man feels like he is unjustly charged with an accident, and of course he is going to be puffed about it, but I feel it is well worth the money spent on it.

MR. READE: For the information of all here I would like to say that the company which I represent joined the National Safety Council in 1913, so we have been members now a considerable number of years. We started the bonus system and all our men are organized 100 per cent. They asked to discontinue it and we have done so, and any reduction that they may have in accidents we have given back in free uniforms. We have got the cooperation of all our men and we gave them all free uniforms after 15 months of service. Further than that, if they made a greater reduction in accidents we gave it back to all of them in pay. We increased their rates. We have made a very great success.

In 1913 our accidents cost seven per cent of our gross earnings and our gross earnings were about $450,000. Today we are running over a million and our accident claims, including mechanical expenses and legal expenses, are about .75 of one per cent, and I call that magnificent cooperation from organized men.

VICE CHAIRMAN EMERSON: We will now go on with the next paper, prepared by Mr. T. G. Hamilton, assistant general manager, Chicago South Shore and South Bend Railroad, Michigan City, Indiana; he is not able to be present with us today and Mr. Reid will present his paper.

HARMONIOUS RELATIONS BETWEEN EMPLOYEES AND MANAGEMENT AND THEIR EFFECT UPON ACCIDENT PREVENTION

T. G. Hamilton, Assistant General Manager, Chicago, South Shore & South Bend Railroad, Michigan City, Ind.

The unique prosperity of the United States has assumed such widespread interest, if not outright envy, in a world greatly impoverished by war that in recent years this country has been the objective point of scores of foreign commissions, groups of distinguished industrialists, economists and labor leaders.

With their fellow countrymen no doubt wondering from where their next meal is to come, let along how they can manage to amortize their war debts, our visitors find it extremely difficult to reconcile this prosperity with the present financial plight of the rest of the world. They are at a loss to explain our exalted living standards, widely diffused happiness and industrial harmony.

They are conducted through our great steel mills, taken down into our coal mines, whisked about on our fast railroad trains and formally initiated into the complexities of our industrial structure. They are permitted to mingle freely with the workers in the front line in order to learn their attitude toward their employers.

The visitors are shown silent, efficient machines performing in a twinkling and with no perceptible effort the enormous tasks which once required the joint and arduous labor of hundreds of men. Instead of hosts of human toilers, crushed in spirit and health by long hours and back-breaking drudgery, they find a mere handful of skilled, healthy and contented workmen guiding and directing these giant, inanimate servants of mankind. They learn incidently, too, that steam and electric power development has given every man, woman and child in our nation the equivalent of 50 ever-willing slaves.

Industry Is Organized to Give Men a Fuller Life

Their guides explain to them that the wholesale introduction of machine tools and power has not only caused our national output to soar to an unprecedented height, but has also increased the capacity of the individual worker employing them, many times over. They are shown that one of our largest automobile factories today produces 12 cars a year, per employee, as against two cars ten years ago, while a shoe worker turns out eight pairs of shoes each day, as compared with four pairs a day ten years ago. It is further impressed upon them, that volume production has materially reduced the unit cost of manufactured articles and that the greater profits, which naturally accrue, have inevitably drawn up the wages of labor after them, so that man today lives a fuller and richer life. His circumstances are immeasurably superior to those of a man of 100 or even 50 years ago. He has become a consumer. The more he gets, the more he wants. To supply his demands, the busy factories roar with industry and the utility companies are enriched by his opportunity to secure the conveniences and luxuries of life. That high wages have a very direct bearing on the nation's buying power with the result that comforts, leisure and luxuries are diffused among our people as they are among no other peoples of the earth, readily becomes apparent.

As these factors, which, at first, seemed to defy answer, are gradually unfolded to our foreign observers, it is probable that the most lasting impression of all is their discovery that the feeling of mutual responsibility and common interest on the part of American employers and employees is ever increasing in strength. They are quick to agree that in the recent strike, British coal miners were butting their heads against the stone wall of economics when they expected to squeeze higher wages from their employers by restricting the output of fuel. It is obvious to them that in America wages are not arbitrarily fixed by employers, but by the rate of production.

The invention of the steam engine and other early types of modern machinery and the advent of the factory system in the last few decades of the eighteenth century, decreed the end of the so-called "Cottage" industries, when virtually every man supplied, by his own efforts, the entire needs of his family. Industrialism required larger amounts of capital than a single individual could ordinarily provide.

Hence, a day soon arrived when industrial undertakings became a co-operative affair; each group contributing a certain part to the whole of productive effort. Some contributed savings, others inventive genius and executive brains, while still others entered the combine by giving of their time and physical efforts. The division of tasks multiplied as time went on and the former owner or manager, clad in apron or overalls, who once worked side by side with his men, inspiring them to better workmanship, found the increasing complexities of his business no longer permitted him actually to "work at the bench." Abstracted by other duties he began to lose touch with the personalities and problems of his men. The breach between employer and employee grew; the rift widened. The influx of new racial and national viewpoints due to immigration; the growth of the printed word with newspapers and periodicals flinging ideas into the uttermost reaches of a working population; changes in living conditions due to urban congestion and changed standards of living; the evolution of a highly complex social order out of one which had been relatively simple and homogenous—all of these subtle influences wove a curtain, not merely of misunderstanding, but of non-understanding, between employer and employee, each becoming an impersonal, unfeeling creature in the eyes of the other. As a consequence of these misunderstandings, pride of workmanship and efficiency slumped all along the line. The amount and quality of individual effort returned for every wage dollar expended was found to be in close mesh with individual attitudes, viewpoints, ideas and motives.

Recognition of the Importance of the Worker

More recently, however, this relationship has undergone a considerable change. Ownership no longer exercises the domination it once had over management, and the relative pressure of profit has somewhat relaxed. The best minds now are agreed that the door has been found in the plan, recognizing and admitting the importance of the worker to the whole scheme of things. He is recognized as the middleman between capital and machinery, for no matter to what stage of labor-saving efficiency we may bring machinery, it is short of what it was created for unless the man who operates it is possessed of equal efficiency. Thus, waste of materials, supplies, overhead, time, supervision and power has its primary source in human factors and the coordination of these factors lies in intelligent, informed and efficient management.

At the same time executives are beginning to realize what an indispensability to success is the loyal cooperation of their men. Labor is being taken more and more into their confidence. Employees are en-

couraged to buy stock and become partners in the business, thereby acquiring a more personal interest in its financial success. Through employee representation plans, labor is given a large voice in the management; more attention, in turn, being given to the welfare of the employee. Short-sighted is the management which does not realize that courteous and efficient employees offer the greatest assurance of success. In the public utility business the customer's impression of the company is received almost entirely by the treatment accorded him by the employee. In the customer's eyes, the employee *is* the company.

Without the loyal cooperation of trainmen and other employees in daily contact with the public, any permanent success in the electric railway business or any other public utility business is an impossibility. In spite of all the mechanical devices which may be employed to assure good service, the success of the company hinges primarily upon the good or ill will incurred by its emissaries to the public. Again it is the human factor—the tap root of which, among other things, means getting back to first causes in human beings. It is as important to know men as it is to know machinery. You can get little out of either unless you understand them, not only in their relations to each other, but to the operations they are to carry out.

Extreme Care Used in the Selection of Men

It is the policy of the company I have the pleasure to be connected with, to use extreme care in the selection of its men. It is our tenet that "As ye hire so shall ye reap." All applicants must not only furnish suitable reference, but they must satisfactorily establish their various connections for ten years previous. Hearing and vision tests are very rigid and medical examinations are given in an attempt to closely estimate the character of disabilities which would be apt to result in lost time. It is impressed upon him at the time that courteous, obedient service without accident is his duty, and that carelessness will not be tolerated. He is told that accidents do not happen haphazardly, but are caused, and that there is an underlying reason back of every accident. Often there are many factors not apparent at the time and place of the accident that have some bearing on the cause. But a study of accidents shows almost indisputable evidence that individual carelessness plays a prominent part.

In what way is this true? The best way to explain is to take an example. John Doe is a motorman. His superior has continually thwarted the men's demand for improved working conditions. John is disgruntled and discouraged. The management has been indifferent toward him and his needs. What more logical result of this policy than that he should be careless of the company and its interests? It is a consequence as inevitable as the appearance of the can opener among a household's culinary articles after the honeymoon is over. As a result John's frame of mind—his attitude—has grown bad for safety and favorable for acci-

dents, and, with his thoughts on his grievances instead of on his work, he bumps a car ahead of him or runs past a red block.

A myriad of similar illustrations might be given, but they would be merely cumulative—cumulative of the eternal truth that as men would be done by so must they do; not the gold plated policy of short-sighted capital and short-sighted labor, but the increasingly popular and always workable policy of justice born of love and begotten by the Golden Rule.

ADJOURNMENT

(NOTE: A full report of the Joint Luncheon meeting of the Electric Railway Section with the Public Utilities Section, Wednesday noon, October 27, will be found with the complete report of the Public Utilities Section, on Page 659, Volume II, of these Transactions.)

THURSDAY MORNING SESSION

October 26, 1926

The meeting convened at 10:00 o'clock, Chairman Emerson presiding.

CHAIRMAN EMERSON: The first thing this morning is a communication from the secretary. I will ask Mr. Eastham to read the resolution which he has.

SECRETARY EASTHAM: The resolution is as follows.

"WHEREAS the Chairman of this Section, Mr. G. T. Hellmuth, was called away on the first day of the Congress on urgent business and has not had the opportunity of seeing the culmination of his year's efforts in the splendid meetings of this Section, the most largely attended and enthusiastic the Section has ever held;

NOW BE IT RESOLVED that the Electric Railway Section expresses its deep appreciation of the untiring and well directed efforts of Mr. Hellmuth during the past year; that this resolution be made a part of the permanent record and that a copy of same be sent Mr. Hellmuth."

CHAIRMAN EMERSON: Gentlemen, I suggest that we adopt this resolution by a rising vote.

(The resolution was adopted by a rising vote.)

H. K. BENNETT (United Electric Railways Co., Providence): Mr. Chairman, may I offer the suggestion that instead of delaying the communication by letter it be sent as a day letter?

CHAIRMAN EMERSON: It is a good suggestion and we will follow it.

The first paper on this morning's program will be by Mr. J. A. Van Osdel of the American Electric Railway Claims Association, Indianapolis, Indiana.

CROSSING ACCIDENTS

J. A. Van Osdol, American Electric Railway Claims Association Indianapolis, Ind.

In the problem suggested by this topic are three primary factors, the "way", the "vehicle" and the "individual", neither of which can be overlooked in any attempted solution.

Means of communication and transportation have always been influential in the development of any country. We think we are safe in saying that the most important physical factors in developing and unifying this nation are its means of communication and transportation.

In response to the demand for improved highways, stimulated by the rapidly developing use of the motor vehicle and encouraged by the lure of "Federal Aid", we find most of the states fairly launched upon a program of highway construction that was not dreamed of 20 years ago.

While the construction program has been and still is being rapidly prosecuted, it has not been able to keep pace with the increase in the number of vehicles which seek to use the way; with the result that the dangers incident to the use of the "way" have been many times multiplied.

The problem of the present is how to make our highways render the maximum of service consistent with public convenience and public necessity, and in these requirements is included the all important element of safety.

In considering the vehicle that is most often involved in these crossing accidents, we naturally turn to the motor vehicle. Probably no phase of accident prevention presents greater difficulties than the one that deals with the automobile. The diversity of interests encountered and the fact that practically every law or regulation looking to safety in this particular field impresses the individual upon whom it is intended to operate as an encroachment upon his personal liberty, serve to make progress in the direction of safety extremely difficult. This is especially true when the class to be restrained is composed so largely of persons of immature judgment, or of little or no responsibility. The question, however, is not the elimination of the automobile, but how to make its use as safe as possible.

Accidents have become so frequent that they cease to impress the general public. They mean but little to those not involved. It is only when we learn of some happening where a dozen or more lives have been snuffed out in a single accident that we are much impressed. Isolated happenings are not impressive.

In trying to evaluate the result of accidents we are mindful that there are certain factors entering into the value of a human life that are very real to those immediately concerned, but which are too intangible to be measured in terms of money; nevertheless, there are certain recognized standards by which the economic value of human life is estimated

at $10,000. Accepting this figure as a fair average, we may approximate the economic loss which this country sustains annually in accidental deaths. Take 1924 for illustration. That year the deaths in the United States due to accidents were 85,000, representings an economic loss of $850,000,000. Of these 17,500 were due to automobiles. This was at the rate of one every 30 minutes from this cause alone.

The rapid increase in the number of automobiles challenges the attention of any one who gives even passing attention to this question. The report of the committee on statistics made in February of this year, to the National Conference on "Street and Highway Safety" shows that the registered automobiles in the United States have (speaking in round numbers) come up from nine million in 1917, to practically twenty million in 1925.

From the report of the committee on Highway Safety made in March of this year, we quote the following:

"Nearly twenty million motor vehicles are upon our roads and highways. Our country was not laid out for this unexpected discovery. Our roads have to be rebuilt and our streets reconstructed. The whole of our traffic situation has to be reviewed and reorganized."

The committee on statistics in the report first referred to, said in reference to the showing made by certain tables set out in that report: "It is clear from the statistics given in the two preceeding tables that the advent of the motor car into the industrial and social life of the United States has added greatly to the complexity of traffic movement on our streets and highways. Unless its operations are properly controlled the toll of death and injury will continue to increase during the coming years."

Statistics Quoted from the Hoover Conference

The committee on statistics in its report made in February this year, to the Hoover Conference, shows that the fatalities on highways in 1924 were 23,291; at the recognized ratio existing between casualties and fatalities, this means over 600,000 casualties; and expressed in money, a loss of over two hundred thirty millions of dollars, to say nothing of the property loss entailed in these casualties.

This country was shocked and ready to respond generously with measures for relief for those who so recently suffered from the Florida tornado, but we venture the statement that if the facts were known, the actual loss in life and property from that storm would appear almost trifling compared with the loss resulting annually from highway casualties in this country.

It comes back to what we said a moment ago, it takes the cumulative force of the many fatalities which are involved in a single casualty, to impress us.

In 1924 and 1925, three times as many deaths resulted from the automobile as from diphtheria, and nine times as many as from typhoid.

The Hoover committee, in its February report says that during the eight years from 1917 to 1924 inclusive, there has been a constant increase in fatalities assigned to automobiles, and they have formed a constantly increasing proportion of the total number of accidential deaths.

Lest we despair at the enormity of the task presented, we should at this point, take note of some of the facts embraced in the report of the above-named committee, that are encouraging. Thus, taking the nine-year period ending with the close of 1925, the ratio of automobile fatalities to the number of registered automobiles has steadily declined, though the ratio appears to have remained stationary during the last two years.

While the totals of automobile fatalities have steadily mounted and still are mounting, due to the increasing number of those vehicles, we should note that in 1917, the automobile fatalities per 100,000 automobiles registered was 182, but gradually declining to 100 in 1925.

Turning from the automobile for the time, let us see what there is on the other side of the account.

The number of fatalities caused by railway grade crossing accidents, by street car accidents, and by horse-drawn vehicles all declined.

That committee also found encouragement in the reduction in automobile accidents in some of the large cities and concludes its report with a recommendation which should give heart to those who have labored to increase the influence of the National Safety Council. I quote the final recommendation of that committee.

"On the whole, and considering the record from every possible angle, the committee feels justified in the conclusion that the safety movement and safety education generally are beginning to produce results in the traffic field, where progress has been much slower than in the field of industrial safety. The battle is not yet won, however. Merely to record a reduction in the rate of increase in automobile fatalities is not sufficient. Fatal accidents in other forms of traffic accidents are declining. They should decline still further. The number and rate of fatalities in automobile accidents should also be reduced. There must be no lessening of intensive effort until this needless loss of human life has not only been checked, but has been reduced to the smallest possible proportions."

Since the conclusion of the whole matter is how to remedy this situation, we shall take a few minutes to suggest certain of the conditions and certain measures for relief, that very naturally suggest themselves.

The Grade Crossing

While the grade crossing is not the scene of all of the accidents of this class it is the place where a great many of these tragedies are staged, and while they can not be entirely eliminated so long as we have the crossing at grade, their number can be greatly reduced.

Grade crossings can not be entirely eliminated until the general public

acquires a higher appreciation of the duty which rests on it in this matter, and is willing to bear a larger share of the expense which such an undertaking involves. Wherever a railroad is involved it seems exceedingly difficult for the public to see why the expense of grade separation should not be borne entirely by the railroad. The public is making a greater use of the highway today than ever before, with an ever increasing volume of traffic that moves over the highways in motor vehicles with a speed equal to that of a freight train, greatly increasing the hazard of highway travel and railroad operation.

Hence, the demand that the public should take its share of this increasing burden is a very reasonable one. Any plan which could possibly be adopted for grade elimination, or even their substantial reduction, would require years to carry out and involve a vast expenditure of money that must come from somewhere; but the establishment of new grade crossings where it is practicable to avoid them, and the clearing up of the view at existing crossings is receiving more consideration at the hands of railroads and public authorities than formerly and this is real improvement.

An enlightened and healthy public sentiment is quite essential.

Law Observance

Law enforcement and law observance go hand in hand in this country; you can't have one without the other.

Laws designed to regulate or abridge habits and customs which have become fixed with the people are apt to be looked upon as invasions of what we are pleased to call personal liberty and the difficulty of their enforcement is because of this popular, though erroneous opinion. This trait of human nature is probably most manifest when the law is designed to regulate the individual in pursuit of his own pleasure.

Laws which undertake to tell the individual how, when or where he shall drive his vehicle, how he shall travel on or across the highway, when to stop and when to go, what precaution he shall take for his own and the safety of others, are usually resented by those upon whom they are intended to operate; and that individual, in convincing himself that the law is wrong, entertains the same false notion of personal liberty that the one does who resists temperance laws, health laws, and other like police regulations. He resists the law because he sees in it an attempt to abridge his personal liberty, although in both cases the law is meant for his benefit, his safety and his well-being, as well as for the general welfare. He sees in it only an interference with his immediate comfort and pleasure and he seeks some means by which he can evade it. It is easy to get an exaggerated idea of personal liberty because we naturally think in terms of self. If we can impress the popular mind that personal liberty ends where the general welfare begins, law observance will be more common and law enforcement less difficult.

In all this, public opinion is a determining factor and legislation must not keep too far in advance of it, for if laws are enacted before there

exists a demand for them and before the people are prepared by education to receive and support them, they become dead letters. Hence, an enlightened public opinion is of first importance. Let us repeat, respect for the law is the strength of the law, and respect begets obedience. Wise laws backed by public opinion command respect and are easy of enforcement.

But let us not at this juncture deceive ourselves with the idea that these accidents now under consideration can be wholly prevented by any sort of laws or rules which operate only to regulate the conduct of the individual. We can not absolutely regulate human inclination or human judgment by legislative enactment or judicial decree, but we can influence them by a course of wise and persistent education. To that end, systematic accident prevention should become a part of our national life.

A Campaign of Education Necessary

The influences which operate to educate the public will, at the same time, educate those who are charged with the immediate duty of enforcing the law. Courts and police officers will be found responsive to it.

The program adopted to carry on this work of general education must be sufficiently comprehensive to reach all classes, and sufficiently practical to arrest the attention of the man of affairs. This program must be applied constantly; we must not expect its accomplishment with a single effort. Knowledge is not attained with one lesson, rather it is "line upon line, precept upon precept, here a little and there a little." The methods by which the public can be sufficiently attracted to this program to insure real interest and a desire for its accomplishment are numerous and must be varied to suit conditions.

Thus far the effort to make safety popular has been exerted in the urban centers, but before we can bring all the people to the proper appreciation of this work, and before we can expect a healthy public sentiment so general as to insure law observance and law enforcement, the rural side of the problem must receive attention. That is a field practically untouched up to this time and while results must not be looked for as quickly as in some industry where instruction, inspection and supervision in safety work are matters of daily routine, rural life stands ready to respond with community effort whenever it can be made to see the need of it, and how to do it.

While the schools are a very efficient agency in carrying on any educational program, we must not lean too heavily upon that institution; we can overdo at this point. Hence a word of caution:

Don't Overload the Schools

Here let us say that by whatever method you endeavor to interest the schools care must be exercised not to add a new study to an already heavily loaded curriculum or you may fail entirely.

Commercial interests have long since sensed the value of the schools as an advertising medium, and teachers and school officials are constantly on guard to prevent certain interests from imposing upon the schools, and through them, upon the public, promotions purely commercial and in no sense essential to the cause of education.

The difference between the use of the schools for commercial purpose and their use in teaching safety is that the former is not essential in the education for which our schools are created, while teaching principles that protect human life is.

Never did society afford such facilities as now for popularizing any worth-while cause. Such civic organizations as Rotary, Kiwanis, Exchange, Lions, Chambers of Commerce, commercial clubs, and the many other organizations that stand pledged to useful service, easily supplement the work which the schools can do in putting this cause before the public. Such a program will undoubtedly have the support of the pulpit and the press.

CHAIRMAN EMERSON: Mr. Van Osdol, we are certainly indebted to you for this fine, enlightening paper. It is very encouraging to find that you can see a ray of sunshine on the horizon.

In asking for discussion on Mr. Van Osdol's paper, I'd like to call on Mr. H. A. Rowe, Chairman of the Grade Crossing Committee of the Electric Railway Association.

DISCUSSION OF MR. VAN OSDOL'S PAPER

H. A. Rowe, Chairman, Grade Crossing Committee, Electric Railway Association

I don't know exactly what to say after listening attentively to Mr. Van Osdol's most illuminating paper upon this important grade crossing question. He has gone into it very intelligently, given a great deal of thought and study to it and presented it to you in a most admirable way. It seems almost a sacrilege upon my part to try to add anything to what he has said. But possibly because I have been interested in the grade crossing question for a number of years, it might not be amiss for me to say a few things.

Mr. Hellmuth, your chairman, asked me to say a few words to you because of my position as chairman of the Committee on the Prevention of Highway Crossing Accidents of the American Railway Association. Most of us are familiar with some of the work of this committee through our poster system, the booklets we have issued from time to time, the stickers we put upon our letters and the various other means we have used to attract public attention to the serious problem before them.

We recognized a number of years ago, back in 1921, that there was need for definite organized work upon the part of the railroads in the education of the public to their responsibilities for grade crossing acci-

dents. You know we are all self-preservationists to a certain extent and those of us who have been unfortunate enough to be attached to claim departments of our railroads, as well as to our safety departments, have sometimes felt pretty sore over the way the 12 good men and true have treated us, as far as grade crossing accidents are concerned. Possibly our self-interest actually does to a certain extent help in getting something organized and that same self-interest will affect you as well as it does us.

But apart from that, I can honestly say that it has been the purpose, the thought, and the desire of the American Railway Association to act principally from a humanitarian standpoint, to recognize the seriousness of the problem, try to do our duty as men, and having done what we can it is our duty not to rest exactly upon our laurels but still to press onward with the work, and that is what we are trying to do.

Railroad Men Must First "Clean House"

Mr. Van Osdol laid particular stress upon the obligations of the public, and of course it is far from my purpose to lessen that effect in any way whatever. But first it occurs to me that we must go at this problem with clean hands. We have no right as railroad men to go to the public and say to them "Men you must do this or you must do that or something else," if we haven't first done our full duty ourselves. We have got to be fair and decent in this matter and we have got to recognize our own short-comings openly and frankly and willingly, and we have to find ways by which we are going to improve our own shortcomings, if we can.

The first thing you have to do on this grade crossing question is to clean house. We have here the statement made by Mr. Van Osdol and it is true, that the very highest percentage of all these accidents comes from the fault of the public; but there are occasions where our own men are at fault and we know it. It is our duty to train our men, to so impress our men that we are sincere and earnest in this question of life saving at crossings, that we must expect from them 100 per cent of their duty every minute of the time; and we must find ways and means by persuasion, education, by discipline, by any other means that come to our command to get our employees to do their full duty every time.

Now we can't stop at that. Our corporations have responsibilities and we must be open and frank about our responsibilities as corporations. If we have a situation which we know in our hearts can be improved from a business standpoint, from a construction standpoint, from a warning standpoint, or from any other standpoint that will give the traveler upon the highway a better opportunity to protect himself, then I say to you that is our primary duty, to so put our property in condition that we can and have a right to expect something from the other fellow.

Of course your problem is somewhat different from ours in many respects, but we on our steam railroads make annual inspections of our crossings to find out whether there has been an unusual growth along our right of way. For instance, we find out whether our crossing flanges have been maintained in good order, whether our crossing flanges are of sufficient width, whether the approaches to our crossings are fair and properly passable. In other words, we go through that situation and find out what we can do that will improve the local situation. When I say we do that, I don't mean to say that it is done on everyone of the 250,000 crossings in the country, but to a substantial extent on the more busily traveled crossings and to a real extent at the less traveled ones also.

I say to you that we also try to put up such signal systems as will give the public reasonable warning of their approach to a railroad crossing; and there are places where you gentlemen are confronted with the same situation, and with signal devices and various other means of protection you can afford some additional opportunity to the traveler on the highway to protect himself.

I think we ought to go into those things most thoroughly and with an open mind and not be afraid to spend those few dollars which are necessary to improve our situation. We have adopted a sign for highway marking so that we have a specific and distinct primary marking for steam railroads alone, which will show, and always have it so that the traveler will be able to see from what direction a train may come. Now that little scheme will be an additional aid. It may open a line of thought and suggestion to you as to something which you may be able to do to meet your specific problem. I am assuming, of course, that you have your interurban as well as your urban situation to look out for.

The Big Task Is to Educate the Public

After you have gone into that situation very thoroughly as far as your own properties are concerned and as far as cooperation with municipalities is concerned, you then have the problem of endeavoring to educate the public with whom you come in contact; and there, gentlemen, is the big task that is before you. When we started out five years ago to endeavor to educate the public on that line we commenced the work with a great deal of fear and trepidation. We were uncertain as to whether we were not going to get a boomerang, whether the thing wasn't going to come back upon us with such fearful force as to demand almost universal elimination of grade crossings, which you know are installed in all of our transportation systems.

But the very enormity of the problem was our strongest defense, and the public has recognized that it is a problem too vast to be set aside lightly, too vast to be overlooked by any corporation, or the corporations of the country, and one in which they have a definite co-interest

and responsibility. So that this very thing which we feared, has reacted to our advantage rather than to our disadvantage; and it may be that you will have some problem in your local situation that you fear will have a reaction undesired by your corporation. Look the matter squarely in the face, go at it with the intention of saving human life and put your human life element above the cost of the change that may be desired. You will find that you have taken the right attitude, as far as a human proposition is concerned, that your public will very shortly come along with you, and will not demand too much from you. It will demand that which we ought to give and that which you ought to be willing to give, but don't be afraid of the problem, gentlemen, simply because it looks too big in the beginning.

You can not go into a proposition of educating the public and expect them to produce results by the simple giving of a talk, by the simple publication of this, that, or the other thing. You have got to realize that the education of the public is a very slow, tedious, painstaking, discouraging proposition. You have got to recognize that you can't get results right away. You may not show results for a long while, but by consistent pounding of the same thoughts with certain modifications, and presenting them in a new way, but pounding and pounding, just as the little drop of water will gradually wear away the stone so will you overcome your difficulty in time.

Follow the Plan of the American Railway Association

I don't mean to say by overcoming this difficulty that you are going to eliminate all of your grade crossing accidents and your street highway accidents. But I do say that you are going to make a wonderful impression and in time you are going to bring them down to the minimum, which is after all what we might expect from such precaution.

I don't know just what you have done in the past, but it would seem to me that you have an opportunity to do much the same on the general principles as the American Railway Association has done. We have in our association a permanent committee on the prevention of highway crossing accidents. That committee functions year in and year out, and it is not for the purpose of making addresses, it is not for the purpose of making an oration, if you wish to call it, or a special report at any one of our conventions or to the National Safety Council. It is for the purpose of carrying on a daily work, a work of publicity throughout all of the years, and to have in mind that they have a continuous problem before them.

Each year we endeavor to interest the public by developing a different type of poster with a different slogan, always bearing in mind our slogan which a man from Canada can always pronounce—"Cross crossings cautiously." Several of our newspapers have said the thing can't be done, but it can be done and we can get people to think straight about a complex phrase like that; and the probabilities are that they

are going to think straight as to their actions when they come to our railroad crossings; at least it is upon that we are working.

I would recommend to you, if you have not already done so, that you establish a permanent committee; that you expect from your own permanent committee definite results; that you cooperate with that committee and give to it your full support, back it up by its publications, publish them everywhere. See that all the suggestions they make, whether you like them or not, if they are intended for the common good, are pushed out consistently to the public that you are trying to reach; and I believe that we can get enough publicity in this proposition that the time will come when we shall be satisfied with the labor that we have performed, or at least feel that we are accomplishing something in the wonderful work that has been done by this Council in endeavoring to save human life.

We believe that we have made our little impression upon the country, we believe that the attitude of the public today is different from what it was six years ago towards our railroads. You may not have exactly the same problem, though you have your local problem, which is hard enough to contend with, I appreciate; but by consistent pushing of a good work upon which you are honestly embarking and in which you are endeavoring to do your full duty, it will sooner or later have its effect. I commend to you then, gentlemen, that you establish such a committee if you have not one already.

I trust you will pardon me, Mr. Chairman, for time I have taken, but I want to leave with you one thing. I feel that this organization is going to be wonderfully helpful to the American Railway Association, if you do something on the line which we are doing; and together we can get the automobile to do something on somewhat similar lines, and with that we are going to reach the dawn of the day that we all hope for.

Automatic Lights and Bells Are New Dangers

CHAIRMAN EMERSON: Thank you very much, Mr. Rowe. We appreciate your coming here today and giving us such an inspiring talk.

MR. NOONAN: There has come with the grade crossing problem what I call a new danger in connection with the installation of automatic lights and bells at crossings. The danger is increased or decreased according to the number of tracks. If you have a one-track crossing, of course it is not so dangerous. I find that many roads are now putting automatic bells and lights at crossings, and they are making one of two mistakes. They may make the time from the moment a train approaches until it gets to the grade crossing so short that it isn't always possible for a truck or an automobile to get across, in my opinion, securely and safely.

The other extreme is to put the time of the connection between the approaching train and its arrival at the grade crossing so far back that the public have become aware of it and won't wait.

I am not talking theory, gentlemen. I have looked into it very thoroughly. I have got the figures and I find that trains are approaching grade crossings in congested places inside the territory limits of cities at 50, 55 and sometimes 60 miles and hour, and they seem to believe that a red light and a bell are sufficient. What happens to the automobile driver? He approaches the crossing, he has read all about the grade crossings in congested places inside the territory limits of cities become familiar with the bell and he says, "This is fine! I'm safe," and he proceeds to cross.

Now if it is a one-track crossing it is all right but if it is 10 or 12, as we have in some of our large cities, I am going to tell you that a train approaching at 55 to 60 miles an hour and striking the crossing 13 seconds after the bell rings, is too darn close a margin to save human life, in my opinion. I don't believe that any red light or any warning bell will ever accomplish its purpose unless we have a sensible reduction in the speed of trains, plus the bell and the light.

MR. ROWE: I think the gentlemen has a local problem in mind that ought to be handled properly by the local people, the municipalities and the railroads themselves. I think the principles of boulevard stops in some of our cities which control the stoppage by a red light should apply to our railroad crossings. We have in many of our major cities what is known as the "boulevard stop" and you need no police enforcement because the average driver is observant of the fact that he must stop at that certain street. Sooner or later, when that same, individual sees the same light at a railroad crossing, he will not proceed unless he knows it is perfectly safe to do so.

You will recognize that in treating a matter from a nation-wide standpoint with 250,000 crossings to consider, that I am not in a position to speak of the merits of any individual crossing or whether the protection is simple or ample, but if you have a local situation I think it should be taken up locally and the necessary protection afforded at that crossing.

CHAIRMAN EMERSON: If there are no questions that any gentlemen would like to ask Mr. Van Osdol with reference to his paper we will proceed with Mr. Carrow's paper. Mr. Carrow is Supervisor of Safety, Pennsylvania Railroad System, Philadelphia, Pennsylvania.

EDUCATING THE PUBLIC AND EDUCATIONAL WORK IN THE SCHOOLS

T. H. Carrow, Safety Supervisor, Pennsylvania Railroad System, Philadelphia, Pa.

It seems that somebody has to be a martyr in every cause and for some reason or other I know of no man that has ever been placed at the end of programs as much as I. I have no criticism of it, but I am willing to be the goat if anybody can follow such distinguished gentlemen as Mr. Van Osdol, Mr. Herbert Rowe, and Mr. Victor Noonan.

I am almost in the position of the German fellow I heard of a long time ago (and it hadn't occurred to me until this morning), who had a bakery business that was going on the blink, and he also had a dog. He was meditating about his troubles one day when he came upon the dog sitting by the fire perfectly happy.

"There you are," he said, "you don't have to worry about when you eat, you live contentedly and when you die that is the end of you. I am in an awful lot of trouble and when I die I've got to go to hell yet."

I should have liked to have given this question more thought. It isn't that I haven't given it thought, but it is my observation that it doesn't matter how much you know about a subject; if you are to present it intelligently to an audience of this type, it ought to receive a great deal of time and preparation before presentation. I have done the best I could with it, but I have had on my shoulders quite a lot of business. I had intended to look over a few issues of newspapers without regard to the date, and select a text from the daily items that appear before our breakfast every morning, but I slipped down here this morning and got a haircut that was very much overdelayed and I found exactly what I wanted.

Accidents Due to Lack of Appreciation of Danger

"Two men killed as automobile overturns, their wives die; driver loses control, car skids and is upset." That is my text. This case has been tried before all of the lower courts and up to the present time the verdict has been rendered at least partially against the plaintiff, the plaintiff being the railroads in this case. It seems to me we have got to take the proposition from an entirely different angle than what we have done heretofore. I was particularly impressed with Mr. Van Osdol's observations regarding the enactment of laws before people are educated enough to accept them, and how can we expect the public to obey with willingness laws they don't know or appreciate the reason for when they are enacted?

Nearly everybody thinks when he reads accidents like that which appeared in my paper, and which appear every day, that it is carelessness, criminal carelessness. Now I hesitate to say that it is not carelessness, because if I did somebody might make a beautiful newspaper story out of it, and it would go to the four winds of the earth, that highway crossing accidents are not due to carelessness. In my judgment, the fact that is as equally important as carelessness is failure of the pedestrian, the average automobile driver, the average person who is causing these accidents, to appreciate the dangers and the difficulties and the death-dealing qualities of vehicles on the highways.

If that is the case, it seems to me we ought to proceed on some definite line of attack. If it isn't due to carelessness, it is a reflection on any man's intelligence to say that criminal carelessness is wilful carelessness, as a preacher down in Maryland said. There is something more important to emphasize than mere carelessness. Your children don't

commit depredations because they recognize the fact that it is wrong; they are aware of it, but are not impressed with the thing that they are doing.

Now I want to illustrate that point. I was taking a trip from Pennsylvania on one occasion. My good friend, Dr. Housman, one of the brightest chemists in the United States, owns 14 automobiles and has been driving them ever since they have been made pretty nearly. He is a very clever driver, a man with very little physical strength but a very keen mind. He can drive his automobile in an expert way and has me beat a mile. He can drive almost as well as my wife can. We were going 35 or 40 miles an hour. His wife and mine were sort of flinging out death warnings every once in a while. He really was driving too fast for me to feel comfortable.

The Psychology of Contact With a Fatal Accident

He came to a crossroad and he saw a terrible wreck, a couple of people mutilated. What happened? He immediately slowed down and maintained a reasonable rate of speed for a long time. What is the psychology of that? What is the explanation of it? Was there something missing in Dr. Housman's mind that caused him to fail to realize at the time that he was driving at a dangerous speed?

How many of us here, for example, have had near accidents that have caused us to pause, that have caused us to hesitate, that have made us more careful? I was once driving down the road about 25 miles an hour and a lady who had no resources except three children that were too small to work, had stopped on the road to put up her rain curtains in a Ford car. A gentleman with a Dodge came along. His car was not under control and he went into us. We turned turtle with my wife and a friend inside, and by the grace of God we were saved. Since that day I never pass a man without more precaution than I did before that date.

Why was it necessary for me to have my life almost lost before I was impressed with the danger that I am constantly in when I am driving an automobile? Simply because I hadn't been instructed and because I hadn't been educated in the proper method of driving an automobile.

Knowledge is power, but knowledge isn't power until it is put into use. We don't need so much to be taught as to be reminded. All of us here have knowledge enough and intelligence enough to accomplish a great many things in our lives that we hadn't done, but we lack that particular thing that gives the impetus to carry on and do it; and that, gentlemen, is the thing that I am undertaking to emphasize here.

We want knowledge to be transformed into action so that the great bulk of these automobile drivers and pedestrians will realize what they are doing, and I can say this—God knows what would happen on the streets and highways of the United States if the automobile drivers were half as careless and negligent and stupid as the boneheaded pedestrians. We need to educate them on both sides. We want something put into effect that will make driving an automobile safer.

Take these obvious precautions that ought to be taken, such as slowing down. I hope before the convention is over that something may eventuate regarding this question, the question of slowing down. It seems almost incredible that a person with a bright light shining across a railroad track where the view is obtuse in both directions wouldn't slow down when he knows it. Looking in both directions—just the ordinary common sense of the situation—would suggest that any man would do that, and listen for the whistle, or the bell, or the locomotive.

It would seem to be even more obviously necessary, when one train is passing, to wait for another train to get out of the way if it happens to be coming in the opposite direction. Yet it is the disregard of those simple precautions, not anything that is obtuse, not anything that is covered up in mystery, not anything that we need to go to a technical college to learn, but it is just those simple precautions that people fail to exercise that are responsible for 80 or 90 per cent of the accidents on the streets and on the highways, and particularly at the railroad crossings, which are now amounting to nearly 23,000 fatal injuries and 600,000 non-fatal injuries a year.

Crossing Elimination Is Only a Fool's Dream

What is the remedy? My good friend spoke about a crossing elimination. I'll have to add that crossing elimination is a fool's dream. We are not going to stop eliminating crossings as long as we are in progressive America. But we can eliminate some, and if the people will get together and do their damnedest we can eliminate more than a comparatively few crossings every year, and I think that people are waking up to that fact.

What is the other remedy? To teach 30 or 40 million drivers of automobiles to use ordinary common sense and the precautions that are suggested by common sense; and I am right here to tell you, friends, that when you consider what a terrible job the electric railways have in teaching Mr. Motorman to be safe, the magnitude of teaching 30 or 40 million drivers of automobiles safety is something stupendous. And for that very reason I think we ought to attack the problem in the most practical, common sense way that our intelligence will direct, and furthermore we ought to back it up by reasonable laws, not by this nonsensical idea that some seem to have—that you can legislate people into Heaven by enacting a law.

I don't believe in that so much. If we didn't have a single law enacted for 50 years the American people wouldn't be any worse off at the end of that time. I sometimes think that if through some magic we could wipe off every single law on the statute books we would be better off. Aside from some few isolated cases, it is my contention that we don't need many more laws; but we want something to start with that will back up a campaign of education and instruction that will tend to restrain people from doing the things that they are doing to cause these accidents that we are daily reading about. And in order to make my

point clear as far as railroad crossings are concerned, what we want is something to induce people to stop, look and listen, meaning to stop when it is necessary to stop.

