

FACTORIES AND WORKSHOPS.

ANNUAL REPORT

OF THE

CHIEF INSPECTOR

OF

FACTORIES AND WORKSHOPS

For the Year 1919.

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*Presented to Parliament by Command of His Majesty.*

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## ANNUAL REPORT

OF THE

## CHIEF INSPECTOR OF FACTORIES AND WORKSHOPS FOR THE YEAR 1919.

TO THE RIGHT HONOURABLE EDWARD SHORTT, K.C., M.P.,  
HIS MAJESTY'S PRINCIPAL SECRETARY OF STATE  
FOR THE HOME DEPARTMENT.

HOME OFFICE,

August, 1920.

SIR,

I have the honour to submit the following Report of the work of the Factory Department in 1919. It appears in the form foreshadowed by Sir Arthur Whitelegge in the Report of 1914, namely in chapters, each dealing with one important subject and containing a summary of the information in the detailed reports submitted by the Superintending Inspectors and Senior Lady Inspectors. The usual reports by the Medical Inspector, the Electrical Inspector, and the Inspector for Dangerous Trades also appear in separate chapters. This plan could, unfortunately, not be adopted earlier owing to the disorganisation of the Department and also of the industrial work of the country during the War.

The chapters contain a fairly full record of the general administrative work of the several branches of the Department.

It will be seen that the standard of safety and sanitation declined during the War owing mainly to press of work, shortage of staffs, and difficulties in obtaining materials and labour to effect repairs or renewals, but that during 1919 a great step forward has been made not only in covering the lost ground but, in quite a number of cases, in advancing still further to a much higher standard. The references to Works Committees, though disappointing in some respects, are particularly interesting as illustrating what can be achieved by self-inspection where Committees are formed on a sound basis and are properly organised. A vast field, however, remains to be cultivated, and much spade work has yet to be done by the Department. Some of the Inspectors' reports show what disheartening work it is, but the results already obtained show that it is well worth doing.

For the first time since 1914 it is possible to include statistical tables. The only important omission from those given prior to the War is the Table of all Reported Accidents according to Industry, Age and Sex, but unfortunately it was not possible to resume tabulation in detail until the latter part of the year. It is hoped in future years to provide more detailed information than formerly with a view to defining the danger zones in the various industries.

It will be noted from Table II that while the number of factories has increased by 12,396 since 1914, the number of workshops has decreased by 8,060, the net increase being 4,336. Reference is made in the reports to the gradual closing down of country workshop industries, and the extensive conversion of town workshops into factories, largely by the introduction of electric power.

The falling off in visits paid, prosecutions taken, and contravention and other notices issued, is explained by the fact that at the end of 1919 there were 28 vacancies on the staff while 18 Inspectors and Inspectors' Assistants were still serving with the Forces or with other Departments, and, in addition, 39 Inspectors and Assistants were not released from the Forces until various dates during the year. It should also be pointed out that individual inspections tend to occupy more and more time, owing to the ever increasing numbers of the Orders to be enforced, and the detailed inquiries rendered necessary in connection with the framing of Welfare Orders, &c.

Fatal accidents increased from 1,287 in 1914 to 1,385 in 1919, while the non-fatal accidents reported fell off from 158,585 to 124,632. These latter figures, in view of the great trade activity during the year, can hardly be taken as indicative of the number of accidents which actually happened, and I think the explanation in the chapter on Safety (see page 12) must be accepted as correct, namely, that there has been great laxity in reporting. It is probable, however, that fatal accidents have been fully reported.

Works (other than Docks, &c.) under Regulations have increased from 67,650 in 1914 to 77,957 in 1919, the Electrical Regulations of Inquiries made for 58,286. Representatives

The only Acts affecting the Department passed during 1919 were :—

The Anthrax Prevention Act, which gives effect to the recommendations of the Departmental Committee on Anthrax by giving power to control by Order in Council the importation of goods infected or likely to be infected with anthrax, and to provide for the disinfection of such goods. This matter was referred to at some length in the Report for 1918.

The Checkweighing in Various Industries Act, which provides for checking the weight or measurement of materials produced, handled or gotten by workmen paid by weight or measurement in certain industries, and gives power to the Secretary of State to make regulations extending its provisions to other industries.

A General Order was granted affecting the length of spells of work in Woollen Factories in the County of Leicester, and 1,265 Special Orders were granted to individual works in various parts of the Kingdom permitting certain exemptions.

Welfare Orders in pursuance of S. 7 of the Police, Factories, &c. (Miscellaneous Provisions) Act, 1916, and containing the usual provisions, were made in respect of Oil Cake Mills and Fruit Preserving Works, and Draft Orders were issued in respect of Laundries, Gut-scraping and washing, and tripe-dressing ; and the manufacture of Metal Hollow-ware and the process of Galvanising.

An Order was made on 28th November, 1919, in pursuance of S. 73 (4) of the Factory and Workshop Act, 1901, requiring the notification of all cases of (a) *Epitheliomatous ulceration* due to tar, pitch, bitumen, mineral oil, paraffin, or any compound, product or residue of any of these substances ; and (b) *Chrome ulceration* due to chrome acid or bichromate of potassium, sodium, or ammonium, or any preparation of these substances.

Regulations were made on 26th April, 1919, for the crushing, grinding, and sieving of Refractory Materials containing not less than 80 per cent. of Silica, and any process involving the manipulation of such materials in the manufacture of bricks or other articles containing not less than 80 per cent. of Silica.

The Shuttle Kissing Committee, whose appointment was referred to in the Annual Report for 1913, and whose work was suspended during the War, resumed their inquiry in April last. They reported in October, unanimously recommending that the practice of Shuttle Kissing should be abolished, so far as Cotton Weaving is concerned, there being several types of shuttles on the market which enable this to be done. The Committee's Report has been referred to the Associations of Employers and Operatives, who were parties to the Conference which appointed the Committee. The Operatives have accepted the Report, and have passed a Resolution requesting the Secretary of State to certify as unhealthy the threading of shuttles by mouth suction, and to make Regulations under S. 79 of the Factory and Workshop Act, 1901, prohibiting it : we are still awaiting a reply from the Employers.

A Research Board, upon which the Home Office is well represented, and in whose work the Department is greatly interested, has been appointed by the Department of Scientific and Industrial Research and the Medical Research Committee jointly "to consider and investigate the relation of the hours of labour and of other conditions of employment, including methods of work, to the production of fatigue, having regard both to industrial efficiency and to the preservation of health among the workers." Professor G. S. Sherrington, Sc.D., F.R.S. (Professor of Physiology, University of Oxford) is the Chairman.

Conferences which have already had important results were held with (1) the Boot and Shoe Joint Industrial Council regarding hygienic conditions generally, and (2) Representatives of the Employers and Operatives in the Herring Curing Trade regarding the working conditions in Yarmouth and Lowestoft in particular, and the question of the prevention of fatigue in general. The first is dealt with in the Chapter on Joint Industrial Councils and Trade Boards (*see* page 110), and the second, so far as it related to the work at Yarmouth and Lowestoft, in the Chapter on Welfare (*see* page 79). On the question of Fatigue a memorandum has been issued to employers throughout the country.