What is the significance of all of these stoppages at crossings? I am a statistician, and you know that statisticians can lie, and liars can be statisticians, and it doesn't make any difference whether I am accurate or not. I have traveled as much as 600 or 700 miles in a tour in an automobile. It is my judgment if you start from Detroit today and go to San Francisco, then back to Baltimore and Washington and over here that the total time that you would lose at highway crossings by using common sense precautions would not exceed one hour. The time it would take you would be 130 days. That is an awful squandering of time, if you think of it. I don't believe people who are as intelligent as we are will resent being told that they don't waste time if they stop at crossings.

Now I am going very readily to my conclusion. How are we going to start about this thing? In the first place I want to draw an analogy here with which you are all familiar. I wonder if you realize that 10 to 15 or 20 years ago the matter of checking and educating, instructing, guiding, and directing locomotive engineers and motormen on the street cars was in a very embryonic stage. We had progressed very, very poorly in this direction. In 1910 the great Pennsylvania Railroad inaugurated a system of surprise checking, now called efficiency checking. The people who did this work were called gum-shoe artists and the men who undertook to carry it on for the railroads were looked upon with a degree of scorn by the men in the rank and file. What is the result? We have gotten to a point on all the railroads where we make check upon check on our 38 units. We have a man on every unit, in some units two or three, to be constantly doing nothing but checking.

We Can Not Always Be on Our Toes in Efficiency

Now why was that necessary? Why is there something in the character of the human mind that makes it impossible for everyone of us to be on our tiptoes to perform our duties right, unless someone is checking us, unless someone is prodding us, unless there is an urge to do it?

Now the same way that we have checked locomotive engineers and street car motormen, changed to suit the situation, has to be applied to the drivers on the highways and at grade crossings and everywhere else. Speaking about reckless drivers, for example, what is the difference between a man that goes into an alley at night and shoots you down and a fellow that recklessly drives you down with an automobile? Why, there is this difference: that the criminal who shoots you with his gun is congenitally wrong; there is something wrong with his ethical and his moral nature; but the man who runs you down with an automobile is frequently just as fine a character as any man in this room, and perchance the vast majority of them would restrain themselves if this method that I am going to come to right now were introduced.

Now the accident record is bad. It is woefully bad. I'll say to you if we are having 25,000 fatalities and 600,000 injuries on the streets and highways and at grade crossings, we would have 10 times that many if every time that every driver did a thing that was a potential cause of an accident, an accident actually followed.

Now, here is my proposition: it is a big job, it is a simple job, it is a job that I think you and the steam railroads, the National Safety Council and everyone else ought to undertake. We ought to start out with a proposition of making a universal check of the things that are done that result in accidents all over the United States. The state of Pennsylvania, from which I come, for example, ought to set aside a week, and every other state in the Union and every other city in the Union. My proposition is subject to elaboration or cutting down, or anything. All I want to do is to get away with the principle. A universal check, with 100 to 500 men on the streets and highways to check up reckless driving and tabulate the results. These articles that appear in the daily newspapers about people that are killed and injured would make not one-half the impression which would be made by a combination of the results of all the states in the Union setting aside one week or one day for a universal check.

Only Three Per Cent of People Wilfully Careless

That seems a rather incredible thing, and I will withdraw that proposition and submit to you definitely the details. All that I want done, all that I suggest here today, is to emphasize that people don't recognize the dangers with which they are confronted. They don't recognize what to do with respect to accident prevention and we must first,—like the railroad companies make checks on their engineers, like the trolley companies make checks on their conductors and on their motormen—make checks on the drivers; and after we have tabulated the information, broadcast it to the four winds. I believe if we can only start out in some simple way, it doesn't matter whether we get 48 states or six, if we can take some specific locality and combine the results of a check in that locality with others, and then proceed on the basis of the situation, I know it is going to help.

I made a check on the highway crossings and I found that only three per cent of the people were criminally careless or wilfully careless, at highway crosssings. Now if the great majority of us are reasonably careful, another proportion a little more careful, then a very small proportion exemplify carelessness. It seems to me if we can fortify ourselves with that fact, there is no legislative body in the United States that wouldn't come across with that protective legislation which is necessary.

I trust that this intelligent audience will have the sympathy with me that ought to arise from undertaking to suggest and unravel so broad a proposition, and in conclusion I will say that as chairman of the Safety Section of the American Railway Association, if there is any way at all

that we can cooperate with you to put across this accident situation at grade crossings in a better light, and if we can help in any way by our cooperation, we will only be too glad to do it.

I will say for your chairman, as chairman of the Safety Section of the A. R. A., in being asked what my budget will be for next year, I have doubled the amount that we are going to spend for publicity on grade crossing accidents; and I haven't any doubt in my mind that the railroads and the trolley companies ought to spend five times as much for publicity and education in respect to highway crossing accidents.

Statistics Help to Visualize the Crossing Problem

CHAIRMAN EMERSON: I think it is very evident why Mr. Carrow is placed on the tail end of the program wherever he goes, because it is one way of holding the audience.

E. J. HARRINGTON (Cleveland Railway Co., Cleveland): What percentage of new crossings are being installed over the number of crossings that are actually eliminated?

MR. CARROW: That information is available from the Interstate Commerce Commission. I can only say that the number of new ones is greater than the number eliminated. I recently returned from a southern trip and there is absolutely a network of railroad crossings in those southern states, just as they are in this state, and there is no doubt that the question of railroad crossing elimination is merely child's play even to talk about.

MR. VAN OSDOL: I was very much interested in what Mr. Carrow suggested as one remedy. I don't know whether you are familiar with the report made by the committee on statistics at the Hoover Conference, but they have stressed very strongly, Mr. Carrow, the very proposition that you have presented to this meeting; and I want to supplement what you have said by recommending to the chairman of this Section that no more helpful measure can be adopted than to cooperate with the agencies that are gathering statistics along the very lines you have discussed. We have got to visualize this thing and you can't do it in one way. It won't do to say, "Oh, statistics are dry!" Statistics are facts, but whenever you can put the human element into statistics you will make them interesting, as you have done.

The point is this: I was very much surprised a short while ago in trying to get some statistics from the automobile association in my own state upon observations and checks that they had made with reference to operating automobiles on highways, and I found they had none. I had to go to other sources for the information that this association ought to have been especially interested in obtaining. They don't know a thing about it. They pay no attention to it. The whole purpose of that organization seems to be to make it as pleasant and as unobstructed for the driver of the automobile as possible. They don't think beyond the point of their own pleasure and look for no responsibility.

I would recommend along the lines of Mr. Carrow's suggestion, that this Section can't do a more effective thing in this year's program than to keep in touch with the Hoover Conference Committee that is going to undertake the checking for the purpose of obtaining the very information that you have recommended.

MR. NOONAN: I would like to go back a moment to the remarks that I made before Mr. Carrow spoke. We are here talking about prevention of accidents at grade crossings and I am not talking about generalities. I am talking about a specific danger—a specific danger which is not difficult to correct because some roads already have seen the light, and in addition to the automatic bell and the light they have reduced to a reasonable speed their trains. Now wherein comes the distinction in large cities? Mr. Rowe did not answer my question. As an officer of the American Electric Railway Claims Association he ought to be permitted to answer it. With that new hazard, that new cause, the railroads themselves ought to be interested in the elimination of that danger, because every time they strike a bus, or a street car, or an automobile they must face the cost.

Mr. Rowe made one very good suggestion which caught my fancy instantly. I don't recall in all the years that I have been attending these Electric Railway Section meetings—and I have been attending since 1913—that any officers from the American Electric Railway Claims Association have appeared on our program on grade crossing accidents.

A Committee Suggested on the Grade Crossing Problem

Mr. Rowe made a suggestion that we have a committee. Now out of this discussion, gentlemen, I want to see action, and I am going to move the chair that this group appoint a committee on the grade crossing problem to work with the committee of the American Electric Railway Association. I take it for granted that here in this room are operating men, division superintendents, and even trainmen who must take street cars across not only one track but 10 or 13 every day. Knowing from my own experience the great care used by the street railways, the constant cautions they are putting before their motormen and conductors, and knowing how faithfully they watch those crossings, I am not going to add any remarks that might be unpleasant; but knowing the check-ups that we make at the grade crossings in Chicago, we know the conditions that some of those crossings are in, and those conditions are similar to the conditions found in many small cities.

I want to say that I don't think it fair to put all the responsibility on the shoulders of the motormen and the conductors, on the heads of division superintendents or on the railroad managements, because I say here now, gentlemen, that a speed of 60 miles an hour, or 55, inside the city limits of any city is too dangerous and there is one remedy for it and that is that it should be reduced. I don't favor going after the steam railroads with clubs, because the steam railways have done a great work to conserve life on property and on their trains. I believe that we should

get more from the steam railroads through friendly contact, but I would predict for Mr. Carrow that if that particular system of safeguarding crossings with bells and lights, plus fast operation, is carried on at crossings where there are six, eight, or 10 tracks, wherever we meet next year some bus or street car is going to be caught in a death trap.

I wouldn't take this floor unless I thought this was very important. Two years ago I stood a lone figure in Cleveland in the Congress Hotel where I brought this same matter up before 300 or 400 steam railroad men. I pointed out to them the hazards of grade crossings in the city of Chicago, where we have had lives lost and where our property had been struck by a train—and you know what those wrecks are. Our trainmen had done everything possible, everything humanly possible to safeguard their passengers and crew.

Remove the Obstructions That Hide a View of Danger

My motion is that we have a committee to take this up with the American Railway Association; and I go further, gentlemen, and say that I think that our group here and the American Railway Association committee and the Steam Railroad Section, which is doing wonderful work, ought to sit in together for a day. One of the difficulties of safety work here is that you men do not come in contact with the safety engineers of the steam roads.

CHAIRMAN EMERSON: I am going to ask you just to defer that motion for the time being. Mr. Carrow has another meeting he wishes to attend. Are there any other questions anyone wishes to ask him?

MR. FUNK: I don't want to take any unnecessary time, but there is one thing about this grade crossing situation that sort of nauseates me. I agree with all these gentlemen have said, but here is the thing that I am talking about, that is, grade crossing campaigns. I have toured a good deal about the country and you can talk about safety devices, you can talk about lights, bells, and gates and all that. I am for them and we must have them. But it seems to me it is especially easy to tell a fellow, "All you have to do is stop and look." When he does stop to look he can't see on account of the obstruction.

I went to a sectional safety convention recently and they talked about grade crossing accidents. We inspected a railroad crossing of one of those railroads that is always talking about preventing grade crossing accidents, and there on both sides as far back as you could see was foliage of trees, shrubbery, fences, billboards, everything on earth to keep a man from using the best safety device he has—his eyes. I think as long as we are talking about cleaning up this thing, let's get our interurban people especially interested in making a survey of those crossings. What is the use of telling a man to stop and look and then shut off his vision? Let us go home and make a little, sensible common sense survey of what we are doing along those lines.

CHAIRMAN EMERSON: We have a telegram here from Samuel E. Johnson, district manager, Public Service Company of Northern Illinois, West

Chicago, who regrets very much not being able to be here. He has prepared a paper on "Mechanical Protection." In his absence, Mr. Eastham will present his paper.

MECHANICAL PROTECTION

Samuel E. Johnson, Secretary, Safety Committee, Chicago, Aurora & Elgin Railroad, Aurora, Ill.

It is necessary in presenting this subject to ask you to look back a few years to the origin of our country. I ask you to remember that on a day in July, 1776, this country of ours was founded on the expression of certain fundamental principals. The representatives started with a declaration of things that were to be objectives of the new government, and you will remember that these were Life, Liberty, Equality and Happiness.

Notice that among those ideals was Life. When your forefathers said, "We establish a man's right to Life" they meant his protection. They might also have meant his protection at grade crossings.

I read an article a short time ago which stated that, "As a matter of history railway grade crossings have been the subject of legislation co-incident with the opening of lines of railroads since the first. Massachusetts in 1835 passed a law reading as follows:

> "And if the Select-men of any town wherein any turn-pike, highway or town-way so crossed by any railroad is situate shall be of opinion that the foregoing provision (crossing signs) is not a sufficient security to the public . . . . that gates should be erected across the railroad and that an agent should be stationed to open and close the said gates; the Select-men may request said railroad in writing to erect said gates."

I believe the first real form of mechanical crossing protection was when our ancestors built drawbridges over moats surrounding their castles. That, at least, made crossings safe, since they removed them when not in use.

About 35 years ago steam railroads conceived the idea that some sort of audible warning was necessary at their grade crossings to warn pedestrians and vehicles of the approach of trains. Electric railroads did not take up the idea until some time around 1900.

The first forms of crossing protection were indeed very crude and a great many consisted of nothing more than a bell mounted upon a cedar post at the side of the roadway. These crude affairs served their purpose and were perhaps the beginning of the education of the traveling public to depend on a warning device at grade crossings instead of relying upon their own senses and judgment to protect them.

Speed of trains has increased as the development in the art of loco-

motion has improved from time to time, with resultant improvement in the grade crossing protection equipment.

Higher standards of living have changed the mode of transportation, not only from the standpoint of railroad transportation but also has resulted in improved methods of individual transportation. The old one horse shay has been replaced with high-powered, high-speed motor cars which travel on our highways today at speed several times greater than that of the finest passenger trains when mechanical crossing protection was originated.

To the bell, originally used and which still remains as a warning, has been added many additional features. The next development was to place the bell upon the post which carried the cross-buck railroad crossing sign. This set-up was used for a number of years and constituted the first combination audible and visible signal. This combination, I believe, really came about as a matter of economy, as the mounting of the bell upon the post at the crossing sign eliminated one cedar post support for the bell. This brought about the first real connection between the warning gong and the railroad, and since it was placed on the railroad crossing sign it was thought apparent to the pedestrian that the bell indicated approach of railroad trains.

Protect the Pedestrian in Spite of Himself

Little or no improvement has been made in the audible signal for grade crossings or in gates or barriers; but other features have been devised from time to time in the form of additional railroad signs, advance notice signs, flashing lights, wig-wag banners, and finally the last word in automatic mechanical protection seems to be the installation of the protective equipment in the center of the highway and located on both sides of the railroad. Automatically operated barriers are now in use in a few locations.

It has only been in recent years that mechanical protection at grade crossings has been designed from the viewpoint of the pedestrian or vehicle driver. His protection in spite of himself seems to be the goal.

In the early days it was felt that the bell was all that was necessary to warn the public of the approach of trains, but as time went on and the characteristics, habits, standards of living and attitude of the public changed, the requirements to be met by the designer of mechanical protection have increased to a point where he must place himself in the automobile driver's position in order to develop really effective protective devices for grade crossings.

The first thought to be given the railroad with respect to crossing protection is the distance from the crossing to the starting contact of the signal operation, which is based upon a maximum speed of the trains operating over the particular crossings.

Today mechanical protection, to be effective and efficient, must be constructed so as to present an honest, well-proportioned endeavor to protect.

It must be attractive and have a setting that will produce the proper psychological reaction in the mind of the automobile driver as to the danger of the crossing.

Just a few years ago the wig-wag signal was developed and in many cases carelessly located at grade crossings, with the result that little or no protection was afforded the motorist or pedestrian. Still later the flashing light was developed and in a great many cases located improperly, so it seemed for a time that the expense of these improvements did not warrant their installation. At this point the engineers responsible for mechanical protection at crossings realized that greater study would have to be given the subject if the devices already developed were to be made effective.

Three results may be noted:

Results of the Study of Mechanical Protection

1. The old standby, the bell, was found ineffective in warning pedestrians and has only been retained in connection with other forms of protection.

2. The wig-wags, which were originally mounted from 16 to 20 feet above the highway crossing and at the side, and many times were carelessly placed behind trees where a view of the signal was obstructed from the motorist, have been lowered to a point where they are now very close to what might be termed the horizontal range of vision of the driver of an automobile.

3. The alternate flashing red light is also now placed at a level where it is readily within the range of vision of the automobile driver as he approaches the crossing. These devices are mounted on pipe poles and in a majority of cases are set on fairly large concrete foundations in the center of highways, where they cannot help but attract the attention of drivers of all vehicles.

From the standpoint of safety the whole atmosphere in connection with crossing protection therefore is greatly changed. In the old days if a pedestrian or the driver of a vehicle heard the bell and stopped, it was very good; but if he did not and was struck by a train, he of course should have heard the bell and waited until the train passed. Today in the majority of highway crossings, outside of territory where absolute barriers are provided, the whole thought given to the selection of the device and the location of the signal is from the point of view of absolute protection to the user of the highway. Individual study is given to each particular crossing, the topography, the trees ahead of the signal and those that form the background of the signal are all considered in the plan. Advance warning signs are located and study given to the height, the size and the color of paint employed in the warning sign.

Finally, inasmuch as the first and original requirement for crossing protection, as far back as 1835, was mechanical gates, and they have

been in continual use since, and also judging by my personal experience on our railroad, I honestly believe that the mechanical crossing gate is today still the safest means of providing warning and protection to those who use our grade crossings.

CHAIRMAN EMERSON: This concludes, gentlemen, the part of this session which has to do with grade crossing accidents, protection, and so forth.

Mr. Noonan, I will be glad to have you submit your motion now.

MR. NOONAN: The motion I made was to carry out the thoughts expressed by Mr. Rowe, that we have a committee to make a study of the grade crossing problem from the point of view of the electric railway, not from the point of view of the automobilist or the pedestrian.

It is contemplated that we be given an opportunity for a round table discussion with the steam railroad section. I find it very hard on my property in Chicago to get any contact with the steam railroads.

CHAIRMAN EMERSON: This committee you are proposing to have meet with similar committees of the steam railroads?

MR. NOONAN: They could meet in conference with them and keep in touch with them.

CHAIRMAN EMERSON: Your motion then is for the appointment of a committee on grade crossings as applied with steam railroads?

MR. NOONAN: Yes.

(The motion was seconded.)

Keeping the Grade Crossing Safe in Canada

MR. READE (Quebec): I would like to say a few words on this matter, Mr. Chairman. In Canada, we are under the jurisdiction of the Board of Railway Commissioners. In Quebec we have all interlocking at every grade crossing and where the street car crosses the steam railroad we have to bear the expense of putting in that interlocking plan with the railroad company that operates that crossing, and it is up to them to see that the crossing is always kept safe. We pay 50 per cent toward the upkeep of these crossings throughout the year. We have four in the city of Quebec and in my 33 years in Quebec I never heard of a railroad crossing accident and we have always had the interlocking plan.

CHAIRMAN EMERSON: We are discussing the motion Mr. Noonan made. Are there any other remarks?

A motion has been made and seconded that we appoint a committee on railway crossings as applied to the things which this particular section is interested in.

(The motion was regularly carried.)

CHAIRMAN EMERSON: The committee will be appointed later.

The next order of business is the discussion of Accident Classifica-

tion and Statistics, and it will be opened by Mr. H. K. Bennett, safety manager, United Electric Railways Company, Providence, R. I.

THE VALUE OF CLASSIFIED ACCIDENT STATISTICS

H. K. Bennett, Safety Manager, United Electric Railways Company, Providence, R. I.

This is not a new subject. For more than 20 years it has cropped out here and there, only to be squelched with the fire of adverse opinion. It is true that local conditions do not always warrant an elaborate set of books to keep the various wheels going around. Yet I unhesitatingly say that if the department of my company of which I happen to be the head, did not keep an elaborate systematized accounting of the accident statistics, we would never know from one week to the other where we stand nor whether we were slipping backward or advancing in the right direction.

To the safety man these figures are as essential as costs are to the purchasing agent, or the number of passengers carried daily, in comparison with other periods, to the operating head of the company. It is true that one set of figures tells the latter story, whereas the safety man has demanded (and rightly, too) that accident statistics be vital and so arranged that they may be compared down to the nth degree if necessary; and wideawake, redblooded, modern executives are realizing this condition and gradually seeing the light of day.

Is it begging the question to know what types of cars are more prolific of accidents? Is it not essential to show the accident ratio between one-man operated and two-man operated cars? And the difference between the number of accidents of the various types as compared with open and closed cars, if you are so unfortunate as to run "bloomers," as they are intimately called? The trouble is that the usual claim department is so zealous in settling its claims that it gives little attention to the cause. The effect seems to be all that interests them. I have noticed, however, that these same claim departments point with pride to the decrease in accidents, the fewer claims presented and the reduced costs.

The question naturally arises, what is considered necessary in the way of keeping statistics?

Perhaps, if I outline briefly the system that is used in Providence, and make the modest assertion that with the ammunition furnished by these statistics we were able to get at the very foundation of accident causes, so that with the first full year of accident work on the property accidents were reduced 26 per cent and, notwithstanding a 20 per cent increase in automobile registrations, there was a decrease of 17 per cent in this classification of accidents, you may be at least interested, if not entirely sold, on the proposition.

In the first place, the safety manager's office is the clearing house for

figures that have to do with accidents on the property of the company, whether it be on the street, in the power station, pits or any other department.

Large maps of the principal cities in which we operate, enlarged to an approximate size of 8x10 feet, giving every street and lane, are used for the charting of the various classifications of street and highway accidents, by means of colored pins placed at the points where these accidents occur. Every day new pins are added and a glance will show where the automobile collisions, pedestrians injured, fatal accidents, derailments, car and car collisions, bus accidents and collisions with other vehicles occur. Thus, you have a birdseye view at all times as to where these various accidents are occurring.

Every accident report is gone over carefully and from each is taken the type of accident, place, date, time, type of bus or car, division, line, and years of service of employee involved. From this data, monthly, semi-annually and annually, reports are prepared for the operating vice-president.

On another chart we classify collisions with other vehicles, with other cars, falls upon boarding and leaving cars, as to the particular type of car. For instance, we have the one-man safety car, the one-man two-man safety car, and converted double trucks operated by one man, these latter having folding steps with automatic control of doors or stationary steps with manual control of doors. Hence the particular reason for this last chart.

For Too Many Accidents There Is Always a Reason

If we are having too many accidents (and of course any are too many) traced to boarding or leaving a certain car, there is a reason. It may be high heels, dragging skirts or plain carelessness; but, on the other hand, the platform may be defective, the edge of the step may be of the saw-tooth variety, there may be loose bolts or some obstruction on the platform, or floor boards or treads may be dangerously worn. The car is then inspected and if anything wrong is found, it is pulled off and taken care of.

Perhaps somebody will say here, "such a condition would not exist if there were proper inspections." My only reaction to this is that such a contention, of course, is perfectly true, but unfortunately there are those who still wait for the horse to be stolen before closing the barn door. Therefore, if anybody thinks we are keeping records unnecessarily, let them be considered simply as a check and the means of constructive criticism.

My good friend Noonan, of Chicago, goes so far as to classify automobile accidents as to the make of the car. Well, I am not going to say nay to that. He may have just as good or a better reason for doing this than I have to keep some records that perhaps may not appeal to you. So again local conditions must to a large degree govern the need for statis-

tics; but I repeat that every company, no matter how small, can well keep such figures as will show them whether they are slipping accident-wise or not.

If you are having a multiplicity of auto collisions at a certain point, there is a reason. Go out there and get a first-hand picture for yourself. It may be out on a suburban line, at a point where there is a density of traffic because some particular intersection is a popular way to reach a shore resort or pleasure park. Brush may obstruct the corner; it may be crossed at grade; or any of a half-dozen other physical conditions may have caused the accidents. Study the situation, put yourself in the place of your operator or motorman; then, if you are unfortunate enough to own an auto drive out and put yourself in the other fellow's shoes and see the accident from his viewpoint. Having done this, apply the cure that seems best to suit the case, remembering that the first application may not work and the patient may need a different kind of treatment. Do not give up for lack of remedies, however, for there are just as many remedies as there are diseases, and accidents are nothing more than a disease of a certain kind. There is a cure for every accident that ever occurred.

Statistics Help in Locating the Disease

But how can a disease be cured if you do not know what the disease is and the remedy to apply? How can accidents be stopped unless you know how, when and where they are occurring, and so have the facts in order to apply a remedy that will cure not only temporarily but permanently?

I have only alluded to accidents to the public but it is as important to know the kinds of accidents that are occuring to our employees as it is to know those affecting the general public.

If employees are being injured by defective tools, your safety department or somebody interested should know it. If any of your employees get a shock in connection with any machinery used in your shops, this fact should also be known. Where you have a safety man on your property, or someone to whom such facts would be valuable, I think an ideal way is to have the heads of your line, power, track, equipment and trans portation departments keep separate records of employees' accidents; these should show the name of the injured person (for the purpose of seeing if this particular person is prone to have accidents), the particular classification of accident, where, when and under what circumstances the accident occurred and in connection with what appliance. A duplication of the cause, kind or person involved in a second accident naturally brings up the question of why, and this can be followed out to suit the individual desire.

These records, of course, should be kept in such a way that they may be looked over; and by this I do not mean a casual look over, but a systematic checking so that preventative measures may be applied as soon as possible.

Local conditions and the need for classification of accidents must be the predominant factors in determining just how far an individual company should go in this particular respect. It must be assumed, of course, that a company operating hundreds of cars requires much more information than the company operating a comparatively small number; but I do not wish to infer by this that it is not as essential for the small company, as for the large one, to use some classification.

It may be a new adventure for some companies to delve into this matter of accident statistics at all, but we must remember (and this is particularly pertinent for those of us who have been in the railway game for many years) that this is 1926 and not 1900, and that in this stage of existence there are many new angles to street railway work which could not have been appreciated 25 years ago. One would have been put down as a dreamer if he could have predicted, 25 years ago, some of these new things which are now engrossing the attention of our public service corporations.

So I strongly urge that each representative here give this matter serious consideration. When you get back to your respective properties look the matter squarely in the face, and with the knowledge that other companies have benefited by keeping these classifications, benefited in the reduction of accidents and in suffering, and also from the cold-blooded angle of dollars and cents, adopt some suitable plan meeting the personal needs of your organization and try it out for one year. If you will do this, I will venture to predict that the effort will not have been made in vain, and that at the end of the year you will say that you not only believe in keeping such records, but that you are adding to your classifications as the trend of the times demands.

CHAIRMAN EMERSON: In view of the fact that there are three gentlemen to discuss this same question of Accident Classification and Statistics, I am going to ask that we defer our discussion until we hear from the other two. I will call next on Mr. Victor T. Noonan.

DISCUSSION OF ACCIDENT CLASSIFICATION AND STATISTICS

Victor T. Noonan, Chicago Surface Lines, Chicago, Ill.

I am not going to weary you with any papers. I want to talk. This matter of the standardization of accident statistics is not new. It is as old as safety engineering is in this country. Proper statistical methods, scientific methods, are as necessary to accident prevention work as anything else you do because your accident statistics are the foundation of your work. You can't prevent crime, disease, or anything else unless you know causes and it is from these facts in black on white that the student of the accident problem gets his data. From that data he then proceeds to work out remedies.

I remember 12 years ago we had the same discussions, the same ignorance and the same indifference in the industries of this country in regard to accident statistics. Many of our largest industries made no distinction whatever between first-aid cases and lost-time cases and compensation cases. Everything was an accident and in the course of time I found myself as director of safety under the Industrial Commission and our statistical department was completely at sea because we were not able to compare the accidents of the various industries. I had to go into hundreds of large industries in Ohio and show them simple ways of keeping statistics for the purpose of getting everything on a standard basis, so that then we would know what was happening in the foundries between the various industries.

In education work I have consistently emphasized to every employer and to every safety engineer the utter necessity of having statistics that are right, that are scientific, and that are clear-cut. Now we come to the American Electric Railway. What do we find? We find, gentlemen, that we are in the same battle that the industries were in years ago, we can not compare our accidents from one city to another and if you did attempt to compare them they would be very inaccurate.

A Problem for the Safety Engineer

The American Railways have the same practice that the American industries had 10 or 12 years ago. They made the foolish mistake of calling everything an accident. Everything that happens on a street car is not an accident. With all due respect to our lawyers, as I said yesterday, if a woman sits down on an eggshell and crushes it on the seat of a street car, it is not an accident. If a man driving a Ford car has his fender bumped that, gentlemen, never in a million years can ever become an accident, because an accident can't happen to a piece of metal. Accidents happen only to human beings. Accidents don't even happen to dogs or horses and there is a clear psychology and a clear logic in this. Yet we find our railway brothers calling everything an accident.

Some of our claims men seem to be afraid to make a change. Why? They seem to think that with the coming of accident prevention work the amount of business they are going to do will be decreased. It won't be decreased. There will always be need for a claim department. We will always have accidents, no matter what you do. This problem, gentlemen, is not for the claim department so much. This problem is one for the safety engineer. It belongs in his department. If you can not make out the statistics themselves in an intelligent way then it should be done by the claim department and there should be close cooperation between the claim department and the accident prevention department, and the claim department should give the statistical information, if possible, in a way that it is desired in the safety department. If your accidents are not properly classified, what happens?

Here are some of the outstanding effects that I see, gentlemen. Please

note these two effects. First of all, I have observed that because accidents are not properly classified and put on a standard and intelligent basis, there is one department in every electric railway property that is crucified, loaded down everlastingly with the burden of the accident problem, and that is the transportation department or the operating department. Here is the claim department forever putting a load on them, 1,000 accidents a week, 200 litigations a week, and so forth.

Then the load is pushed down on the average executive so that he is afraid to look at his accident report. All he gets is that constant load of accidents and costs; and then the property itself in the eyes of the public is always being advertised in the press as being one of the worst causes of accidents in the city or town. A jaywalker crosses the street and collides with a street car and is killed. The street car is blamed for knocking down a pedestrian. A man makes a Dutch crossing with his automobile and collides with a street car and the street car company is blamed. A man is intoxicated and he forgets the track he is on; he is going west and strikes a street car going east and the newspapers have it, "Street car rams automobile and kills driver." That is all part of your system of reporting accidents and your system of keeping track of accidents.

Now, gentlemen, if the recommendation that I would like to see go through were adopted, it wouldn't mean a big change in the statistical methods in your claim department but it would mean a big relief and a big load lifted off your transportation department or your operating department and your trainmen, and it would mean more pleasant reports for your executive and vice-president.

Separate the Paper Reports from the Accidents

We should have the accidents brought out in the daylight and not submerged in a lot of camouflage so that you don't know what is going on from one year to another. I am very proud to say that the Chicago Surface Lines' claim department, headed by Mr. Treaty and his predecessor, Mr. Ginan, cooperated 100 per cent with our department. They gave us everything and worked out every new suggestion that was made with the result that today, in our property, we have daily reports and weekly reports and monthly reports which show a clear segregation of the major accidents, from which we are able to make charts and diagrams and put them in a magazine or put them on our bulletin boards, and from which I am able, myself, to put my nose on the track to locate some of the causes.

Now let us find out the simple basis that I would like to see adopted. First of all, instead of calling everything an accident, gentlemen, let us begin at the A. B. C. and separate paper reports from accidents. A paper report is not an accident unless someone has been injured. All things that happen, such as a woman tearing a dress, little arguments, fights between passengers and trainmen, all of those things are not

accidents and should be put in Class Number One paper reports. Not hard to do, gentlemen; it is very easy.

Secondly, going up the ladder, all property damages ought to be kept separate from paper reports. You see that, don't you? You operative men see what that would do, for you get that information every week. And thirdly, your injuries should be kept separate from your property damages. In Chicago we run anywhere from 800 to 1,000 accidents a week, calling them by old classification. It is very important for me, gentlemen, looking at it from the accident point of view every week, to watch that line and every day see how many paper reports are turned in, how many property damages. Why? Because the automobile is more and more becoming a costly problem for the operating railroads of this country. I want to watch that automobile line exactly and compare it with the previous month and with the previous year. Then your injury line—that is very simple. These three simple standards do not necessarily affect any changes in the system of accident statistics as originally adopted by the Claim Association ten years ago. It is a step more to clear the atmosphere.

Segregation of Fatal Accidents Necessary

Outside of your injuries you keep your fatality accidents. Here is one class of accidents that absolutely needs segregation. Many operating departments in this country are every month turning into the management fatal accident reports, and when you get them you find fatal accidents in there that no street car and no motorman ever caused. When a case came through where a girl was killed by a Ford car I use to pass it up. The train crew got out and took the license of the car and gave what first-aid they could, and properly. Yet that accident comes through on our fatal lists as one of our accidents. That is wrong! Fatal accidents other than the company's should be kept separate. That is not hard to see and we see no reason why any claim man should object to that. Yet they seem to object to it.

Then there ought to be a further sub-division along the line, divided into two main classes, injuries and deaths and property damages, calling them preventable and non-preventable; call them company accidents or non-company accidents; the accidents caused by our own trainmen; the accidents caused by the company's own fault; the accidents caused by failure of mechanical equipment, meaning bells and buzzers; and then the clear-cut accident caused by the other fellow, the truck driver who comes out of a side street and strikes the side of your car.

How can any accident prevention department prevent such an accident, and yet those types of accidents are happening. Those types of accidents caused by the other truck driver or the pedestrian should be absolutely kept separate in a classification of accidents because when they are kept separate the safety engineer as well as the general superintendent of operation and the division superintendent of the train

and the trainman can be supplied right along in their committee meetings and in their safety meetings, not with just general talk on the causes of accidents, but with illustrations of the types of accidents that are happening each day on the lines.

In the same way the costs ought to be split up. There should be more study of the causes of cost, and there should be more study as to where the cost lies and on what classes of accidents. We have 35 accidents per month out of 1,000 that are costing in the course of the year a quarter of a million dollars. Here is one bunch of accidents where our accident prevention work ought to center itself to see if they can cut down the number of those accidents and the cost of them.

Gentlemen, this is a problem for the safety engineer largely. Yet to everyone of you operating men here it is important because the proper standardization of accident statistics is going to be the greatest help to you, whether you have a safety department or not, in carrying on intelligently your accident prevention work, so that you will know exactly where to apply a remedy. It is unfortunate that some of our claim departments have taken what I may call an antiquated stand on this. They are behind the times, because this basis of accident statistics that I am urging is recognized by the best scientific experts on statistics in this country as the proper basis for keeping track of accidents. Therefore the claim men who will not cooperate with the accident prevention department or will not help their operative departments to secure this information and standardize it throughout the country, are simply holding back a good work; they are not cooperating in a great and important work in their own organization that has for its purpose the saving of human life and the prevention of suffering.

Cooperation Between Claim and Accident Prevention Men

I have been personally so discouraged about this—I have talked it at these meetings for years—that this past year I absolutely made up my mind that I would not discuss it here this year. I have said if I can't get cooperation through our National Association that I would go ahead on my own job and do the work as well as I can with the approval of my own management and with the cooperation and good will of my fellow associates. But I can look back and remember that Mr. Bennett, as a claim man, had the vision to see the value of this work, and he had the courage, gentlemen, to come here today and read this paper. He read it modestly but well, and when they asked me to back him up I could not stay in the background and refuse to say a few words here. I hope that these few words will give you something to think about, that they will impress upon each and every man here the necessity of watching your accident statistics and having a good standardized system to carry on your accident prevention work.

In conclusion I want to pay you all a compliment. I have attended these meetings ever since the beginning, and never before have I found such pleasure in attending an accident prevention meeting of our Electric

Railway Section and listening to such wonderful discussion from the floor as has come up at these sessions. I have been impressed by the questions that have been asked, and I think, Mr. Chairman, the officers of this Section deserve commendation, but the gentlemen who are present deserve the highest encouragement because I feel sure that each of you is sincerely trying to represent your own property and your own management in the way that men should do who have this great work at heart.

CHAIRMAN EMERSON: The concluding portion of this discussion is to be presented by Mr. G. B. Powell, superintendent of transportation, Louisville Railway Company, Louisville, Kentucky.

VALUE OF ACCIDENT CLASSIFICATION

G. B. Powell, Superintendent of Transportation, Louisville Railway Company, Louisville, Ky.

The subject could be made to produce a formidable array of comparative figures and pages of highly technical statistics but I am not a statistician and have no legitimate reason for attempting to punish those present. The value obtained from accident classification in the organization with which I am connected, The Louisville Railway Company, will constitute the message I have to deliver.

Two reasons for classification of accidents stand out with equal prominence. To determine the "Cause" and "Fix the Responsibility," both of which are fundamentally necessary if the attempt to prevent recurrence is to be successful.

All accidents are the result of the negligence of someone, so in public transportation of passengers it is necessary to classify in order to determine whether the responsibility rests on the employee, passenger or those on the streets. When it is found that the employee is responsible, the remedy can be quickly applied. If the passenger is to blame then by the slower method of additional safeguards and education the results may be obtained; but when it comes to dealing with those who share the streets with us, the careless jay walking pedestrian and the speed mad vehicle driver, the results to be obtained and hope for the future must come by the painfully slow process of legislation supplemented by public opinion produced through costly education.

We use more than 100 classifications of accidents incident to street railway operation. Automobile collisions constitute 80 per cent of the total, so, of course, head the list, and in seeking our goal, cause and responsibility in auto collision, the analysis leads to 20 or more classifications.

For instance, direction would seem very simple—right angle, same direction or opposite direction; but be not deceived if you expect our

good friend, classification, to produce results; open up its pages and search therein.

Right angle, yes; but at street crossings, between corners, from right or left, or at alleys; likewise, same direction or opposite direction is only meager information until classification discloses—struck rear, front, right side, left side, rear left corner, head-on, etc.

Persons injured classified as passengers, pedestrians and employees is only a start; each must be sub-classified under at least a dozen headings before the analysis will yield its value. Car collision, split switches, boarding and leaving, all down the line the process of proper classification must be pursued until each accident is properly tagged and hung up before us, with the reason therefor, as plain as if it had been purposely staged before an audience assembled to witness its production.

When this is done the value of classification manifests itself in the opportunity to present to the party responsible, those in authority over them, and the local safety council the true facts, which often results in cooperation in adopting means to prevent a recurrence of similar accidents.

Another classification we have found valuable is in relation to the location on the property where accidents occur. A map of the city showing all street car lines is posted and colored headed pins are stuck in the map at the exact location where an accident occurs; different colored pins represent the different kinds of accidents—white, auto accidents—red, car collisions—black, boarding and leaving, etc. This method of classification enables us to determine the location on the property where accidents most frequently occur and accordingly concentrates our efforts in the troublesome location.

Data Valuable in Analyzing the Accident

Another classification of great value is in relation to the time accidents occur; this is also kept with colored headed pins stuck in a chart which is divided into hourly divisions. As would be expected, the greater number occur during the peak hours of travel, but many important discoveries were brought to light by this method of classification; for instance, more automobile-street car collisions occur between 8:30 and 9:30 a.m. than during the peak rush hour, 7:30 to 8:30 a.m.

Analysis of this situation discloses that speed substituted for leaving home on time is the predominant cause of these collisions. The increase between 11:00 and 12:00 at night over the earlier evening hours deals with the homeward rush mixed with joy riders starting out, and includes many serious accidents in our line of business. The value of hourly classification is the information enabling concentration of efforts at the right time.

One more classification I desire to mention, one which we deem of vast importance, is fixing the responsibility in relation to our employees. All accidents are recorded on the employee's record card and are classified

"Blame," "No Blame," or "Non-committal." The non-committal are those accidents which the employee was not responsible for but which he might have prevented by the exercise of extreme care and good judgment. In other words, save the other persons in spite of their carelessness. This method enables us to keep constantly before us the efficiency of our force in accident prevention and has materially assisted in building up the splendid cooperation we enjoy in our organization.