Pamphlets issued during the year were as follows :—

Messrooms and Canteens at Small Factories and Workshops.

Welfare and Welfare Supervisor in Factories and Workshops.

Fencing and Safety or Transmission Machinery in Factories.



A Leaflet, forming an appendix to the Home Office Leaflet on Safety Committees, was also issued, containing "Suggestions for Rules for Safety Committees in Factories and Workshops."

As regards "Institution" factories and workshops under S. 5 (2), 1907, eight Orders were made revoking earlier Orders or cancelling schemes, and returns of employment were received from which it appears that there were employed 65 children under 14 years of age; 664 young persons under 16; 1,479 young persons between 16 and 18; 4,210 adults, making a total of 6,418—812 persons were engaged in supervision of the work or in managing the machinery. The large majority of these persons were employed in laundry work.

Several important prosecutions were taken and are referred to in the various chapters. In a number of cases the Magistrates expressed regret that the maximum statutory penalties were so small.

In October Mr. Bellhouse, Dr. Legge and Miss Constance Smith attended the International Labour Conference at Washington as advisers to the British Government delegates. Mr. Bellhouse, in addition to assisting Sir Malcolm Delevingne on the Commission appointed to deal with the minimum age of employment and the night employment of young persons, acted as Chairman of a sub-committee which considered the position of the Oriental nations; Dr. Legge acted as Chairman of the Commission which dealt with Dangerous Trades; while Miss Smith acted as Chairman of the Special Commission appointed to deal with the night employment of women, and the employment of women before and after childbirth. After the termination of the Conference Mr. Bellhouse and Miss Smith, along with Sir Malcolm Delevingne, took the opportunity of visiting a number of factories in various parts of the United States and of making such inquiry as was possible in the short time available into the administration of the Labour Laws. On their return they submitted a very interesting report of their doings which was published by the Home Office, and presented to Parliament in January of this year.\* A short account of Dr. Legge's doings will be found in the chapter on Industrial Poisoning (*see page 59*).

On the 31st March, 1920, the Department suffered a severe loss by the retirement of Sir Malcolm Robinson, C.B., I.S.O., after a long and honourable career as an Inspector. He had intended relinquishing his appointment at the end of 1919, but he consented to stay on for a few months in order that he might lay before the Factory Staff Committee, whose inquiries began just before the close of the year, his scheme for the reorganisation of the Department.

I have to record the following retirements during 1919 :—

- (a) From the permanent staff—Mr. W. C. Evans (12th January), Mr. E. F. Boggis-Rolfe (14th February), Mr. H. T. Ringrose (28th February), Mrs. M. H. S. Anderson (17th March), Mr. T. K. Evans (12th April), Mr. J. E. Appleyard (31st May), Mr. C. A. Taylor (9th June), Dr. E. L. Collis (24th June), Miss Stevenson (18th September), Miss Lindsay (15th October), Mr. J. Good, O.B.E. (31st December).
- (b) From the temporary staff—Miss Macleod (31st January), Miss V. Harris (28th February), Miss Dibbin (3rd June), Miss Carbutt (11th July), Mrs. Rackham (17th July), Miss Davies (16th August), Miss Hutchinson (8th September).

The following new appointments were made :—

- (a) To the permanent staff—Hon. M. Pease (3rd February), Miss A. W. Hastings (28th October), Miss K. H. Mellor (30th October), Dr. S. A. Henry (23rd December). The three first named had previously served in a temporary capacity.
- (b) To the temporary staff (to fill vacancies)—Miss B. M. Coombes (3rd February), Miss P. M. Capes (4th October), Miss E. M. Bradley (4th October), Miss B. M. Gwynne (4th October), Miss E. Schofield (4th October), Miss F. E. Messiter (19th December).

I regret to report the following deaths in the Department, viz., Mr. M. E. White, who was at the time serving with the Explosives Department, and Miss Vines, H.M. Senior Lady Inspector in the Northern Division.

I am, Sir,

Your obedient Servant,

R. E. GRAVES,

*H.M. Chief Inspector of Factories.*

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\* "Labour Administration in America. Notes of Inquiries made by Home Office Representatives attending the Washington Labour Conference." Cmd. 606. Price 2d. net.

## CHAPTER I.

## INDUSTRIAL DEVELOPMENTS AND STATE OF TRADE.

BY

R. E. GRAVES, C.B.E., H.M. CHIEF INSPECTOR OF FACTORIES.

The first year after the cessation of hostilities has been a very notable one for industry, and it is remarkable how complete has been the change over from war to civil production, and with what wonderful smoothness this stupendous task has been accomplished on the whole. The first great step in the transformation was the gradual, and now almost complete, withdrawal of women from the men's industries where they performed such magnificent service during the War, and the absorption into industry of the demobilised men. The next great step was the resumption of the manufacture of the ordinary articles of commerce. In many trades the manufacturers had little difficulty because the articles made were much the same either for war or peace purposes, but in many others which had been equipped specially for the manufacture of war material, new work had to be found and machinery and plant adapted. For example, factories in which aeroplanes were made are now being used for the manufacture of furniture, motor vehicles, wooden toys, etc.; a cartridge case factory is now making household hollow ware; shell factories are making such things as steam-boilers, locomotives, agricultural tractors, and milk churns; and at a factory where concrete ships were built concrete blocks for house building are now being turned out. One very large armament firm have turned their attention to the making of railway locomotives, marine engines, and boilers.

Without exception the reports refer to the unprecedented demand for commodities of all sorts, and apparently manufacturers generally have booked enough orders to keep them fully occupied for a very long time to come. To meet this great pressure they have been reaching out in all directions with a view to expansion, and the demand for buildings and plant of all sorts is only equalled by the general unsatisfied demand for everything. All the Reports refer to difficulties in the way of progress, but the following from Mr. Walmsley (Midland Division) is typical as to the position.

Many factors have combined to retard progress, amongst which may be mentioned difficulties and delays in transport, reduced hours of labour, labour disputes, and the shortage of raw materials and fuel, whilst the steady and continued increase in prices has made it extremely difficult for manufacturers to enter into contracts of any magnitude. Notwithstanding all these adverse influences and the unprecedented high prices of goods generally, the demand for practically every marketable commodity has probably never been so great. Even in such luxury trades as jewellery, silver and electro plate the manufacturers have had their stocks completely cleared out.

The shortage of houses and of skilled labour are mentioned by other inspectors as additional hampering factors.

Though many new and excellent factories have been built, and large extensions made to existing works, the scramble for premises, coupled with the high cost of building, has led to very unsuitable premises being taken into use in some cases. Mr. Taylor (Norwich) refers to one such place taken over by a new firm, in which he found insufficient means of escape in case of fire and in which the construction, arrangement, and size of the rooms made proper lighting, ventilation, and heating difficult, to say nothing of the increased cost entailed in running such a rambling sort of place. Mr. Taylor has been in touch with the architects responsible for the conversion of several of these places and has been able to give useful advice on many points, but, he says, where he was not consulted during the planning stage, the first visit paid usually revealed structural defects to remedy which caused trouble and expense which might have been avoided.