Summarizing accident classification, as I see it, knowledge is conceded to be power. Analysis is recognized as the best method of obtaining the desired knowledge of any subject. Classification of accidents is an analysis which will reveal cause and responsibility, the necessary goal if prevention is to be secured. Therefore, classify the accidents which occur on your property: First, in general groups, then subject each group to an analysis which will spread them out before you until their legibility permits a clear vision of the cause and who is responsible, then and only then will you be in a position to apply the best possible remedial preventive measures.

Committee Study of the Various Classifications

CHAIRMAN EMERSON: This concludes the presentation of the subject and the meeting is now open for discussion.

MR. READE (Quebec): I have some interest in this last subject, especially on the point brought out by Mr. Noonan, and I would like to make a motion to the effect that the Council print the code followed by Mr. Noonan and send it out to all members of this section for their approval, and by doing that we can get some adopted plan to classify our accidents.

The motion was seconded.

CHAIRMAN EMERSON: Before asking for discussion on that, it occurs to me that the proper method to pursue would be for the committee to study the various methods of classification and then make a recommendation. The classification Mr. Noonan uses in Chicago wouldn't be the one that applies throughout the United States and Canada. I don't think a committee should be limited in its work to the study of any one particular system. I would like to hear remarks from the other gentlemen.

MR. NOONAN: I should explain that there was a committee in connecnection with this Section on standardization of statistics, but we got nowhere. My plan is not a classification which would conflict with the claim department because I have simply outlined a skeleton that any company could follow.

MR. VAN OSDOL: If Mr. Noonan's motion has prevailed it is certainly the motive of that committee, after a study, to make such standard recommendations as might seem proper and undoubtedly they will, by questionnaire or otherwise, get the reaction from the various interests; and it seems to me that that will cover the point made by the gentleman from Canada, and this committee will accomplish that very thing.

W. H. BOYCE (Pittsburgh Railways Co.): I would like to make a suggestion along the same lines. Inasmuch as there are about 150 company

members in this group railway Section, there are probably only 20 per cent of them represented by delegates here, and therefore this committee should send out a questionnaire to all the companies embodying the question Mr. Noonan outlined and all the details of Mr. Noonan's plan, and then let the committee study those replies and give that matter careful consideration before they make their report.

SECRETARY EASTHAM: As secretary of the Section during the past year and also chairman of the Committee on Recommendations, I think that the committee to which Mr. Noonan refers has already been under advisement, because the Committee on Recommendations thought that one of the main recommendations and investigations would be along this same line. In one of the news letters sent out during the past year a request was made that all the members send in what they were doing in the way of classifying accidents. I think about three answered out of the 150 members.

Assistance of Section Members Is Asked

Now for the new secretary or the new committee that may be appointed along that line, I would like to suggest that some means be had of seeing that the communications that go out from this Section reach the right party in the different organizations and then that the right party take the individual responsibility to reply to the request, whether it is in the form of a questionnaire or a request to have their classification of accidents or whatever it may be. It is only through the help of you members that this Section is going to be anything like a success.

I'd like to stress something that I think is in line with what is being suggested. I think it would be a splendid thing to get all the companies to send in to the committee just how they are classifying their accidents, whether from the claim department's standpoint or from the standpoint of those who have safety departments. With us, the claim department don't cover it as I want it, so I go over all the reports in my department and get figures for the safety department in addition. I am not going to take the time to discuss how that is done, but it is along the same general lines of classification, not quite as broad as Mr. Powell's, but broader than the average company.

CHAIRMAN EMERSON: I am going to ask you to defer that question until we finish this motion. We want to get an expression with regard to Mr. Reade's motion.

MR. POWELL: I don't believe in passing the buck. Now it seems to me that last year when they were working on this classification proposition, there had been a lot of literature sent out and questionnaires, and somehow or other I didn't know they had been sent out. Now this Section of the National Association should find some means of getting this information or these requests to the right party. Most companies have a safety department and I know they will answer and I know that every transportation department superintendent would respond too.

CHAIRMAN EMERSON: I presume it is the idea back of the motion that

this committee shall study ways and means of securing adequate data so that they can in turn make a recommendation.

MR. NOONAN: We had a committee on that proposition. May I make that clear again? I was on it and Mr. Powell was on it, too. The American Electric Railway Association had such a committee. I was on a previous committee some years ago in this very Section. Mr. Welch, the executive secretary of the American Electric Railway Association, down at his office in New York City has never been able to get information on questions from any companies throughout the country. It is my opinion that if you will draw up a model and send it out as something worked out and something constructive you will get far better results.

CHAIRMAN EMERSON: That is what Mr. Reade has in mind.

G. R. WHITMORE (Illinois Power & Light Co., Peoria, Ill.): I would like to know whether this classification applies to every department or merely the claim department. The transportation department may have a way of classifying accidents, the safety department may have a way of classifying accidents. Just what does this motion mean?

MR. NOONAN: This plan is simply to take the accident data as kept by the claim department which is the proper department to get it from. The claim department is the logical department to start with.

To Draw Up a Model Plan of Keeping Records

CHAIRMAN EMERSON: I understand that what Mr. Reade has in mind is the securing of the proper form of accident statistics which will be handled properly through the claim department, to be adopted by them and which will be adapted to any property. In other words, to draw up a model plan of keeping records and so forth which will throw more information into the different classifications and segregations of the accidents that occur. I think everyone here understands the motion. It has been seconded.

(The motion was put to a vote and carried.)

J. L. FAHEY (Scranton Railway Co.): I would like to ask Mr. Noonan whether he regards torn clothing, that is clothing damaged on the cars, of sufficient seriousness to be classified as property damage?

MR. NOONAN: Absolutely no. No material that is damaged is a property damage. There are a great many things that happen that don't come under either classification and then you put them under paper reports.

CHAIRMAN EMERSON: We will proceed to the last section of the program for this session, which is a round table discussion. The first section of that relates to "No Report Claims and What Is Being Done to Reduce Them." Mr. G. R. Whitmore, general claims attorney of the Illinois Power & Light Company, Peoria, Illinois, will present that subject to us.

NO REPORT CLAIMS AND WHAT IS BEING DONE TO REDUCE THEM

G. R. Whitmore, General Claims Attorney,
Illinois Power & Light Corporation, Peoria

Did any of you claim men ever receive a letter something like the following?

> "I represent Sam Traicoff, who was seriously injured about two weeks ago, when he was thrown to the street while alighting from one of your cars at Main and Broadway. According to the witnesses, your motorman started the car with a jerk while my client was in the act of alighting from the car, and this is a straight liability case. My contract calls for 50% of whatever is paid either by way of settlement or suit.
>
> If I do not hear from you within the next ten days, I will file suit for $20,000.
>
> Yours truly,
> I. M. A. Chaser,
> Attorney."

All of us have received such letters, and we immediately look through our files and records, and what do we find? Nothing. We then take up the matter with the operating department and both start an investigation.

There is no need to detail the grief, worry and absolute dissatisfaction that follow claims of this character. No one is satisfied or pleased, whatever may be the outcome of the case.

Typical "No Report" or "Blind" accidents fall into two classes, namely, those that are fake and fraudulent and those that are meritorious. This applies either to accidents to employees or to the public.

Accidents involving the public generally will be discussed first and then we shall take up the question of "No Report" employee accidents.

The main purpose of claimants in connection with fake or fraudulent "No Report" accidents is to capitalize them; the best way that we know of to reduce the number of such accidents is to keep them from being capitalized and thus discourage claimants. We can investigate the claimed accidents and the claimant himself, and, if not absolutely satisfied with every feature of the case, we can and should decline the claim. In an investigation of such a claim, something will always crop out indicating that the matter is not straight in every way, and intuition and experience will enable us to detect the crooked claimants.

We have adopted the policy of declining claims growing out of unreported accidents, unless we feel certain in each case that the accident did happen and that the claimant is telling a straight story. Our experience shows that we have very little trouble with claims of this nature, except in one large city where, it appears, there is a gang of negroes making a practice of pressing such claims. In the last three months we have had over a dozen such claims at this point but we have declined them all. Some suits have resulted but we intend to defend them. If we should concede anything in the way of settlement in any of these claims,

we feel that there would be no end to claims of this nature being pressed, especially by unscrupulous attorneys.

However, we believe that it is more important to consider here, how we can reduce or eliminate accidents that actually happen, but are unreported, and where the claims appear to have merit.

Most of the accidents of this class, in connection with electric railway operation, are of two kinds; one, vehicles or persons struck by other than the front end of cars; and two, passengers falling in cars, on platforms or in boarding or alighting.

Railway officials and operators or trainmen can not control the actions of vehicle drivers or pedestrians, who insist upon running into the side or rear end of cars, and such accidents, sometimes unreported if slight and a jar is not noticed by the car men, can not be prevented by the railway. We can and do prevent standing vehicles and persons being struck by the overhang of cars by careful operation, watchfulness and due regard for the rights of others by our car men. Safety lines help and so does proper parking, careful driving, thoughfulness and alertness on the part of vehicle drivers and the public generally. Naturally, education of the public and vehicle drivers in particular regarding the danger of such accidents will tend to reduce them, but the first thing for us to do is to see that the company officials and employees appreciate the responsibility which they bear in this connection and do what is possible on their part to prevent such accidents.

The Human Element Important in All Claims

What are we doing and what can we do to prevent unreported accidents, where passengers fall in cars and from step and platform? Proper operation of cars in good condition over smooth track and with no outside interferences will tend to prevent them, but we do not always have such ideal conditions. All managers want their equipment and tracks well and economically maintained, but we know that sometimes economy alone in maintenance is the aim. This should be a point to strive for by every mechanical department but there should be no excuse for the operation of defective equipment. Sometimes a car in bad order will get out on the line, but it need not run for any considerable period, if motormen and conductors will report such cars at the first available opportunity to the proper company officials and such company officials do their duty.

It is our feeling that the human element is the main thing with which we have to contend. Our experience has been that one or two men out of a hundred have unreported accidents and these men cause most of the trouble. An old, experienced and loyal employee seldom has to be called on the carpet in connection with an unreported accident. It is the inexperienced, thoughtless, indifferent and careless employee that causes such accidents to happen; and, furthermore, if such an accident does happen he will either not know of it or, knowing about it, fail to report it unless the injuries are apparently quite severe.

The first duty is upon the superintendents, who hire the men, to use judgment in selecting men for operating our cars. Assuming that we have selected the right men as employees, there must then be constant supervision by competent officers to see that the employees are kept up to a high standard of conduct. All the rules and supervision in the world will not make a "bad" employee good and the quicker we weed out the shiftless, careless, thoughtless and incompetent employees, the sooner will this problem be solved. It has been our idea always that properly selected employees, well trained and supervised, will solve most of our accident problems, including the problem of the unreported accident.

The Unreported Accidents to Employees

Unreported accidents to employees are also a source of trouble and annoyance. I think it is the experience of most companies that practically all regular and steady employees report all accidents causing personal injuries to themselves. Occasionally, a very slight injury, such as a scratch or a splinter in the finger or the like, is unreported. Little attention is paid to an injury of this nature unless an infection sets in; then it often happens that the injured person can not recall the place, time and cause of the injury, thus making it very difficult to handle such an accident under the terms of the Workmen's Compensation Act.

Accidents causing strains and particularly ruptures are the most unsatisfactory of all unreported employee accidents. We have all had experience with hernia cases, but we are finding the remedy and a solution in the provisions of the Compensation Acts of the various States. For instance, in Illinois the situation as to hernias has been cleared up exceedingly by the enactment of paragraph D-1, Section 8, Workmen's Compensation Act, which provides as follows:

> "An injured employee, to be entitled to compensation for hernia, must prove:
> (1) The hernia was of recent origin.
> (2) Its appearance was accompanied by pain.
> (3) That it was immediately preceded by trauma arising out of and in the course of the employment.
> (4) That the hernia did not exist prior to the injury."

This provision is also limited in that notice of an accident causing a hernia must be given the employer within 15 days after the accident.

Prior to the passage of this amendment to the Compensation Act in 1925, it was necessary that practically all hernia cases be handled in accordance with the terms of the Compensation Act. The time, no doubt, will come when each state, which has a Compensation Act, will provide for the handling of hernia cases somewhat in accordance with the provisions of the Illinois Law and then, in our opinion, substantial justice will be accorded both the employees and the employers in connection with such cases.

The remedy for unreported employee accidents, particularly those in which regular employees are involved, largely lies in constant supervision. By this, we mean that the managers and superintendents should see that the foremen, who are in direct charge of the employees, are instructed that regular form accident reports should be made out immediately upon the happening of an accident and that the foremen carry out their instructions. This is not so difficult where the industry is located in one or two central plants but the situation is complicated somewhat when, as in the case of a company like ours, we serve several hundred communities in a number of states and have various plants, small and large, at many points. However, it is just a question of having a good organization, specific instructions and constant supervision.

When it comes to the question of unreported accidents to casual employees, such as those engaged in track work in the summer, or construction work from time to time, we have a more difficult problem. Such employees are not particularly interested in the welfare of the company, are not imbued with the spirit of loyalty toward the company to see that everything is done in accordance with instructions and what is right and proper, and we often find that a large proportion of our unreported employee accidents come from this source. Casual employees are here today, gone tomorrow and can not be easily traced. With a regular employee, we have this original physical examination and other physical examinations from time to time, as well as a record of his past employment. Such is not the case with casual employees and when a claim is made by such an employee for an unreported accident, it is necessary to spend much time and energy to find out all the facts.

Unreported Claims Are Usually Found Unworthy

One remedy is that of discouragement, that is, an unwillingness to recognize any such claims, growing out of unreported accidents, until every source of information has been thoroughly investigated. We believe that in the vast majority of cases, such claims are found to be unjustified, if not fraudulent. We have just had two such cases, one, a construction employee, shortly after the work had been completed and he had been laid off, claimed that he hurt his leg, the injury resulting in an ulcer. Upon investigation, we found that some years previously this man had a claim under the Compensation Act against another employer and had received compensation. We located the doctor who had taken care of him and he stated that the injured man's leg was in exactly the same condition at the time of the hearing of his claim against our company as it was some years previously. We won this case. Again, another construction employee, shortly after his discharge, claimed permanent disability as a result of an unreported accident. Upon investigation of this case, we found that this man had had a claim against a previous employer and had been awarded compensation for permanent disability and had received a large lump sum settlement.

The attorney for this claimant dismissed his case after this evidence was introduced.

We believe that the safety department can do a great deal to eliminate unreported employee accidents. The safety engineers can educate the employees to report immediately all accidents, no matter how minor the injury may seem to be, can supervise and instruct foremen and can see that the instructions are followed.

Perhaps it is not within the purview of a paper of this kind that we should discuss the question of physical examinations of employees. We believe that practically all employers now follow the policy of having a thorough physical examination of employees at the time of their employment and further examinations periodically thereafter. We do not believe that many employers require physical examinations of casual employees. Our rule is that if a man, originally taken on as a casual employee, remains with the company for a period of thirty days, he must then submit to a physical examination. Solely from the standpoint of the claim department, and not considering anything else, we believe that every employee should have a physical examination prior to his employment. We find that reports of physical examinations are of value in checking up on injuries later claimed by employees, particularly in connection with unreported accidents, and more particularly, in connection with claimed hernias.

I have not attempted to set out how and in what manner all unreported accidents may happen but have discussed only those which are most common. Many otherwise unreported accidents become reported by reason of employees reporting every incident or occurrence in connection with company operations coming to their attention either while on duty or off; the employees should not judge of the importance or triviality of the matter but should report it to the company officials.

In my opinion, unreported accidents will be greatly decreased in number, if all company officials and employees do their full duty.

CHAIRMAN EMERSON: The second section of this discussion is "The Standing of the Safety Department in the Organization," by Mr. James Harmon, safety manager, Interstate Public Service Company, Indianapolis, Indiana.

THE STANDING OF THE SAFETY DEPARTMENT IN THE ORGANIZATION

James Harmon, Safety Manager, Interstate Public Service Company, Indianapolis, Ind.

In preparing a paper on this subject, I am doing so with the feeling that the safety engineer should do nothing except look after the safety work on his property, but I am taking into account also that some safety engineers, in addition to their safety work, take care of other duties of the utility such as claims, insurance, etc.

To find the standing of any department in an organization, it is necessary to study the workings of that department and learn whether or not it renders real service to its organization and the nature of such service.

In all organizations there is service which is productive and non-productive. The non-productive service is always more or less a source of worry to the management because it does not show a direct return in dollars and cents. Unfortunately, the returns from the service given by the safety department are indirect. This being the case we need not expect this department to rank as high in the organization as the productive departments, unless it furnishes an exceptional service, the value of which is not necessarily based on dollars and cents.

The safety department is created for the purpos of educating the employees in accident prevention work by enlisting their cooperation and affording them an opportunity to take a personal part in the program of this work, insofar as it applies to accidents to themselvs, fellow employees and the public.

Employees Must Be Kept Posted on All Safety Rules

The employees as a whole must know that accident prevention work is very important and that in order to accomplish the results desired they must, at all times, be posted on the safety rules and instructions and their work must be governed by them. One of the problems of the safety engineer is to be able to make a check personally of his entire organization to see that all of the foremen are doing the things they should do by carrying out the safety rules, and frequently you will find they become careless and that is when the accident occurs.

Quoting Thomas A. Edison from Mr. Babson's book, "If success is the acquiring of money or power or fame, then the struggle is not worth while, because after you get these things you find them to be mere empty shells." The safety department is attempting to do something more worth while than merely to gain a success in money, power and fame. This is to make people happy and when you are able to do that you are a success and you are in a successful business. With that thought in mind, let us investigate the service that is rendered by any well organized safety department.

I have often been asked what is the nature of the work of the safety department. As the head of such a department, the only answer that I can give is that our work is to educate the employees and public in accident prevention work. Years ago before accident prevention work was as aggressive as it is today, it was often felt by the management of certain industries and utilities that in order to operate such properties it was necessary for a certain number of fatal and personal injury accidents to occur to those employed. But statistics show that since this work has been taken up nationally by many industries, and has been made a part of operation, there is a material decrease in the number of accidents on properties employing the same number of men doing prac-

tically the same kind of work; and for that reason the safety department standing in those industries is of the very highest.

One never knows how many people are made unhappy and sad on account of one serious accident. We all know, however, that in many instances it not only does cause unhappiness but also a great amount of suffering, especially if the one who is injured or killed is a father. The dependents will necessarily be deprived of the protection to which they are entitled.

Taking that one thought and comparing the number of accidents that occurred on your property ten years ago with the number that occurred in 1925, you can get one measure of the results of your work. That is the humanitarian side of the accident prevention problem. But there is another side that must be taken into consideration on well managed properties and industries, and that is the amount of money that necessarily must be spent on account of accidents.

When a safety department is able to show a reduction in the number of accidents, it not only preserves happiness to many but it makes a considerable saving in dollars and cents.

A peculiarity of the service given by the safety department is that all members of the company, both employees and employers, profit alike. They all need it and must have it if they are going to continue to be happy and successful.

Safety Work Must Be Done in a Businesslike Way

This department is not set off by itself as in some departments of other organizations. It is a department with which every official and employee should be closely affiliated. The safety director and his assistants only attempt to solicit and direct the support of each and every employee, but the work will not be successful if it is expected to be carried on by the safety department alone.

To conduct safety work successfully and maintain the high standing of your property, it must be done in a business-like way and be made a part of the operation the same as any other department; and it must not be allowed to be set aside in order that some other work of the organization can be taken care of. Every employee must understand that safety duties are as important as any other duties he has to perform.

If you are a successful safety engineer, in close touch with your organization, you are not only able to reduce the numbers of accidents but you are instrumental in bringing the management and employee closer together and so are enabled to establish better industrial relations. You have caused the management to become more interested in the employees and the employees to become more interested in each other. This naturally creates a friendlier attitude among all. Not only does it get the employer and employee closer together, but it develops unselfishness.

It also helps materially in creating a better feeling on the part of the public towards the company. For the public is prone to grasp such

a situation. We have two ways in which we are able to enlighten the public. One is through the employees and the other through the publicity department. All this naturally brings about much better feeling and creates better public relations. When you have reached this point you have accomplished a thing worth while. You have reached a higher efficiency, and this efficiency naturally will show up in the operating expenses of the company.

I have attempted to show that the safety department performs work of the highest class. In addition to the things I have mentioned, it is guarding the company against expenditure of money on which they get no return—that is, the expenditure of money made necessary by preventable accidents. Not only does it assist in reducing such expenditures but it helps materially in getting lower insurance rates.

Round Table Discussion Is Dispensed With

CHAIRMAN EMERSON: This part of the program was to be in the nature of a round table discussion. The two sections just read were to start the discussion. Due to the lateness of the hour I think it is inadvisable to start any sort of a round table discussion. I wish we could limit ourselves to this: that if any gentleman wishes to ask either of the gentlemen any questions with reference to their papers, or can throw any light on the ground which they have covered, we will be very glad to hear from them.

MR. READE (Quebec): I would like to ask Mr. Whitmore whether they ties have tried to pay the claim over there?
submitting these records to the other railroads to see if these same parhave a clearing house for these state claims. Do you have a way of

MR. WHITMORE: We compared notes with Mr. Harmon's company, but we do try to disseminate this information that we have regarding claims.

MR. READE: I think it wouldn't be a bad idea for either the National Safety Council or this Section to have a clearing house and submit all the claims, and then if a repetition came up we could easily isolate those cases.

MR. WHITMORE: I think that has been tried, Mr. Reade, several times. The question has been brought up at several conventions and it has always been found inadvisable to start a thing of that kind.

MR. BOYCE (Pittsburgh): When we get our statistics we don't clamp them up on the wall in the central office. For instance, in our company we get out a list of dangerous points where accidents have occurred and post them on the bulletin board for the benefit of the trainmen, showing them the number of accidents that have occurred within a three or six months period. We are constantly in touch with the inspector of traffic who has to do with all the traffic officers in Pittsburgh, and also the traffic engineer who finds it very helpful to have us turn those accident records over to him, and if we give him the benefit of the information we have he will probably be able to locate a beacon or a safety device that will save us accidents.

CHAIRMAN EMERSON: The following paper has been arranged in place of one upon bus operation which was scheduled for our Wednesday morning session. Mr. N. T. Brown, Vice-President, Philadelphia Rural Transit Company, Philadelphia, has very kindly consented to present his views upon the subject. I take pleasure in introducing Mr. Brown.

SAFE BUS OPERATION

N. T. Brown, Vice-President, Philadelphia Rural Transit Company, Philadelphia, Pa.

Mitten Management has been operating in Philadelphia in coordination with the street car and sub-way-elevated lines of the city, a fleet of motorbuses to the number of about 400, in addition to which we operate an intercity bus service with Philadelphia as the hub, and reaching to New York City on the north, Washington on the south and Atlantic City on the east. All our buses are of the gas-electric type, which was developed by Mitten Management engineers in cooperation with the engineers of the General Electric Company and the Yellow Truck & Coach Manufacturing Company after several years of research. The gas-electric principle thus developed has been generally adopted by manufacturers and operators, and in our opinion is the feature which has made the motorbus entirely applicable to city transportation.

P-R-T motorbuses have had an enviable record of safety, and it is about this particular phase of operation that I wish to speak.

The gas-electric bus is superior, in our opinion, to the mechanical drive from the standpoint of safety. The smoothness of operation during the period of straight-line acceleration produces practically no jar as compared with the uneven advance of the mechanical drive. The significance of this feature is at once apparent when one considers the large number of stops per mile in city transportation service and that passengers are continually walking in the aisles toward vacant seats when the bus is accelerating.

The elimination of gear shifting enables the operator to keep both hands on the wheel and his entire attention on the traffic through which he is driving. The conservation of human energy because of the elimination of approximately 5,000 shift operations per day is helpful in preventing accidents, since the driver is more alert than he would be if he was compelled to shift gears, thereby more slowly reaching the point of physical exhaustion.

The gas-electric bus is provided with three separate and distinct brakes. The foot and hand brakes are common to the ordinary type of motor vehicle, and in addition there is a regenerative electric brake. In making a stop, the operator uses both the foot and hand brake at the same instant, doubling the safety factor. The electric brake is used in emergency, being especially valuable in controlling the bus on a down grade, its effectiveness being in direct ratio with the vehicular speed. That is, when the bus is moving slowly, the braking power is slight, and increases as the speed of the bus increases.

To protect against rear-end collisions because of frequent stopping, each bus is equipped with a rear stop-light. A tell-tale light is mounted on the dash in a position to be readily observed by the driver, so that he may tell at a glance whether or not the stop light is in operation, and govern himself accordingly.

The constant bane of every motorist is the brilliant headlight which blinds him at every hundred yards along our roads and our city streets, and many accidents are caused because of carelessness in the focusing of these lights. The headlights of P-R-T buses are kept properly focused in accordance with the state law, and recently we have installed safety lights which can be played on the edge of the road, allowing the upper headlights to be turned off entirely, and eliminating even the slightest glare in the eyes of the approaching driver, at the same time lighting up the side of the road so that there is no danger of ditching the bus.

We have installed in our central garage a brake testing machine, by means of which brakes are scientifically and equally adjusted, so that the pressure is the same on each wheel when the brakes are applied. The machine indicates the weight of the pull on each wheel, and instantly records any inequality of braking power, as well as whether power is being lost due to dragging brakes, when the brakes are in the off position. High points on the brake lining and drums, and similar brake failures are also indicated. Equal distribution of braking force on both rear wheels has eliminated the hazard of skidding on wet pavements.

Brakes Are Kept at Maximum Efficiency

It is thus possible for us, by regular test of every vehicle, to assure ourselves that brakes are at their maximum efficiency at all times. Since good brakes are a vital factor in the prevention of motorbus accidents, their mechanical perfection at all times is vital to successful operation.

Adequate inspection of a large fleet of motorbuses is a requisite, not only in order to make every vehicle safe at all times, but in order that maintenance may be kept at a high standard of efficiency. Inspection of buses is regular and frequent, and every mechanical detail is tested by expert mechanics.

Nor is the importance of trained personnel lost sight of. In fact, we recognize that the human factor is probably the greatest of all in the prevention of motorbus accidents. Drivers are employed only after passing rigid medical examinations, and after meeting equally rigid standards as to weight, height and age. These men are thoroughly trained in motorbus operation before they are allowed to operate in regular service. Because of this care in the selection and training of men, we have succeeded in building up a force within the past two years, which in appearance, in courtesy, in skill, in operation and in general efficiency has won the plaudits of the public of Philadelphia, and numerous comments from visitors to the Sesquicentennial this summer bear testimony to the esteem in which this operating organization is held because of the high standard of its personnel.

The bus is no longer an experiment. It has come to stay. It has a definite place in the coordinated transportation system of the great city. It finds a field of increasing usefulness in intercity and interurban service. It is encouraging to see that street railway and steam railroad managements are coming to a realization of the fallacy of attempting to thwart the progress of a facility which has so thoroughly met the popular taste by contributing a great share to the speed, comfort and safety of modern passenger transport.

In addition to these factors of safety as outlined, there is maintained in the central office a system map, the duty of one man being to place a pin on this map showing the location of each accident which may have happened. These locations are then analyzed, with the idea of determining whether or not any of the factors contributing to the accident hazard can be removed; for instance, possibly the moving of the traffic officer from one side of the street to the other, or the changing of traffic regulations at this location, or the removing of a billboard or shrubbery which may obstruct the view of the driver approaching an intersection. We have found that this has materially helped to reduce the number of accidents.

The News Letter Should Certainly Be Continued

CHAIRMAN EMERSON: Mr. Eastham spoke yesterday about the difficulty he had in getting responses to his news letters. I think that the news letter is a very good thing if it is followed up and if members respond properly to the information that is asked. Before we adjourn today, I would like to get an expression from those here as to whether they think the news letter should be continued. You are all familiar with it and all those who think it should be continued please raise their hands.

(About 15 raised their hands.)

These cards that have been filled out asking questions which we expected to discuss at the round table today—I know these gentlemen are anxious to have those questions answered. It is going to be impossible to do so this morning, so I am going to turn them over to Mr. Connors and if he sees fit he will use them in his news letters.

Gentlemen, we are about to bring this meeting to a close. Before we do so, I want to call on Mr. Reid who has an announcement to make.

MR. REID: Just a word or two as the chairman of the Program Committee. The program which we have had for the last three days would be absolutely impossible without the cooperation of the members of this Section. The papers which have been read and the speeches which have been made speak for themselves. I just want to express the thanks of the committee for the splendid way in which these speakers have responded. We first as a committee got together and decided upon the subjects which we thought would be helpful to the Electric Railway Section. We then decided upon the speakers that we thought could present the various subjects in a way that would bring some messages to this

Section, that would be helpful and worth while; and I am happy to say that not a single individual refused to write a paper or make a talk before this Section. I think that speaks very well for the interest of the men in the general accident prevention work and of the work of this Section in particular.

I didn't want to let this meeting close without this word of appreciation to those who have so splendidly responded to the preparation of these papers and these talks.

W. J. ROUNTREE (Ga. Railway & Power Co., Atlanta, Ga.): I have not been fortunate enough heretofore to attend a meeting of the Safety Congress so I have nothing to use as a basis of comparison, but in these three days that I have attended these meetings I, for one, feel that the Section owes Mr. Reid and his committee, as well as the speakers, thanks for the service they have rendered us, and I would like to express publicly that appreciation.

A Separate Pamphlet for the Section Minutes

CHAIRMAN EMERSON: Will you put that in the form of a motion?

MR. ROUNTREE: I make a motion that this Section extend to Mr. Reid and his committee a vote of thanks for the splendid work they have done during the past year.

(The motion was seconded.)

CHAIRMAN EMERSON: It is moved and seconded that the thanks of this Section be extended to Mr. Reid and his committee for the very admirable work they have done during the past year.

(The motion was carried and a rising vote of thanks was given Mr. Reid.)

MR. REID: Mr. Chairman, I would like to make a suggestion here and see what the reaction is to it. It will be quite a while before the National Safety Council publishes the proceedings. It is a tremendous job. This is one small section among the whole meeting in Detroit, and I am wondering if it wouldn't be helpful to the members of this Section if we were to ask the National Safety Council staff to print the proceedings of this Section and send it out to the members. I make a motion that the Council be requested to do that and not wait for the big, bound volume of the proceedings that will come out several months hence. I think it would be well to have this right away.

DR. SEGARD (Third Avenue Railways): I think there are 47 Sections in the National Safety Council and if each of these Sections made the same proposal it would simply mean duplicating the work of printing that tremendous volume which we each get free each year.

J. M. LOFTIS (Pittsburgh Railways Co.): I believe that the best results are to be obtained from getting this information to the member companies just as quickly as possible. While I do feel and agree with the brother here that it is a little bit selfish on the part of the members of this Section to ask for special consideration, yet I am thoroughly con-

vinced that the best results will be obtained if we get the information right away.

MR. BOYCE: It seems to me if we took the matter up with the reporting company who reports the convention perhaps we would get a typewritten copy which could in some manner be duplicated and sent to the members rather than impose the burden on the National Safety Council. I would like to hear from some of the members regarding this suggestion.

MR. REID: I would like to say just a word with reference to that. All of this material is set up in type for printing of the big volume that will come out some time and it would be a very small matter, if I understand it correctly, to print the proceedings of this particular Section and send it out in pamphlet form. It will not involve any very great amount of expense or trouble because the type is already set up, or will be, and it has to be printed anyhow. My idea was to get this stuff immediately rather than to wait for the big book that comes out.

MR. READE (Quebec): You can't expect something for nothing. We ought to pay a dollar or two dollars to get this in advance.

W. F. HANN (United Railways, Baltimore): I have attended all these sessions and I know what has been going on here, but there are several other Sections that were held at the same time that I would have liked to attend, and I would like to get a typewritten copy of those I was unable to attend.

CHAIRMAN EMERSON: That is beside the question now.

DR. SEGARD: I have never failed to get my volume of the proceedings of the National Safety Council in due time to use it in addition to my own personal notes.

CHAIRMAN EMERSON: Has the motion been seconded?

(The motion was seconded, put to a vote and carried.)

Many Platform Men Attended the Section Meetings

CHAIRMAN EMERSON: Gentlemen, just one word in closing. I want to thank you gentlemen for the honor that you conferred upon me yesterday. One year ago at this time the National Safety Congress met in Cleveland and that was the first Congress that I had ever attended. At that meeting the general manager of the Cleveland Railway Company gave a complimentary luncheon to the delegates and about 30 or 35 attended. Yesterday there were something over 80 tickets sold at one dollar and a quarter each. The same proportions, if not greater, has worked out in the attendance. The operating man can't help but feel the increasing influence of this safety movement. It is very evident that it furnishes a ground for the getting together of the various departments in the railways and also furnishes an opportunity to coordinate so that the best results may be obtained.

One of the things that gratified me particularly these last three days was to see the large number of platform men that have attended. I think this is a splendid showing. I think it is a splendid idea. I have been an

operating man all my life and I can look at things pertaining to a railway operation better probably from their standpoint than I can from any other. These men are the men that are going to get results in the end. They are the boys that are coming in contact with the public constantly. It is through them that we are going to get anywhere, if we do. I only hope in future meetings that the platform men will have a larger representation than they have had this time. I think it is a splendid start.

I wish to close in thanking you for all your kindness in attending these meetings. I shall hearten by the interest you seem to have shown and in this coming year I pledge you my very best efforts to try and carry on the work which has been carried on so well up to the present time.

ADJOURNMENT

Employees' Benefit Associations Section

New Officers of the Section

CHAIRMAN: SIDNEY W. ASHE
General Electric Company, Pittsfield, Mass.
VICE-CHAIRMAN: W. FRANK PERSONS
The Milwaukee Electric Railway & Light Company, Milwaukee, Wis.
SECRETARY: JACK DEMPSTER
Canada Cement Co., Port Colborn, Ontario, Canada.

October 28, 1926

W. J. MacPHERSON, Chairman,
Manager of Industrial Relations, Public Service Company of Northern Illinois, Chicago, Ill.

THE first session of the Employees' Benefit Associations Section, National Safety Council, was called to order at 9:50 o'clock in the Small Banquet Room, Ball Room Floor, Statler Hotel, Detroit, Mich., Chairman W. J. MacPherson presiding.

CHAIRMAN MACPHERSON: The first order of business is the appointment of the Nominating Committee. The Executive Committee has informed me, however, that they have tentative plans for changing the scope of activities of this committee; we will therefore pass up the appointment of the Nominating Committee at this time.

We will take up the first paper, which is by Mr. Frank L. Rector, M. D., editor, *The Nation's Health*, Chicago, Ill.

HOW FAR SHOULD INDUSTRY GO IN A HEALTH PROGRAM?

F. L. Rector, M.D., Editor, The Nation's Health, Chicago, Ill.

How far should industry go in a health program? The answer to this question can be made short and to the point. We may say "the limit;" but as the limit varies in different localities and industries our terse definition needs some elaboration.

One of the qualifying elements to be considered in this question is the relation of the industry to hospital and other facilities. Obviously

in an organization such as a mining camp the management must provide a complete medical service, not only for employees but their families and dependents as well. An industry located near a community having adequate medical and hospital facilities might feel called upon to provide little except emergency treatment for its accidents arising directly out of the employment.

But further than this we may well consider just what should be expected from a preventive medical program among groups of industrial workers. Probably the humanitarian interest taken by managements in their workers is fostered largely by rigid legal requirements on the one hand and the desire to obtain increased production through increased efficiency on the other. This increased efficiency may be obtained in several ways, among which are lessened labor turnover, decreased absence due to ill health and accidents and a greater contentment of workers with their working and supervisory conditions.

Industry Has Obligations in Reference to Employee Health

By a strict legal interpretation of medical service we might say that industry as such is not responsible for any conditions affecting the employee's health or welfare except those associated with his employment; but the industry which places such a narrow interpretation upon its obligations comes far short not only of fulfilling its obligations to the workers but of getting from them in actual production the returns which they would have a right to expect if a more liberal policy of personal relationships prevailed.

A preventive health program comprehends the prevention of more serious stages of disabilities already contracted as well as the onset of any disability. First aid for illness is just as necessary as it is for accident. Headache, stomach aches, backaches, and other aches may be more disabling than some injuries, and may be the forerunners of more serious disabilities that threaten prolonged absence from work. While their immediate treatment may be for relief, the real object is prevention and as such has a proper place in a preventive health program in industry.

Further efforts than simple relief of the immediate disability should be made with these cases to determine the cause. Diagnostic means should be resorted to for the answer. Such types of illness are not regarded by the sufferer as of sufficient importance to consult a physician and if industry does not check them up they will go without consideration until another and perhaps more serious attack drives them to see a physician. Then it may be too late to remove the cause and the worker will be doomed to a chronic condition requiring extended and perhaps life long treatment.

Men who have had wide experience in this work are pretty well convinced that industry profits in all ways by furnishing adequate facilities for determining the physical condition of workers at any and all times. It is felt that industry should not be called upon to provide treatment for those conditions which have no relation to the employment but they

should provide such diagnostic facilities for the careful examination of employees who are below par physically as will enable them to know what is their actual physical condition. Such workers can then carry this information to the physician of their choice to guide him in the treatment of their cases.

Such a worker will not go to a physician of his own accord. He does not consider his ailment sufficiently serious to justify the expense. And the medical man would not be able to give a thorough examination and diagnosis, either out of regard for the expense to the patient or because of the lack of facilities for making the necessary tests. In such a case some superficial examination would be made and the patient dismissed with a prescription and some advice. In any case, no lasting good would have been accomplished.

Two aids to diagnosis are lacking in the average physician's office, the X-ray and laboratory facilities. Both are rather expensive to procure and both need special training to use, something which the average physician does not possess, especially if he has been in practice for several years. Moreover, his practice might not warrant the purchase of such equipment.

On the other hand industry can well afford to provide these two facilities as they will be in almost constant use. With the many cases to be looked over industry can afford to engage some physician skilled in the operation of such equipment to carry on this work, the expense again being unnoticeable.

Possibilities of the Health Campaign Very Extensive

If industry would make provision for such diagnosis, and then insist upon the periodic examination of workers and upon the proper attention by workers to any defective conditions which might be discovered, health improvement of such a group would become so marked as to return to the industry many times any expense which the provision of this equipment may have made necessary.

Instead of interfering with the practice of the local physicians the work as just outlined would be a great help to them. Diagnostic aids would be offered them in their own community that previously could be had only in some distant city. Defects and disabilities hitherto unknown or unsuspected would be brought to the workers' attention and he would be urged to have them corrected before they become incapacitating.

Industry should not undertake treatment of these conditions, but should urge and assist workers to have the work done. Tactful urging of the worker by the industrial physician and tactful cooperation with the family physician would bring about satisfactory results in the majority of cases.

Opposition to such work on the part of local practitioners is due to one of two causes; either the medical man in industry is too aggressive and undiplomatic in his approach to the problem, or the local physicians are satisfied in their smug complacency and resent the efforts of industry

or any other influence to wake them up to a true realization of their duty and opportunity.

We hear much these days of the increase of chronic diseases and the diseases of middle and later life, such as cancer, heart disease, apoplexy, and various forms of kidney disorders. One explanation of this increase is that in recent years much of the health work has been concentrated upon the infant and school child so that the death rate in this group has been markedly lowered. The child has been carried safely over the critical periods of early life, only to fall prey to the more insidious ailments in later years. The death rate from tuberculosis, a disease of adolescence and early adult life has also been cut in half. Typhoid fever, an early adult disease, has been practically wiped out. Diphtheria, scarlet fever and smallpox are on the way to extinction. The chronic diseases just mentioned usually have their beginning in early life although their onset is so insidious and so quiet that only a careful examination of the individual will detect them in their early stage. For this reason a periodic examination of workers should go carefully into any sign of abnormality which may appear and should be carried far enough to satisfy both the physician and the worker that the root of the trouble has been found.

Questions Regarding the Periodic Health Examination

Who should undergo this periodic examination, and how should he be selected? Every person actively connected with the organization from the president down should be included. Frequently the higher executives are most in need of such a physical inventory. Obviously this work takes time, and at first it might be well to take the oldest employees, or those exposed to possible poisons or other hazards, if there are such; another group will be found in those returning to work after a protracted absence following illness or accident. Still others will be found by the foremen who are falling down on their work or who give other evidence of declining vigor. Yet another group will voluntarily ask for such examinations, once they are available. A little quiet propoganda as to the value of these procedures in discovering to a few popular workers that they needed medical attention will do much to remove prejudices against it.

Thus far the financial and economic aspects of such a program have not been stressed although they are of as much, if not more, importance to the workman and his family as they are to industrial management. I would like to suggest to this group, interested as the most of you are in employees' benefit associations, a thought whereby your organization can render to your members a service of far greater value than that which now serves as the major reason for your existence. Benefit associations are for the benefit of their members. This idea of benefit has in the past been translated into personal financial relief in case of incapacity for work due to any one of several possible causes. I have not the latest figures before me but my most recent information was to the effect that the minority of such associations consider the physical

conditions of the applicant when he seeks admission to its ranks. Unless he is obviously disabled or diseased, and few such are found in industry, he is admitted without question.

To my mind, mutual benefit associations offer the finest possible opportunity for doing health work and a program something like the following could be undertaken with profit.

1. Require all applicants for membership to pass a careful physical examination at the hands of a physician designated by the association, who is familiar with the work the applicant does. The plant physician is admirably adapted to do this but in case he is not available a well qualified man should be placed in charge of this work. Those unable to qualify as first class risks may be given a deferred classification until their deficiencies can be remedied.

2. Provide facilities if they are not already available in the industry for determining what the worker needs to remove his deficiencies. If necessary, assist the workman with financial aid to have this work done. It will be much cheaper in the long run to spend a portion of the association's funds for remedial work with the provision that the amount so expended be returned by some regularly stipulated time, than to be compelled to pay for a varying length of time the benefit provided by the association's rules and regulations. Mutual benefit associations, if they so desire, could provide a complete remedial as well as diagnostic service for their members, together with nursing care. This complete service is seldom needed and is not to be recommended except in most unusual cases.

Inducements to Have Corrective Work Done

A higher rating with increased benefits could be made an incentive to have the needed corrective work done. If the organization so desired it could provide its own medical staff and nursing service to carry on this work. In doing this, however, certain matters should not be lost sight of and certain practices which have existed from time to time should not be indulged in. One of these is that of compelling a member to submit to treatment by the association physician, assuming that for some reason he did not wish that particular physician to do the work. The psychological effect of such an arrangement would do much more harm than good. To minimize the chances that such objections might arise the association should always have as its medical advisor a physician with qualifications second to none in the community. By his prestige his services will seldom be refused. Neither the physician nor the nurse should make investigations as to the cause of absences from work. A tactful layman is much better suited to make primary investigations and on the basis of his report the physician or nurse can take any action that is indicated. In that way their services are confined to those of helpfulness and they would be welcomed in their contacts with the workers and their families rather than shunned as so often happens when they are doing ordinary police duty, and that is what first investigations are. I know of nothing that will so quickly demoralize the

average industrial medical organization, both with the workers and with the medical personnel itself, as to require investigation work from the staff.

After nurses have gained entré to the home they will have many opportunities to drop a hint to wives and children regarding right habits of health. A suggestion upon some small but important domestic problems that will be helpful in the conduct of that home will always be appreciated. There are countless ways in which a nurse can render assistance. But she must be tactful at all times and never assume a superior attitude.

Keep each member's records securely away from public inspection. The physician alone should have full access to them. Association officials may be given sufficient information to serve their needs but confidence and cooperation can only be obtained by respecting confidences of others.

Let me recapitulate by saying that industry should go as far in a health program for workers as it can without pauperizing the employee or the private physician. Industry can do collectively for large numbers what few, if any, private practitioners can do in the way of adequate and accurate diagnosis. Such types of diagnosis as X-ray examinations and laboratory tests requiring special equipment and skill come well within the purview of industry to furnish.

The physician should emphasize periodic health examinations. He should give relief to temporary disabilities so that the workers can remain on the job. He should perform the indicated examinations and tests to determine the physical fitness of the worker, provided, of course, that very unusual tests are not needed. Whether or not he sees patients in their homes will depend on circumstances. In general, he should delegate home visiting to the family physician, although he should be in sufficiently close touch with the case to know if proper treatment is being given. He should seize every opportunity to impart some health information without being offensive or a bore.

The Nurse Should Assist in Health Education

The nurse should assist in health education while in contact with workers in the plant and when she visits in the homes it should be only on invitation from or consent of the worker or his family. Here her greatest opportunity will be found in teaching health. Needless to say, both the physician and nurse should be examples of healthy living. A lazy, indifferent and careless person, be he ever so bright mentally, will not be a good example for workers to copy. Physicians and nurses should radiate health as they will teach far more by example than by precept.

Neither physicians nor nurses should be used to make primary investigations of absence, due possibly to injury or accident. A tactful layman should be engaged to do this work and where a health program is tied up with a mutual benefit association the employment of such an investigator can well be a part of the association's program. This will leave the medical and nursing staff to carry on their professional work,

and will forestall any unpleasant criticisms of their duties by those they are serving.

A successful health program is a cooperative affair. Unless the sympathetic understanding of the workers is obtained and the active cooperation of the management is secured, the physician and nurse may blow their trumpets until the walls tumble down without making the slightest impression upon the situation.

Likewise where a mutual understanding is reached great good can be accomplished.

Nothing has been said about such health activities as dental work, eye examinations and furnishing glasses, day nurseries, children's clinics, and related problems. Most of these are of general community interest and should be undertaken by the community. If the industry wants to have a part in this work it can well do so by a contribution to the community chest or other fund which supports the work. Circumstances may make it advisable to undertake certain of these problems within the industry. When such a condition exists the general principles discussed earlier in this paper should prevail.

So we see that the limit which we placed upon this work at the beginning of this discussion is not a rigid one, but flexible and adaptable to varying groups. The greatest good to the greatest number should be the goal toward which all such work is directed.

Discussion Following Dr. Rector's Paper

CHAIRMAN MACPHERSON: We all appreciate Dr. Rector's comprehensive paper. I think that the wide scope of the paper makes the subject almost limitless, so there should be a lot of discussion. I am sure Dr. Rector will be glad to answer questions. The paper is now open for discussion.

H. C. LOGAN (Union Carbide Co., Niagara Falls, N. Y.): We have three doctors in our plant. One full time and the others part time. We have two nurses and two first aid men. We started primarily to take care of our employees but the scope is widening out. I would like to ask the doctor how far a person should go in dispensing medicine? In our winter and fall seasons when there are so many colds, our employees all want to take cough medicine and aspirin home with them. The amount of material going out of the plant seems to be unlimited.

CHAIRMAN MACPHERSON: I am going to ask Dr. Rector to make notes of the questions. There will probably be several of them and he could answer them all at one time.

HERMAN W. ALLEN (M. Wile & Co., Buffalo, N. Y.): We have a plant with about 1,200 employees and it struck me that Dr. Rector's paper referred mostly to plants with 20,000 or 25,000 employees. I don't think our firm would see very easily where they could absorb the expense of a staff physician and nurses. In fact, I think they would notice it so much that it would take a pretty good persuader to do it. Our benefit association keeps about $1,500 ahead. We don't want to have any more than that because it amply takes care of our needs, and we like to have the

members feel that they are paying their way. The firm donates half the material for the association, and for any unusual occurrence there is always a check forthcoming to see that the fund is kept at this point. I would like to find some way out of it for us, because the doctor's recommendations are very fine.

L. J. PARRISH (A. O. Smith Corp., Milwaukee, Wis.): Referring to the gentleman's remarks on Dr. Rector's paper: he stated that he did not think the same principles could apply to a plant with 1,100 or 1,200 employees. Perhaps that objection could be met by several plants in the same locality going together. In our plant we have about 5,000 employees and we maintain quite a comprehensive preventive medicine clinic. We have a full time X-ray man. We have a full time doctor of internal medicine. We have a full time oral surgeon, dental hygienist and a bacteriologist. We have three technicians, stenographers and nurses. We have been in operation about two years and we are prepared to show that it pays.

Problem of the Company With Many Thousand Employees

HOMER W. BANG (Illinois Bell Telephone Co., Chicago, Ill.): I was not in to hear the first part of Dr. Rector's paper. We do not have periodic physical examinations, but we are very anxious to follow out a plan of that kind if it is feasible. What we are up against is this: we have about 25,000 to 28,000 employees in Chicago, and when you figure a year with 300 working days it will average about 100 physical examinations per day. We appreciate that would take quite a medical staff, but we want to give them the kind of an examination they ought to have.

We now have health classes throughout the territory in Illinois for women employees. We experimented with that last fall and we are starting out full blast this year and that will bring about the desired periodical physical examination.

Now, as I say, we can not see our way clear to have a staff sufficient to give 100 physical examinations per day. We have about 150 at the present time just on health matters.

I would like to ask the doctor if it would not be a good proposition to offer this service to the employees for a certain amount? Some employees would not have to be examined over once every 10 years and that would make it possible to give these periodical examinations without making our staff almost a good sized clinic.

S. W. ASHE (General Electric Co., Pittsfield, Mass.): Judging by our experience, in order that a physical examination shall be of real value to the man, it has to be pretty thorough, and that means that it is a pretty expensive thing. If you have a head man of the department, for instance, a key man, it is going to cost you $10 a man to get the kind of examination you want, and if you have 6,000 or 6,500 employees the thing becomes prohibitive; therefore while the periodical physical examination is a fine thing, I think that you have either got to be satisfied with a very nominal examination or you have to cast around for some other way of getting the examinations. One way is with your Benefit Association and

you can work to a certain extent with your local Board of Health, and you can work with the local physicians. Most of them will cooperate with you. You can get from the local Board of Health a list of all contagious diseases.

We are very much interested in that kind of work. We keep in touch with the local physician and the local Board of Health. If you see a person working whose record with the Board of Health indicates that he has a disease that needs attention, we see that he is relieved from his regular work and given proper treatment, and also the proper follow-up treatment in the home. In that way we can do it in a pretty thorough way, but if you try to detect all these things through the physical examinations, the cost will be prohibitive.

CHAIRMAN MACPHERSON: There is a challenge to the statement that the periodic examination pays and perhaps we will have some discussion as to how to measure whether or not it does pay.

J. W. RIDDLE (The Youngstown Sheet & Tube Co., Youngstown, Ohio): May I ask a question here? It seems that the discussion is all on the subject of expense. Does that mean the expense to the company or to the Employees' Benefit Association?

CHAIRMAN MACPHERSON: I would say that it depends upon the particular organization, because in some cases it might be a direct cost to the company and in others it might be a direct cost to the Benefit Association; or in some cases the cost might be to both when both contribute to the expense of paying the employees for lost time.

MR. RIDDLE: I brought up that question because it is apparent in our company, from the employees' standpoint, that our Association can not afford to make any sort of an examination outside of what the company might have to make when the man was employed.

The Confidential Relations of the Physician

DR. G. H. WOOD (Frederick Stearns & Co., Detroit, Mich.): Dr. Rector's paper is full of meat and good suggestions and is an excellent guide to certain industries. I would like to go over the whole paper, though that is impossible, but there are one or two points that I would like to bring out. The first is the confidential relations of the physician and his assistant. That is the thing which is violated a great deal in industries and Dr. Rector brought that out. Of course, slips occurs, but some industries want to compel the medical department to act as detectives and that is absolutely to be avoided.

In the course of 14 years' experience in medical and industrial medical work this question has come up to me rather forcibly a number of times. There were times when apparently I was in danger of losing my position if I refused to act as a doctor and then turn around and act as a detective. In other words, I do not go to the employee and get his confidence and then go and tell the employer the confidential things I have learned.

I protect the interest of the company by advising them as to the results to be accomplished if the man is unsafe in the industry. Or better yet, if the employee is in a condition where he should not work

and will not advise the company, I advise him to resign and do not allow him to be discharged. That is just an illustration to bring out what I mean.

In a few cases I have been asked definitely to go out and investigate a man who was believed to be faking or to have been drunk or something of that kind. Where I have done that I have not gone as a physician, I have gone out to his house and I haven't said, I am a company doctor; I have said that the management wants to find out the cause of your accident. I simply went there as a man so that there is no deception.

The point I want to bring out is this, the management should respect the physician's confidential relation with his patients and should not expect him, or a nurse working under his direction, to divulge those confidences. The doctor can protect the company without it. There is one thing in all these years that I have been unable to solve and that is the relation of the industrial physician to the family physician. Dr. Rector has brought up some points here on which I would like to have him give us a little clearer idea, if he can, where to draw the line.

Certain Ideals of Conduct for Every Physician

All physicians have certain ideals and in order to keep successful we must keep those ideals in mind. One of the things which the American Medical Association has written is this, "That no physician shall accept practice under such conditions that he will not be able to give the patient the benefit of his best efforts," and it is the one thing which we all try to follow out.

When a physician accepts a case he is responsible for the whole case until he is through with it, or until he is discharged by the patient. Under these conditions, how far can the plant physician go in treating a patient who is known to be a patient of the family physician? How far should a plant physician go in starting a case and then turning it over to the family physician? When should he turn it over? Dr. Rector says, if I understand him correctly, that when a plant physician undertakes a case he is to do it thoroughly, and later on he says that home patients should be delegated to the family physician.

Now I don't quite get the point as to whether the case is to be turned over to the family physician or whether the family physician is to be asked to work as assistant to the plant physician or what? I would like to have that cleared up.

One disadvantage of the plant physician starting a case and then turning it over to the family physician, is that the family physician does not know the beginning of the case, except maybe from the report.

The question of expense has been brought up here and that, to my mind is the one thing that makes it almost impossible for the plant physician to continue home treatment, because almost everybody tries to avoid the expense of the treatment. It is not merely because they do not like to spend money, it is because they do not have it to spend. The cost of living these days is so high that it is a serious proposition. That is a thing we need to solve and I hope that there are more speak-

ers here who can give us some light on the subject of how the question of expense can be met by either the Employee's Benefit Association or by the employer, or some other way.

H. JOHNSON (The Hoover Co., North Canton, Ohio): I think our subject is, "How far should a company go in a health promotion program," and I want to say that the Hoover Co., North Canton, Ohio, goes the limit. We have had a hospital with two nurses for two years. We have had a part time doctor for almost two years, and every one in our employ must take a physical examination and those physical examinations are charged to the company by the doctor. In fact, the doctor only charges $2 for those physical examinations and he is assisted by nurses.

To our old employees who were with the company before the physical examinations were started, the physical examination was of course to be a voluntary proposition. I am sorry to say that only about two per cent of them have taken advantage of it. We are starting now to work out something that will give those fellows the incentive to take those physical examinations. We do not want to be insistent upon it. Of course when there is sickness and these employees come to the hospital, that is the cue for the doctor to give the physical examination. We have put several physical examinations over in that way.

Our employees organized five months ago an Employees' Relief Association of their own. They have about $2,000 in the reserve fund now and the insurance is working out wonderfully without any of the company's help financially.

Advice to Go to the Family Physician

We find that most of our office employees have sickness. They are not injured, while the factory employees are so busy working that they get away from the psychology of having something wrong with them and they work it off, but we don't intend to have them take yearly examinations. We only give those to the employees who come in, and if the doctor finds anything wrong with them he will take another examination in six months of that particular thing that is wrong. He will advise all employees to go to their family physician. We don't ever want our doctor to get to the place where he is treating our own people. We want him to understand that we are throwing him business. We are paying the doctor for part time service and that is all we are asking him to give our employees.

In follow-up systems of that kind, our nurse will call up the family physician and get the data and reports on our employees who are sick. Every morning the foreman reports to the hospital all those who are absent on account of sickness. Where we have such a report, the nurse will automatically try to get in touch with them. Sometimes we find that the person who is sick has a relative working in the plant and the nurse follows up that medium to find out why he is absent. We are going to start the first of the year on a follow-up of the employees in the factory. We are only doing it now in the office, although the nurse secures the report of all factory employees reporting absent. If that

employee is absent three days the nurse will visit his home and find out what the trouble is.

Our Employees' Benefit Association will cover all that possibly in the next two months. They are printing a little returnable postal card and giving them to every employee who belongs to the insurance, and they will mail them in to the secretary when they are ill or are going to be ill for one or two days. The secretary in turn notifies the physical department. Ninety-nine per cent of the factory employees and 48 per cent of the office employees belong to the Employees' Relief Association.

G. M. KELLER (Colorado Fuel & Iron Co., Pueblo, Colorado): Our Health Department dates back about 40 years. We are the pioneer in industrial medicine, but we still have many of the same problems that have been discussed here. The first, I think, is a very delicate question. Just what is the relation of the medical department to the police duties of the employment department? I agree that the medical department must maintain the confidence of the employees or it loses its entire value, but it also has certain very definite responsibilities in maintaining the management standards of the physical welfare of the employees.

Our medical department was an established requirement for the new employees. With our medical department, no one would apply for employment with a venereal disease. We all probably agree that it is undesirable to have anyone with a venereal disease in your employ. The medical department would bar them upon the first examination.

Employees Invited to Go to the Hospital Freely

We want every man who has any disability to go to the hospital freely, and they do, but when a man goes to the hospital, say after some period of employment, for a broken leg or any injury, and while he is at the hospital or dispensary the doctor finds some condition existing as one of the diseases that would bar a man from new employment, what then is the hospital's responsibility? The hospital has set up the standard for new employees and here is a man discovered with a disease, which, if he was a new man, would make him ineligible. What is the doctor's responsibility?

I would like very much to hear the principal speaker's opinion on it, and perhaps some of the other people might express their point of view.

The other thing that was brought up is the matter of expense and I have a notion that possibly the Benefit Association may be a part answer to the problem of company expense. Our plan calls for a contribution of $1.50 per month from every employee to the medical fund. This entitles a man to medical service for himself and medical service for his family at a reduced rate, but that doesn't cover the cost of our hospital and medical staff. There has been some talk of how it could be extended to give free service to the employee's family because, as has been said today, the question of doctor bills is a very serious proposition to the employee.

We are all getting the insurance habit and the mutual benefit habit and it may be the answer to our problems. We want the benefit fund to be such that it will entitle both the man and family to hospital facilities and medical attention. I know of one such association with the Standard Oil Company of Louisiana, at Baton Rouge, and I wonder if there is anybody here that can tell me just how that association operates?

MR. ASHE: I should like to reply to one question from the management's standpoint. Most companies say that the General Electric Company has set up certain standards for physical examinations on which they will determine whether they are going to hire the employee or not. If a venereal disease, or something of that sort, is found, for the protection of the other employees we will not hire that person.

Standards May Be as High or as Low as Desired

You can set your standards just as high or as low as you want in regard to taking the employee into your organization, but once you take the person into your organization he is a part of your big family, and if there is anything possible that the company or management can do to help him, it seems to me that in justice to the employee it should be done. Now that means when you have a Mutual Benefit Association functioning by the employees. Incidentally, we have a very successful one which we have run for about 15 years and it has cash assets of about $20,000.

The Mutual Benefit Association has never said, "Well, here is an employee who does not look very well. We should not take that person into the association." If you will bring those things up and let the employees discuss them, you will find that they want everybody in, and the person who is not very well and the person who is likely to need help, they are the kind that they want in the association. You don't want to set standards that are going to keep this person and that person out because they are likely to be a bad risk. If you do that you are getting away from the fundamental idea of the Mutual Benefit Association. If you set certain fundamental principles of that sort back of your organization, all these other little things that come along and cause injustice will be taken care of automatically.

We do one little thing that might help you. We have the regular scheme of paying sickness and death benefits, but in addition to that, over a period of years, we have built up a separate fund, not from the weekly contributions to the association, but from profits of little carnivals and such things. We just let this fund keep on growing and only spend the interest on it each year. At the present time this fund is pretty close to $10,000. The interest on it runs in the neighborhood of $400 each year. If we have a case of a man who needs special hospital care or requires an X-ray examination, we have this $400 each year for just such cases.

G. W. WILLOUGHBY (Michigan Bell Telephone Co., Detroit, Michigan): I am here not as an experienced man, but as a student to learn what

I may from your meetings. It seems to me that while all the points that have been brought up are very interesting, they do not all bear upon the subject as outlined in the program. Unless the time is limited to the discussion of that particular subject, we are not going to get the benefit out of the meetings that we anticipated.

DR. G. H. WOOD (Frederick Stearns & Company, Detroit, Michigan): I have been with my firm for eight or nine years. I have one of the most pleasant connections that could be asked for. My firm has been very liberal to their employees for 30 years, and they have done a great many things not generally done. Years before a compensation law was thought of they gave their injured men full time pay while they were off. That was 30 or 35 years ago, I believe, and they have done many things in a sort of personal way. They have not had an elaborate organization, but, of course, we are talking about organization and what has been done in various ways. When I went with this company eight or nine years ago the employment department wanted me to examine new employees and write out a report for them of what I found. I said to the management right away, "What I find is the basis for my conclusions and it seems to me that what you want is my conclusion, and not something about this man that can be talked about." The management agreed with me.

Men With Contagious Diseases Are Rejected

The management has certain standards that I am supposed to follow. When a man applies for employment, he comes to my office to be examined. I reject anyone who has a cantagious condition that would be dangerous to the other employees, and write across his application "Not acceptable." If he is acceptable I write across his application "May be accepted." That is all the employment man knows about the details of the man's condition.

That, I think, will explain how we protect the company's interest and at the same time protect the confidence of the employee or the applicant.

CHAIRMAN MACPHERSON: I find that we are forcing Dr. Rector to write another paper, so I am going to ask him to answer some of the questions we have had thus far.

I want to comment on just two matters. The first is the question of police duty. The question was put up to the Employees' Committee, who have quite an interest in the Employees' Benefit Association, and their experience was that most nurses soon became spotters. We finally decided that if the figures indicated that we needed a spotter, we would get one for such work and not use a nurse. In that way we would not have to try to cover anything up. In fact, the Employees' Benefit Association was a little anxious to try out a spotter for a while. An analysis of cases showed, however, that checking of this kind was unnecessary.

The other thing is the cost of periodic examinations. Periodic examinations increase the lost time on account of illness, and the cost is very

great. The cost may be overcome by getting the people cured and back to work as more efficient employees. Without very elaborate statistics our records show that the periodic examinations have increased the days lost. It seems that "Go home and go to bed for a few days" is still one of our most popular medicines.

DR. RECTOR: The first question is about the dispensing of medicine. That has always been sort of a bugaboo in industries. As far as I know the lid should be clamped on very tight on that proposition. If a person comes in with a cold or headache and is going to stick on the job, you might give him a cathartic or give him a rhinitis tablet that will stop his sniffles and let him go back to work. Beyond that, they should get it outside. You can create the dope habit in a way by continually doping your employees; the first thing you know you will be running a pharmacy instead of an industrial dispensary. My advice would be to not dispense any drugs whatever except one or two minor things. Giving out aspirin tablets which can be bought at any drug store is poor business.

In Some Cases Small Plants May Combine Their Efforts

Now, the question of the small plant which may have a Mutual Benefit Association. The small plant has an opportunity to carry on some of the things that were suggested in the paper. One of the subsequent speakers said that the small plants in a certain locality could combine. I think the small plants should have their Employees' Benefit Association and a hospital. If the small plant can not do it itself, it might get two or three other industries of fairly good size to go in with it.

One of the best opportunities for real medical work is in the small plant. There is an answer to the small plant problem. It is a community or cooperative dispensary in which they could afford to have a full time set-up, both of personnel and equipment, and those full time workers, the physician, the nurses, the attendants and so on, would divide their time as needed among the industries in that community. It has been tried quite successfully in a few cases and I don't know why it has not been carried out to a greater extent than it has. I think that is the possible answer to the question of providing the facilities, which we discussed, for the small plant.

Regarding the cost of re-examining employees, I indicated some of those possibilities in my paper. One was, that when a man is away from work for any length of time on account of injury by an accident, he has to go through the medical department so that we can see what shape he is in. The question of the cost of re-examination in that they increase lost time is possibly so, but if you could check up the condition of your employees, you might find that you have saved a great deal more lost time in the long run, that has been the experience of people all along the line. The physician may send the man away from the job for a short time and thereby help to save a great deal of lost time that would have resulted if he had kept on going in the condition he was in.

Mr. Ashe's experience over in Pittsfield has not been so very good if it costs his company $10 to have an examination done. I don't think it should cost that much except in very unusual cases where it would take an hour to give a man a physical examination. I think the executives of a company should go the limit in having their employees re-examined. They should have their employees' health looked after and see if there is anything wrong with them. They have a great deal of responsibility. If any of the employees show symptoms of illness, the doctor is justified in going to great lengths in giving those people thorough examinations.

In the case of the average employee, if you have a physical examination record, when he comes in you have a pretty good basis to go on. It should not take so long to make the examination, and it is not going to be a very expensive proposition.

Cost of Conducting Medical Department Is Low

It was found recently that the cost of conducting medical departments in the plants, good, bad and indifferent, all thrown in together, was only 36 cents per $100 of the payroll. The cost of the work is nothing when we come down to the figures that show the value of the goods produced. I think that any industry can afford to absorb that without very much complaint.

The question of minor illness was brought up by one of the speakers here. I think every industry is justified in taking care of their employees as long as they stay on the job; if the employee is so ill that he must go home, then he should call his own physician. It is the duty of the company to take care of him while he is on the job.

Regarding the question of how far the plant physician should go in the treatment of employees, I think the plant physician should treat emergency cases, but when an employee is able to go home he should have his family physician. Of course, he may want to retain the plant physician as his family physician, which is all right, but the plant physician is justified and authorized to treat emergency cases only. After that it is a question of how far he wants to go.

I don't think I like Mr. Johnson's plan about giving the employee an examination when he comes into the dispensary for something or other. That won't go very long. It is one thing that you must keep away from. Don't try to put something over on the employees for you will find that procedure will not become popular with them. Be open and above board. Don't make the employees think that there is a nigger in the woodpile somewhere. Put your cards face up on the table.

Several years ago I was with the United States Public Health Service and we were doing some examining in northern New York. We went into a plant there and told the men what we wanted to do. We laid our cards face up on the table and got their cooperation, and almost to a man they came up to be examined, but there were a few who said that there was no government doctor going to examine them. We paid no

attention to them, ignored them entirely, and went ahead with our work. Usually the day before we got through we let it be known through the plant that we were going to get out the next day, and I think, almost without exception, all the men who protested against being examined came up and said, "All the other boys have taken the examination so we will take it too." There is always some way you can get at those things if you do not try to force them. If you use judgment and diplomacy, you can get by on practically all of these problems.

MR. JOHNSON: I wonder if we should insist upon the foremen of departments, office managers and assistants, taking the physical examination?

DR. RECTOR: It seems to me that if anybody is to be forced to take the physical examination, it should be the heads of the departments. I don't believe in force. I believe in persuasion, and that brings up a very interesting point. Unless you do get the management behind you in anything that you are doing in this line, you are not going to succeed. The employees will not come up to be examined if the heads of their departments have not taken advantage of the physical department's facilities. So the big problem of the physical department in the industries is to sell the management, from the executive officers on down the line. If all the heads of the different departments have taken advantage of the facilities offered by the physical department, it will not be much trouble to get the employees to fall in line.

A Peculiar Situation in a Boston Plant

I was in Cambridge, Massachusetts, once where the plant physician was on a part time basis and the work was in charge of a nurse. I noticed employees coming in and getting some sort of treatment or medicine and the nurse made no record of it. I told her that she must have a good memory to remember all the people that come in. I asked her why she did not make a record while the employees were there. She said to me, "You know, there is a peculiar situation here. The cost of the medical department is charged against each operating department on a monthly basis, and based on the number of employees who use the hospital facilities, and a number of the foremen will not permit their employees to come down here for treatment if we make a record of it so that it will be charged against them at the end of the month." That was very interesting and you can see what was happening. You must get the cooperation of the supervisors if you are going to put over anything of this kind.

CHAIRMAN MACPHERSON: I think we will have to close the discussion on this paper I am sure we could go on all the rest of the morning.

The next paper on the program is by Dr. Eugene Lyman Fisk, of the Life Extension Institute, New York City. Dr. Fisk has been unable to get here, and he has asked Mr. Leo D. Woedtke, of the Fred T. Ley & Co., of Springfield, Mass., to read his paper for him.

PERIODIC HEALTH EXAMINATIONS IN INDUSTRY

Eugene Lyman Fisk, M. D., Medical Director, Life Extension Institute, New York City.

The ways in which periodic health examinations may be linked to the activities of the mutual benefit organizations in the plant, have been well worked out by Mr. Harold A. Ley* and presented in a previous discussion before this body.

That the theory of periodic health examinations in industry is absolutely sound is, I think, admitted by all who have given this subject any attention. There are people, however, who accept the theory and principle but have their doubts as to its practical working in an industrial group. Surely no one familiar with industrial conditions can question the enormous influence of health on industrial productivity, on turnover, on the accident rate, and on perhaps the most important condition that we have to deal with in industry—fatigue.

In considering the problem of industrial fatigue, these questions should always be asked: "Is the worker tired because he is ill, or ill because he is tired?"

Also, industrial experts, experienced in dealing with human beings, realize how difficult it is to influence the personal actions of men. It is an entirely normal and healthy characteristic for men to have confidence in themselves and their health and power to work as long as they feel well. The difficulty of securing the cooperation of men whose impairments are not causing pain or actual physical disability, is well recognized; but most worth-while things we are trying to do in industry are difficult, and no important measure is to be disregarded merely because it is a difficult one to carry through.

In this brief paper I shall present certain evidence bearing upon the practical workings of the periodic health examination system in industry, and its actual results in so far as the service has influenced the lives of those examined. The statistics derived from life insurance sources have already been presented to this Section by Mr. Ley.

I may remind you that in nine years' experience of the Metropolitan Life Insurance Company, a reduction of 18 per cent was effected in the death rate among those examined; and among those found more or less seriously impaired, a reduction of 53 per cent was attained. In the Guardian Life Insurance Company of America, a study covering ten years' experience showed a reduction of 23 per cent in the mortality of those examined; of 26 per cent when the extreme old ages were excluded. These are business figures of tremendous significance. Many have been skeptical as to the degree to which policyholders in life insurance com-

**How to Interest Employees in Improving Their Health*, by Harold A. Ley. Address Before the Fourteenth Annual Safety Congress Held Under the Auspices of the National Safety Council in Cleveland, October 1, 1925.

Prevention of Waste from Ill Health in Industry, by Harold A. Ley. *Safety Engineering* June, 1926.

panies would respond to the message of a Life Extension examination; but the answer is found in these figures.

Shifting our attention, however, to a different type of statistical proof, I call your attention to the accompanying table indicating the results attained in a group of about 600 industrial employees taking these examinations for three successive years.

TABLE A

Improvement in Physical Condition of 596 Industrial Workers resulting from Periodic Physical Examination as revealed by the medical and surgical attention needed at 3 successive years of examination.

Class of Medical or Surgical Attention Needed	Number of Cases Needing Attention At 1st Exam.	New Cases Needing Attention At 2nd Exam.	Percentage of Cases Cured Within Year Following Discovery of Impairment
General Medicine	90	60	69
Eye	217	66	52
Ear	64	24	58
Nose and Throat	144	79	50
Surgical	79	62	62

A study of this group shows why the death rate is so rapidly pulled down by a service of this kind. You will note in the various types of disabilities requiring medical attention, cures were effected ranging from 52 to 69 per cent; that is, within one year of the examination it was shown that the need for medical attention of various kinds had been reduced to that degree. This study covered a group of 596 employees selected at random simply on the basis of having had three successive examinations. In this way any possible special environmental influence is eliminated. These results would indicate the uncomplicated influence of the periodic health examination service and not of any special intensive work at any particular plant.

I think anyone familiar with industrial conditions will appreciate the enormous difficulty of attempting to trace the complete influence of such a service. The results on the death rate in these groups can only be ascertained after many years of exposure, and then it is often difficult to trace cases. The morbidity results may be affected by complicating factors, such as epidemics, special plant conditions and turnover, and other matters having nothing to do with the health examination service. But in this particular study we have evidence derived from individual consideration of the actual characteristics of the people examined and the extent to which these individuals have profited by the counsel given.

The type of examination I have been discussing is the standard one

employed by the Life Extension Institute in industry. This covers an examination of each region of the body, a chemical examination of the urine, and the delivery of a report by the examiner outlining conditions found and making recommendations as to the type of treatment to seek and the modification of personal hygiene that is necessary. This is the kind of an examination that is feasible and attainable for the average worker. I do not, however, think we should ignore the ultimate possibilities of these health examinations made on a broader scale for the higher class of executives. There is evidence available along these lines which is very illuminating and which is summarized in the following table:

TABLE B

Classification According to Degree of Impairment
100 Policyholders Examined Under the Vital Protective Routine
(Average Age 43)

Class		Number
1.	No physical defects or errors in hygiene	0
2.	Very minor defects requiring attention or observation	0
3.	Minor defects requiring hygienic correction, or minor medical, surgical or dental attention	12
4.	Moderate defects requiring medical supervision as well as hygienic correction. Impairment influencing longevity	70
5.	Advanced physical impairments requiring systematic medical or surgical attention	15
6.	Serious physical condition requiring immediate medical or surgical attention	3

This group comprised 100 individuals carrying large life insurance policies who received very critical and thorough examinations at the Head Office of the Life Extension Institute, including X-rays of the teeth, of the chest, and of the heart; electrocardiographic study, blood chemistry, and practically every laboratory investigation and specialized study that is available. These men were all high-class executives, accustomed to the best of medical attendance, and carrying on important activities. Yet in this group, three serious cases of heart disease were uncovered, and 27 of the group showed important impairments which could not have been elicited by the more elementary forms of examination.

I am convinced that these broader examinations will in time become the vogue among important executives who require to know whether they are likely to have a fairly long look ahead in their chosen activities or whether they need to modify those activities or prepare in any way for their restriction.

The relationship of these physical impairments to industrial fatigue is very close indeed; in fact, it is my opinion, from a close study of the industrial situation, that the major factor in industrial fatigue is physical impairment and not the hours of work or the nature of the work.

A thoroughly sound and vital human organism can carry almost any load of work through a fairly long working day without accumulating any pathological fatigue. The fatigue that carries over to the following day and is more or less continuously carried day after day, almost invariably arises from some infection or poison or physical deficiency on the part of the individual, and not from the nature or quantity of the work performed. Of course, we meet conditions of mental ill health quite as definite as physical ill health, and these may be a factor in fatigue. These conditions, however, may be revealed by a critical medical survey and oftentimes corrected.

How much underlying unsuspected physical impairment exists in the population was shown by the results of a sickness survey made by the United States Public Health Service. Sickness is not always the real index of physical condition. The diseases that figure most largely in the death rate may show an almost negligible sickness rate—as sickness is ordinarily understood. It is only by the periodic health examination that this underlying physical state can be disclosed and pave the way for corrective work before it is too late.

I can not leave this subject without insisting that the most important measure that could possibly be adopted for the elimination of waste in industry and for the mitigation of fatigue in industry, is the periodic health examination, followed by proper counsel and direction as to the treatment of pathological conditions and the correction of any factors in the personal hygiene or environment that are contributing to physical failure.

In the report that I made to the Hoover Committee on the Elimination of Waste in Industry, it was set forth, on sufficient data, that failure to employ these methods generally throughout the country occasions an annual loss of some three billions of dollars, and that one billion, eight hundred millions are lost in industry. This loss is preventable, and the cost of prevention will leave a margin of profit of at least a billion dollars.

I see no reason to change these estimates which were derived from the intensive study of small but representative groups. This is a practical, constructive business measure in industry, adding not only to the productive lifetime of the worker, but increasing his capacity to work and to live and to enjoy life. That is the principle or theory upon which the work was started, and experience has justified it. There are many business measures universally applied which lack the proof as to their utility which is now available regarding the periodic health examination.

ADJOURNMENT

THURSDAY AFTERNOON SESSION

October 28, 1926

The second session of the Employees' Benefit Associations Section convened at 2:00 o'clock, Chairman W. J. MacPherson, presiding.

CHAIRMAN MACPHERSON: This afternoon's session is to be a "General Round Table," and a general round table means a group that gets together and has a sort of free for all discussion.

The Nominating Committee consists of Mr. Homer Neisz, of Chicago, and Mr. Wills MacLaughlin, of Toronto, Canada. Mr. Neisz could not be here and has asked me to present this slate for him.

They recommend for chairman of this Section, Sidney W. Ashe, of the General Electric Company, Pittsfield, Massachusetts; and for vice-chairman, W. Frank Persons, of the Milwaukee Electric Railway & Light Company; and they recommend that the secretary be chosen by Mr. Ashe because probably he will want to select someone close enough to him to be of considerable service in that position. If you want to grant that authority I will entertain a motion for the election of this slate.

C. G. PATTERSON (Alton Box Board & Paper Company, Alton, Illinois): I move you that the slate as recommended be adopted.

(The motion was regularly seconded and carried unanimously.)

CHAIRMAN MACPHERSON: This afternoon we have six subjects for round table discussion.

On the first subject, "How to Keep the Small Plant Association Out of the Hole," a good deal depends upon what is meant by "hole." In our case we have a very easy way of changing the dues and it is our aim to keep the dues fixed in such a way that the amount of money on hand will always take care of current liabilities. Fortunately, we haven't had to change very frequently.

We have no fear of going into the hole because simply by a vote of the board of directors elected by the employees we can change our dues effective the following month. So there is no such thing in our plant as going into the hole. I would like to hear how some of the other companies keep the small plant association out of the hole.

MR. H. JOHNSON: Our insurance has only been in operation since May, and those starting in January, February and March will possibly be the fat months of the year for benefits and we have contemplated that condition.

Is there any one here who can give approximately the increase of benefits likely to be necessary in what we call the sick months, that is the sickness over the summer months? We don't know just how we are going to get through the winter and we don't want to make an assessment. We all know that assessments are very hard and a very bad thing to start to do.

ARTHUR M. COON (Dunlap Tire & Rubber Company, Buffalo, New York):

Our Association pays a very small fee. The members are assessed 15 cents a week but whenever we vote a large amount of money like $400 or $500 to recreation like baseball or bowling or any similar case and we find it brings the reserve fund down further than we would like to have it, I simply notify the company that such is the case and they donate a check through the Association which pretty nearly covers the amount. It is never the same amount but that is how we keep out of the hole. The firm, of course, does this but the members still feel they are running and paying for the Association.