In order to meet the ever increasing cost of production and the scarcity of labour, and to speed up production, there appears to have been, all over the country, a very general conversion of workshops into factories by the introduction of mechanical power. Several of the reports refer to the greatly extended use of electrical power both for this purpose and also for motive power in large works. Mr. Rogers mentions that in Bristol the supply of current for power has increased from 11,000,000 units in 1914 to 21,000,000 in 1919, and Mr. Wright reports that in the Newcastle-on-Tyne district extensions have had to be made in the public supply generating stations to cope with the increased demand for power, and also refers to the installation in one large iron mill of electrical plant for driving a large reversing rolling mill requiring 2,500 to 8,500 horse-power. Mr. Wilson (Northern Division) says its use is on the increase for heating metal furnaces and for welding steel castings.

The following are trades in which developments are specially mentioned :—

*Shipbuilding and repairing* (S.E., S.W., N.E. and Northern Divisions).—There has been conspicuous growth of the industry on the East Coast of Scotland at Alloa, Burntisland Kinghorn and Dundee, and an important development at Londonderry, where several thousands of men are now employed in the industry. In the Newcastle district, however, while orders are plentiful and yard space is being increased, there has been a decline in output on the Tyne and the Wear as compared with the years just before the War. This is attributed to several causes (1) the strike in the early part of the year, (2) the shortening of hours to 47 per week, (3) the stoppage of work on Admiralty ships, (4) inadequate railway transport, (5) a natural slackening of effort on the part of the workmen after five years of strenuous war work.

*Glass* (S.E., Midland and N.E. Divisions).—This industry was developed enormously during the War, particularly in the manufacture of such articles as optical and chemical glass ware and electric lamp bulbs, which were almost entirely made in foreign countries before the War, and in other branches of the industry, such as the manufacture of bottles of all sorts, and domestic glass ware, further developments are now taking place. One firm in the Midland division who made a very large proportion of the aeroplane gunsights required during the War is now developing the manufacture of lenses for cameras and scientific instruments. In the manufacture of bottles there has been a wide movement towards amalgamation, and several large works have been erected. Mr. Jackson (N.W. Division) refers to “a very marked revival and extension,” while Mr. Wright (N.E. Division) says “the installation of automatic machinery promises shortly to revolutionise certain branches of the industry.” Mr. Walmsley (Midland Division), while mentioning developments in various directions, says, “Very little progress has, however, been made in improved methods of manufacture and it is doubtful if under existing conditions of production the trade could successfully hold its own against foreign competition.” Further remarks upon the development of the Glass industry will be found in the paragraph dealing with Research on page 8.

The *Hosiery* trade is very brisk and the starting of new works is mentioned in Derbyshire and also in Scotland and Ireland. With regard to Scotland Mr. Wilson says that employers have been wise in establishing their new premises in districts where employment for females was needed.

In the *growing and de-seeding of flax* in S.W. England there have been interesting developments, due largely to organisation by the Board of Agriculture and Fisheries. In 1914 only a few hundred acres were under flax and only one scutching mill was known. In 1919, over 3,400 acres were grown and seven or eight scutching and de-seeding factories were at work.

Other trades in which developments are in progress are motor vehicles of all sorts and general engineering in several districts; synthetic dyes and fine chemicals, including increased output of phenacitin, aspirin and saccharine (N.E. Division), while in the N.W. Division the position of the dyers and calico printers, who were hard hit for want of dyes during the War, has been relieved, to an extent which could not have been anticipated, by the enterprise of firms in our rejuvenated dye-making industry. In the Midland Division a large number of brass articles which were formerly cast are now being made by hot stamping and pressing, and machine moulding of brass is making some headway. A steadily growing trade in the manufacture of magnetos, formerly obtained entirely from Germany, is also reported, and two trades, namely the hearth furniture (kerbs, coal boxes, etc.) trade, and the perambulator trade, are mentioned as giving employment to many disabled soldiers. One firm of perambulator makers has had over 85 per cent. of their work done by one-armed men.

Both the Midland and N.E. Divisional reports refer to amalgamations and co-operative arrangements between firms with a view to increased and cheapened production. Standardisation and specialisation appear to be the order of the day. In this connection Mr. Walmsley specially mentions the stove and range manufacturers and the gun trade. In the latter the movement has been carried very far, a Limited Liability Company having been formed of all the registered members of the trade, “the scheme being designed to benefit all those engaged in the trade by transferring certain processes from factories which are not so well equipped as others, and assigning such work to firms who have specialised in that particular class of work. This Company . . . will interest itself mainly in output and reduction of costs, thus enabling its members successfully to meet foreign competition.

A committee of experts has been formed to decide upon patterns and to draw up specifications for various parts." Mr. Law (Sheffield) also mentions the development of mass production in some of the lighter steel trades, and the adoption of labour-saving machinery in the cutlery trade, particularly in the forging of table blades, and the stamping and grinding of scissors and razors.

Mr. Wright (N.E. Division) reports the following interesting developments in industrial research.

The British Research Association for the Woollen and Worsted Industry, having a membership of some 450 firms, was established early in 1919 in connection with the Department of Scientific and Industrial Research. It has already carried out a large amount of useful work at Leeds University and kindred institutions, and it is now about to remove to premises near Bradford where chemical and physical laboratories will be established together with engineering and other workshops. Its aim is to benefit the industry as a whole rather than individual members.

The Glass Research Association with headquarters at Sheffield has come into being more recently. Dr. W. E. S. Turner, head of the Glass Department at Sheffield University, writing recently on the future prospects of the British glass industry, expressed the view that there are three hopeful signs of success: (1) the increased capital now flowing into the industry, (2) the greater interest being taken by British manufacturers in the methods employed in the United States, where engineering has been brought into the industry with results of an astonishing character, and (3) the formation of the Glass Research Association. He also mentions indications that manufacturers are beginning to see the need for employing technical skill in the works for the benefit of the firm itself, and that during the last session they have had at the university a large entry of students intending to take either the Diploma or Degree course in Glass Technology.

Miss Anderson, H.M. Principal Lady Inspector, has contributed the following paragraphs on industrial developments and the state of trade as they affect women.

Any complete summing up of the women's position in industry in 1919 is extraordinarily difficult owing to the presence and working of various contrary currents, favourable and unfavourable, both to the retention of women and extension of their employment in relation to new developments of trade and in some instances to their resettlement in their old industries. These currents have varied in intensity in different parts of the country and in different branches and groups of industries. The variations naturally affect the conclusions of the Inspectors reporting. Most are agreed as to certain outstanding features: (a) that the year must be regarded as a transitional and abnormal year, particularly in the sudden falling away of employment for women in engineering industries, and as substitutes, before large branches of their own work had time to expand; (b) that in spite of all the difficulties that had to be encountered in the turnover from war production to civil production, the strikingly unselfish readiness of the women to yield place, even in the work where they had altogether made good, to the returning men, greatly helped to facilitate the transition. "In peace-time industries, where women had been replacing men on well-paid work, the temptation to remain must have been great and it says much for the . . . women that here too they left cheerfully as the men returned" (Miss Slocock). The change back has been effected with far less effort than was the earlier change from civil to war production, and this is largely an effect of the careful substitution agreements of employers and workers made in so many industries under guidance of the Factory Department (Mr. Jackson); (c) that many younger employers returning from the War have a new outlook as regards need for fresh methods of production and new vision as regards workers', and particularly women workers', needs. As one said to an Inspector, "We have seen the impossible undertaken and accomplished . . . and now we want to carry on here." The Inspector adds, "Out of the materialism of war there has emerged in individuals a wider spirit of toleration which is very wonderful to watch" (Miss Coombes); (d) that friendly as the relations have been in the past between Inspectors and both workers and employers, there is a new eagerness on the part of employers to have frequent visits from the Inspectorate. "I have come across two or three ex-officers starting new ventures expecting an Inspector's visit and willing to co-operate in what must be a new spirit of comradeship" (Miss Gwynne). "Letters from occupiers expressing thanks for instructions and help given are by no means uncommon" (Miss Escreet); (e) that employers are awakening to the need of starting new factories for women's recognised industries in places where employment for women is limited, and instances of hosiery and wholesale clothing factories in new neighbourhoods hitherto lacking women's trades are specially noted; (f) that in the later months of the year the supply of labour for the older industries was growing more normal, as wages rose for learners as well as skilled workers, and better

conditions for welfare were developed ; (g) in certain industries, such as the manufacture of corsets, blouses, shirts and collars and cardboard boxes, which were greatly reduced or almost in abeyance during the War, workers being diverted to war industries, there was an acute shortage of skilled labour, due largely to practical cessation of normal training during war-time. On resuming ordinary peace undertakings in such industries, the tendency has been gradually to make up the deficit by training young workers rather than by intensive training of older women.

In discussing the new spirit found in factories amongst employers which "promises well for the future," Miss Martindale refers to complaints that have been made regarding certain indications of slackness on the part of the women. "That a new spirit amongst the women should not be so clearly definable as amongst the employers is not surprising when one remembers what a profound upheaval in their lives the War has caused. During the War women's powers and capacities were called into full play and no one denies that there was a response beyond all expectation. To-day there is little call to a strenuous and sustained effort, entailing full use of powers and faculties. Instead, interesting work is taken out of their hands, and they are being forced back into the routine of their hitherto normal occupations. Some employers, keen to produce, are not inclined to regard the point of view of the woman employee with much patience, others have grappled with the situation by making efforts to open up new avenues of employment for them" (Miss Martindale).

In a factory employing many young women and girls in new and old processes, most of whom had been munition makers, a capable welfare supervisor observed to me that unquestionably there was at the beginning of 1919 a slackening of energy, due to over-fatigue in the making of munitions and to a mental and physical reaction from the strain of the War. A considerable proportion of the girls had to be sent to convalescent homes to recover health and tone, but by the end of the year returning strength and vitality was noticeable, especially in the girls employed on new lines of work. Here not only were they encouraged to show initiative in suggesting modifications of patterns for the varied articles they were forming in coloured "erinoid," but they were also enabled to attend technical continuation classes and to develop physique by means of drill, dancing and other recreation.

Cotton and woollen textiles, hosiery, boot and shoe, hats and wholesale clothing, stand out amongst all other industries in the demands they have made during 1919, especially in the later months, for women's labour. If more systematic intensive training could have been undertaken in textile factories at the beginning of 1919, of girls of 16 to 20 years, who had in many cases no trade other than munition making, the industries as well as the women would have gained. The shortage of women's labour has been marked throughout the year as the housing difficulty remains, even though improved wages and welfare conditions have removed part of the earlier obstacles to inflow of labour. "One or two large woollen manufacturers have attempted or considered the provision of hostels, but women do not take kindly to hostel life, except perhaps as a war emergency measure" (Miss Slocock). Limitations to the supply of new machinery and shortage of women's labour are severely felt in the Halifax district, and throughout the West Riding there is a shortage of the very necessary burler and mender. In Huddersfield accumulation of pieces due to this cause has resulted in overtime beyond the 48 hours week (Mr. Wright).

As regards cotton, in some districts the number of women in the mills is greater than before the War. "In the Burnley district demobilised men are not returning to weaving, and there is therefore a large increase in the numbers of the women employed" (Miss Andrew). "The whole of the cotton industry is booming. Many firms have orders on hand which will absorb a whole year's production. In the weaving branch there is a shortage of weavers and looms are in consequence idle, yet there is talk of new sheds being built (Mr. Jackson). In the linen textile trades in Scotland, in spite of the great demand, work is hampered by want of flax and shortage of weavers, so that looms are standing in nearly every mill (Miss Meiklejohn).

In wholesale clothing, special training factories organised by the Ministry of Labour in Yorkshire have facilitated the drawing in of much-needed women's labour, and manufacturers are taking the women over when they are trained. In the Manchester district the clothing trades have vacancies for many more workers than they can secure. "In the felt hat trade of Stockport there is a notable dearth of trimmers to whom falls the pleasantest work and the highest wages, so far as women are concerned, in the industry" (Miss C. Smith). "In Leicester the hosiery and boot and shoe trades could absorb several hundred more workers if they could be suitably housed, and the Chamber of Commerce have approached the Municipal Authority in regard to provision of hostels" (Miss Escreet).

Another flourishing industry employing an increased number of women and girls is the gloving industry in Yeovil, where manufacturers are providing special teaching by a woman of experience (Mr. Shaxby).

Several more or less luxury trades are mentioned by Inspectors as affording a field for increased employment of women, e.g., sweets, cigarettes, jewellery. Production on an increased scale in some places and as a new industry in others, gives fresh or extended employment for women or girls in several useful directions: e.g., de-seeding and scutching of flax in South-Western and South-Eastern England (skilled and fairly heavy work), factory dairying in South-Western England, milk products, household hollow-ware making, pencil factories in Cumberland.

The glass industry is one of those into which women entered in a new way as substitutes during the War, and in which they have necessarily continued to a considerable extent throughout 1919 under more or less emergency conditions, owing to shortage of men and particularly to insufficient boy labour, although in Yorkshire use of automatic machinery is changing the trade, apparently not much general progress has yet been made through development of improved methods of manufacture in careful application of women's capacities to branches of the work particularly suited to them, although in the lightest branches of glass-blowing they appear to have done exceedingly well, e.g., in test-tube making. The interesting provision for Glass Research in Sheffield ought to make future progress in this direction possible.

In the Potteries and elsewhere makers of tiles and sanitary ware and other goods for the building trade are very busy. The numbers of women employed in a considerable number of potteries visited by Miss A. Smith were very little less than during the War, when they were working as substitutes for men.