MR. JOHNSON: I want to meet and talk with any member here who has or knows about an association maintained by and for the employees and which is contributed to only by the employees. I think most of the companies represented here and having relief associations are contributed to by the firms also.

FRANK WHITE (American Multigraph Company, Cleveland, Ohio): Our Association is all by and for the employees and they are the only ones that make contributions to it. We have found, of course, that in the months of say November, December, January, February, March and possibly April, about six months out of the year, is when we pay out most of our benefits. I will go so far as to say 75 per cent of our benefits are paid in the six months I have mentioned.

The Association Is Insured Against Deficit

I don't know whether that answers the gentleman's question or not. The company does not contribute to the Association and the employees do not want them to give anything or make any donations.

G. F. CLOSE (Commonwealth Steel Company, Granite City, Illinois): We have had a Benefit Association for about five years, and while we don't have any profit during the year we have no fear of running into the hole because we reinsure the Association with an insurance company. We find that during the six winter months, from November to April, the benefits are about twice as high as they are during the other six months.

Of course when the Benefit Association finances itself, pays the benefits directly, they have a more difficult financing problem than if it is reinsured. We know what our rate is going to be all through the year and we may have to raise our dues at the beginning of a new year when we reinsure. We really haven't that privilege, of course, but during the year we have no trouble because the insurance company stands the gaff.

S. B. WILKES (Larkin Company, Inc., Buffalo, New York): I can't say anything that isn't corroborative. We have an association of 35 members. It is supported entirely by the employees and we have found that about 75 per cent of the benefits go out in the winter months.

NATHAN SHAW (Illinois Power & Light Company, Chicago, Illinois): I would like to ask the gentleman who just spoke what benefits they have that they reinsure?

MR. WILKES: Our Association is composed of two parts. We have

the life insurance which the company provides, and the men pay entirely for the sickness and accident insurance, but as a matter of fact we insure both. The part in which I am concerned covers sickness and accidents outside the shop. The inside accidents are covered by compensation. The Standard Accident Insurance Company of Detroit carries that risk.

JOHN D. SWITZER (Mathieson Alkali Works, Niagara Falls, New York): When our Association was organized about 28 years ago we had, I suppose, in the neighborhood of 400 employees. At that time the company donated 25 cents and the employees 25 cents each month and we paid benefits of $5 a week. It went along on that schedule for about three years and then we went in the hole. One year we were forced to call upon the company for a loan of $300 which we paid back later on and we went along for perhaps 15 years on that same basis. We had more members but we still paid the same benefits and received the same compensation.

Benefits Were Raised When Times Grew Better

In that way we swam through it, but about 1917, of course, wages went up all over the country and people were not quite so much disposed to get sick. If they did get sick they didn't lose much time. Five dollars a week was not much of an attraction to them. The result was that within five years we piled up a surplus on that basis of about $1,500. Then we raised our benefits to seven dollars a week until such time as that fund would be pulled down to $700, and that lasted for about two years.

I was secretary of the Association for about five years and the expenditures during that time were about 75 per cent higher during December, January, February, March, and sometimes April than they were during any other month or months during the year.

However, we have taken over the group insurance plan for employees at a premium of 50 cents per month. The company is not connected with the Benefit Association except in the way of helping them out, and we are now paying $7 a week and we seem to be getting along very nicely.

EDWARD S. LICHT (Empire Gas & Electric Company, Genoa, New York): Relative to keeping the association out of the hole, we are thinking of a plan now that we think will be quite successful and that is an investment for the surplus that we have in the Association. We are thinking of taking this surplus and allowing the employees to make loans on it, to borrow money out of it, and to pay six per cent interest unless the amount is to be used for sickness in their families or something of that sort, in which case they will be required to pay four per cent interest. If that plan goes through we think it will not only build up our surplus but will also make it quite convenient for employees who wish to borrow money in that way.

MR. SHAW: I want to repeat the question I asked when the meeting

first opened. Are there any members who have been connected with the Association who did go into the hole? We want to know what some of the pitfalls are that we might go into.

I don't believe it would be just right to discuss that question without referring to our own organization. About 62 per cent of our employees are now members of a hospital association which we have and which was organized in 1917.

At that time the company realized that in time of illness and death there was more or less distress among its employees and therefore they devised this plan. We are seriously considering revamping it and anything that I might contribute here is given with the idea that some of the others, with a more revised plan than ours, can help us. We have been in the hole and the company has very cheerfully and liberally contributed to the fund in order to keep it going.

During the life of the Association the company has probably contributed about $90,000, and we graduate the dues or assessments to the fund on a salary basis. In the higher salaried classes they pay rather large amounts. In the lower graded salaries the contributions are very low, the smallest amount being 25 cents a month.

We have gone in the hole (although we don't feel we have provided excess benefits) and if there are other quesions that will help us to bring this matter out and help someone else I should be glad to hear them.

Members Contribute According to Various Classes

CHAIRMAN MACPHERSON: Let me ask, when you have gone in the hole where is the burden placed, on the company or the members?

MR. SHAW: The company has always made up the deficit. There has not been any change in the assessment to the members. That is a fixed plan by which we assess them on a monthly basis and we don't change the amount they contribute.

MR. RIDDLE: May I ask what the cost is to the members and what they offer in benefits to the members?

MR. SHAW: The highest salaried employee contributes a maximum of $4 per month and the lowest 25 cents per month. They are graduated in amounts of $100 and down to as low as $2.50, which run approximately 25 cents, 40 cents, 60 cents, 80 cents, $1.20, $1.60, $2, $3 and $3.50, and as high as $4 per month. On salaries less than $200 a month it runs at one per cent per month and in excess of that amount it runs one and one-half per cent a month. The average cost per employee figures out about 22 cents per month.

It just happens that we have an Employees' Association with the cost all to the employees and where the company has never yet contributed, not because we couldn't secure that contribution but we have never found it necessary. Through 25 years the expense to the insured in the plant was 50 cents per month, with an average death benefit of $250 and $7 per week for accident and sick benefits. In the last 25

years with an average of 7,000 members, a surplus of $100,000 has accumulated.

That is also being rather lenient with the claimant for benefits if it is found that at the end of the disability period (which in our case is 13 weeks) he or she is still in need of help, we may extend that to another 13 weeks in any one year or period. But since that time there has been so much cooperation propaganda about insurance schools with outside groups coming into industrial organizations (possibly you call it underwriting excess insurance), that we have formed a plan of our own where we know through our past experience and through the statistics offered by the various insurance representatives that we can't fail unless it is in the face of a catastrophe.

We have obtained all our figures from authoritative sources. They were accumulated from all the larger insurance companies who write industrial insurance in the United States. We took two months in which to investigate this and find out our cost. So we now have a $1,000 death claim and $7 or $8 a week sick benefits with, of course, the death claim rated at the total disability rate, in compliance with various items in the By-Laws that call for a payment on loss of members and loss of time.

Nothing is Compulsory in the Association

In our Association nothing is compulsory. It may look as if pressure is brought to bear but there is none. We had one benefit where there was no examination necessary to enter the employment of the company, but we decided that in fairness to the other members it was necessary to go through this examination which meant the same thing as getting into the insurance plan. So these figures that I am giving you have really been compiled by the insurance actuaries who are specialists along that line.

CHAIRMAN MACPHERSON: I find the discussion is drifting toward the subject, "How can one determine the proper basis for membership dues?" and unless there is some other discussion on how to keep the small plant out of the hole, we will pass on to the next question.

I think also that the next subject is very much connected with number three and we might discuss them together. Number two is, "The Secret of Success of our Employees' Benefit Association." I think answers to that will be practically the same as the answers to number three, which is "What Is the Best Plan of Administration for an Employees' Benefit Association?" We might discuss those two together.

The secret of our success in the Benefit Association is the fact that it is operated entirely by the employees. They do their own checking up on malingering, make recommendations on cases that are entitled or not entitled to benefits and also the dues are based on our current expense, and, therefore, the employee is interested in keeping our expense favorable. In cases where the company pays the difference in expense, the incentive is probably taken away.

C. G. PATTERSON (Alton Box Board and Paper Company, Alton, Illinois): I am inclined to be like our chairman in his attitdue of administration. We have only 175 men in our Association. Our Association attends directly to the employees and we have directors and sick committees who look after its members and in the last three years we have accumulated a surplus of $3,000 upon 15 cents per week, per member.

The company put in 15 cents apiece for each member but above that we have saved more than the amount the company has given us in the last three years. Prior to that time we had 10 cents a week, a $50 death benefit, $25 childbirth benefit and we accumulated a surplus there. Then we cut out taking subscriptions from the men for over a year. But that eliminated the new men coming in, so we had to reform on this basis, with 15 cents a week and the company came in with their part of it.

Our office force is not in the Association at all. The directors are elected by the men. The secretary informed me the other day that the childbirth rate had drawn the fund down $175 last month.

What Measures the Success of the Association?

HERBERT W. ALLEN: May I ask what you mean by the success of the Association?

CHAIRMAN MACPHERSON: Success might be measured in several ways and I suppose there would be as many opinions as there are people in the room. In my opinion one of the things that indicate the success of the organization is the percentage of members who belong to the Association. Another is the financial structure that guarantees the performance of what you say you will do.

In our particular case we have 92 per cent of the employees as members and have kept that number almost level for six years, and membership is not compulsory. Ninety-two per cent means almost 100 per cent because there are always a certain number of applications in the mail and our membership becomes effective following the first or fifteenth of the month. I would say it would run 98 per cent if we had the applications listed that are always in the mail.

The success of the Association might also be measured by your financial difficulties or the lack of them. In our particular case we have operated for six years without changing dues, and we started out with the intention of operating so that the dues would equal current cost. After six years we have a $7,000 balance. We feel our rate was a pretty good guess.

MR. ALLEN: We have been told in our Association that it would not be a success in any sense of the word if we had a 100 per cent membership. In other words, the life of your Association is to have a new knocker or a few people who do not see the benefit of the man at all. If every man is a member the interest sort of dies down and it is not as active and strong as it would be otherwise. For that reason we have never urged that our membership be 100 per cent. We have never made

any extraordinary effort. The ones who want it come and ask for it without being solicited. If they are ever solicited it is only through their work.

We feel that our Association is a success because of the 88 or 89 per cent membership under those circumstances and we take up any activity that any organized group of employees would take up or that they may wish to take up and that activity is paid for entirely through the funds of the Association. That covers everything from baseball and all sorts of sports to education and lectures, entertainment, everything imaginable.

We do what the group wishes to undertake and we feel that because they do take up so many of those activities (and they are usually a success) that our association is a success.

I might mention that we have an employees' representative council in our plant. The directors elected by each of the different departments constitute the representatives in this council and they act for their shop mates both in the Association and in this workmen's council and also in our safety council. The director is "some punkin" in the department.

CHAIRMAN MACPHERSON: We agree with the last speaker on the subject of lining up men. We set up a little resistance to joining by charging $1 admission fee. That has nothing to do with the dues but we charge that $1. We find that the fellow who decides not to join and happens to get sick and is sick for six or seven weeks without any benefits, becomes a very fine salesman for the organization in the future.

Each Man Should Be Sold on the Merits of the Association

G. A. DOELLER (Dayton Power & Light Company, Dayton, Ohio): When we employ a man, the employment office doesn't feel that it is really functioning in its fullest capacity if we haven't sold the man the merits of our Benefit Association.

It is rather pitiful when a man doesn't belong and is not in a position financially to take care of his obligations, and who shortly after he has been employed by your company is taken sick and is sick perhaps for six or eight weeks. We feel that we have not done our duty in the employment office if we have not sold him on membership in our benevolent association.

We do not have a compulsory method but in nearly all cases we put the matter up to the new man in such a way that we generally get his application.

MR. ALLEN: It seems to me if the employment department points out all the advantages to the new man he is going to do most anything to get the protection.

GEORGE E. BARLOW (Welfare—Olds Motor Works, Lansing, Michigan): May I ask what is your age limit for a member?

CHAIRMAN MACPHERSON: We have no age limit. Is there someone who wants to say something on that?

MR. RIDDLE: May I give you our experience? Our age limit is 55. Between the ages of 50 and 55 we have them pass this special rigid examination, and I feel that the success of our organization has been the keeping of the average age, the average age limit at 43. That is the insurable age, that doesn't mean the age of the man, that means the premium age. Thirty-five is the average age of the individual. When a man reaches his fiftieth birthday he has to pass a special physical examination.

N. F. STALEY (Goodyear Relief Association, Akron, Ohio): I would like to tell you a little about our relief association during the past 17 years. We have accumulated (if you want to call it a surplus) at the present time about $123,000. We have been paying $12 a week for Class A members which includes men whom we hire up to the age of 50. Men whom we hire over the age of 50 we rate as Class B and pay them $8 a week. Class C are women and we pay them $8 a week for ten weeks. The other two classes get benefits for 16 weeks.

Total Insurance Carried of Over Twenty-Six Millions

About two years ago we amended our rules and regulations to no pay for the first week and during the first 18 months of that time we ran a deficit of $10,000. We pay where the state pays, regardless of whether the injury happens in our shop or outside the shop. We pay for it anyway and I think that is quite a drawback, because when a man is injured and gets paid by the company and the state too it has a tendency to foster malingering. The big thing that we are up against is our Class C, the women. We have run a deficit on those people ever since we took them over in 1917. This year I believe it is going to run something around $2,000. Up to the present time we have been doing the best we could but we have made an amendment to our By-Laws whereby we are going to raise the dues on the women, making them pay the same as Class B, and we think that will wipe out our operating deficit.

We have enough money coming in on our securities to offset the deficit and I believe we are going to make a little net profit. Our investment must earn in order to cover the operating cost. The insurance is furnished by the Goodyear Tire & Rubber Company. That has nothing to do with the relief association any more than if you should join our association and we should make you a present of $1,000 insurance and pay the premium.

At the present time we have what we call service insurance. That is where men have been with us for long periods of time. Our total insurance at the present time is over $26,000,000.

Now that is not all paid by the Goodyear people. We have what we call personal insurance, or extra insurance, that the men can purchase at a very small rate, $5.40 per thousand a year and quite a few have availed themselves of that opportunity. I think we have something like $4,000,000 of personal insurance but the balance of it is paid by the Goodyear Rubber Company. The $9 a year that the men are glad to pay, covers sick benefits for 16 weeks at $12 a week.

We saw where we were going to run a deficit for paying the first week and we took it up with the men. We have, by the way, the industrial representation plan in our factory and you not only have the individual member to deal with but you have the industrial service to deal with. We took it up with some of those men and we finally did get it down where we didn't pay for the first four days, and that has saved us in the last year, approximately $7,000.

We also have a clause that we must be notified within six days of a disability. That can be changed by the trustees. For instance, if a man is seriously ill he can not notify us at once but within a six-day period he usually can notify us, or some member of his family can do so. That rule, of course, is very flexible and I would like to hear from some of the rest of the Mutual Benefit Association men on notice of disability.

Our experience has been that some of the men will leave their work, regardless of whether they are taken from the payroll, go away possibly the length of five or six states and come back at the end of three or four weeks and bring a doctor's certificate indicating illness during that time. We know we are getting stuck, but we can't help ourselves because we do pay on the doctor's certificate.

A Waiting Period of Thirty Days

Also we have a waiting period of 30 days. However, that does not affect the insurance; it is effective right away. We had one man who had only worked two hours and a block flew over and killed him, and of course, his family was paid $1,000.

There was a time when we let them work three or four months before they were told about the insurance but that was a cumbersome way of getting men and it kept an extra solicitor on the work. So now we take them as they come through the labor bureau and we write them up right then and tell them the benefits will not be effective for 30 days. We charge $1 initial fee. Every man is examined by a physician when he comes in and his physical condition determined at that time. But the thing I am interested in hearing is what is your experience with your women employees.

MR. CLOSE: The last speaker has raised the question which has bothered us more than any other one thing in our Benefit Association experience and that is the employees being sick and failing to give proper notice. We have a rule that a man must give notice within 10 days if he wishes to draw insurance, but as a matter of fact we can't enforce it. If a man is really sick and we know he is sick, even if he didn't give notice, we sometimes threaten him and tell him we can't pay him. We tell him the insurance company may turn him down. But as a matter of fact we have always paid those claims on delayed notice if they are bonafide sick claims and I don't believe there is any way of getting out of it.

The only way to do is to emphasize it in any way you can in your plant publication and through the board of directors, having them empha-

size it with the men in their departments; but after all if a man is really sick you are going to have a heart and you are going to pay him. It is a very serious problem and one that causes a lot of inconvenience and trouble.

If anyone here has found a way to solve the problem to really secure prompt notice in every case, I want to hear from him.

CHAIRMAN MACPHERSON: You will find that question is listed here on our program as number five, "How we check up on our disability cases," and I hope your question will be answered then.

I would like to move on to number four, "How can one determine the proper basis for membership dues?"

Now let's get that question in mind. I don't think the question means how much do you charge in your Benefit Association, but how to determine the proper basis upon which to make the charge.

Study of Other Associations Valuable

You will find when you have studied and discussed Benefit Association work, that one charges one price, say 50 cents a month or 50 cents a week, and somebody else charges some other amount; there are so many ways, we would have to get out our note books and take notes to remember them all. It all depends, of course, whether or not life insurance is included in your plan. It depends on whether or not you start paying benefits after the first week or after the first day or after the fourth day or some other period. It depends also upon whether or not the workmen's compensation cases are included. I think the money charged should not be included in this question. How can one determine the proper basis? I suppose the answer to that by a good many people would be, tell the actuary the kind of association you want to set up and then let them tell you the rate to charge.

In our case we went to three companies that had Benefit Associations; they had had them a long time. We found out what the amount of lost time was on account of sickness. In those companies we found sickness beyond the first week (which was what we wanted) amounted to 1.03 of the total working time. In other cases it was 1.06 and in another case it was 1.01.

We made a guess that our employees were just a little bit healthier than that. We guessed that we could charge dues based on one per cent of the benefits to be received. Then we distributed that cost to the men and to the company. The employees paid two-thirds of the benefits and the company paid one-third. When the rates change, that proportion still holds good. In six years we have not had to make a change.

Our scheme was to find out the amount of lost time and then base the dues on that estimate.

Now perhaps somebody has a better method or a more scientific scheme for determining the proper basis for dues. We would like to hear from you.

MR. JOHNSON: We guessed at it in this way. We tried to figure what

the lowest paid worker in our plant would consider. We guessed it 15 cents and it has always stayed there.

CHAIRMAN MACPHERSON: When you say 15 cents that has to be related in terms of what you pay, of course. For instance we pay from 75 per cent to 100 per cent of full pay for a period of 52 weeks. Most of our advisors told us that that method would cause malingering, but our experience has been quite the contrary.

MR. JOHNSON: Isn't it a fact the cost to the member is based entirely on the amount of money you pay back to him? An insurance plan as given to us by outsiders was based on the amount of money we had to pay outsiders and was paid on the amount of money we had to pay back to our group plan plus their overhead as mutual companies.

We took our record for 25 years and took their records on group insurance over an average insurable age about which I spoke a minute ago. In addition to that we figured we should have a certain backup to offset. Most of the smaller organizations' plants are in one place and the risk is all in one place. That meant that in the case of a catastrophe, a whole group would be wiped out and we figured that the success of our larger organization would be still greater if we combined the various works in the various states under this insurance, thereby spreading the risk; so I can say again that our cost to the member is based entirely on what we have to pay to the member or to those who have become sick or who have died in the meantime. And also by the figures of the actuary writing group insurance.

How to Check Up on the Disability Cases

CHAIRMAN MACPHERSON: On this next question, "How we check up on our disability cases," I think there will be a lot of discussion and questions.

DR. H. E. ROBERTSON (Norton Company, Chippawa, Ontario, Canada): We have about 225 men in Ontario under this plan. We find that it is very profitable to employ a trained nurse. Our By-Laws stipulate that a man must notify us within 40 days when he is sick. But our employment department makes up a list every morning showing the men who are absent. The first day the nurse will not look a man up but when he does not appear on the second day, the record will show that there has been a second day off and if she finds that he is sick she will render whatever service she can. By the time it gets to the fifth day, if he is not able to make out a disability slip she will make the slip and turn it in to the secretary.

Every now and then a man neglects to turn one in and it has been our custom when we find a man that has neglected to turn it in through some cause or other, to try to read the "Riot Act" to him.

We have our directors' meeting every Thursday night and we make it a point to bring him in and find out just why he failed to turn in his slip. In that way we throw a scare into the man and we find it is mighty good advertising. We get him up there, get his story and then,

of course, our By-Laws leave it up to the board of directors whether or not we can give him benefits. We put it up to the board of directors.

Then again in our annual meetings or semi-annual meetings we continually drum upon that subject of disability. It is really a process of education because while 75 per cent of your men may be steady you still have the new men that are coming in all the time, who do not know anything about the rules of your association and it takes time to educate them along those lines.

I will say in connection with the nurse's services, we have found it very beneficial. We have eight directors in the association spread out in the shops among the employees. We find that if we cooperate with the foreman who is vitally interested in the man being on the job, we get somewhere with the training. We have 30 or 40 men really tracing or training the new men all the time and in that way we keep down the malingering to a very great extent and find it very easy to operate.

Notice of Illness Must Be Given Promptly

We have a clause in the by-laws, "No benefits paid unless notice has been given within six days." Our organization is now on its second year. Since the day of organization we had over 80 per cent of the men and have had continually, for the past year 95 per cent and have also been a financial success.

One thing we have had since the first day of our organization: the fellow who don't report his disability until he is ready to collect his benefits does not get the benefits. We check up in this way. We made every foreman a member of the board of directors in the different departments and had them report all of their men that were off and the cause for the absence.

To show you how far some of them will go, we had one man who had been off 14 months and he wrote in for benefits. We had never had anything like that before. This fellow had gone six or seven states away and then made his claim. We have prided ourselves on the fact that we have always paid the benefits the second week after the man has been disabled and made all the further payments until he returned to work. We make the payments every two weeks and all of those fellows who did not report within the first six days, had to wait until after a regular period, until after the meeting of the board of directors, unless the men were in bad financial circumstances.

MR. JOHNSON: We haven't had a case of that kind in five months. I think it is due to the fact that we have a clause in the by-laws which states that if we are notified within three days they will receive compensation but otherwise the disability will not begin. It begins only on the date on which it is received by the secretary of our association.

Of course we do not pay for the first seven days' sickness or accident. If he is off seven days and we get the notice on the seventh day he would draw benefits on the eighth day but if he doesn't get his notice in until the tenth day he has lost three days.

Another clause we have is that no employee or member of the association dare leave the city in case of accident or sickness without first notifying the secretary, and that case will be brought up at the next regular board of directors' meeting. He may secure permission to go if he leaves the address to which he is going and keeps the secretary informed that he is away. Unless he does that religiously he will not be eligible for any benefits. We have had very good success with this plan.

We had a case of one of our girls going away to a resort in order to rest up. She had had a nervous breakdown. She reported to the secretary she was going to be away for six weeks. The secretary reported it to our company doctor who also called her in and talked to her. It was brought up before the board of directors when she came back at the end of 10 weeks and she reported back to the secretary and the secretary reported to the doctor who talked to her again, and the benefits were passed upon and approved.

I think enforcing those measures has done more to get our employees to report their sickness and accidents than any other one thing.

CHAIRMAN MACPHERSON: The point of view seems to be to make the Benefit Association an insurance company and puts the burden on the members. I wonder if we should not consider it as a service department of the company and that it might take the initiative and go out and try to serve the employee who is sick.

A Membership Committee Visits the Sick

If the employee is sick we go out to see him. The membership committee selects a man to go or maybe several will go and they will help him fill out his form of proof of claim, and see that it does get through properly and promptly. Do not misunderstand me, this isn't a professional visitor or a nurse, it is a member of the committee selected by the employees for that purpose.

C. H. WHITEMAN (The Mathieson Alkali Works, Saltville, Virginia): There is one point that makes a different condition at different plants. One of our troubles is we have several hundred foreigners. We have several hundred colored men employed. The ordinary American white man will understand the rules and will be very glad to comply with them, but it is a tremendous job to get the foreigners and colored men to take any responsibility on the thing at all. We do all we can in every possible way to help the fellow fill out his notice when he is sick but we have some 38,000 or 40,000 men and we can't get reports every day, not oftener than every week or every two weeks through our employment department to know when men are off.

We have a nurse we send around but, of course, if we don't know the case we can't send the nurse around to investigate it. That is the particular problem with us, these groups of people who are not educated in American ways of doing business and who don't seem to care to learn.

CHAIRMAN MACPHERSON: One scheme that sometimes helps a little is

to have the reports go to the office and a copy of them sent to the Benefit Association and someone there goes through them every day to make sure that none who are off duty on account of sickness are overlooked.

MR. PATTERSON: We have a bonus system in our plant that requires each man when he is off to notify us the same day or his bonus for the month does not stand. That bonus averages 17½ per cent of the man's monthly wage and it is quite an item. If a man does not report the first day he is off, his bonus is delinquent, so that helps us to keep in touch with all our men.

MR. STALEY: It is all well and good to have these rules and say that we won't pay if they do not notify us, but if a man is down and out and you know he is sick and he brings you the credentials that he is sick, I think that fellow should be paid absolutely whether he notifies you or not.

A Little Trouble Will Develop Once in a While

Of course, we have a little trouble once in a while with a fellow that is beating you and he even boasts about it, that is hard to handle. We had a case of a girl who went out of the state and had a doctor from the Goodyear people to take care of her on the side and when she made that claim we had to pay her the money. Those are the cases I would like to know how to handle.

CHAIRMAN MACPHERSON: We have that problem to some extent in our association, but they know we will pay the benefits. We have heard of companies that wouldn't pay benefits unless they were notified by a certain date, but there aren't many who enforce such a rule and consequently we do not have such a statement in our rules.

On the question of malingering, whether or not some outside doctor states it is a bona fide case, our rules provide that when there is any question, or the membership committee refuses for some reason to sign the proof of claim or when any officer of the association refuses to approve it, that case is referred to the committee of employees who have final decision.

Our experience has been that the employees who are interested in running this association are very hard boiled on the subject and we haven't found a malingerer they let get by. Since this plan was instituted we have had only five cases where the employees' committee has recommended "no benefits" and a case like that now and then has a very wholesome effect.

MR. WHITE: I think the chairman has hit the keynote when he says that we should look upon the association as a part of the service division. Also the gentleman from Canada in the plan he outlined said practically the same thing.

At the multigraph company we know that sometimes we are being beaten by a malingerer. It can't be helped at times, yet if it is going to be a mutual organization in fact as well as in name we have got to consider in our estimation that it be part of the service division work to see that these men and women are taken care of.

We have our board of governors, composed entirely of employees out in the plant. We tell them if we can be of service to call upon us, but they prefer to run it themselves.

CHAIRMAN MACPHERSON: I have heard frequently that we are being beaten by malingerers and I have never had any statistics. In our company we picked out one division with 1,000 employees, appointed a committee consisting of both management and employee representatives, and had that committee analyze every single case of sickness for one year in that group of 1,000 for the purpose of finding repeaters or finding cases that could possibly be classed as malingerers.

That committee could not find a single case where they would even suspect malingering. Every case was checked up by someone close to the employee or by going to the family or the doctor, and they were not able to find a single case. We have had several cases where the employees have recommended discharge and no benefits. We have three cases within the last two years where the employees' committee has suspected malingering and where the company had to take a stand and prove the employee was entitled to benefits.

The Follow-Up System Prevents Malingering

MR. ROBERTSON: I believe if you have a Mutual Benefit Association you have to make it a part of your organization. You have got to follow up the production and where you have a large number of men or in plants where you can not have a trained nurse I think the followup system is certainly a wonderful thing and it can be handled through these committees. I have seen it worked out in other plants. I know how it worked in our plant. We have never had a case of malingering, due to the fact that we have had this followup system.

You should have a large number of men on these committees and if they discover any malingering it is up to the board of directors to disallow such claims.

DR. WOOD: When these employees make these investigations do they do it on company time and if so is there any special arrangement made for replacing them while they are away, or how do you manage that part of it?

MR. ROBERTSON: As this other gentleman stated, we work through committees. Each department has a committee according to the number of employees. They have a committee of one, representing about 15 employees and if that person can not call on the sick person the first night or the second night we have to send someone else because we must have a report not later than the second night. Of course, we look up all we can but it is simply a check, and they go on their own time.

We figure they are interested in the association to the extent of going to see this sick person and we have a rule that they may spend any amount of money up to $3 for flowers, food or something of that sort, providing they have reasonable belief that that person is sick when they start out.

There is one little thing I would like to ask. How many accept a doctor's certificate as final proof of the sickness? We put that thing up to our board of directors. We believe there are some doctors who are not absolutely honest and ethical, just the same as other people in business, and we put it all in our board of directors' hands in case there is any suspicion of the doctor's veracity. We have an investigation made and sometimes we find it a good thing to do so.

LEONARD KING (Brooklyn, New York): You seem to have answered some of these questions in the same way we deal with them. We have a division in the company of about 25 bureaus. It is a gas manufacturing concern and these heads of departments have been sold on the association idea, so that they have to inform the members of the sick committee within that certain section by the second or at most the third day of sickness, and in case there is no such information given we hold the sick committee's representative in that section responsible.

The Doctor's Statement Is Not Always Final

I don't think we have under discussion the question as to whether the employee is cheating you or not That does not seem to be very important to me. I guess all these gentlemen will admit that that is only a very small loss at least. It does not pay to take it into consideration.

CHAIRMAN MACPHERSON: Answering Mr. Robertson's question as to whether or not the doctor's statement is final: In our company it is not. The committee determines whether or not the individual is entitled to benefits. We had a case where the committee doubted the sickness and the employees questioned his rights to benefits. Then he brought a statement from the doctor, that so-and-so was absent from work on account of sickness. Then the committee called on the doctor and finally he admitted that the employee was absent on account of sickness but that it was on account of sickness of someone else.

MR. LIGHT: Our company supplies power and light and gas for the territory covering 18 or 20 towns and cities. In the cities we have perhaps two and perhaps three men that act on the board of directors, in towns or villages there will be perhaps only one.

These men are elected by the members of the association of their town or city and they have complete charge of visiting the sick, complete charge of collecting dues for their particular territory, and we find it works out very successfully. The word of those men is taken for the truth. Anything they think should be done, is done. They also send in requests for flowers and food or anything of that nature to be sent to the sick person and we find it works out very nicely.

CHAIRMAN MACPHERSON: We were asked a little earlier in the meeting to ask Mr. Williams for his observations and whether or not the so-called employees association is regarded by the employees as a company association or whether they think it is something the employees are actually running?

MR. WILLIAMS: I think the answer to that question depends on what the actual experience is in each case and how it works out for employees under a given condition.

I have been asked a great many times what the ordinary worker thinks about the plant doctor and whether they resist plant examination by the doctor. That was a question very much in people's minds several years ago and I kept my eyes and ears open and I found it all depends upon the way the people were actually being handled by that doctor. If they were handled well by the doctor they continued to believe in the system and if they were not handled well they thought it was a bad proposition; I was really shocked to find how badly handled the average worker was when he went for a physical examination.

The answer, therefore, to any of those questions is, that the worker is getting his attitude toward these things always by means of his personal experience. If he has a bad experience he is against the whole proposition and it is an idea that is worth keeping in mind.

Unemployment the Cause of All Unhappiness

The temptation of every convention is to leave out that factor of the actual closeness of relationship between those who are working out a given situation and those perhaps who have had a favorable experience, and we tend to overstress the value of that or this particular mechanical detail; so that we are inclined to say we will do it this way or that way because such and such reports a good experience from this plan, and then are surprised to find it doesn't work so well for us.

It seems to me that if you can make sure of keeping in close touch with the workers and see that time after time they are well handled, you can be perfectly sure you don't have to be bothered about any unreasonable attitude in the situation. It does seem to me in general the Mutual Benefit Association gives a tremendous service.

Of course we all know that unemployment is the cause of all unhappiness in the industrial world today. That is either the fault of the management or the industry or of the public or the ill health of the employee or by accident to the individual. And when I think of all the troubles I have heard told, told to me by workers in this country and abroad, I believe that practically 90 per cent of them are the troubles which come from the loss of jobs, either from causes over which they have no control or resulting from sickness or accident. The ordinary man who has a job and who is able to work is likely to be a fairly contented employee.

I think, Mr. Chairman, the better step along this whole line of the Mutual Benefit Association is to give more individual attention to health, to prevention of accidents and the happiness of the employees. Of course, more and more caution is being taken to prevent accidents and yet the matter of the prevention of ill health is being given no attention at all as compared to the attention given the prevention of accidents; and that is in the face of the doctor's statement that a great deal of

ill health is preventable; so I should like some suggestion that next year more attention be given at meetings like this to the possibility of the prevention of ill health as a legitimate part of the ordinary Mutual Benefit Association.

CHAIRMAN MACPHERSON: Our last topic is, "How far should the Company go in Contributing to the Up-keep of the Association?"

There are quite a number of ways of doing that. Some of the companies feel that the company should contribute to these losses and in that way make up the loss. That, I think, takes away a certain amount of incentive. There is an advantage, perhaps, in the company paying none of the Benefit Association costs and still most companies, before there was a Benefit Association, did pay certain people when they were sick and perhaps the company would be embarrassed to turn over to the association the results of their experience and make it look as if the company were trying to unload a certain obligation or expense; that is probably why some of the companies contribute to the association.

In our case, the company pays for the first week's sickness, half time for hourly employees and full time for monthly employees the first seven days. That has nothing to do with the association. After the first week the employee receives 75 to 100 per cent of his salary for 52 weeks.

The Company Here Shares in Payment of Dues

Dues are arranged so that the company pays one-third and the employees pay two-thirds. The company pays all the administration expense. So in the net result the company pays a little more than half the total expense for sickness but still when talking to the employees we talk about the fact that the employees pay two-thirds and the company one-third. We think it is a good thing for the employee to feel that he is carrying more than one-half the load.

I would like to hear a lot of opinions on how far a company should go in contributing to the upkeep of the association.

MR. ROBERTSON: Our association has, as I have stated, 225 men. We have two classes. Class A covers the employees who are earning less than $90 a month. There are, of course, very few in that class. They pay fifty cents a month. All the others pay $1 a month.

Our Mutual Benefit Association went into the group insurance plan and the company agreed to pay half of the insurance premium, which, at that time with about 95 per cent of the employees in the Benefit Association, amounted to $1,600 a year, so that the company is paying really about $800. Our dues from the association run at an average of about $200 a month, which gives us a figure of $2,400 per year, plus the $800, which the company gives. You can readily figure out that the men are paying the major part of the money and the total of the claims run about $1,000.

By that method any death benefits are taken care of by the insurance company and the Mutual Benefit Association is only paying the accident benefits which amount to $6 a week, that is $1 a day for industrial accidents, and $12 per week on sickness. We find with that arrange-

ment we are above water and running along smoothly and giving service to the men which is the primary object of the Mutual Benefit Association.

From our experience it has a tendency to keep your employees satisfied and also lowers your labor turnover, which is quite an item in these days and always will be for that matter.

P. J. KOETSCH (Milwaukee Coke and Gas Company, Milwaukee, Wisconsin): Our company contributes 25 per cent of what the employees put into the fund, providing it is kept up to 65 per cent. We have clocks that the employees punch. As a matter of discipline we dock them for coming late or for missing the clock, and we never felt that that money belonged to the company, so we returned it by putting it into the Mutual Benefit Association fund at both our plants.

MR. WHITE: Our boys seem to feel that they are more on their own feet if they do not receive any cash contribution from the company. In other words they feel better about financing and operating their own project on the cash they put into it themselves and for that reason our company does not make any regular contribution. They would, however, make a contribution if we asked for it, any time. They have so stated that fact.

Employees Are Well Satisfied With the Association

Insofar as our employees are concerned they are perfectly satisfied with the way it is run.

In the group insurance, the company, of course pays all the premiums and that provides for $500 insurance after 30 days in the service, increasing up to $2,000 after 10 years of service. We have, in addition, the plan whereby the employees may elect to take an aditional $1,000 at a very low cost.

The fact that the company does not make contributions and that this Mutual Benefit Association is carried on by the employees has tended to create a better feeling in our company and in the plant. I would like to ask the chairman at this point whether or not we are going to have an exchange of opinion here this afternoon on the weekly or the monthly rates or dues and the weekly benefits?

The last gentleman said his dues amounted to from 50 cents to $1 a week, or month, and that they paid $6 a week benefits. It seems to me that there are some complications, and to get an exchange of opinion on all cases, such as death benefits and many cases that are unique within themselves, it would almost require the sending out of a questionnaire on the subject. However, if the members here feel that such information would be desirable do you think, Mr. Chairman, we could have that arrangement made?

CHAIRMAN MACPHERSON: Yes, that could be done but there has been information published on this subject and I assure you it is very complicated. It is a big subject and should be given time and thought.

MR. LICHT: It might be a good plan to exchange our constitutions

and by-laws. Then each member could be furnished a list and it could be mailed to them regularly after the information is collected.

(A motion was made that the chairman appoint a committee to go into the question and communicate with the members present at this congress, how far they would be willing to go and how much they wanted to contribute in the way of financing the project).

MR. ROBERTSON: I second the motion.

MR. H. JOHNSON: I want to offer an amendment to that resolution. I like the idea of the exchange of constitution and by-laws. That would give us just exactly what we want in the way of dues and benefits, but it might help all of us possibly to help our own association if we could get some of the good things out of our constitutional by-laws that we don't have time to note as we talk about them here in this meeting. If such an amendment is in order I would like to make it.

(The amendment was accepted.)

CHAIRMAN MACPHERSON: Any further discussion. I would just accept a modification if I may. There are 6,000 delegates at this convention and I do not feel we could ask the various companies to send us 6,000 booklets. I am going to ask the people here who desire such an exchange of information to notify me after the meeting and we will put them on the exchange list and try to get this information for them from all of the Benefit Associations of the companies.

(The motion was passed unanimously.)

CHAIRMAN MACPHERSON: We have gone through with the list of subjects that were scheduled for discussion today. Has anyone any general question or statement to make on this subject?

Problem of Incorporation in the Small Association

MR. LICHT: I would like to ask if any of these smaller associations have found it necessary or advisable to incorporate? Our association is studying out that problem now and we haven't quite decided but we feel as though we must do something before long because if any of those funds were misappropriated the directors would be held responsible.

CHAIRMAN MACPHERSON: We contemplated that very question and took the matter up with our attorneys who recommended that while the association should operate independently, still the recognition of it by the company and by the board of directors should make the Benefit Association a department of the company and that covers our incorporation. The Benefit Association legally is a department of the company.

MR. COON: This is not in strict accord with the discussion right now but the question has been asked as to whether it is a general practice with the companies to set aside time for the directors' meetings.

In our plant the Benefit Association has been in effect a very short time and no provision has been made for that proposition.

MR. SLOAN: We have an association controlled entirely by the employees, while we have the undivided support of the company along

with it. We employ, when we are in full operation, about 1,800 to 2,000 men. We have about 50 per cent of them in membership. Our dues are $1 per month. We have accumulated about $1,100, possibly $1,200 in a period of four years. We pay $12 a week for sick benefits, $12 a week for accident, and the accident benefits start after the third day and the sick benefits after the first week off.