In the skilled dressmaking retail trades there does not appear to be any expectation of return to conditions at all similar to those before the War. There is complaint both of lack of supply of skilled workers and of decreased demand for production. Thus with the rise in wages there is a movement on one side for occupiers to limit the work undertaken to what they can do alone, or on the other towards going into partnership to reduce expenses. Application of electrical power is extending in the larger dressmaking establishments. Milliners' workshops in the old sense have almost disappeared, outside London and a few of the greater cities, the trade being absorbed by the wholesale producer and distributor.

A certain amount of transference of women's work to changed production has occurred in factories engaged on munition work during the War. For example, one national shell factory is used for manufacture of cardboard boxes; aeroplane and other munition factories have turned to motor-car and cycle production, where women are employed on accessories, or to production of sewing machines, or tin box making, where a few women remain as assistant fitters. Two aeroplane factories have been converted to wooden toy manufacture and to watchmaking and small electric instrument making, in which it was hoped that a large number of women might be employed.

Apart from a few scattered examples of this kind, too little thought seems to have been given, by those discharging women, to what might be done in the way of adaptation of work for them or improvisation of training to prevent their unemployment. On the whole the position is simply that "women have almost disappeared from engineering works" and "the women who were employed during the War in metal-working processes in substitution for men have mostly gone. . . . their places so far as still available are filled by demobilised soldiers and youths. . . . The women have all left the heavy iron trades of South Wales, except a few employed as sweepers at a set of blast furnaces. No women are known to remain as drivers of overhead cranes" (Mr. J. H. Rogers).

One of women's special trades, the laundry trade, has gone through a difficult year. In the South-Eastern Division the trade has not shared in the general activity of demand, and it has been difficult for occupiers to obtain sufficient work. The great shortage of women's labour experienced during the War has steadily lessened in 1919. Although conditions have already considerably improved in laundries, much has yet to be done to obviate wasteful organisation which hampers development of comfort, safety and health. "In certain streets there are several very small factory laundries, each with its own boiler and engine, any one of which could probably produce power and hot water for all the laundries in the street, each has its own van, and in each the occupier slaves from early morning till late at night as engineer, stoker, washhouse man and van man. In each the wife is forewoman and sometimes packer, in addition to her household duties, and is far harder worked than any of her women. Co-operation and sub-division of work might be developed with very much less waste of energy and fuel, and one would imagine with much more comfortable lives resulting without reduction of output or income" (Miss



Pearson). In a Yorkshire laundry, women have been substituted by disabled soldiers in collar polishing, starching and packing, as well as in the washhouse, and the manageress expressed satisfaction with results.

Whereas in some cases employers have wisely established new factories for women's trades, clothing, textile, confectionery, etc., in localities where there was a surplus of women either through local lack of their trades or a sudden cessation of war industry, on the other hand an acute shortage of skilled women has, for various reasons, been seen in certain industries and places. A new recognition is growing up and spreading of the vital importance of securing well-distributed balance of the sexes for unhampered, healthy development of industry. In certain places, as Mr. H. J. Wilson points out, this lack of balance has assumed an extreme and serious form.

"In areas," he says, "where women's employment predominated, such as in the textile centres, manufacturers cannot, even by advertising and offering all manner of inducements, secure a sufficiency of female workers. It would actually appear that an adequate number of women does not exist to staff the vacancies, at least not in the localities concerned, and owing to the extreme difficulty of securing lodgings, girls from a distance are not attracted. Manufacturers and municipalities, too, are recognising now that unless there is a reasonable balance in the demand for both men and women in any given locality, the industries in the end suffer from a shortage of one or other, and general development and prosperity are impossible. To compensate for this difficulty hosiery factories have been started in mining and other areas where men are predominantly employed, and conversely shipbuilding has been developed in such centres as Dundee and Londonderry and Alloa, where the bulk of the employment was for women. It is obvious that successive generations of young girls, so necessary in the textile trades, cannot possibly be forthcoming if there is not employment for the fathers of families. Yet this fact was not much recognised in the past, and certain centres, such as Dundee and Hawick, are to-day suffering acutely from lack of young women necessary to keep their plant fully occupied. Industries in the past have grown up somewhat haphazard with a tendency for factories manufacturing the same type of article to concentrate in the same town or locality. There were no objections to this so long as the industries concerned gave approximately equal employment to the two sexes. On the other hand, if the demand for one sex predominated there was difficulty in satisfying it unless workers were brought from a distance by rail or tram. This position is marked at present in the following centres in this Division: Dundee, Dunfermline, Hawick, Galashiels and certain areas in the north of Ireland. On the other hand, in the iron-producing towns there is an unsatisfied demand for men and insufficient local employment for women. Women, however, appear reluctant to leave home and live in lodgings; they prefer local employment, consequently if their services are to be utilised it will be necessary to bring suitable industries to their neighbourhood."

## CHAPTER II.

## SAFETY.

BY

H. J. WILSON, O.B.E., H.M. SUPERINTENDING INSPECTOR OF FACTORIES.

*Accidents—General.*

The year 1919 can hardly be considered a normal one; the industries of the country were to a large extent in course of reconstruction and reorganisation as a result of the change over from War to Peace conditions. In almost every district alterations and additions to premises were in progress, new machinery was being installed, and as a result of consequent disorganisation many departments of individual works were not in full working order for a part of the year. Further, the prolonged strike in the iron founding industry affected not only that trade but many others which were dependent on a regular supply of castings. For these reasons the accident returns, even in specific industries, such as the cotton trade, are hardly comparable with those of pre-War years. There has also been laxity in reporting accidents throughout the country. Enquiry in my own Division has brought to light several pretty glaring cases of this. It is probably due to changes in the clerical staffs following on demobilisation, and the need for instructions from and supervision by the management. My experience in this Division is borne out by that of Mr. Jackson in the North-Western Division, where statistics of cotton accidents were compiled for the nine months April to December. Assuming that the accidents during the first three months of the year were in the same proportion as in the last nine months, the total so arrived at for 1919 compared with the total for the year 1914 (the last year for which these figures are available) shows a falling off of 55·8 per cent. in the number of cases reported. This reduction is not confined to any single department of the trade, but is spread, almost equally, over all branches of it and over every class of machinery. An effort was made to ascertain the true facts and whether these figures actually represented a diminution of accidents or not. Mr. Hird, the District Inspector at Bolton, who had charge of the compilation of these returns, made very careful enquiries. At first he thought that there might be a reduction in the number of persons employed, but enquiry of the Federation of Master Cotton Spinners pointed to there being an increase and not a decrease in the number of workers, in spinning at all events. The next point he considered was whether the reduced working hours (from 55½ to 48 per week) was the cause, but a careful scrutiny of the reports showed that on comparing the weekly average of cases reported when the mills were on 55½ hours with that for the 48-hour week, there was an increase during the latter period. Mr. Hird therefore comes to the conclusion that the decrease is primarily due to laxity in reporting and that when the normal office staffs have returned, this neglect will cease with a consequent increase in the number of cases reported. Mr. Jackson endorses this view. He had special enquiries made in certain mills, with results that showed serious irregularities in not reporting accidents in several cases. Other Inspectors have found a similar state of things in different parts of the country, and the conclusion must, I think, be drawn that the apparent decrease is one of reporting and cannot be accepted as a diminution in the accidents which have occurred.