Our relief association is incorporated under the state law of Ohio. Our board of directors is elected at our annual meeting for the election of officers. We have a president, a secretary and the board of directors, consisting of nine members.

The board of directors passed a resolution on a motion that any director failing to attend is fined and each director is paid for those meetings by the relief association out of their funds. Each director is paid $3 a meeting for attending. Of course we are a rolling mill, and rolling mills never operate after 11:00 o'clock Saturday morning. That is the way our association is run and we have been very successful in four years.

CHAIRMAN MACPHERSON: It would be very presumptuous for me to try to interpret the attorney's decision but I think the company would back up any controversy by a member suing the association or for any other situation that might come up.

MR. STALEY: Our relief association was incorporated as a separate association for the relief of sickness and accident and it has been operating very successfully. The company has nothing whatever to do with the management of it. The directors are all elected from the membership and we really try to keep executives from being elected on account of the effect it might have on the membership at large.

Does the Association Pay An Income Tax?

I would like to ask what some of the associations have been doing in the way of income tax, whether they have been paying any or not? That is a question that we have been up against for several years. We haven't paid any yet but we didn't know whether we should set aside a fund for it or not.

MR. RIDDLE: We have been organized for 16 years and have paid no income tax. We are not incorporated. We feel that we are a relief association whereby all money paid in by the members is payable back to the insured. Therefore, we do not come under the state commission of the state or the other association. If we incorporated we would have to lay down certain specific rules that we would have to live up to.

Previous to the war we had paid no income tax and after the war the Government sent on some men and notified us that there had been a special tax placed on relief associations, that this law had been put on the statute books of the United States Government and that we were compelled to pay a certain tax per member for a period, I believe, of three or four years. We went back and pleaded our case and we have

been notified that anything we do so long as it is not for profit is not taxable.

C. W. ALBRIGHT (Morgan and Wright Company, Detroit, Michigan): I will say that in Michigan the general incorporation law passed by the legislature in 1921 provides specifically for the incorporation of non-profit Mutual Benefit Associations. This gives the advantage of naming the association legally to handle all money and to own property and to sell it. That is necessary to carry on the business and does not involve any elaborate, technical organization or responsibility which would be embarrassing.

ADJOURNMENT

Food Section

New Officers of the Section

CHAIRMAN: VERN D. SUTTON
Postum Cereal Co., Inc., Battle Creek, Mich.
VICE-CHAIRMAN: F. A. HASSE
Corn Products Refining Co., Chicago, Ill.
SECRETARY AND CHAIRMAN MEMBERSHIP COMMITTEE: A. H. WEIDENMANN
Casualty Reciprocal Exchange, Kansas City, Mo.

Committees

PROGRAM: F. A. HASSE, Chairman
Corn Products Refining Company, Chicago, Ill.
STATISTICS: RALPH E. PROUTY, Chairman
Aetna Life Insurance Co., New York City.
POSTER: A. C. SELMON, M. D., Chairman
Kellogg Company, Battle Creek, Mich.
ENGINEERING REPRESENTATIVE: THOS. S. STROBHAR
Wagner-Taylor Co., Philadelphia, Pa.
EXECUTIVE COMMITTE (The Officers and)
H. T. EGGERT
National Biscuit Co., New York City.
ALEXANDER DIENST
National Sugar Refining Co. of N. J., Long Island City, N. Y.
STANLEY H. KERSHAW
National Safety Council, Chicago.

October 26, 1926

VERN D. SUTTON, Chairman
Safety Supervisor, Postum Cereal Company, Battle Creek, Mich.

THE Food Section of the National Safety Council convened in Parlor "D" of the Book Cadillac Hotel, Detroit, Michigan at 9:30 o'clock, Mr. Vern D. Sutton, safety supervisor, Postum Cereal Company, Battle Creek, Michigan presiding.

CHAIRMAN SUTTON: Well, gentlemen, the first session of the Food Secion of the National Safety Council will come to order.

We are very glad to see so much interest manifest in the new Section.

PURPOSE AND SCOPE OF THE FOOD SECTION

Vern D. Sutton, Safety Supervisor, Postum Cereal Company, Battle Creek, Mich.

Ellis Parker Butler, in his very amusing story, "The Great American Pie Company," tells of a couple of old codgers following the occupation of delivering pies baked by their respective wives. Meeting one day with their baskets of wares, they fell into heated argument over the competition each was creating for the other, but finally decided that more profitable than fighting would be to combine their interests and control the market for home-made pies in their village. With control of the market they could raise their prices, and with the extra profit buy up the fruit in season which came into their town, and thus eliminate competition of the commercial bakers.

Following this they might corner the entire fruit market and prevent the manufacture of goods to be shipped in by outside bakers. To prevent overbidding by bakers, canners, and fruit and produce men, they would buy up the orchards and farms and hire the farmers to run them. This would give them control of the wheat as well, and they would have to buy up the mills for grinding the wheat, the lumber and cotton industries for making boxes, barrels, and bags, the railroads for transporting their goods, the steel mills for nails and railroad iron, and ultimately the state legislatures and Federal Congress.

In organizing a Section of the National Safety Council for manufacturers and distributors of foods, we found ourselves with almost as limitless prospects before us as the pie merchants of Mud Creek, Indisouri. All Sections of the Council are closely affiliated with the subject of "Food," because this is vital to life itself and the major part of life's activities center about it.

Take food out of transportation and that industry would find its business greatly curtailed. The Steam Railway and Marine Sections, therefore, are eligible to the Food Section.

Much food distribution is by automobile, and because of this and that customers must be brought to points of distribution, we also welcome the Taxicab and Fleet Owners Section, and the Electric Railway Section.

To provide vehicles for delivery we gladly include the Automotive; and to provide tires and gasoline, also the Rubber and Petroleum.

Our foods must be prepared by heat and we open our doors to the Public Utilities and Mining.

We must have buildings to house our distribution points, and therefore Construction, Cement, Quarrying, and Woodworking are joyfully embraced.

And so we might go on, including Health and possibly, for obvious reasons, Rehabilitation, and all other sections. At any rate, friends, members of all Sections are royally welcome to the Section of Food Manufacturers, Distributors, and, to be more comprehensive, Consumers.

But if our interests are so interwoven with the other Sections, why separate ourselves from them? Because, while our topics are of interest

to them and their topics of interest to us, we may have topics not applicable to them and they have had topics not applicable to the manufacture and distribution of foods. During past Congresses of the National Safety Council, your speaker has found it necessary to try to spread over so many Sections that he ultimately was too thin even for pancake batter.

I would visit the Automotive Section, for instance, to hear a discussion of "The Value of Statistics," and at its termination the next speaker started to talk on "The Hazards of Spraying Bodies." Now we are dealing with the inner portions of bodies, and Duco finish and like subjects are of greater interest to us when we are seeking our new chariot and flirting with the temptation to lay safety aside and step on it out on the highway.

In the Mining Section "The Display of Posters" enticed me into the meeting, but the succeeding topic, "Blasting" frightened me out. If we were brides instead of representing experts in food preparation, we might care to know something about blasting.

In the Metal Section, "Shop Committees" was decidedly appropos, but "Foundry Hazards" did not aptly apply, as our moulding is more likely to be done on a moulding board.

It Is Now Possible to Be Mutually Helpful

So it is readily perceived what agility was required in order that a delegate might hear two or three papers of interest during a session. By having a Section devoted to the Food Industry it should be possible to have all topics on our program of more or less direct interest to all delegates from food manufacturing and distributing concerns.

It will be possible also to be mutually helpful throughout the year by pooling our problems and exchanging ideas. One of the ways in which this can be done is the news-letter. Now, a news-letter is not a book written by the president or secretary, or one versed in letters; it is the views of all members who are sufficiently interested to take part in the discussion, and unless there are contributions from a large number it will be worthless.

We have issued four news-letters, inviting responses in each, and have received just three letters contributing matter to be incorporated, one of which arrived just as I was leaving for the Convention. I'm sure others had something to say, but why didn't you say it? During the coming year I hope you'll say a plenty.

How about the posters of the National Safety Council? A lot of them are not good for the food industry; isn't that right? They will be glad to publish some that are good. What are your ideas for a poster? The Section ought to be able to help the Council get out some fine food posters.

There are many things in which we can help each other. If organization has made possible the great safety movement in industry, in public and in the home, why will not organization of those whose interests are more specifically the same, make possible great achievement in safety among those engaged in the manufacture and distribution of food?

I am going to ask Mr. Wiedenmann to speak along the same lines on "The Purpose and Scope of the Food Section."

DISCUSSION OF THE PURPOSE AND SCOPE OF THE FOOD SCTION

A. H. Wiedenmann, Casualty Reciprocal Exchange, Kansas City, Mo.

Having been associated several years with an insurance institution specializing in only a few industries, all of which with the exception of two, might be classified under the "Food Industry," I have felt the need of a Food Section in the National Safety Council to stimulate the industry's interest in accident prevention.

It may seem strange to those present associated with the food industry, but there are still an enormous number of food manufacturers, large and small, who have an alarming number of accidents, but consider them inevitable or not preventable and take no action to eliminate them. They feel that insurance will make amends for their neglect to preserve life, limb and property. Incidentally these concerns are working hardships on others in their industry as well as themselves.

Wherever our engineers can tactfully do so they recommend membership in the National Safety Council. In the past when the benefits of the Council were outlined a large percentage of our policyholders have felt little good could be gotten out of it because there was no Section to fit their particular needs.

Now comes the establishment of the Food Section, and I feel confident that as soon as we can get the news of the Section broadcasted among the industry generally we shall have one of the largest and most active Sections in the Council. I have some ideas for advertising the Section and feel that if everyone present puts forth his best efforts toward this end, our ambitions will be realized.

I feel statistics can be gotten for the different industries which will bring to light many safeguarding methods not heretofore used. In my experience I have seen hazards which were believed beyond correction for lack of methods. I have even made some suggestions which, perhaps, were not at all practical and have had the engineer explain to me how impossible it was to guard the hazard. And then I have seen this same engineer get a vague idea out of my impractical suggestions and eventually work it into an effective safeguard.

Experience of this kind means only one thing, and that is that each of us may be the means of bringing to these Congresses ideas and suggestions that can help in the solution of problems for somebody.

CHAIRMAN SUTTON: There may be some little discouragement because of the limited representation we have, but it is pleasing to know that we have a larger representation than the National Safety Council anticipated. That is evidenced by the fact that we are over-crowding our room.

In order that we may be well acquainted, I want to say that Mr.

Wiedenmann, who has just spoken, represents the Engineering Department, Casualty Reciprocal Exchange, Kansas City, Missouri; he has been one of the members of the Steering Committee and has rendered very splendid service in organizing this Section.

Another member of the Steering Committee is Mr. Strobhar, Wagner, Tayler Company, Philadelphia, Pennsylvania. I am going to ask Mr. Strobhar to express his ideas along this same line.

THOMAS F. STROBHAR (Wagner, Taylor Company, Philadelphia, Pennsylvania): I did not hear all of Mr. Sutton's first remarks, but I listened to enough to find out he was describing this as the National Safety Council meeting and that all the other sections are subsidiary to ours.

We were presented with a long list of members of the National Safety Council who possibly might be interested in the Food Section. We had expressions from a number of them apparently not being in favor of organizing a separate section. Those letters I believe came mostly from the packers and tanners. They seemed to think that we were trying to take food from them.

We have received one letter, however, from a Mr. Snyder who is with the Griggs Cooper Company of St. Paul. I am going to read a letter that he wrote in, because, I think that letter amplifies some of Mr. Sutton's remarks on the subject. The Griggs Cooper Company are manufacturers and wholesale grocers.

Letter From An Interested Food Manufacturer

"Your letter in reference to the organization of the Food Section of the National Safety Council received, and in answer will state that this movement has my hearty cooperation. In regard to the problem of accident prevention in my plant, I would say that we are in rather a unique position owing to the peculiar condition of our factory.

"In the first place we operate a 60-oven cracker bakery, making all kinds of crackers and cookies, from the cheaper grades to the highest in the market. The plant is extensive and very complete. Next we have a large candy factory which is also complete in every detail, making a general line of candy of every description. Then we have a complete roasting establishment, spice grinding machinery and extract department and other departments where we manufacture and pack baking powder, soda, and starch. In another department we prepare and bottle pickles and olives. In connection with this we also have a vinegar department where vinegars are reduced and put up in barrels. Then we have an extensive preserve and syrup department where we make a complete line of jellies and jams and put up all kinds of syrups and molasses.

"In conjunction with these factory units we have just constructed another building to take care of our large jobbing business which heretofore has been located down in the center of St. Paul. We have our own refrigerating plant with large coolers where we store tons and tons of raw material of every kind. We have just constructed a large garage

because we cover both St. Paul and Minneapolis with our truck service.

"You will see, therefore, from this brief resume that our hook-up, if you will pardon the term, is rather unique. We have a great deal of machinery in these various units of our factory that would possibly not be found in another establishment of a somewhat similar character. We have them all safeguarded and in our past experience have had a very low percentage of lost time accidents." (You see, that, perhaps, is why he is not here today. They are perfectly satisfied with what they are doing, but we will show them up later in the things we want to bring out.)

"In thinking over what part of our institution would probably interest manufacturers of food as safety problems"—you see, this is a news letter item he is bringing right here—"the thought comes to me that we have one thing that no doubt every manufacturer of food some way or another uses—the steam jacketed kettle, which is used throughout our plant and they are very hazardous. We have had a number of blow-ups in times past and one just recently where the bottom of a large kettle blew. Fortunately we have had no serious accidents result from the blow-ups, but if some course could be taken whereby all steam jackets could be made uniform with all popular safety facilities I believe this one proposition would be very effective in national safety work."

Now, I took the trouble to salvage that letter from among the number that we received in our steering committee work, thinking that it would open up avenues of thought and use in this Food Section from other members, and also to get those who are members and who are affiliating with the Section to go after the other manufacturers that we would like to have reap the benefit from the Section work that we are going to put out.

The Food Industry Shows Need of a Food Section

One of the other particular reasons for having a Food Section, aside from all the things Mr. Sutton brought out, is its use, its universal use As you go over statistics, for instance, in the state of Pennsylvania, the manufacturing state, for the first six months of 1926, we found that the building and construction program showed an increase of 44 per cent in accident frequency. Food section, plus 66 per cent, the outstanding one of the entire list. Textiles, three per cent; publicity minus 41 per cent. Hotels and restaurants, plus two per cent. Metal workers, plus 10 per cent. Now, if that applies in Pennsylvania, (and no doubt it applies in other states, as well), if those interested in food show an increase in accident frequency of lost time accidents of 66 per cent, that industry needs help.

At this Congress, I believe, the Construction Section is going to ask the National Safety Council to provide a paid secretary. They are claiming that they are the largest industry; that is, that the Construction Section represents throughout the country the largest wealth and that they had the highest accident record. No doubt they do have a

great many accidents and they do need help, but when we take frequency of accidents—lost time—plus 66 per cent in one state, I know that by cooperating together in a body, exchanging ideals, helping each other, that we can not help but show something like the public utilities here show in a minus 41 per cent.

CHAIRMAN SUTTON: In order to perpetuate this organization it will be necessary that we have officers and at this time I am going to appoint a Nominating Committee who will report at our session tomorrow morning. I will appoint on that committee Mr. F. A. Hasse, of the Corn Products Refining Company, Mr. H. T. Eggert, of the National Biscuit Company, and Mr. S. H. Kershaw of the National Safety Council. These gentlemen will report their nominations at our meeting tomorrow morning.

The matter of steam jacketed kettles has been very splendidly introduced already into this meeting and we are now to know something about this subject. Mr. J. T. Morrison, chief inspector, Hartford Steam Boiler Inspection and Insurance Company, Chicago, Illinois, will speak on that subject.

STEAM JACKETED KETTLES

J. P. Morrison, Chief Inspector, Hartford Steam Boiler Inspection & Insurance Company, Chicago, Ill.

(Accompanied by lantern slide projections.)

One identified with the Hartford Steam Boiler Inspection and Insurance Company derives great pleasure from attending the National Safety Congress for we have been engaged in "Safety First" work for something over 60 years. In fact, I am confident in saying we were the pioneers in that field. Our first policy of insurance, issued about 60 years ago, and subsequent policies, carry the provision that our inspectors have reasonable access to the boiler, steam jacketed kettle, or other insured object, for the purpose of making inspection to prevent loss of life, injury to persons, and damage to property.

When the inspection work was inaugurated, the steam boiler was looked upon as the source of energy most likely to get beyond control and wreck the surrounding property, but as industries developed and changing living conditions resulted in the establishment of immense food preparing plants, in which the old-fashioned preserving kettle, which the housewife had used on the kitchen range, was replaced by vessels of much greater capacity, using steam instead of the direct action of the fire as the heating element, the safety of such equipment naturally became one which concerned not only the owner of the establishment but the public in general, as the explosion of a jacketed kettle or rendering tank was quite likely to be disastrous.

Those things having a direct influence on the safety of steam jacketed kettles, retorts, rendering tanks, and pressure vessels of most every description, may be grouped under the classification of material, design, construction, installation and operation.

The material should be suitable for the purpose intended. Many of the acids and gases which result from food preparing processes, have a rapidly corrosive effect upon iron and iron alloys, while they may affect to a less extent such materials as copper and aluminum. On the other hand, the vessel of copper and aluminum may not safely withstand the pressure which could be carried upon a similar vessel constructed of steel.

Assuming the material and design of the vessel is all that it should be, the methods of construction employed by the manufacturer may be such that the vessel is irreparably damaged, and does not possess a sufficient margin of safety when it reaches the purchaser. Such imperfections may be so concealed by other parts of the structure that they can not be detected until failure takes place. A means of avoiding methods of that kind is to provide in the specifications for rigid shop inspection by an expert representing the purchaser. We frequently encounter the excuse, "That's good enough," when material or workmanship is criticised by the shop inspector. I know of nothing which will undermine and destroy the workman's judgment more rapidly. The man who is continuously being satisfied with inferior goods because it is "good enough," soon loses the power to judge and appreciate perfect work.

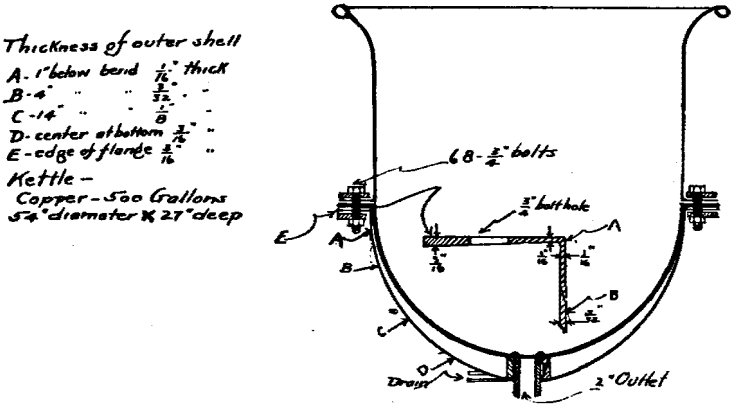
A Copper Hemispherical Jacketed Kettle

You will recognize the accompanying slide as representing a copper hemispherical jacketed kettle, such as is used in the majority of food preserving plants. The outside shell of the jacketed section is exposed to stresses tending to pull the copper sheet apart, while the inside shell is subjected to collapsing stresses, which copper, as a material, is poorly equipped to resist. The small cross section illustrated, gives an idea of the manner in which the material was stretched during the process of manufacture. This reduction in thickness could not be detected after the parts were assembled, so the vessel continued in operation without its weakness being suspected, until it failed quite violently, causing the death of two men. The manufacturer of such equipment should know if his finished product possesses but one-third the thickness, and one-third the strength the material had before fabrication was commenced.

We encounter a great variety of methods of connecting up food cooking equipment. In some cases there is a safety valve on one steam line leading to the kettle, although there may be two or more such steam lines without any pressure regulating device. Again, the safety valve intended to protect the vessel from an over-pressure may be located directly on the vessel, which, in the case of rendering tanks and objects used in kindred service, is prohibited, as the contents of the tank are quite likely to obstruct the safety valve if it has occasion to operate, so future operations will be seriously interfered with, if not absolutely prevented.

The food preparing plant should be equipped with a sufficient number of steam headers, that each vessel of a certain pressure classification may

be connected to the header carrying that pressure, and the steam header should be provided with a stop valve, pressure regulating valve, safety valve and pressure gauge, of sufficient capacity to meet the requirements of all the vessels connected to it. A jacketed kettle intended for but 20 pounds pressure should not be connected to a steam line carrying 80 or 100 pounds pressure, with the thought that the attendant will regulate the steam flowing to the jacketed kettle with such precision that the 20 pounds pressure will not be exceeded, unless the branch line leading from the higher pressure header to the lower pressure object, is equipped with proper safety devices, consisting of a stop valve, pressure regulating valve, safety valve and steam gauge.



Drawing of a copper hemispherical jacketed kettle.

In our inspection work we are frequently confronted with the statement that a certain condition, which has been criticised, has existed for weeks or months or years, and an accident has not occurred. If such reasoning is carried to its logical conclusion, we might be just as sure that we shall never die, because we never have. I was impressed with a news item from Washington, D. C., which appeared in the daily press recently. A blacksmith is said to have had 25 years of experience at his trade, and during that time is estimated to have put on 100,000 horseshoes, which would correspond to an average day's work of shoeing three horses. He had been quite fortunate, and had never suffered injury. However, a few days preceding the date of the news item, the horseshoer entered his chicken yard. His Plymouth Rock rooster jumped up and kicked him. The spur entered the knee between the joint and the kneecap. The blacksmith is on crutches, with the probability of being a cripple for life. So do not let anyone tell you that because an undesirable condition has existed for a number of years, it should not be remedied.

There seems to be abroad in the land the idea that steam at 80 pounds pressure contains twice as much heat, and will do twice as much work in one-half the time, as will steam at 40 pounds pressure. So the plant superintendent, anxious to increase production, and reduce production costs, is inclined to carry a higher pressure on the jacketed kettle than that for which it was intended. I have in mind the chef of a large kitchen which was equipped with a large variety of food cooking vessels, upon which 100 pounds pressure was carried, although the margin of safety required by good practice would limit the pressure to 40 pounds. In fact, one of the kettles was tested to disruption, and failed when the hydrostatic pressure exceeded 100 pounds but slightly.

The chef would not agree to a reduction in pressure, but when a pressure gauge was so adjusted that it traveled from zero to 100 pounds, while the pressure actually was increasing from zero to 40 pounds, and the regulating devices were set to control the pressure at 40 pounds, the chef was entirely satisfied. He could not tell the difference between 40 pounds and 100 pounds by results, but depended entirely upon the pressure gauge, which in this case had been purposely calibrated to deceive him.

The Incident of the Michigan Cheese Factory

Before considering seriously any plan to exceed the safe pressure on a jacketed kettle, tank or retort, try setting the pressure gauge a few pounds ahead, and see if the results are just as satisfactory. The increase in pressure from 50 pounds to 100 pounds, increases the stress in the material 100 per cent, and reduces the margin of safety by 50 per cent; while the heat contents of the steam at 100 pounds pressure is but approximately one per cent greater than in steam at 50 pounds pressure.

Just by way of emphasizing the little thought given to even primary safety requirements by some people operating pressure vessels, I would mention a recent experience of one of our Michigan inspectors. He visited a food preparing plant. As a matter of fact, it was a cheese factory. He was to make the preliminary inspection of a boiler which had previously been uninspected and uninsured. Aside from a number of defects resulting from operating conditions, the boiler appeared to be an average risk. But the inspector could not locate the safety valve. Upon inquiring of the engineer he learned that the factory inspector had visited the premises but a short time before, and that during the visit the safety valve of the boiler operated automatically. When it did so, a considerable cloud of soot was discharged from the boiler-room into the cheese making department. Quite naturally the factory inspector objected to the preparation of food in just that way. Those in charge interpreted his objection as being directed at the safety valve, and proceeded to remove the offending member just as soon as the boiler could be taken from service. They explained to our inspector that the factory inspection laws of Michigan do not permit the use of a safety valve on a boiler in a cheese factory. It had apparently not occurred

to them that the safety valve could be adjusted to discharge in some other direction.

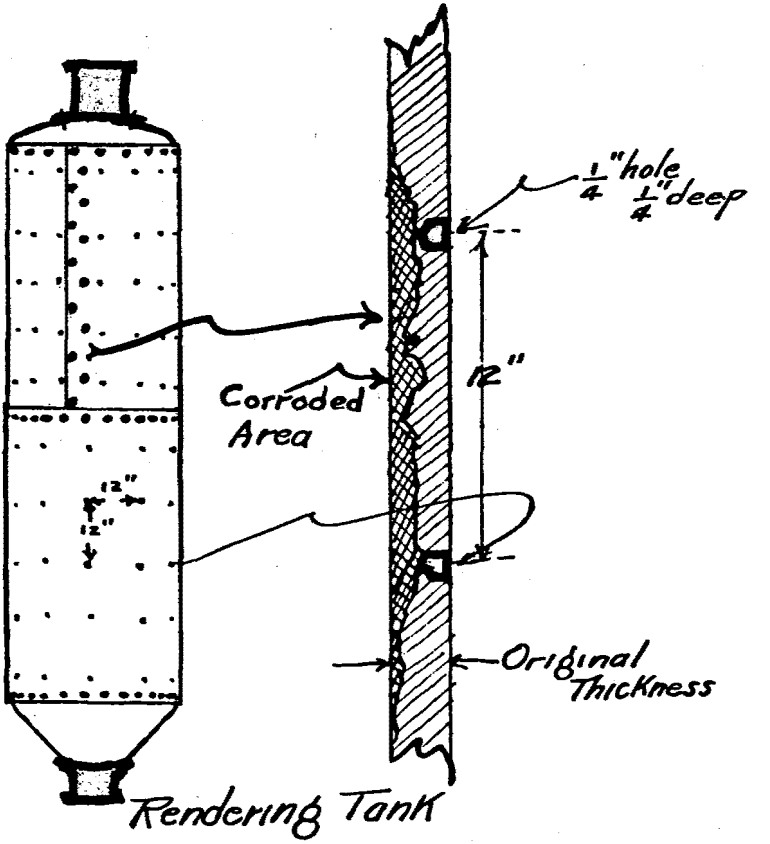
"Familiarity breeds contempt." The truth of this old saying appears to us quite frequently. The man who has observed a certain pressure on a certain vessel daily for a number of years, soon becomes of the opinion that everything is safe and serene, and that there is no cause for uneasiness. Forty or 50 pounds pressure is quite low when compared to the 1,200 or 1,300 pounds pressure now being carried in some of the central stations, but those boilers and turbine casings subjected to that pressure possess a relatively larger margin of safety than does the ordinary jacketed kettle or rendering tank carrying 40 pounds.



After an explosion in a rendering tank at St. Louis.

The accompanying slide pictures the results of the explosion of a rendering tank when carrying 40 pounds pressure. The failure resulted in damaging a considerable part of the plant, as well as in the death of one man, who was decapitated, and the serious injury of another. The investigation which followed developed the fact that the rendering tanks in the establishment had been examined thoroughly during the month of June. Several of them were found to be so badly corroded they were considered unserviceable, and accordingly were disconnected from the steam header. The tank which exploded, and the one adjoining it, were criticised, but it was estimated they could be continued in service until the first of the year, possibly a term of five or six months. The inspector understood those tanks which were immediately removed from service would be replaced with new ones, but such was

not the case. The balance of the tanks were continued in service approximately 24 hours a day, so the deterioration was twice as rapid as the inspector estimated it would be. The explosion occurred on November 13.



A vertical rendering tank showing corrosion.

It is logical that some means be devised to detect the deterioration which takes place in cooking vessels, so plans can be perfected for replacing the old ones with new before the point of failure is reached.

The third side is intended to represent a vertical rendering tank, with which our packing houses are equipped by the thousand. In the sectional view you will note the manner in which the internal surface has been corroded until the tell-tale holes have been reached, resulting

in slight leakage, to be taken as a warning of the decrease in thickness which has taken place. Under ordinary operating conditions, the tell-tale hole may be closed by a wooden plug until the "cook" is completed, and after the tank has been emptied, may be permanently closed by the use of a one-quarter inch rivet driven cold.

These tell-tale holes are one-quarter inch in diameter, and drilled one-quarter inch deep from the outer surface of the shell of the average size vessel, say 72 inches in diameter, and are located opposite the region of greatest wear, which occurs on the inside surface of the tank. This plan, with certain modifications, can be applied to pressure vessels of all descriptions, where the operation is likely to cause a reduction in thickness, and weaken the vessel.

The operation of a pressure vessel, such as a jacketed kettle, rendering tank, retort or compressed air tank, may not in every case present a hazard equal to that encountered with the operation of a steam boiler, for the steam boiler has temperature stresses, and is subjected to the changes which result from the use of impure feed water; but the cooking vessel is subjected to some temperature stresses, may be affected by acids and gases, and, in general, is operated by men having little or no mechanical training, undependable in an emergency, and properly enthusiastic in catering to the needs of the inner man. So I would urge that some competent authority be consulted when new equipment is purchased, and that you have a survey made of that now in use, to determine if life and property are being needlessly exposed to danger.

Discussion Following Mr. Morrison's Paper

CHAIRMAN SUTTON: Would anyone like to ask Mr. Morrison any questions or make any comments on this paper?

MR. STROBHAR: I should like to ask regarding the location of the relief valves on the cooking utensils. You spoke as though they were to relieve right at the utensil; is that customary?

MR. MORRISON: The relief valve and all the safety devices should be on the steam line furnishing the steam to the cooking utensil.

MR. STROBHAR: I get that all right, but perhaps the relief should blow off in the room. You were talking about the cheese factory and the boiler blowing off in the cheese room in making Roquefort cheese, which they had not anticipated. Now, the question comes from the picture you were showing and the description you indicated on that slide.

MR. MORRISON: That is one point I did not go into. I did not go that far with it. This should not discharge in any place that would be likely to injure a workman. Ordinarily those pipes are piped to six or eight feet and discharged upwards. They do not need to be located in the room. They can be located at any place. You have brought up a thought of something that occurred in Detroit not so very long ago in a large automobile plant. The safety valve on a boiler discharged right toward the man-hole of another boiler and when that safety valve blew, two men working in that other boiler were killed. Those safety valves

should discharge so that it would not likely injure anyone by escaping steam which is quite hot, but I did not go quite that far.

MR. STRODHAR: I had that in mind when I asked the question. The other was the possibility of taking some legal action against the manufacturer of that kettle. Were you able to recover on account of any negligence on the part of the manufacturer when he made a copper jacketed kettle such as you described, as being one thickness in one place and another thickness in another place—one thickness at a joint or bend? I inferred that it was extreme negligence on the part of the manufacturer to make an apparatus of that kind.

MR. MORRISON: That was not done and I would say that after that had been in service a year, it would be hard to establish the manufacturer's responsibility.

CHAIRMAN SUTTON: Safety is practically synonymous with far-sightedness and in making safeguards and corrections of hazards it is always necessary, as has been brought out in this discussion, to be very certain your safety provisions do not create another hazard. We have found that very frequently.

We have another interesting talk, in fact, two more which I believe will apply more or less directly to all of our industries. The first is by Mr. G. C. Agry of the Lanson Company, Syracuse, New York.

HANDLING OF BAGGED AND CRATED MATERIALS

G. C. Agry, Special Representative, The Lamson Company, Syracuse, New York

While I am admittedly new to this particular group meeting and its intents and purposes, I have endeavored to read, behind the actual subject assigned, the intent which caused the assignment. I have given careful thought to what form of message would prove of greatest interest to this important branch of the National Safety Council. With a desire, therefore, to give you as constructive a message as possible, I am taking the liberty of broadening the subject assigned to me and have given it my own interpretation, which is perhaps best summarized in the following rewording: "Safety in Handling Package Loads." My discussion, while particularly applicable to food plants, has many factors which have equal application in most other forms of industry. I hope the very broadness of its scope, therefore, will have a particular appeal.

Some ingenious person for convenience of memory, has divided the common forms of package loads into what he popularly terms "the six B's." They are: Bags, Boxes, Barrels, Bundles, Bales and Baskets. Of course, as particularly applied to the Food industry, there are many subdivisions of these, and there are forms of containers in common use which are not adequately described by any of the six "B" terms, such as Cans and Bottles. But for purpose of having in mind what is meant by pack-

age loads, the six "B's" will serve excellently, and further description of packages will be given as we have occasion to make mention of them.

It will be well appreciated that the advantages of mechanical movement and handling of materials have been largely viewed from other aspects than that of safety. In the use of automatic conveying machines, emphasis has been largely laid on such important factors as, speeding production, saving in handling labor, reduction in floor space requirements, reductions in cost of manufacture and similar production and cost minimizing considerations.

Let us, however, take these four items and see how many safety factors are automatically incorporated in them. Let us do this by comparison methods.

Speeding Production

Picture a plant not equipped with modern conveyorized methods in which the necessity of increased speed of production has become essential. It is difficult to describe adequately all factors. Probably, however, it will be necessary largely to increase the force of laborers devoted to handling and trucking materials, raw, in process, finished product. Can any such increased handling force be used with full efficiency? It is doubtful.

If unloading platforms and storage space for incoming material have been adequate under former conditions, necessity of increasing volume of production by increased handling labor is almost certain to result in increased congestion and confusion throughout the incoming materials division. The same is true, probably in even greater measure, as concerns the handling of work in process. Aisleways are likely to become overcrowded. The injury hazard is not only increased by larger numbers of people passing to and fro for the carrying of materials, tending towards accidents due to collision and dropping of materials, but overcrowded aisleways tremendously increase the danger that not only handling labor but machine operators will be jostled or bumped in a manner so that clothing and parts of the body become caught and entangled in machinery.

Finished products in the increased volume brought about by greater speed of production must be handled into storage and out to shipment—but how? If handled by increased labor, the hazard of collision accidents along loading platforms oftentimes adjacent to railway sidings is increased; strains and over exertion casualties in finished stock warehousing operations are subject to increase, not only because of larger number of workers, but because of the haste and necessity of work under tension.

Suppose in contrast we substitute for attempts to speed production with larger man power facilities, conveyorized movement of material, incoming along receiving platforms and into storage; through the processes of manufacture, to and from the various machinery operations within the plant; and out to freight car or auto truck loading of finished product and into finished product storage.

Taking these in order, we shall then have for incoming material a system of conveyors arranged in logical manner along unloading platforms and into storage. The man-handling of materials will in general consist merely of placing the materials on the conveyors at the loading point and removing them at the opposite end. Peaks of handling and necessity of providing speed in movement of incoming materials can readily be taken care of by a properly controlled conveyor flow, for mechanical conveyors can be made to run at a speed in excess of the maximum rate at which materials can be placed on and removed from the conveyors. Under such conditions there will be no increased congestion or confusion in handling incoming materials under necessity of speeding production.

Similarly, conveyors for handling material in process can be arranged to give a logical flow between operations. Many times even the removing of loads from conveyors can be taken care of by automatic deflectors. Speed in production with conveyorized movement of materials eliminates necessity of otherwise traffic crowded aisleways. Some conditions will permit of placing conveyors on ceilings and in all events, since there will no longer be necessity of people moving about aisleways carrying or wheeling articles in process, collision, dropping of loads, jostling of operators near machinery and similar hazards will be entirely done away with.

The use of elevating conveyors for raising loads between floors, and of chutes and spirals for downward passage of material, elimfnates the hazards incident to the operation of elevators for materials handling movement. Involved in this are all the well known dangers of elevator operation, the getting of loaded vehicles or hand carried loads on and off of elevator platforms and similar considerations.

Conveyors for the loading out of finished product into railway cars, auto trucks and into warehouse storage will be, for the most part, nonreciprocating. A movement of finished product by conveyors does not nominally require a return of an empty container for reloading. If such is required, returning loads are arranged to flow over a uniform, well designed and adequate pathway. The condition is in contrast to outward passing loaded trucks with returning empties and the hazards of confusion, collision and excessive strain under pressure of speed. Conveyors can properly meet any necessity of speed in handling, and warehousing operations are simplified by conveniently arranged conveyorized movement to and out of storage.

Saving in Handling Labor

The safety factors involved in this production item are obviously allied with those previously brought out.

There are many operations in industries which can be done only by human hands and human intelligence—plenty of such operations go around. The more we can relieve labor from performing as a truckhorse or beast of burden, the more we reduce the hazard of strain, flat feet and

casualties resulting from overtired physical condition. Reduction in numbers of material handling laborers of course reduces hazards in proportion to numbers.

Reduction in Floor Space Requirements

From the standpoint of production it is very evident that factory floor space should be devoted to machinery and manufacturing operations and not to storage of materials in process. Much emphasis in connection with the consideration of the use of conveyors is therefore rightly laid upon reduction in floor space requirements through making as large a percentage of actual factory floors available for manufacturing operations as possible. Let us consider for a moment then, what is the effect on safety factors of this improvement in use of floor space.

A plant operated without modern handling methods and utilizing a considerable portion of floor space for storage of materials in process evidences considerable accident hazard, due to materials standing about machines and piles of unfinished merchandise stored in various places around operating floors. Trays, boxes and containers of one sort or another; standing trucks, platforms and similar pharaphernalia promiscuously standing abqut machines and aisleways increase the hazards of stumbling falls. In many plants where the movement of materials from operation to operation is dependent upon the intermittent arrival of labor, it is necessary that goods in process shall be placed in temporary storage in an unavoidably haphazard arrangement about machines and other forms of manufacturing operations, awaiting the arrival of the laborer who is to move these goods.

Such standing merchandise, especially with unavoidable lack of uniformity of location at all times, is unquestionably a fall and bruise hazard. We are all creatures of habit. Witness how successfully we move about a darkened room at night when all pieces of furniture are in their usual place, but how quickly we stumble and bruise ourselves on articles out of their accustomed location, even though we ourselves may have placed them in their new position but a few moments before. In similar manner, operators, with minds intent upon production, find difficulty in moving about floors with promiscuously placed merchandise.

Then, too, standing merchandise has an important effect upon proper lighting at machines and other operations.

Standing merchandise creates an extremely dangerous hazard when it prevents accessibility to machines in case of accident either to machine or operator.

The extent of hazard resulting from fire with piles of unfinished merchandise standing about manufacturing floors is obvious.

Again, standing materials in process are often a detriment to efficient supervision and departments operated with imperfect superintendency obviously offer greater accident hazards than do departments which, because of fully supervised orderly methods, function with standardized efficiency.

There are many other angles from which this interesting consideration can be viewed, but time permits me to stress only a few of the reasons why a consideration of methods of reduction in floor space requirements, through the employment of mechanical carrying devices, automatically improve the casualty hazards. In general, conveying machinery can be arranged to give uniformity in flow of material from operation to operation, can be placed in a manner largely to eliminate idly standing merchandise, and where storage between operations is necessary, such can be provided for in uniform manner, at definite locations where all hazards of light, accessibility to machines, fire precaution requirements, and proper supervision have been definitely considered. Very frequently, too, the utilization of conveyors suspended from the ceiling will provide a large amount of "conveying storage." I mean that goods are in storage while they rest on the conveyors; and since in the latter instance the conveyors are suspended from the ceiling, adequate storage space is provided with the merchandise entirely removed from the manufacturing floors.

Reduction in Cost of Manufacture

This is the last of the four commonly stressed production factors which I have suggested. It is obviously so wide a subject that lengthy discussions could be given to it alone. Let us briefly consider only a few of these.

Oftentimes excessive costs are brought about through a lack of uniformity in the timing of flow of material. Intermittent man-handling of goods in process brings about time almost of idleness about machines and other operations, during periods when operators are awaiting the arrival of new work; while in marked contrast there are peak periods when congestion of work is so much in evidence that operations must be performed with extreme haste under pressure. Such peak conditions may become extremely tiring to operators. Haste of itself, when operators realize that an abnormal amount of work must be performed in a brief space of time, brings about a psychological condition in the manner in which materials are handled and work performed, which is not conducive to safety.

Perhaps one of the outstanding performances of conveying machinery in general is to bring about uniformity in flow of material. The pace is set for proper performance of work and goods pass forward continuously and uniformly, according to standardized methods carefully determined upon. There are no periods of breathless haste supplemented by periods of comparative idleness. Proper relaxation is taken care of by definite rest periods, and expertness during working hours is brought about by uniformity in volume of work to be worked upon.

Another important item in the reduction of cost of manufacturing often revolves around the consideration of reducing the interval of time of manufacture. It is frequent that the time necessary for the complete manufacture, inspection, packing and shipping of products can be re-

duced as much as two-thirds through the installation of systematic uniform methods of handling materials through all processes. While the chief factors of such accomplishment involve large financial savings in goods in process and permit that manufactured articles be turned into profitable sales much more speedily than would otherwise be possible, it is evident that from the safety side, such accomplishment in reduction of interval of time of manufacture can only be brought about through simplified, uniform, systematic methods of handling throughout. All reductions in handling decrease accident hazards in proportion, and especially is this true if handling methods are scientifically studied and worked out.

CHAIRMAN SUTTON: His talk has been so complete and lucid I think there is very little we could misunderstand about it.

A recent no-accident campaign on the part of neighbors of my own company, the Kellogg Company, enlisted my interest so heartily that I found myself participating in spirit almost to the same extent I would have, had the contest been in our own plant. When finally a lost time accident occurred, you can imagine the feeling I experienced, and we have with us Doctor Arthur C. Selmon of the Kellogg Company of Battle Creek, who is going to talk to you, I hope, on the no-accident campaign to which I refer.

"NO-ACCIDENT CAMPAIGNS"

Dr. A. C. Selmon, Kellogg Company, Battle Creek, Mich.

This paper will be based on the "No Accident Program' which we are following in the Kellogg Company factory. While we were proud of our past low accident record, yet the very much lower accident rates reported by certain other industries assured us that we could do more than we were doing to decrease the sum total of mutilation and suffering resulting from injuries sustained in our plant.

Beginning with July of this year, we started on a program that is producing very gratifying results. In the recent past our plant averaged a lost-time accident for every 70,000 man-hours. July and August have always been our worst months for accidents because during these months we have a large number of new and untrained workmen. But in spite of this handicap, under our new program we put in 700,000 man-hours without a lost-time accident instead of 70,000, which had been our average previously. For the 71 days, from the first of July until the ninth of September, our Safety banner was not lowered once, a record many fold better than any previous one in our plant.

The main objective in a "No Accident Program," as I conceive it, is to take men and women who are already well stocked with old, careless habits and root out these, planting new and better ones in their stead. We started out by attempting to get every employee thinking and talking about Safety First. It is surprising that even in the best regulated factories workmen get into the habit of doing many thoughtless and

careless things. To break these habits requires at the outset something in the nature of a decided jolt or shake-up.

We put up bulletins offering a reward for the arrest of the cause of accidents, and asked for slogans, suggestions, posters, etc., bearing on accident prevention in the plant. The price paid for the usable ones was large enough to make it worth striving for. Slogans and suggestions poured in by the score. They came from men and women in every department, from janitors to foremen.

A sub-committee from our large Safety First Committee met daily for the first few weeks, and later two or three times a week, to go over these contributions and select the best ones. The usable ones were posted throughout the factory, together with the names of the authors.

Thought was given to methods which would be most effective in making use of the "eye-gate." A large safety banner was made and hung in such a location that one could not pass the time clock without seeing the banner. When there is a lost time accident, the banner comes down for a whole day and its absence is so conspicuous that it strikes you with almost as much force as though the floor had been taken up.

A Gold Banner at End of a No-Accident Month

We started with a green banner and when the month of July was passed without a lost-time accident, we replaced it with a gold banner. When the demon of carelessness finds his devilish way to our factory and we have an accident, the gold banner comes down and the green banner goes up again, but it carries a gold star for each month passed without an accident, in order to keep prominent the record of past achievements. The gold banner replaces the green one at the completion of a full month without a lost time accident.

In the use of slogans, bulletins, posters, etc., staleness must be avoided. A single fresh slogan or poster every day or every couple of days, is noticed and read, whereas if the board is posted over with a number of bulletins, the men, seeming appalled with the effort required to do so much reading, only give a passing glance and do not stop to read. Fresh posters or bulletins every day or two lead the men to form the habit of stopping at the bulletin boards daily—whereas material left on the boards for several days gets stale and destroys this very valuable habit. Even such a minor thing as changing from day to day the location on the bulletin board of the bulletins and posters is well worth while.

We make use of a large three-sided pedestal-like bulletin board for extraordinary announcements. When in use this is placed in the lobby in such a position that one or the other side directly faces every person passing in or out of the plant. When an accident happens and the safety banner is taken down, a bulletin is posted immediately on this board, giving name of the injured, nature of injury, how it happened, department where he was working, etc.

In checking up on the adequacy of guards and the presence of hazards, a safety first man of wide experience was invited to spend some time

working with our own safety inspectors. At the time of instituting our present program the whole plant, from cellar to garret, was given a thorough going over. This is very essential because even a very good safety first man who has continually inspected the plant may fail to note things that need attention. So it is worth while occasionally to get in a man who is not familiar with the plant, just for the sake of a check-up on things that may have been overlooked.

When making safety first inspections, examining guards, looking for hazards, etc., there is an educational value to the workmen in doing this ostentatiously. By making a certain amount of show of the work the men will be impressed with the importance of everything that has to do with accident prevention. The men should be encouraged to point out to the safety inspector anything they think is a hazard and he should get their suggestions. In this way he will often pick up something of value. Whatever he does, he should not give out the name of the man who reports these things, if by so doing there is any possibility of getting him in bad with his foreman or fellow workmen.

A Small Safety Committee a Mobile Unit

Accident prevention work covers every phase of a plant's activities and we have found it essential in our factory to have a small safety sub-committee of four or five men who form a mobile unit, giving prompt attention to everything connected with safety work. They promptly investigate every accident and as far as possible assess responsibility, considering such factors as whether the accident was due to lack of proper guards, neglect of foreman to instruct the man, carelessness on the part of fellow employees, or whether it was due to carelessness or disregard of safety rules on the part of the injured man himself. The result of their investigations is put in writing together with any suggestions as to measures to be used in avoiding a recurrence of such an accident.

Many of the near-accidents, that is, minor accidents which come near to being serious ones, should be looked into by this committee. The hospital staff and the foremen must cooperate in this accident prevention work. It rests with them to get the data on how and where these near-accidents occurred. This information must reach the small safety committee without delay.

Upon investigation it will often be found that the stage was all set for a crippling accident but an overruling Providence in some way mercifully intervened. It may have been due to a piece of gross carelessness or to disregard of safety rules, and should this be the case, if the party responsible is given a few days layoff, the lesson to him and to his associates will be driven home and clinched.

Activities of this nature have great educational value and therefore are well worth the effort. It is a case where a "stitch in time saves nine." The men are brought to realize that accident prevention is as much a part of their job as is the oiling of their machines. They find out that accidents, near-accidents, and disregard of safety rules are really serious affairs.

CHAIRMAN SUTTON: Are there any questions you would like to ask Dr. Selmon?

MR. STROBHAR: You brought up a very interesting subject when you talked of near accidents. So few of the companies keep a record of the near accidents. I would like to know if you have the relationship of near accidents to accidents. Do you keep a sufficient record to chart and show how they bear to lost time accidents? If you know what an accident costs, you can readily see the value of the safety work.

DOCTOR SELMON: You understand, I am a novice in the whole safety work. Medical work was my line, but it struck me this is the finest piece of preventive medicine that can be done any place or by anybody. That is what interested me in this work. If we went along at the old rate we would have 19 people with eye or other accidents, whereas we only had three; so I can visualize that bunch of 16 people with fingers on their hands and eyes in their heads that can see. That appealed to me and as a result we had a check up on those near accidents. That is where the nurses and doctors in the medical work must cooperate by carefully and diplomatically inquiring into how this thing happened and finding all about the people concerned and all the factors concerned. But we haven't been going long enough to get this proportion that you mentioned here. We will have that in time, but to give you figures now would be of no value at all because the time is too brief.

Green Favored as Color for Safety Signs

MR. WIEDENMANN: I am not criticizing Dr. Selmon's signs at all; I think they are very fine; but there is one thing that I noticed and that is red. We have quit using red almost entirely on any sort of safety signs and are using green. I think it is more restful to the eyes, draws more attention, and is certainly a positive color for safety.

DOCTOR SELMON: I accept that criticism. It is well taken.

MR. MORRISON: I would like to inquire about the plan of positively fixing responsibility for the accident, or at least, broadcasting the responsibility. That is something of an innovation. I would like to know how it is received in general by the employees. Now, that is one of the British methods in case of a boiler accident. They classify them, minor and major. In case of a major boiler accident resulting in considerable injury or death they hold an investigation and not only fix and publish the responsibilities but frequently in a measure fine the responsible workmen, the money so paid being turned over to the injured party or the defendant, as the case may be. In a sense, making the party responsible for the accident contributes toward compensation payments.

DOCTOR SELMON: This is the only instance of the kind that we have had, but after carefully investigating the case in question and consulting also with the man's fellow workmen, there was no question at all about his negligence. So far as we can see it had a very wholesome effect, and as far as the man himself is concerned, I think he rather accepted it that he had been careless and something was coming to him.

We were very discreet about it and considered it from the stand-point of his fellow employees, whether we were doing him an injustice; that is one of the things we must not do, treat them unjustly.

MR. AGRY: I would like to ask Mr. Wiedenmann concerning his comment on the use of red. I am new to safety councils of this sort, but I visit a great many plants and I venture to say that 80 per cent of the plants I visit do have red signs. I notice that whenever I go into a plant I always read the red signs. I wonder what the experience of the council has been? Has the experience of the council been such that they feel that green or red is the best color?

MR. WIEDENMANN: I think the red signs are good for fire apparatus and things like that. Red is all right for a single danger sign or something like that, but for safety instruction I think green is far better. I have made some tests with that in a few plants and it has met with their hearty approval.

More Posters for Food Section Next Year

MR. AGRY: There is a little feeling that the use of too much red is bad.

MR. WIEDENMANN: Yes. We consider green a positive color.

MR. EGGERT: I think it is wise practice to change your colors every week or two, or every month. If you leave the same color they think it is the same sign and it doesn't create the interest necessary to accomplish what you are after.

CHAIRMAN SUTTON: At the beginning of the meeting we spoke of the possibility of getting some posters for food members, I think we have found that there is a talent in the Food Section and we should make an effort during the coming year to get out some food posters or to assist the National Safety Council in getting out some.

This banner to which these slogans and posters are attached, covers one which the Council put in here. Now, these bulletins, which you can not now see, are all usable in our industry, but do they carry the forceful message that something especially applicable to our business would? This emphasizes, I believe, the need of endeavoring to get out some Food Section posters.

MR. STROBHAR: I don't want to make any comparison. I think we might get ourselves in a little bad here if you are trying to compare the posters as issued by the National Safety Council against one issued by one of our members. We are selling the National Safety Council service and along with that goes the use of posters which our members may procure. I think we might, as a Section, appoint a committee on posters, and either ask our members or others to contribute posters, material and experiences which may be turned over to the National Safety Council for use among our members. If you wish to stimulate that income of posters I am perfectly willing to offer a personal prize for the best one that the committee might select or something of that kind. The committee has at its own disposal the selection of them. I

won't mention what the prize will be but the committee can make the selection as to the one which deserves the prize.

CHAIRMAN SUTTON: That is the spirit. I think we have demonstrated here a fine spirit. I am glad Mr. Strobhar spoke as he did. I don't want to be misunderstood. The National Safety Council has entreated us to send them our home made posters and suggestions for posters that they might serve us better, and I am not criticizing the service they have rendered because they have done splendidly in getting out the posters that we do use, without our assistance. They have offered prizes to the workmen who would suggest a poster, and those workmen, of course, would suggest something applicable to their line of work. What I am trying to emphasize is that this Section should at once take up the work, as you suggest, of contributing our part and our ideas on safety posters so that the National Safety Council can serve us better, as they so earnestly desire to do. I am sure we will be benefited by it. I think the suggestion of appointing a Poster Committee is one thing we should do and I believe you are all agreed upon that.

ADJOURNMENT

WEDNESDAY MORNING SESSION

October 27, 1926

The Food Section of the National Safety Council convened in Parlor "D" of the Book Cadillac Hotel, Detroit, Michigan at 9:30 o'clock, Mr. Vern D. Sutton presiding.

CHAIRMAN SUTTON: The first thing on our program will be the report of the Nominating Committee. Mr. Hasse will give us that report.

MR. HASSE: Gentlemen, the Nominating Committee selected the following officers for your approval, to serve you the following year: Vern D. Sutton, chairman; F. A. Hasse, vice-chairman; A. H. Wiedenmann, of the Casualty Reciprocal Exchange, secretary. On the Executive Committee we have H. P. Eggert, of the National Biscuit Company; T. F. Strobhar, of the Wagner, Taylor Company, Alexander Dienst, National Sugar Refining Co., and S. H. Kershaw, of the National Safety Council.

MR. STROBHAR: Mr. Chairman, to save time, I move that the secretary be instructed to cast a ballot making the election of these men as proposed unanimous.

(The motion was regularly seconded and carried.)

CHAIRMAN SUTTON: The first talk we are to have this morning is by Mr. John S. Spicer, chief of Accident Investigation Section, Pennsylvania Department of Labor and Industry, Harrisburg, Pennsylvania.

SPECIAL SAFETY PROBLEMS IN THE FOOD INDUSTRY

John S. Spicer, Chief, Accident Investigation Section, Pennsylvania Department of Labor and Industry, Harrisburg, Pa.

When this subject was assigned to me, I thought it might be interesting to give you the actual experience in our state, and accordingly I asked our statistical division to give us a statistical report of accidents in the food industry for the year 1925 and the first six months of 1926.

I am not quite sure whether it covers the scope of this Section. In fact, it may overlap some of the other sections that have been formed. But during 1925 in the state of Pennsylvania, 31 fatal accidents were reported to the Department, and 4,133 non-fatals; as compared with the first six months of 1926, when 16 fatals were reported and 2,460 non-fatals.

I have my own ideas, of course, of the specific problems in the food industry because all the accidents occurring in Pennsylvania pass over my desk every day and sometimes they average from 200 to 900 a day.

Naturally, you get a little bird's eye view of what is occurring throughout the state.

Now, the food industry is not peculiar in itself. It has a few individual problems, but as far as accidents are concerned the food industry is the same as any other section of industry in the kind and variety of accidents occurring.

I thought it might be interesting to analyze the fatal accidents that were reported and so I gathered together those 31 reports that were sent in to the department during the year 1925. I thought we would analyze them and see whether there are any particular outstanding features of those reported accidents.

In the first place, I found that five of the reports covered accidents which occurred in previous years. For some reason they had not been reported in the year in which they occurred, so that leaves us a net total of 26 fatals occurring in 1925 and in the second six months three additions were reported, so as far as the record of our department in Pennsylvania, we absolutely know there were 29 fatal accidents occurring in 1925.

Details of the Fatalities During 1925

Now, consider for a moment how these were classified. Two fatals were automobile collisions; one being a grade crossing, and the other the night foreman of the mill was killed by being crushed between two railroad cars in the mill yard. Two fatals occurred to painters who were up on a scaffold painting a building. The rope was a very stiff new rope, and in some unaccountable way it came off of the F hook which holds the scaffold and those men were dropped to the ground. Three were elevator accidents. One of them a man was going up in the elevator and stuck his head out and got crushed between the elevator floor and the floor of the building. Another fellow was on the floor and he raised the gate and looked in and got crushed, and the third man opened the elevator door and stepped into the open hatch-way. One was kicked by a horse. Two were killed by means of fire arms. One was a district manager, held up and shot, and one was a guard who dropped his gun out of his pocket; and incidentally we have had almost a half dozen of those accidents where a guard leaned over or something, and the gun dropped out and he was killed. I think I can recall three within the last few years, showing the absolute need of guards wearing holsters at all times when they are carrying firearms.

We get now down to the accidents which are peculiar to the food industry.

We had two men killed with, or, in connection with kettles handling hot material. One man was making cheese and it boiled up in some unaccountable way and the stock ran over him and scalded him and he died a few days later. Another, in a candy factory, had had steam on a kettle and he turned the steam on, but intead of waiting for a

little while until the steam condensed and the pressure was relieved, he opened the top and it came out and scalded him and he died. Then in handling material, the same old story, you know, occurs in all industries. We have five killed from that cause. One fellow hoisting sugar bags in a sling. A couple of them rolled out and knocked him off of the pile of sugar bags and he was killed. Another one, a repair man was hit by a falling pipe. Another fellow had a strain from lifting; peritonitis developed and he died. We had two blood poisoning cases. One fellow was pulling back a bolt on a door and lacerated his finger; blood poisoning set in. And another one was handling crates of material and he crushed his finger and blood poisoning set in.

So as we analyze these various accidents we find that very few of them are hazards peculiar to the food industry. They are found in all these various industries.

Accidents in Machinery Peculiar to Food Industry

Our machine accidents, however, show some things which are interesting peculiarly to the food industry. We had one fatal in the bread mixer. We had one fellow get up in a conveyor to adjust it and he fell off and was killed. Another man removed the belt, or a guard from a belt, on a shaft and was trying to make some adjustment. He was caught in the shaft and whirled to his death. Another fellow was working alongside of a large fly wheel, which was guarded with standard rails, and the supposition is that he fainted, and when he came to in a dazed condition he wanted to crawl away, but instead of crawling away from it he fell over the board in the fly wheel and was mashed up considerably.

Another was crushed by a big truck backing up against him. Another man was helping an electrician trace out short circuits and he caught hold of the brass electric light fixture and the floor was wet and he was covered with prespiration and he was electrocuted. Another one occurred in a sugar crusher, which was a horrible accident. It seems that it was the end of a turn and the man when he came on was supposed to go up and look at the crushers and see that they were all right before he started them in motion. He came on the job, went up and looked into one crusher, but failed to look in the other one where a man was employed making repairs. He went down and turned on the juice and as a result that fellow was mashed up.

Now, there is an analysis of the 29 fatal accidents occurring in one year. You will see that a very small proportion of them were the result of hazards peculiar only to the food industry.

I did the same thing with 1926 accidents which were reported for the first six months to our department. We had 16 reported as you will see in the table. Five of those were for previous years. So that left a net total of 11 occurring in the first six months of 1926. If we consider that with the 29 reported as occurring during 1925, we will find that we have had a 24 per cent reduction in fatal accidents in the food industry. Assuming, of course, that our experience during the

last six months of this year will be as good as it was during the first six months. But on the other hand, our non-fatal accidents have shown, as you will note, considerable increase. About 4,900 this year, as compared with 4,100 last year. Assuming, of course, that the rate for the last six months of the year is the same as for the first six months.

An analysis of those accidents shows as follows. Five were falls of persons. One gored by a bull—a dairy man, with a dairy company. A machine accident—another bread mixer. Now, during these two years we have had reports of three fatal accidents in bread mixers and they were horrible things. One occurred, I think, in Philadelphia, where the man was attempting to clean the bread mixer. Of course, he tried to do it while it was in motion, as they alway do, and was drawn into the mixer. It took them a half hour, I think, to try to get him out by running the machine backwards, and, of course, he was smothered to death besides being mashed all to pieces. A street car collision. Another hold up. Another strain while lifting a lot of meat. Another fellow was up tightening the gasket on an ammonia line while it was under pressure and the ammonia blew out and suffocated him.

So as far as fatal accidents are concerned we find that the food industry has the same problem, in so far as the general trend of accidents is concerned, as any other section of industry. You can take experience in any particular industry and you will find that the outstanding classifications under which accidents are occurring are those old familiar ones of persons falling, falling objects, and handling objects. Machines are generally in the minority.

In Pennsylvania Machine Accidents Being Reduced

I think you will find it very interesting also to note that as far as experience of Pennsylvania is concerned the number of machine accidents is being reduced.

Now, what are these machines that are being reported as causing these accidents? Well, this matter of bread mixers sort of got on my nerves. I took over this work about two years ago and as you sit at your desk and observe a flow of accidents coming over, from 200 to 900 a day, you, of course, can't pick out many details, but there are certain things that are outstanding and that impress themselves on your mind. What we try to do is pick out the serious ones—the ones we thought there was some possibility of doing something to prevent and then studying them; sending them out for investigation by our inspectors and then taking another procedure which I want to talk to you about and which has brought wonderful results, I think.

In the matter of bread mixers we decided, of course, that these accidents only represent the most serious. There were a bunch of other cases where bread mixers were involved, where a man maybe got his arm broken or a less serious injury, because it was possible to shut that

machine down; somebody happened to be there before the man was drawn in, and possibly it was not a high speed mixer where if it once gets hold of you I guess it is almost impossible to get away.

We started in reporting these accidents back to the manufacturer of the machines. We would send a man out and investigate them and then we would report back to the manufacturer of the machine. That has had wonderful results. I think chiefly on that account one of the firms manufacturing these machines has developed an electrical control whereby this type of accidents will be eliminated.

I believe today if you will go in any bakery, factory or industry you will find the men cleaning the machines while they are in motion. There are signs on the machines that you are not to do it, but the men will do it. When the machine is thrown—turned over on its side to throw out the dough—after the dough has gone out, then they will take their paddles and get in there. Of course, they are careful and many times they get away with it, but sometimes on these high speed machines, if they get caught, then, of course, it draws them right in as it did in the three cases I cited.

An Electrical Control Was Developed

The company I mentioned has developed an electrical control. As that machine is tilted to a certain angle it stops and as it gets over further the only way in which you can make it revolve is by pushing a button, and then they can clean it out with the one hand on the button. If that hand is released from that button the machine stops, so the possibility of getting caught, I think, has been reduced to a minimum, because if a man gets caught he is not going to keep his hand on that button. It will come off immediately. They at first, I believe, developed a system of foot control that you had to keep your foot on a bar, but you can imagine if a man was caught with one or both hands he would try to push down with his feet and the chances are would keep the power on the mixer and the danger would not be eliminated. But with this system of one hand being necessary on this electric control button while he might use the other cleaning, I think those accidents have been reduced to a minimum.

Another class of machines on which there are very many accidents is the meat grinders. I venture to say that in a year's time I have had 50 cases. They got so numerous I could not help but notice them and I started to follow the same plan of procedure. There were about four, five, or six companies in the country who were manufacturing these grinders and I began shooting out these accidents to them, showing these employees in hotels and plants who were sticking their fingers in the hopper instead of using the plunger which is always provided. They stick their finger in and get the end of the finger chopped off; and in fact in one case in a packing house, it took a man's arm off to the shoulder. These manufacturers said, "We never

heard of all these accidents occurring. We are surprised. We can hardly think it is possible."

Well, why haven't they heard of them before? For this reason, I think. Here is a man who purchased a machine from a manufacturer. It is in perfect condition and he turns it over to his employee and says, "You shouldn't do this or that with the machine," but the man does. He does take chances. He doesn't use the precautions which he should and he is injured. The employer doesn't think it is the fault of the machine, and as a matter of fact it isn't. The employee has taken chances which he should not have taken, and naturally there is no report made to that manufacturer.

Results of Reporting Accidents to Makers

Well, we take the other position; we believe that the manufacturers, if they know that accidents are occurring on their machines, will take some particular pains to see if they can't make that machine so that accidents will be eliminated. One company manufacturing meat grinders, and selling a large proportion of the ones that are in use, began getting these accidents and they began to sit up and take notice. I notified them all. I would tell them we had an accident on a certain type of machine at a certain place at a certain time. They all get that same information. Naturally they are not interested to see so many accidents occuring on their particular class of meat grinder, for you can fully imagine that their competitors will say, "Our machine is safer than that fellow's. They are having a lot of accidents."

Well, they began sitting up and taking notice, and the company has developed now a machine which I had the pleasure of looking at last week, where they have changed the hopper arrangement and have an auxiliary feed to take the meat from the hopper into the worm that does the cutting, and which generally cuts fingers at the same time, so that the chance of accidents has been almost eliminated. There is one possibility. If a man reaches his hand way up in under he might have the tip of his finger cut off. What has happened to that particular machine? They are now able to advertise, "We can cut meat with speed and safety," and not only is the machine more safe, but it has increased the capacity almost three times.

One of our largest companies which uses enormous numbers of those machines and in whose branch plant occurred that case where the man's arm was taken off, is seriously considering, I understand, putting in all these new machines. We believe that this system of going back to the manufacturer of the machine and telling of these accidents is going to have more weight and we are getting more accomplished than by any other system we have adopted.

In the food industry, I think about 78 per cent of these machine accidents occurring particularly in bakery products—occur at the point of operation, and we find that particularly the case with respect to rolls of all kinds. We had an interesting experience along that line by re-

ferring these things back to the manufacturer of machines. It was where they were making pans, which, of course, is a part of the food industry in a way, but they were corrugating rollers where the sheet metal was run through the roll to make a little corrugation. The fellow got his fingers in there—I don't think he was very seriously hurt, as I recall, but we sent that accident out to the manufacturer of that roll and we said, "Have you devised any way in which that point of operating can be guarded?" It developed that the owner of that machine was running it backwards and of course the manufacturer was only too glad to set him right. He was tickled to death that we had called the matter to his attention; and the owner of the machine, of course, was satisfied, and we were helping everybody. Naturally, the chance of accident in that machine was eliminated.

I don't think I can stress that matter too strongly. If the owners of these machines will shoot back their experiences to the manufacturer we are going to get improved machinery and we are going to eliminate to a large extent these machine accidents. I think the reduction in machine accidents as shown by our experience there is an indication of this kind of work, particularly on safeguarding, because at the present time if there is a serious accident ocurring our inspector is on the job usually within a week, as soon as we can get the information out to him and he finds time to go around.

An Enormous Number of Accidents in Automatic Machines

In the development of automatic machinery, like packaging machinery and wrapping machines, we have an enormous number of trivial accidents and still they are reportable accidents from these causes. Little gears and sprockets and chains sometimes have not been guarded. Now I remember not so long ago, I found a fellow that got his fingers caught in a pie making machine. I never knew there was such an animal and I wrote out to the company; I found there was a machine that makes something like 100 or so pies an hour, but there are little gears and sprockets on those things which are not protected. We called the matter to their attention, and I think the new machines that they send out are going to be safeguarded in those particular places.

We have had the same thing occur on conveyors. Conveyors are going to cut down our handling accidents considerably, but on portable conveyors we have found little gears or sprockets or belts that have not been guarded and the men invariably get caught in them. As the accidents occur we refer them back to the manufacturer of the machine and they are developing little aprons or little guards to cover up those things. On dough breaks we have had a bunch of accidents. If you recall, I think, there are two sets of rolls there. The men shove the dough in at the bottom and it comes out at the top roll. They put their hands under there and invariably if they are not careful they will stick their hand in with the dough underneath. Within the last six weeks I had a man come to my office from across

the river. His hand was in terrible shape. It was a question of whether they wouldn't have to amputate it. On one of the dough breaks a little apron is now being developed that is put on those machines so that it will protect and keep the hand out from under that roll where for some reason they will stick them in.

So that all this automatic machinery with the small gears, cogs and belts, if you people have them in your own establishments, I think it is well worth while considering having those moving parts covered up, because sooner or later these men get hurt on these things.

Then the question of infection is one which I suppose has been considered. It seems prevalent, more prevalent in the food industry, especially in meats and packing houses and things like that. A small cut generally results in infection if it is not given careful consideration. It is peculiar that where meat is handled the chances of infection seem to be greater than in many other branches of our industry and we have a large number of accidents. This is particularly so in places like restaurants and hotels where meat is cut and sliced. Then the slicing machine is another source—bread slicers and meat slicers. We have been having the same experience on those machines as the grinding machines, and we are keeping back the accidents.

Manufactureres Getting Tired of Hearing About Accidents

I know from the tone of the letters that some of these manufacturers are getting sick and tired of hearing about accidents occurring on their particular machines; but we shoot them back just the same and I see it reflected in some of the talk of the salesmen. I was down at the Sesquicentennial at Philadelphia where a lot of machines are on exhibition and I questioned them and some of them are making claims on their various machines that they are more safe than others and so on. But we feel that you can't give a man a machine and say, "you must use the plunger." You have got to make that machine so the use of the plunger is a necessity, and if that is done I think we are going to eliminate a lot of machine accidents. Just how it can be worked out is going to take a little time. The thing can't be determined in a minute. But I think the problems can be worked out, and who is better fitted to do that than the manufacturer of the machine?

We have had 100 to 200 accidents on bread slicing machines and meat slicing machines in a year's time and usually it is the tip of the finger or even one or two fingers that have been taken off. They will take a small piece of bread or small piece of meat and instead of putting the block back of it and shoving it up against the knives they stick their fingers in there and the first thing you know it is off. As a matter of fact, down at the Sesquicentennial exhibition there are two meat slicing machine exhibits side by side. Of course I went in and looked them all over and did not tell them who I was. Afterwards I was telling why I was interested in one particular machine and he said his rival demonstrator was giving a demonstration of cutting

meat and, be-gad, he got his finger cut off right there in the demonstration. So when the demonstrators of the manufacturers cut their fingers off I think it is high time for the manufacturers to sit up and take notice.

In talking about these matters I am not covering all these hazards. I realize that very seriously, but I am giving you our experience on what is actually taking place. There may be more dangerous machines. There may be greater hazards, but if there are they are not being reflected in the accident reports which are turned into our department from day to day.

The main things are rollers, slicers, dough mixing machines, all kinds of packing machinery, wrapping machinery, meat grinders, sausage stuffers, ice making machines. They are the types of machines which are causing the trouble. Particularly where you have to put something in the hopper and the man will follow up and stick his hand under or in after the material. For instance, in a grinding machine there is an orifice at the bottom usually where the ground material comes out. Now, there seems to be a peculiar fascination for a man to stick his fingers up in there to see what is in there, just like they stick their fingers in the cigar cutter. They put them in there to see how the end of the cigar is cut off and they find that the man gets his finger cut off. Now, they have done that on the grinders. They stick their fingers up there. One of the manufacturers has made a series of rods that are up in the orifice there so that the material can come out, but the person can not get his fingers up in the mechanism. I think that is a very good development.

This Man Showed Just How the Accident Happened

I remember a case in a lumber mill—a wood working plant, of course—but a fellow had been injured on a saw and his fellow employee took another man down to show him how this fellow was injured and he stuck his finers up there and had the same accident occur to him.

We don't believe that you can stop accidents until two or three things are done. First, is the machine. It has to be made fool-safe. Second, the foreman has to be on the job everyday, insisting that the men preform their work in a safe and sane manner and be held strictly accountable for the accidents occurring in his own particular department. And third, we believe that it is absolutely necessary that the man at the top be sold on safety.

I don't care how much safety engineers work or how hard they work or what they do, if the boss at the top isn't sold on safety, his efforts are practically of no avail. These safety meetings that are held when the boss is conspicuous by his absence are, to my mind, simply a waste of time. If a man isn't willing to put his time against the time of his employees at a safety meeting, I think you might just as well not hold them. I have reached the point in my experience that I would not go out and talk at a safety meeting if it wasn't held on company time. The plant that wants to hold a safety meeting at noon while the men

are eating is just making a gesture in safety and really is not sold.

In the last analysis I think you will find that up at the top is the main factor in not holding that meeting on company time.

In conclusion I would like to say that the food industry is, to our mind, no more hazardous than any other. It has a few particular problems, yet a majority of them are almost the same as other plants; and my plea to you, as owners of machines, particularly if you get these accidents, is that you shoot them back to the manufacturers. We are going to get somewhere, we believe, if you do that. We have had evidence of it. I could cite you 50 cases, I think, similar to the ones I have given you, and in so far as machines are concerned, I think we are going to get an awful lot in reduction of accidents if we work along those lines.

Discussion Following Mr. Spicer's Paper

CHAIRMAN SUTTON: Are there any questions anyone would like to ask Mr. Spicer?

MR. STROBHAR: I think Mr. Spicer brought out a very important point. So many of the machines used in the food industry are made by the manufacturers themselves. It is right, and I am thoroughly in accord with the idea of communicating with the manufacturer and seeking his cooperation and support. I think the same thing should be done with every manufacturer of food machinery. The food industry has people who make other similar machines and I don't think there is any necessity of keeping those things a secret any more than the Department of Labor and Industry.

Perhaps if the department in Pennsylvania found that the National Biscuit Company was manufacturing a machine for its own use that was discovered to be dangerous and could seek their cooperation and support in improving it, which I am sure they would do, it would be a fine thing. There are other manufacturers of similar products that ought to be advised of that dangerous condition. I don't know whether they are communicated with. For instance, in many of the various kinds of equipment that are submitted to the Underwriter's Laboratory for approval and bear the label of the Underwriter's Laboratory in Chicago, that in itself is an indication of the efficiency of that particular type of machine and it is so published and listed in the selling of it; and people will say, "Has it been approved by the Underwriter's Laboratory?" Food machinery is never submitted to the Underwriter's Laboratory for a label—that is machinery made by a manufacturer for his own use. I have never heard of any. I was wondering if we might not in some way become a clearing house for communications with our members if we learn of a dangerous proposition or if we learn of a good means of protecting the dangerous equipment; why couldn't we broadcast that information to our members who, I am sure, are interested in the subject?

CHAIRMAN SUTTON: That is a very splendid suggestion. Anyone else?

F. J. MALLORY (Representing the Province of Ontario Health and Labor Department): I notice that there were several fatal accidents, and other accidents on elevators. I do not know whether the state of Pennsylvania has adopted inter-locking systems which we have in Ontario, but in the last two years we have not had a single fatal accident and very, very few minor accidents. I am just wondering whether they adopted that or not?

MR. SPICER: We certainly have, but inter-locks won't prevent a man from sticking his head out as the elevator is going up or down. In that connection I want to make this point on elevators: within a space of two years, notwithstanding our inter-lock, a large number of accidents occurring in cities of first importance, like Philadelphia and Pittsburgh, have come to our attention. Of course, these larger cities have their own elevator inspection departments and are not under state control. In our monthly bulletin some months ago I made a list of about 25 accidents, many of which were fatal, where men had walked into open shafts. The door had not been closed or there had been some reason for that inter-lock not operating.

Elevators as a Rule Are Not Properly Lighted

I think that has been due to a large extent that elevators as a rule are not properly lighted. In several places lights have been on the elevators and the man has reached in to turn on the light before he steps in, thinking the elevator is there and then he goes to the bottom. We had a case of a nurse in a hospital; it was a hydraulic elevator, I believe; and she got into the elevator and got off at a certain floor, leaving the door open, and the elevator crept up a little bit. It was a little dark, you know, and she came back and walked into the open hatch-way without looking. We had another case in a factory where the elevator was not to be used for passenger service. It was contrary to the rules, of course, but it seemed to be the custom that about 5:00 o'clock when the factory closed, they would jump on the elevator and ride down four or five stories. In order to do away with this practice, they shut down the power and when they got down half way between the floors the power went off and one of the women got excited and pulled up the gate, tried to jump off and rolled under the gate and down the shaft way under the elevator floor.

Now, possibly inter-locks would have stopped lots of those accidents if they were in proper condition, but I think in some way they had gotten out of order and of course, had not been discovered up until the time the accident occurred. Notwithstanding the strict enforcement we are trying to do, these elevator accidents are continuing. Of course, we have quite a number of elevators in the state, but I would like to emphasize that many accidents could be prevented if our elevators had sufficient illumination and if the people would get out of the habit of going into a dark hole.

CHAIRMAN SUTTON: We have another very interesting topic to be handled by Mr. David J. Price, engineer in charge of development work, Bureau of Chemistry, United States Department of Agriculture, Washington. I have been very anxious to know what Mr. Price is going to tell us.

THE OTHER SIDE OF DUST EXPLOSION PREVENTION

David J. Price, Engineer in Charge of Development Work, Bureau of Chemistry, U. S. Department of Agriculture, Washington, D. C.

A National Safety Congress is evidence of the fact that safety to life is of nation-wide importance. It can no longer be considered a local matter, in which interest in a catastrophe or a disaster is limited to the section of the country where it occurs. Matters that concern the protection of human life are of nation-wide interest. We have learned by costly experience that the disaster of the East or West today may become the catastrophe of the North or South tomorrow.

It is, therefore, a splendid arrangement which makes possible a national meeting where safety to life is the principal object and where plans for the application of safety measures can be given thorough consideration. The creation in the National Safety Council of a section designed to give direct attention to safety in the manufacture of our food products also makes possible the consideration of any special industrial hazards.

Attention in the United States and Canada has been directed in recent years to a peculiar industrial problem involving extensive losses in life and property. The possibility of dust explosions in the manufacture of our essential food products is now generally recognized, with the result that research has made very helpful contributions to the knowledge available on this subject.

The purpose of this address, however, is not to refer primarily to what would be termed the technical phase of the problem. It is rather my intention to refer to an aspect of this industrial plant study not heretofore presented, an aspect that has impressed me as peculiarly significant, which may be termed the "other side of the story," or the humane aspect of the work.

It is sometimes difficult to measure the accomplishments of safety work and really to see that encouraging results are being obtained. This address, therefore, resolves itself into "a message of encouragement" to the safety men in the industries, with the thought that it may stimulate them to greater achievements if possible in the noble work in which they are engaged. No one can engage in a nobler undertaking than to devote his time and effort to the development of preventive methods that will result in the protection of the life of his fellowman.

In recent years dust explosions have occurred in lines of industry where they had not previously taken place. The number of industrial plants in which the dust explosion hazard exists appears to be constantly increasing. Explosions of wood dust, powdered rubber, sugar, sulphur, zinc

dust, magnesium powder, aluminum dust, cork dust, powdered milk dust, paper dust, dye material, pitch dust, leather dust and starch dust have occurred. In fact, it appears that any type of dust which will burn will readily explode and result in a dust explosion under favorable conditions.

This development in recent years, which indicates definitely that dust explosions can occur in practically all lines of industries where combustible dusts are created during manufacturing operations, is of particular significance. We readily recall that in view of the fact that the earliest dust explosions occurred in flour mills and grain handling plants, it was the general opinion for some time that such explosions were necessarily confined to the grain handling industries. The disastrous losses experienced, however, in a large number of recent dust explosions indicate the wide range of the problem. This emphasizes the importance of careful study to determine the relation between certain types of processes and the dust explosion hazard.