As a preliminary to accident prevention it has been found essential to have a careful analysis made of all accidents occurring in a particular industry and so classified as to bring into prominence not only the machines which cause the majority of casualties, but the respective parts of these machines. When this has been accomplished, provided a sufficient total of accidents has been analysed, Inspectors are in a position to concentrate attention on the machines or parts thereof which prove to be the most productive of accidents. Such an analysis, made by Mr. Jackson, of accidents in rubber works in his Division, is appended:—



Accidents in Rubber Works (including Rubber Recovery and Rubber Garment Works).	Number of Accidents Reported.	
	Three years, 1916-17-18.	One year, 1919.
1. Prime movers ... ..	1	1
2. Transmission machinery ... ..	9 (1)	6
3. Hoists and (power) lifting tackle ... ..	9	2
Hoists ... ..	4	1
Other tackle (including overhead cranes) ... ..	5	1
4. Rubber grinding machines ... ..	6	2
5. Washing machines ... ..	11	—
6. Masticating machines ... ..	2	—
7. Rubber rolls ... ..	53	12
Mixing rolls ... ..	39	9
Doubling rolls ... ..	6	1
Warming-up rolls ... ..	8	2
8. Wet mixing machines ... ..	7	1
9. Calenders... ..	19	10
10. Vulcanizing machinery... ..	8	1
11. Tube making machinery ... ..	4	1
12. Spreading machines ... ..	12	3
13. Stamping and cutting machinery ... ..	41	19
Power presses ... ..	6	2
" punches ... ..	18	12
Hydraulic presses ... ..	4	—
Guillotines ... ..	6	1
Band knife ... ..	3	1
Other ... ..	4	3
14. Cable making and covering machinery ... ..	27	4
Wire winding ... ..	7	—
Stranding ... ..	6	—
Rubber lapping ... ..	1	1
Tape lapping ... ..	8	1
Braiding machines ... ..	3	2
Wax covering machines ... ..	1	—
Finishing machines ... ..	1	—
15. Other "rubber" machinery unclassified ... ..	5	8
16. Other machinery, not rubber... ..	15 (1)	14
Sewing machines ... ..	3	9
Box stitching... ..	4	—
Not classified... ..	8(1)	5
17. Works maintenance department ... ..	17	6
Lathes... ..	2	1
Drills ... ..	2	—
Screwing machines ... ..	1	—
Grindstones and emery wheels ... ..	4	1
Circular saws... ..	3	1
Other machines ... ..	5	3
18. Hot liquid, molten metal ... ..	21	4
19. Explosion, back draught from boilers ... ..	2	2
20. Electric shock ... ..	3	1
Total machinery, &c., accidents ... ..	272 (2)	97
*Non-machinery accidents ... ..	388 (2)	174 (2)
	660 (4)	271 (2)

\* Including 42 cases of septic poisoning in the three years 1916-18, and 22 cases in 1919. Figures in brackets, thus (2) indicate fatal cases, which are included in the totals.

Mr. Wright, following the proposal agreed upon at a conference of employers, employees, and Inspectors in July, 1914, has had all the accidents for 1919 in the woollen and worsted mills in the North-Eastern Division tabulated. As his Division comprises the vast majority of the woollen and worsted factories in the country the figures can be taken as absolutely representative of the conditions in the industries named. The tables are too long to publish but the following is the summarised result: In the woollen industry there was a total of 1,087, and in the worsted 856 accidents. Cleaning machinery in motion was responsible for 140 cases in woollen and 85 in worsted factories. Hoists were answerable for 54 accidents, of which 5 were fatal. Nine accidents were due to mill gearing, three being fatal. In weaving, woollen looms caused 29 flying shuttle accidents, only 7 of which were due to want of guards. On worsted looms 22 shuttle accidents occurred, 2 only on looms without

shuttle guards. Other machinery accidents, although considerable in the aggregate, are few so far as they refer to individual parts of the various machines, and call for no special comment. Of the total accidents in the combined woollen and worsted industries, namely, 1,943, no fewer than 903 were due to other causes than machinery in motion, such for instance as scalds and explosions.

In the Northern Division an analysis was made of all crane and winch accidents reported over a period of two years in the Glasgow and Lanarkshire districts, and the results are detailed under the heading of cranes, dealt with later in this section.

The keeping of detailed records of machinery accidents in cotton mills, Mr. Jackson (North-Eastern Division) states, had to be discontinued during the War, and was only resumed at the end of March, 1919, and as they are for nine months only they are not given in detail. Commenting on accidents caused by scutchers in cotton mills, Mr. Jackson emphasises the fact that such cases should not occur, as practically all these machines are provided with locking mechanism for the beater covers, but that workmen tamper with the locking motions. As a warning to others a workman was prosecuted for making one of these locks inoperative. He himself was seriously injured, and after the accident the studs of the locking motion were found in the pocket of the coat he was wearing. The same remarks apply to card-locks, which are frequently put out of operation by workers. During the nine months covered by the records serious accidents occurred owing to the locking mechanism being out of order, and prosecution and conviction followed in each case, in one instance the firm being fined £100. Dealing with speed frames and draw frames Mr. Jackson reports :—

“The percentage of accidents due to cleaning these machines in motion is higher than on any other class of cotton machinery, being roughly 50 per cent. of the reported cases as against 10 per cent. on mules and 17 per cent. on ring spinning frames. If this cleaning were stopped the accidents on this type of machinery would be insignificant.”

A reduction in tin roller accidents on ring spinning frames is noted, and the fact that during the past ten years there have been no accidents with these rollers where they have been properly guarded in the North-Western Division speaks for itself. Out of 372 machinery accidents on looms, 89, or 24 per cent., were due to flying shuttles. Were such mishaps and those caused by picking sticks eliminated, accidents on cotton looms would be few in number. In the Burnley district, where there are over 210,000 looms at work, the average number of accidents occurring on looms seldom exceeds three or four per week.

Several Inspectors comment on the old evil of cleaning machinery in motion still being a prolific source of accidents. In the cotton trade the percentage arising from this cause is certainly high, but where the cleaning is done by experienced and careful persons the risks are much reduced. In one mill in Burnley it has been the system for some years to employ certain men for this purpose and other light labouring work. The results have been satisfactory, accidents being reduced. The District Inspector states that the same system is being adopted in certain mills in Nelson and is working well. This arrangement if adopted throughout the trade may prove to be a possible solution of a problem of long standing.

Mr. Rogers (South-Western Division) has prepared a return showing the result of investigation of 812 accidents, the return covering 23 per cent. of all fatal and one day accidents, and just under  $\frac{1}{2}$  per cent. of the 7 day class. In the former group 301 out of 774 investigated disclosed no defect of plant or machinery, 200 were apparently the result of breach in some respect of Section 10 of the Act or Regulations, and 148 were due to other presumably preventable causes.