Extent of Losses

The Bureau of Chemistry has a record of 280 dust explosions in industrial plants. In 70 of these explosions 459 persons were killed, and in 92 of them 760 were injured. The property loss in 144 explosions amounted to $33,500,000, an average of approximately $240,000 for each explosion.

The importance of this can be more fully appreciated when we realize that a recent census of manufacturers shows that approximately 28,000 industrial establishments in the United States alone are subject to this hazard. These factories employ approximately 1,324,000 persons and manufacture products of an annual value in excess of $10,000,000,000.

Research work has shown that dust explosions and gas explosions are somewhat similar in behavior. The causes which ignite combustible gases will readily ignite combustible dust. The various dusts have fixed ignition temperatures, as have the combustible gases, and require certain limits of concentration to make an explosive mixture. The control of the problem, therefore, must be approached in much the same manner as the control and prevention of gas explosions.

Progress Made in Control

Although the matter of dust explosion prevention has been given direct attention in the United States and Canada only in recent years, significant progress has been made in the fields in which this special endeavor has been undertaken. Marked progress has been made in connection with the losses from dust explosions and resulting fires in grain threshing machines in the Pacific northwest. These explosions and fires cause extensive losses to both threshing machinery and grain and very little relief was afforded until the matter was taken up by the United States Department of Agriculture and the state experiment stations in that territory.

The investigations resulted in the development of effective control measures which have been instrumental in the reduction of losses and the prevention of these explosions during the threshing of the grain crop in

the northwest. This is a definite example of service which the Department of Agriculture has rendered the farmer. The value of this work has been recognized by the insurance companies, with the result that special rates are now given to the machines equipped with the devices developed by the engineers of the Department of Agriculture.

Marked progress has also been made in the control of dust explosions in certain lines of industry. This is particularly true in flour mills, in which the first disastrous dust explosion on record occurred. This resulted in the design and installation of mechanical methods for effective dust control. The explosion in the Washburn Flour Mills in Minneapolis in 1878 resulted in the loss of 18 lives. The records indicate that only four lives have been lost in dust explosions in flour mills since that explosion.

This must not be taken to mean, however, that dust explosions do not occur in flour mills any more. There have been a number of explosions in recent years. Because of the effective control and preventive methods adopted, however, they have been localized in effect and confined to very limited areas.

Similar progress has been made in other lines of industry, particularly in those industries in which large losses of life and property damage have been experienced.

New Contributing Causes

The question as to why so many dust explosions are occurring in our industries in recent years in comparison with the earlier periods of operation is raised. This ought not to be difficult to understand.

There are several principal contributory causes of the frequency of dust explosions in our modern industries. The expansion to large-scale operation, accompanied by new processes for the utilization of by-products, naturally increases the hazard. Large-quantity production results in the creation of finely-divided dust clouds, which make the ignition more readily possible. New lines of operating processes and new types of machinery and appliances have also contributed to the hazard. In dealing with this matter it must be understood that many of our dust explosions at the present time occur in what may be termed our modern up-to-date and improved industrial plants.

The "Other Side" of the Story

I do not propose to discuss the technical aspects of dust explosion prevention. I am dealing today with "the other side" of the story. The research work is directed primarily to the determination of the causes of these explosions and the development of control and preventive methods. It is gratifying to observe that, as a general rule, these measures are applied by the industries as rapidly as they are developed by the engineers of the Bureau of Chemistry, and that very close cooperation exists between the manufacturing companies and the Bureau in this research work.

There is a certain stimulation, however, to the safety worker in the manufacturing plant, that should make a special appeal for renewed interest and activity in this industrial problem. In dealing with a subject of this kind one naturally becomes impressed with the importance of the protection of the lives of the workmen involved.

In the investigation of industrial plant dust explosions it is necessary to proceed very promptly to the scene of the explosion and to remain long enough to obtain at least some definite idea as to the circumstances under which the explosion occurred and the methods that might be adopted for the prevention of a similar occurrence in other lines of industry.

This close contact with the "human aspect" of the problem gives the investigator an impression which can not be obtained under any other circumstances. In many instances when the explosions have occurred in extremely cold weather the recovery work has been very difficult. Sometimes from ten days to two weeks have elapsed before all of the bodies have been recovered. Often identification is impossible, which adds to the complicated situation.

One can not deal with a problem of this kind in which human life is involved without being tremendously impressed with its seriousness. An explosion resulting in the loss of lives of 50 workmen means a large number of dependent wives and children. The pathetic instances surrounding tragedies of this character leave an impression upon investigators that can never be entirely taken away. It affords a stimulation for greater incentive and for wider exertion of effort to bring about a full realization of the importance of this entire matter and the development of additional precautionary measures.

Value of Safety Work

During the recent observance of fire prevention week our attention was called to the importance of the reduction of our fire losses. The estimates indicate that the annual fire loss of the United States for 1925 was about $570,000,000, making an approximate loss of $1,084 per minute. Although this fire loss is increasing at a rapid rate, the tragedy of it all is that reports indicate that upwards of 16,000 lives were lost last year in these fires. President Coolidge in a special proclamation referred to "the thousands of lives sacrificed each year through fires" and stated that "the conservation of man power and material wealth from such destruction is a challenge to the progress of our civilization."

It appears that approximately $150,000,000 of the loss was caused by fires on farms. These losses have been advancing at a very rapid rate. Secretary of Agriculture Jardine in a statement on fire prevention week, called attention to the losses from fires on farms and referred to the estimated loss of 3,500 lives each year as a result of fires in farming communities. Up until this time very little has been done in a national way to make a thorough study of farm fires and to render assistance to the farmer in the prevention of these fires and the protection of life and property.

When we consider that 16,000 lives are lost annually in explosions and fires in the United States—approximately two lives every hour—the larger proportion, of course, being in the industries, we can not help but be inspired to greater effort and endeavor.

Safety work in the food industries is a noble undertaking. Although the results in many cases can not be definitely measured, this work should carry with it a sense of satisfaction that could not be enjoyed in any other line of effort. The desire on the part of the safety man to acquire all knowledge available on the subject of dust explosion prevention is deserving of the greatest encouragement.

The application of this knowledge in the installation of control measures will eventually result in the reduction of our losses from dust explosion and fires and in the saving of life and property. The human appeal that accompanies work of this character should in itself be an incentive for greater effort on the part of the men in the industries to protect the lives of the workmen engaged in the operation of our factories.

The Food Section of the National Safety Council can render a distinct service in this matter and it is hoped that this address will direct attention to the "other or humane side" of the problem. A service of this kind rendered to one's fellowman, although difficult to measure, will eventually result in those accomplishments which under no circumstances could be otherwise obtained.

The U. S. Department of Agriculture is willing and anxious to make available all information it has that will in any way assist the industries of the country in the reduction of the losses of life and property as a result of dust explosions and fires.

Practical Experiments at a Plant in Louisville

CHAIRMAN SUTTON: We are certainly very grateful to Mr. Price for coming here, and we feel that he has given us some very valuable information. Are there any questions you would like to ask Mr. Price?

W. P. PENTY (Kellog Company, Battle Creek): At Louisville, two years ago, I was greatly interested in the subject of dust explosion, and was disappointed because the gentleman who was supposed to speak did not appear. But through the information I received there I sent to the Bureau of Chemistry at Washington and they very kindly sent a miniature grain elevator to our plant. I collected dust—possibly 10 or 15 different kinds—and we had a demonstration to about 1,500 employees, and in every instance the dust exploded, more particularly the dust that comes from the unloading of corn. That seemed to be more powerful really than powder. We have been very careful since to keep the dust cleaned off and in a safe manner.

MR. WARREN (Minute Tapioca Company, Orange Mass.): We had a question in our mind as to whether our raw material, being a tapioca flower, had any dust hazard; and so our chemist took the matter up with Mr. Price's department and we sent samples of various dusts of the product in various parts of the processes. The report came back—a very

complete report—showing just wherein there were no hazards and wherein we should take a particular safeguard. We have used the vapor-proof lamp in our raw material department where the flower comes in, feeling that there was a possible danger. The report was of particular benefit to the men. Probably you also have workmen who have been with you for a number of years, who have said, "Oh, there is no danger here. We haven't had any trouble—probably won't have any trouble."

But we got the different foremen together and went over very carefully with them the report and it was a very liberal education; they were surprised and since that time it is quite often that they come to us and say, "Now, do you think this particular thing that I am doing is going to have any possible effect upon any hazard?" The effect we have gotten with the men looking out for any trouble has been a wonderful help to us to get that thought of a possible hazard across.

The Department Actively Cooperating With Industries

MR. PRICE: Mr. Chairman, I certainly appreciate those kind words. I would like to make clear this one thing. We enjoy at this time in this work pleasant relations with everybody concerned. I mean by that, the companies and insurance people and underwriters and everybody in the game. I am chairman of two committees of National Fire Protection and the insurance men are all close friends of mine, but we appreciate at Washington what might occur as far as that particular aspect is concerned. If an industry finds there might be a dust explosion hazard present and that there might be an unpleasant relation resulting from the insurance aspect, they may take the matter up confidentially with the Bureau of Chemistry. We have had a policy from the very first that if any company sends in a sample of dust and wants that confidential relationship it will be maintained. If, for instance, an insurance inspector goes out and collects samples from this factory and sends them to the Bureau, we have refrained from making a test of that dust until we are assured that the company which operates that plant is a party to the agreement. We will not send the report unless a copy is sent to the company, and it has worked out very nicely and there is no embarrassment. The big thing, I think, on both sides is to try to get somewhere in the way of control. We had a case last week where we were in conference with a company in the east that is grinding a product that is shipped in a bale from Japan. It is used in the manufacture of insecticide—very explosive. In that conference we tried to convey this thought: the morning after an explosion takes place and the New York executives call you in they get an awful lot of satisfaction out of the fact that they were doing all they could to stop it. The executives are quite remorseful when they haven't done just as much as they ought to have done, and that is the important thought—a fellow gets an awful lot of satisfaction out of knowing he has done all he can do.

MR. EGGERT: Is that reel available?

MR. PRICE: Yes, we have quite a number of the reels. During fire prevention week we had several copies in use and we will be glad if you

will write in for one and we will send one to you. We also have lantern slides we can send out. Anyone needing that material may write to us at Washington and we will be glad to supply you either with the films or lantern slides. If at any time our engineers are in your vicinity when you are having a meeting we will be glad to have them arrange to stop off with you. We can't always send them to meetings on special occasions. But if they were in your territory and an explosion occurred, they might stop over and see you on the way back.

CHAIRMAN SUTTON: The Postum Cereal Company also borrowed these films and the miniature elevator from Mr. Price's department. We put on an exhibition and we took one precaution, purposely, in giving our demonstration. We gathered the dusts, as did the Kellog company, but before blowing them into the miniature elevator we put them in a mass on the table and touched a flame to them and none of them would ignite in that way, but blowing them into the elevator, suspending them in the air, mixing them with the oxygen, they exploded, every one of them.

Hazards from Dusts in the Event of a Fire

MR. PRICE: This afternoon at the request of the Detroit Fire Department, I am going to show this same film. Some of our greatest disasters have been as a result of dust explosions. For instance, firemen have attempted to draw the contents of a bin after they thought the fire was out. We had one case in Milwaukee, a furniture factory where there was no evidence of any fire remaining. The sprinkler heads had worked and the firemen could not see a fire but they did not want to go back without making sure the fire was out, so the chief kept one company of 12 men and they pulled the contents of a bin. It was about 30 feet deep. It was fine wood dust, and when they were doing that an explosion occurred and six of the men were killed—the captain and five others—and that same thing has occurred in many instances. That is one type of hazard. The contents of such bins should never be drawn during a fire or after a fire, but they should be wetted down and the contents left in. You can appreciate the reason for that, because if you are pulling the contents out into a room and get the right mixture of dust in the room you are going to get an explosion.

Now, another hazard has been in the firemen approaching these plants during a fire. There was a case of this character in a cinnamon factory, where 18 men were caught and who were right over the bins when the bottoms dropped out and the cinnamon dust exploded. The other point the chairman referred to brought this to my mind. This pile of dust will not explode unless you diffuse it with the air. In some cases we have had explosions where the firemen could not understand what happened. They approached the building and it blew up. We had a case in a cork factory where they were manufacturing oil cloth. It seems a heavy stream of water struck the dust and blew it into the air. If it gets into the air you are going to have an explosion. That is a very interesting development. The firemen should not have approached it with a very heavy stream of water, because the shooting of the heavy stream

into the pile of dust will blow the dust into the atmosphere and if there is fire an explosion will follow. We have had several cases in the last year where men have been killed.

MR. SMOKE: Doesn't that same thing occur where you have static electricity in a mill?

MR. PRICE: There is a possibility of that if you are using air for removing dust from machines. Of course static sparks will ignite dust, but I don't think it would be safe to blow dust if you were near a fire or source of ignition.

MR. SMOKE: I was getting back to Postum's idea of the short circuit and the charred wood and dust.

MR. PRICE: The static as a rule would have to come from some operating machinery.

MR. SMOKE: Belts and things.

MR. PRICE: It is a very interesting thing. We have gone out where they are threshing grain, between the Cascades and Rockies, where there were as many as 400 explosions in six weeks in threshing machinery, right out in the open fields. It is a very low humidity and a high temperature and the wheat entering the machines, the friction of the straw on the metal surfaces, gives the same effect as if you stroke a cat's back. You build up a static charge and the static sparks ignite the grain dust. The first thing we did was to ground the machines like a lightning rod system on a house. Of course it was difficult because the ground was dry and it had to be moistened. They burned up so many machines insurance companies would not carry the risk and it was a very pretty problem to deal with. I think it has been controled to this extent: we have placed fans on the decks of the machines and have used the grounding method; but it indicated beyond a shadow of a doubt that the static sparks were sufficient to ignite the dust. Some engineers said it was too cold a spark to ignite the gas. We have had many cases recently in industry to contradict that. It appears as if certain of these dusts will electrify themselves by friction.

CHAIRMAN SUTTON: The present problem is to dispose of the dust?

MR. PRICE: I think so, yes.

CHAIRMAN SUTTON: I am sure we have many good things today, and we have a very interesting talk coming next by Mr. Thomas S. Strobhar.

DANGERS FROM FOREIGN OBJECTS IN FOOD PRODUCTS

Thomas S. Strobhar, Wagner, Taylor Company, Philadelphia, Pa.

Some of you are manufacturers of food, some dispensers; we are all consumers, for we must eat to live. My particular plea is to safeguard the public from foreign objects in the food they eat, and at the same time protect the manufacturer and the dispenser from a comeback on the part of the injured public with unreasonable and exaggerated claims.

The numerous claims brought by consumers of food on account of the presence of foreign objects has resulted in practically all casualty insur-

ance companies looking askance at insuring manufacturers or dispensers of food, especially the chain restaurants and chain stores.

I have in mind a certain chain restaurant and retail store, the insurance of which has been offered to every large insurance company, either to be declined or cancelled. In order to find out why this was so, I made a study of all claims brought against this concern, analyzing them as to cause and effect, and learned certain facts which may be of interest.

Six Months Summary

Number of Houses in Operation	28
Cause:	
Glass	29
Stone	11
Nails	7
Tacks	5
Wood	4
Miscellaneous	4
Live Stock	3
Wire	3
Bones	3
Shot	3
Tin and/or Solder	2
Pits	2
Total	76
Effect:	
Nervous Indigestion	3
Broken Teeth	19
Lacerations and/or Infections of mouth and/or throat	51
Miscellaneous	3
Total	76

A study of this table shows that the larger numbers of injuries were found to be due to the presence of glass, stones, nails, tacks, wood; whereras livestock was a comparatively small cause, showing at a glance general cleanliness.

The presence of foreign objects in food naturally causes alarm, resulting in some cases in nausea; and a large number have resulted in lacerations of the mouth or throat, with consequent infection; also broken teeth, and usually a loss of time from business. It is against all this that a defense must be developed.

There is very little law on this subject, but the cost of investigation and of building a defense against shyster lawyers, especially in this particular kind of claim due to negligence or implied warranty, is very expensive. A lawyer who pursues a nuisance claim or who seeks an amicable settlement out of court should not be encouraged but should be faced in court and no claims paid until the court so decides.

To return to the analysis, after a six months' drive, the number of claims was reduced from 25 to 13 a month.

How has this been done? By organizing for safety. It may seem a coincidence that the ratio of the number of accidents to the public is in direct proportion to the number of accidents to the employee; but it simply means that if the employee is deeply interested in the idea of safety for himself and others there will be fewer accidents to the public and vice versa. Safety committees, safety sections, plant inspections, analysis of the principal causes of accidents, all play their part in the campaign to eliminate foreign objects in food.

Safety activity should begin at the time the applicant applies for a position. Safety should be stamped indelibly upon his mind and he should be made to realize the importance the management gives to safety, and by keeping everlastingly at it the entire personnel of any organization may become imbued with the safety movement and, naturally, result in greater efficiency and safety to the public and the employee.

A Concrete Example Is Stones in Beans

Let us consider as a concrete example of our problem, the presence of stones in beans—the ubiquitous bean—for there are perhaps more orders of the homely bean served from coast to coast than any other cooked food. The stone which is usually found in beans closely resembles the bean in appearance and perhaps goes undetected until someone's tooth is broken. The same problem was faced by coffee roasters years ago, and eliminated by a device which all bean packers would do well to adopt. An apparatus was devised whereby coffee is placed in a hopper on the floor, is passed through metal chutes through the floor and lifted up by air into storage bins; all but the stones or nails which are not lifted but sifted out at the bottom of the chute.

Or take, as an example, nails which are sometimes found in cereals. This foreign object is removed by having the grain spread on a jiggling table, enclosed on the sides but open at the ends, with a trough leading into a metal chute. Underneath the table are long bar magnets. As the table moves back and forth the grain is jiggled to the ends and as it passes over to the edge of the chute, any nails or pieces of metal adhere to the magnet.

Glass, which I found to be the cause of the largest number of injuries, is frequently accounted for by broken electric bulbs having fallen into uncovered containers, or by broken containers themselves. Glass is found in sugar because the lid is often screwed on carelessly or too tightly, or because when a tray holding a number of bowls is jarred and the edge of a bowl cracked, a piece of glass may fall into the sugar.

The department for assembling food is often too crowded and too poorly lighted. These conditions, if present, can be changed. There should also be a separate room where boxes and containers can be opened and thus remove from the assembling department the hazards attendant on unpacking, such as nails, nail heads, splinters, etc.

Constant supervision must be made by a foreman to see that the employees are using due care in handling food so as to avoid the presence of foreign objects. Too much emphasis can not be placed on the need

of daily inspection of the employee as to neatless and cleanliness. During the last six months we have only had one single claim for the presence of pins in the food. Prior to this, it was customary to have as many as five in one week. The pins were worn by the serving and waiter girls and those in the bakery and kitchen. Pins worn by factory girls should be prohibited and their need replaced through garments that may be tied on.

In this brief space I have only touched on a few of the foreign objects in food, how they can be removed and the eating public protected. Each one of you will have his own special problem to work out but we can all get together in taking every precaution for safety in the preparation of food or, if accidents will happen, by fighting nuisance settlements of unjustifiable claims through cooperation.

Foreign Particles in the Food a Serious Problem

MR. EGGERT: I am absolutely in accord with Mr. Strobhar's idea of fighting shyster lawyers. We come in contact with them ourselves and we know our own experience.

CHAIRMAN SUTTON: I think we all agree with that. You may save some money in one case by conceding to the lawyer and settling your claim, but you are opening the gate for all the rest of the shyster lawyers in the country.

MR. EGGERT: They are worse in New York City than in any other place.

CHAIRMAN SUTTON: I said, jocosely, in opening the session yesterday, that I thought we might include not only food manufacturers and food dispensers, but food consumers. We learned from Dr. Jackson Monday afternoon, and from Mr. Strobhar this morning, that there is great possibility of applying safety to food consumption, and it might be well either to adopt that phase in this Section or organize a Section in the National Safety Council to teach the people how to eat.

It may be that food manufacturers can find some way to prevent foreign particles getting into food some day, but they haven't found it yet, and when you fight it one way you find it popping up in another. I know in our plant we did as Mr. Strobhar has suggested. We provided aprons that tied on and the girls were not allowed to wear pins. We also ruled against their having pockets so that they could carry anything to the machines in their pockets. But there are certain articles that girls must have, and when we did that they would carry these little articles in the front of their dress; when they leaned over the food those things would sometimes drop in, and we had a veritable avalanche of shine eradicators. So now we don't know where we are.

MR. SMOKE: There could be a long discussion had between Postum and Kellog on that subject.

MR. WIEDENMANN: I think in the food industry welfare work is very important because I have known of cases where there has been malice on the part of the employee toward the employer and they would see

that some foreign substance would get in the food before it went out. We have had cases like that.

MR. EGGERT: That happened more frequently during the war.

CHAIRMAN SUTTON: We had a case just like that. The girl got angry at her forelady so she took some of these little rubber bands and she cut them in about half inch pieces and threw a handful of them into a package, and we got a report from the customer that the grape-nuts was full of worms. I am glad you suggested that, Mr. Wiedenmann. That is another application of welfare—how it reflects to the employer by protecting against just such things as that.

We are now going to have the pleasure of hearing about the "Specific Hazards in the Sugar Industry," by Mr. Dienst.

HAZARDS AND THEIR PREVENTION IN THE SUGAR INDUSTRY

Alexander Dienst, Safety Supervisor, National Sugar Refining Co. of New Jersey, Long Island City, N. Y.

In days gone by sugar refineries were referred to as slaughter houses with respect to accidents, but today they are as safe to work in as any other well guarded industry. This is due to continual striving for safety on the part of the management and its staff.

A sugar refinery consists of much high speed and heavy machinery, such as centrifugal machines, conveyors, elevators, minglers, high pressure pumps, etc.; also hot water and liquor tanks which are of a most hazardous nature. No expense has been spared in properly guarding all these hazards. This is a most essential step. The next is to educate your workers to think safety, and continually keep this thought in their minds by having an occasional rally with a safety talk by some expert safety engineer who can put the idea over, and by displaying safety bulletins all over your plant. This counts for much, as the pictures bring the safety thought home to the men when other methods sometimes fail. A most pathetic picture was published recently under the caption, "Why Doesn't Father Come Home?" These words were uttered by a little girl standing at the gate of a small cottage awaiting the return of her father from his day's work. Instead, notice came that he was lying in a hospital—a victim of carelessness. Articles of this nature have a powerful influence upon the minds of workers.

Team work produces results; train your men's minds upon one thought, "Safety," and have them pull together and you will meet with success.

Promote the fullest cooperation in your plant. This can be done through the foremen only, by bringing them together at an occasional meeting. We find the best time to do this is immediately after working hours in your cafeteria (if you have one) and serve them with a dinner and a smoke. They then become warmed up and express their ideas of safety freely and point out the weak spots in their various departments, if there are any. Encourage them to talk, don't throttle them.

Walter P. Chrysler says: "If you know how to do your job better, don't hesitate to tell your boss about it. Men who advance far do not refuse to listen to suggestions from men they employ, but welcome practical suggestions for improvement.

Bring the men on the firing line into the picture and fix their responsibility. Show them the main objective toward which your organization is directed. Keep this objective continually before them in visual form if possible. Show them the obstacles which confront them and the challenge which is laid down before them. Express your confidence in them, and make them feel that success rests upon their shoulders.

The problem of accident prevention may be briefly stated as follows:

Make it some person's business to discover unsafe conditions and practices and then do everything possible to eliminate them through active cooperation between this person and those responsible for the performance of the work.

Education is obviously required, but discipline to enforce the results of education is equally essential.

If you do not get cooperation voluntarily—force it.

We had a case where our mechanics deliberately removed the glass guards on the emery wheels before using them. We immediately placed a sign on each wheel reading: "Don't use this wheel without the guard in place or wearing goggles, otherwise you will be discharged." This produced results.

The Birth of the Safety Organization

Now let me tell you about the birth of our safety organization.

Some five years ago a safety rally was held in Long Island City by the Metropolitan Safety Council, then a local branch of the National Safety Council (of which I was a member). We attended this meeting, fourteen strong, and afterward adjourned to a dining room nearby where one of the party suggested that we start a safety organization in our plant and we then and there organized and elected our officers.

One week later we called a meeting in our main office after work and invited our plant manager to attend.

He met with us and commended our action, told us we had his hearty approval, that we could count on his support, and assured us that the management would back us up to the full limit.

We enlarged the organization to include all first class foremen in the plant.

The following object was unanimously adopted:

"The object of this organization is to promote safety throughout the refinery and to lend encouragement to public safety, to the end that accidents may be prevented and better industrial conditions and civic life may be promoted."

After holding several meetings we found that matters were getting complex. As important questions came up, there were too many conflicting opinions and we got nowhere (a case of too many cooks spoil the pie).

We then organized an executive committee of six, consisting of the assistant superintendent, assistant consulting engineer, master mechanic, production manager, personnel manager and safety supervisor, who meet bi-weekly during business hours and discuss and pass on all matters of importance and report back to the general committee who meet monthly around the table. This works out very satisfactorily as it gives everyone a chance to talk for himself.

We have three factory inspection committees, each consisting of three first class foremen who serve four months during the year. They, with the secretary, make a complete tour of inspection through the plant monthly and note any possible hazard they may find.

We also have a safety inspector who makes an independent inspection weekly and bends every effort to find hazards the committee may have overlooked. The moral effect keeps the committee alive.

Details of the Practical Safety Plan

These reports are discussed by the executive committee at their meetings and orders are given to make the necessary changes to eliminate the hazards reported.

Giving the executive committee power to act on these questions saves much lost time.

A complete report of all matters transacted by the executive committee is made to the general committee at their monthly meeting for discussion.

The officers of the safety organization are safety supervisor, safety engineer, safety inspector and secretary (who keeps all records and attends all meetings).

Our dispensary, or first aid room, maintains a medical department consisting of a full time graduate nurse and a part time physician who visits the plant one hour each day and is on call at all time for emergencies.

All cases that receive first aid treatment by the nurse are ordered back the following morning for examination by the doctor who passes on the merits of each case and a complete record of same is filed.

The personnel of this department is such that the workers feel entirely free to come for treatment or advice for the most trivial accident, as they are always treated with courtesy and kindness.

We are running a safety contest and distributing cash prizes to each foreman and sub-foreman of the five departments having the best safety records for each six months, and those winning first prize also have their names inscribed on a banner displayed in a conspicuous place in our cafeteria. This contest is based on hours lost and the results are obtained from past experiences and a suitable allowance for the hazard in each department.

All our men are examined for hernia before employment.

We have a fast rule that each mechanic before starting to repair any machinery must remove the fuse from the fuse box and carry it with him, so that no other person can possibly start the machine while

he is working on it. There is also a sign placed on fuse box reading: "Hands Off—Repairs Being Made."

When instructions are given to clean or repair a bucket elevator the foreman locks the fuse box (which automatically lights a red light on top and at the elevator boot), and keeps the key in his possession, giving the man a key to unlock the boot, which he is not supposed to do unless the red light is on. After the work is finished the man locks the door in the boot and returns the key to the foreman in person and he in turn opens the fuse box with his key and starts the elevator. We place the entire responsibility on the foreman.

I will quote our accident record since 1922 which shows a marked improvement.

ACCIDENTS CLASSIFIED

Year	No. of Accidents		Percentage Based on Full Time Workers		
	Total	Monthly Average	No Lost Time	Lost Time	Total %
1922	471	39.25	2.12%	1.47%	3.59%
1923	226	18.83	0.71%	1.22%	1.93%
1924	227	18.92	0.89%	0.83%	1.72%
1925	140	11.67	0.33%	0.74%	1.07%
6 Mos.—1926	67	11.17	0.23%	0.73%	0.96%

As a result of the workings of the safety organization every piece of machinery is guarded as far as practicable and various safe practices have been inaugurated.

Among the material effects of this work are the following which in most cases are characteristic of the sugar industry:

1:—All new installations are inspected thoroughly by the safety engineer and are not allowed to be put into operation unless O. K. from a safety standpoint.

2:—Centrifugal Machines: Individual vertical motor drives have replaced the horizontal line shafting.

3:—Char House: a ventilating system has been installed to drive out the intense heat, making working conditions more favorable.

4:—Boiler House: a ventilating system has been installed to expel the gas fumes, thus lessening the liability of men being overcome.

5:—Belt Conveyors have been placed as near the ceiling as is practical and in other cases railings have been placed around them.

6:—Live Steam Lines: at each live steam outlet a bottle of carron oil and some cloths are placed, in order to give a sufferer from burns some relief before going to the first aid room. All foremen are trained how to use it.

7:—Ash Cellar: water has been run in with the ashes to lessen the amount of flying dust and so lessen the chance of eye injuries.

8:—Dust Collector: a dust collector has been installed in the powdered sugar department, which makes working conditions better. This collector deposits the dust in water, thus decreasing the fire hazard.

9:—Notice: we hand each new employee a memorandum reading as follows:

NOTICE—Read Carefully

It is the policy of this company to cooperate with its employees to prevent accidents.

Should you meet with an accident, no matter how slight (if only a scratch) report to your foreman at once, and go to the First Aid Room for treatment.

This may prevent infection, loss of time and much suffering.

This notice is printed in four languages, English, Polish, Italian and Spanish.

We also have a Safety Boosters Club consisting of all employees. Each member is presented with a Safety Boosters button.

CLASSIFIED PERCENT OF ALL ACCIDENTS

Year	Hand Labor	Infections	Burns	Eyes	Falls	Machinery	Miscellaneous	Total
1922	49%	4%	4%	13%	14%	9%	7%	100%
1923	63%	3%	2%	9%	8%	3%	12%	100%
1924	64%	7%	3%	10%	10%	3%	3%	100%
1925	70%	2%	4%	7%	8%	4%	5%	100%
6 Mos.—1926	64%	3%	4%	14%	6%	.....	9%	100%

Actual results which are accomplished by saving man from pain and suffering have a tendency to promote good will among workers. Workers' good will has definite value as a factor in increased productivity; yet, important as productive efficiency may be, unquestionably the conservation of human life, health and happiness is a much more important consideration.

MR. SMOKE: May I ask the number of employees you have?

MR. DIENST: Twelve hundred. This is just one plant that I look after.

CHAIRMAN SUTTON: I want to say that I think next year at least, so far as my influence will be effective, we shall have a less number on each program, and have a larger number of sessions and opportunities for further discussion—more discussion than we have had. Moreover, I am going to endeavor to convince the rest of the committee that we ought to have a luncheon and get-together and get acquainted with each other as some of us did at breakfast one morning. It is very helpful.

Now, we are going to hear something of specific hazards in bakeries by Mr. Allan H. Wiedenmann, manager, engineering department, Casualty Reciprocal Exchange, Kansas City, Missouri.

SPECIAL HAZARDS IN THE BAKING INDUSTRY

Allan H. Wiedenmann, Manager, Engineering Department, Casualty Reciprocal Exchange, Kansas City, Mo.

It will be my endeavor to cover my subject by a review of the causes of accidents in 100 bakeries for a period of one year.

While this experience may not be indicative of the entire industry, observation and experience show that there will be but few causes that

escaped listing. I am sure that if there are any such causes, the frequency thereof will be of no consequence.

The plants analyzed have been taken at random from the subscribers at Casualty Reciprocal Exchange having annual payrolls varying from $3,000 to $200,000. Thus, we get what may be referred to as average plants, going from the smallest to those with a comparatively high payroll exposure for a bread bakery.

The year 1924 has been used in this survey, because it is the latest year in which complete information can be had on the time lost and labor costs.

In analyzing the 100 bakeries producing the 384 accidents, we made some interesting preliminary disclosures. For instance, there were 58 of the 384 claims not tabulated because there was no time lost, no medical expense, and no compensation expense; 144 medical cases had no lost time; 117 medical cases involved lost time, with a total number of 704 days out, and 65 compensation cases with 1959 days lost time. The severity of these 65 cases can be judged by the fact that there were only four costing more than $300 in combined medical and compensation cost, three of which were from $300 to $500, and one cost approximately $1600. There are no dismemberment cases other than the loss of fingers.

While the 100 plants reported 384 accidents, there were 36 that did not report a single case, 21 reported only one accident, and 21 reported more than five accidents; only nine of the total number had more than 10 accidents.

Excluding the plants reporting no accidents and the 58 claims without loss of time, medical, or compensation expense, we have a remainder of 326 cases, which have been divided into the following 25 causes:

		Medical Only		Compensable Non-Serious		Compensable Serious	
Number	Proximate Causes	No.	Time Lost	No.	Time Lost	No.	Time Lost
44	Falls of Persons	40	121	4	133	—	—
35	Handling Objects	33	71	2	14	—	—
31	Striking Against Objects	23	49	8	140	—	—
23	Operating Machines	10	7	12	321	1	186
23	Pushing or Pulling Objects	17	50	6	209	—	—
21	Gases, Acids, Hot or Corrosive Substances	18	20	3	63	—	—
18	Falling Objects	17	47	1	8	—	—
17	Machine Exposed Moving Parts	16	32	1	90	—	—
15	Lifting	11	37	4	142	—	—
15	Cleaning Machines in Motion	8	16	7	254	—	—
12	Hand Tools	11	24	1	13	—	—
10	Falling Objects Handled by Inj.	8	29	2	37	—	—
10	Caught Between Objects	9	69	1	46	—	—
10	Struck by Objects	9	4	1	7	—	—
10	Protruding Nails	7	33	3	72	—	—
7	Explosions, Gas	5	16	2	40	—	—
7	Slivers, Wood	6	16	1	14	—	—
5	Foreign Objects	5	—	—	—	—	—
4	Oiling, Repairing, Adjusting Mach's.	—	—	4	154	—	—
2	Horse Play	1	38	1	17	—	—
2	Broken Glass	2	4	—	—	—	—
2	Slivers, Steel	2	10	—	—	—	—
1	Defective Flooring	1	9	—	—	—	—
1	Intense Heat	1	2	—	—	—	—
1	Electricity	1	2	—	—	—	—
326	Totals	261	704	64	1773	1	186

FALLS OF PERSONS:

Ladders, pushing objects, stairs, wet and greasy floors, tripping, slipping on level and an elevator shaft contribute to this cause, and with the

exception of one case, acidents were not due to defective equipment or the absence of safeguards. In my opinion the elimination of this cause will require carefully prepared educational campaigns.

HANDLING OBJECTS:

A total of 35 accidents come under this cause, 14 from handling defective or rusty bread pans, eight hot bread pans, two defective dough troughs and 11 miscellaneous objects. The prevention of this cause requires careful inspection and maintenance of bread pans and dough troughs. Also that employees be instructed to use pads or gloves, with ample protection of the fore arm in handling hot pans.

STRIKING AGAINST OBJECTS:

This cause is purely a case of carelessness or clumsiness on the part of the injured and can be remedied only by instilling the safety habits.

OPERATING MACHINES:

These accidents are due to the point of operation hazard of the machine which frequently becomes jammed or the dough sticks and without thinking the employee attempts to get the dough feeding properly again by pushing it with his hand while the machine is in motion. The machines on which the majority of these accidents have occurred are the dough mixer, divider dough brake and moulding machine. Safety rules on this cause should be posted instructing employees to stop machine before relieving jam. Enforcement is imperative.

Other Classes of Minor Accidents

PUSHING OR PULLING OBJECTS:

Seventeen of these were bread racks, four dough troughs and one box. The employee jammed the bread rack against another one, wedging his finger between or, in pushing dough trough through a door, would strike the side of the door jam with his hand. There were also two hernias and four strains caused by attempting to push or pull a rack or trough too heavily laden. Prevention of this cause can be accomplished through proper instructions on handling objects and careful physical examinations.

FALLING OBJECTS:

Most cases occurred where the employee was struck while passing by or coming in contact with improperly piled stock and material, such as bread pans, rolls of paper, sacks of flour, etc. The prevention of this cause will require the careful inspection of stocks and seeing that they are safely piled.

MOVING PARTS: ARE DIVIDED AS FOLLOWS:

Eight gears, five belts and pulleys, two chains and sprockets, one set screw and one shaft end. Accidents of this nature can be prevented by efficient safeguarding.

LIFTING:

These accidents in most cases are caused by the employee not properly lifting or attempting to lift too heavy a load, in each case resulting in a hernia or a strain. The elimination requires instruction in lifting properly and careful physical examination.

CLEANING MACHINES IN MOTION:

Machines entering into this cause are moulder rolls, dividers, dough mixers, rounders, and bread wrappers. Machines must not be cleaned while in motion.

HANDLING TOOLS:

The majority of these were caused by the careless handling of the (dough) scraper commonly used in bakeries in cleaning machines and other equipment.

FALLING OBJECTS HANDLED BY THE INJURED:

In most cases this was purely carelessness or too much speed. Prevention can only be accomplished by instilling the safety habit in the employees.

You can readily see that the majority, in fact nearly all, of these accidents have occurred though thoughtlessness and violation of safe practices on the part of the injured. This is true also of the remaining causes whose occurrence has not been so frequent.

There is no doubt that these causes can be eliminated only through educational measures such as frequent instruction, oral and written, in the proper operation of machines, accident prevention contests, safe practices, and safety bulletins characterizing the most prolific causes.

Experience Favorable from an Insurance Standpoint

The point desired to be emphasizd is that all of these plants have had periodical inspection for the removing of dangerous conditions evident to competent safety engineers. They have also had the bulletin service, which, while general in character, continually reminded the employees of the possibilities of accidents and their basic causes.

With these considerations taken into the analysis of the claims, we believe the experience for this period may be considered favorable from an insurance standpoint. However, much yet remains to be done in the prevention of accidents, through perfecting more "fool-proof" bakery machinery, and through the careful planning of educational campaigns. Our own observation of other plants where the same type of safety engineering and accident prevention service has not been in effect would indicate that the baking industry outside of the plants served at Casualty Reciprocal Exchange, has a far greater frequency and severity of accidents.

In the past, I believe the point of operation of the dough mixer has been the greatest hazard, causing death and permanent disabilities, all of a gruesome nature, and all resulting from the bakers attempting to remove dough, or clean the machinery while the power was on. There has been no practical way devised to guard the mixer so that the power could not be applied when the mixer is in a tilted position; however, companies are now manufacturing the tilting type mixer with an auxiliary motor, so that power is applied to the rotating of the mixing arm only so long as the operator keeps his finger on the safety button located in front of the dough mixer. This permits him to have one arm free for the removing of dough

or the cleaning of machinery, and likewise places the control of the machinery under his finger at all times.

It is hoped that this type of mixer will rapidly replace the old type, although the bakeries still demand the old type, and manufacturers, eager to satisfy this demand, and with no thought of safety, continue to make them. That same thing applies to a great many machines manufactured today without proper safety devices. There has been a noticeable improvement in the last several years in the manufacturing of bakery equipment, and you will seldom see modern equipment now which does not have the moving parts completely guarded before leaving the factory. As a whole, we believe the manufacturers of baking equipment should be commended for the improvement they have made from a safety standpoint.

There is much to be done for the elimination of accidents in the baking industry. I am not only expressing my personal opinion, but the opinion of my principals, when I say that the Food Section of the National Safety Council is invaluable in promoting safety among bakeries, as this section will concentrate its activities on the methods of preventing accidents in the foods industry.

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