#### *Accident Prevention.*

Several Inspectors draw attention to the number of accidents which result from some defect in plant or error in design of machines, such as absence of loose pulleys, striking gear, belt hooks for overhead shafting and defectively-arranged starting levers. Where the latter are liable to be accidentally moved the results may be very serious, and many workers, while engaged in cleaning, adjusting or repairing machines, have been trapped and seriously injured in this way. To prevent such accidents the starting lever should have a secure catch, making accidental movement impossible. Mr. Shinner (Bristol) draws attention to accidents which are rendered more serious by the absence of arrangements for immediately stopping machinery. Through the increased adoption of electrical energy electrical stop motions can now be fitted without difficulty and the power cut off instantaneously in case of accident. In the iron and steel industry Mr. John Law (Sheffield) describes a fatal accident to a workman due to his being pulled through the

couplings of a train of rolls in an iron mill, a not uncommon type of accident, which led to a conference with the Steel and Iron Rolling Mill Employers' Association regarding the adoption of a thoroughly safe type of fencing for such appliances, and he states that there is every prospect of this very necessary safeguarding being carried out by all members of the association in an efficient manner at an early date. Mr. Bennett (Stockton) has noticed that accidents are more common to men recently returned from the colours than others, and he attributes this to their having forgotten the precautions necessary to avoid industrial casualty. Dealing with the same subject Mr. Bremner Davis (Kent) remarks:—

“ Many had hoped the large number of men returning from the forces would bring with them a sense of discipline and order which would tend to make them use guards and observe precautions much more carefully than the average man who had not their experiences. Unfortunately this effect is much less marked than might have been expected.”

It has been found, however, that a proportion of returned soldiers are cleaner and tidier in their persons and in their work than they formerly were, more self-respecting in fact, so that the army influences have not all been lost.

Eliminating all accidents which could reasonably be attributed to absence of fencing there remain a vast number which no known safeguards could obviate; their prevention lies rather in the training and education of the worker. This aspect of the question has been given special attention in the Northern Division; severe accidents to boys and girls of 14 or 15 years of age have been followed up, and it has frequently been found that the youthful worker was totally unaware of the danger he or she was exposed to.

In certain cases the young person had only been in employment for a few weeks or less and was naturally ignorant and inexperienced. The excuse in such cases that the worker was careless is irrelevant, as indiscretion at that age must be assumed as natural, and, moreover, it is seldom proved that there has been wilful carelessness. For a worker to be handicapped at the outset of industrial life by the loss of a limb is not only a very serious matter for the victim, but a loss to the community, and even if there were carelessness the punishment is out of all proportion to the offence committed. Occupiers who take into their employment very youthful and quite inexperienced workers incur a special obligation to see that due care is taken that they are educated and warned as to the hazards of their occupation. Striking examples are quoted from shipbuilding yards where boys fresh from school, with no previous experience of working at heights, have been set to work on staging 30 or 40 feet from the ground and have fallen, usually with serious consequences. Investigation failed to elicit any evidence that these lads were properly instructed and warned of the risks associated with the industry. During the last year no fewer than 46 boys, ranging from 14 to 16 years of age, fell from heights in the Clyde shipyards alone, and in four cases the injuries proved fatal. The Inspectors consider, as the result of long experience, that it would be advantageous to prohibit the employment of boys under 16 on ships under construction, the dangers being too great for such immature youths lacking, as they do, the discretion of older workers.

Mr. Williams (South-Eastern Division) is impressed with the growing desire to assist the Factory Department in its efforts to secure a higher standard of fencing in factories, and there is confirmation of this view from widely different industries and various parts of the country. Employers, Mr. Williams finds, frequently invite Inspectors to advise them on the point, insurance associations show increased activity in insisting upon safeguards, while in some works special safety committees have been set up. The following instance may be quoted, Mr. Turner (West London):—

“ Quite recently a large firm, where the fencing and guarding of machines is of a fairly good order, wrote stating that they desired that their machinery should be as well-fenced and safeguarded as possible, and to this end desired to discuss the matter fully, and wished also to see, if possible, any specially well protected machinery in any other factories so that they could bring their own machinery up to the highest standard of safety.”

Mr. Johnston (North-East London) states that certain insurance companies refuse to insure against accidents till they are satisfied that H.M. Inspector's requirements have been fully complied with. Mr. Clark (West London) dealing with the same subject, points out that where accident insurance is done on a mutual basis in a well-defined class of industry, a useful opportunity exists for employers to become aware of the main factors in the causation of accidents and to take measures accordingly. Further, they can exercise pressure on others in the same trade who are the cause of undue expenditure in the shape of claims owing to obsolete or inefficient safeguards. Mr. Clark states that such an organisation exists in an important centre of the furniture trade in his district, and, as

an instance of the improvement made in safeguarding wood working machinery, mentions that it is now exceptional to find centre surface planing machines with other than circular cutter blocks. This, together with other improvements, has been of material benefit in preventing serious accidents.

### *Safety Committees.*

The experience of several British and American firms shows that apart from legal requirements, reduction of accidents can only be secured by gaining the interest and co-operation of operatives and officials through safety committees; but considering that the idea has been before the manufacturing community for several years it is somewhat disappointing to find that the setting up of such committees proceeds rather slowly. Although there are conspicuous exceptions—usually large, well organised firms—the idea of the safety committee has not met with by any means unanimous favour. This doubtful attitude is reflected in the reports of many Inspectors and seems to be rather general throughout the country. Mr. Brothers (Warrington) says:—

“Safety committees are not at present much in favour with employers owing partly to the reluctance to add to the number of committees of one kind or another, and the workers are not keen on joining these somewhat irresponsible bodies when they aim rather at a share in the control or conduct of the business itself.”

Mr. Jackson (North-Western Division) regrets the lack of progress in setting up these committees, and adds that while the value of them is fully appreciated by our staff, it is not so by employers. Shop committees, he states, exist in various trades for securing the observance of trade union rules, and in one or two cases they have taken up the question of fencing and safety, but it is only one item amongst many others and does not get the attention it deserves. The reports of the Inspectors in the North-Eastern Division show that very little has been done in that area. Mr. Lauder (Newcastle-on-Tyne) is disappointed with the result of his efforts in his district. He says that although a few safety committees have been appointed, he does not think they are imbued with the proper spirit and determined by every means in their power to reduce the number of accidents occurring in the factories. Mere methods of routine and periodic walks over the works will not effect the object desired. In one works he heard a workman refer to the safety committee as the “Whitewash Committee,” apparently under the impression that its sole object was to safeguard the firm against any blame arising out of an accident. This attitude is very regrettable, but fortunately there is growing evidence that committees, where properly constituted and seriously interested in their functions, can produce surprisingly good results.

One very large firm in Birmingham has set an example of high ideals in this direction. The firm employs something like 14,000 hands, and the principals realised that the effective co-operation of their workers was essential if the number of accidents occurring in their large works was to be substantially reduced. Safety committees were therefore formed to the number of six, each committee being composed of ten workers elected annually by their fellows in the department represented, and four members of the management. Meetings are held monthly, and the chair is taken by an additional member representing the firm—either the welfare manager or the works manager. All accidents occurring during the preceding month are discussed, and recommendations made with a view to removing any danger which exists. If necessary the committee visit the scene of the accident and obtain evidence from the person injured or any available witness. The recommendations made by the committee are duly laid before the management, and they are always carried out. Further, every inducement is offered to the workers to make suggestions for securing greater safety. The committee meetings are held during the working hours, and the members are paid for the time spent on committee attendance. The findings of the committee are recorded in a gazette published by the firm and distributed gratis to every employee. The management are of opinion that there will be a considerable saving in labour changes and lost time due to accidents from the action taken, but no figures are yet available for comparative purposes. They also think that much better results are achieved by the thorough discussion in committee of accident causation than by the individual efforts of a safety officer. One of the main objects aimed at is to make the worker think of his safety.

In a large iron and steel works in the Cardiff district Mr. T. O. Edwards reports that a committee has been formed in every department, consisting of (a) the manager and foreman representing the management, and (b) two men elected by the workers for a term of six months. The first workman representative retires at the end of the first three months, so that the subsequent elections will occur every three months. Three officials

including the boys' welfare supervisor, have been appointed to act as safety inspectors, and also to be members of the joint committee of the whole works, which consists of representatives from the various departments. These officials devote an appreciable amount of time to the work, and survey the works periodically. The committee is purely for safety purposes, and consists of men from each department, amounting altogether to about 80.

Mr. Buchan (Liverpool) dealing with the valuable work being done by the safety committee in a large factory in his district, observes correctly that no great diminution of accidents can be looked for until both employers and workers become fully alive to the ever-present possibility of accidents. That this attitude of mind can be created, and that many accidents of all kinds can be prevented, is substantially proved by the following figures from the works he refers to; where an active safety committee has existed for some years.

Year.	Number of Accidents.	Percentage of Total Employees.
1916... ..	201	3.67
1917... ..	101	1.59
1918... ..	88	1.49
1919... ..	83	1.13

The value of the work done by this committee will be seen from the following details. Their percentage of accidents to persons employed in 1909 was 1.79; the committee was then in being, but during the War it had to be discontinued owing to shortage of staff. There was no committee in 1916 (when the percentage, as will be seen, rose to 3.67), but it was re-established in 1917, and the accident returns for that year and the following amply justify its existence.

Mr. Seal (Manchester) reports that several committees have been established in his district, but refers to a difficulty which arose in the dyeing and finishing trades where the operatives' associations, misunderstanding the objects and functions of these committees, objected to them being set up. These objections have, however, been overcome, and the committees which had been disbanded have been reformed. The appointment of safety committees is also reported from Preston, Wigan, Stockport, Sheffield, and Derby and London. Mr. Roos (South-West London) describes a safety committee appointed for a paper box factory employing over 1,000 operatives, and another in a soap and candle manufactory. Mr. Butler (East London) reports that a works committee in the match trade has punished with dismissal several workers who failed to observe precautions against accident. He also refers to the appointment of a safety officer by a firm controlling nine separate ship repairing yards in the Port of London. The appointment has been held for twelve months, and the officer finds himself a busy man. Although it is rather early to expect definite decrease of accidents due to this appointment the firm had nevertheless 46 fewer claims under the Workmen's Compensation Act in 1919 than in the previous year, notwithstanding that the number of employees in the various establishments had been increased by almost 500. A very similar appointment has been made in Port Glasgow by a firm controlling several large shipyards, but in this case the officer directs his attention almost exclusively to the safety of men engaged on ships on the stocks, and is not concerned with the machinery in the various shops. The duties, however, in this particular work alone are very onerous as the vast majority of accidents arise in the actual building of the vessels and not in the machine and boiler shops.

A number of the staff refer to the appointment of safety inspectors and heartily approve of the arrangement, as it is obvious that periodical visits by members of the Factory Department can never have the same effect as the daily and hourly supervision of a works official whose activities are entirely concentrated on the prevention of casualties. Mr. Cook (Coventry) reports the appointment of two safety inspectors in large works in that district, and all accidents, however trivial, are reported to them, full powers being granted to take such action as they consider necessary. He adds that the reports on accidents sent by them to the District Inspector contain much very useful information in addition to what is usually given on the official form. They also welcome the visits of the Factory Inspectors, and seek their assistance and advice in matters of difficulty. Mr. Hird (Bolton) succinctly sums up the advantages of safety inspectors. He says:—

“ I have not the slightest hesitation in saying that without some proper method of ensuring supervision, such as by a safety inspector, and some propaganda to cultivate the safety sense in the workers, much of the work already done will be wasted. The works manager is mainly concerned with production, and cannot give the time necessary to safety; the workpeople are also chiefly concerned with production and do not sufficiently realise danger. So that the need for safety inspectors to advise the manager on the one hand, and to instruct the workpeople on the other, is a real one in every large factory. The matter has its economic as well as its human side. I suggest that this is work which could well be done by a smart ex-soldier acquainted with the particular trade, but disabled from following his proper occupation, and that the wages of such a man would, in the long run, be well repaid by the results achieved.”

#### *Works Committees,*

Works Committees as distinguished from purely safety committees, have been set up in various parts of the country. The functions of these committees vary considerably, and they deal with a wide variety of subjects affecting the general welfare of the workers, such as the settling of local troubles, arranging systems of apprenticeship at reasonable wages, regulation of out-workers' hours of work, heating and lighting of workrooms, time-keeping, holidays, bonuses and rates of pay for piecework, education, recreation and canteens. Inspectors who have given special attention to the working of these committees all agree that their influence has been excellent in abolishing friction, in bringing the management and the operatives into closer touch, and in securing a happier and more human relationship between the employer and the employee. Those who have studied labour conditions have observed in the past that there was frequently a regrettable gulf between the employer and his manager and foreman on the one hand, and the rank and file of the workers on the other, and no satisfactory bridge existed to enable them to meet and discuss judiciously trouble which inevitably arose from time to time in the ordinary work of the factory. In the writer's experience several labour disputes which led to serious dislocation of industry originally arose from some comparatively trifling matter which, could it have been immediately dealt with by a works committee of reasonable men representing both management and workers, might have been checked at the outset. A satisfactory works committee affords a medium whereby contending parties may be brought together and suspicion and misunderstanding cleared away at once before it has grown to unmanageable dimensions. Mr. Bennett (Stockton) describes one such committee which has been set up in connection with a large iron works in his district, the success of which appears to be largely attributable to the personality of the manager. There is a main works council, with various committees delegated from its members. Separate committees deal with the following matters: safety, education, recreation, housing and canteen. The main works council is constituted by three representatives from each trade union having members amongst the workmen, with three deputies to attend in the event of the principal members being absent, together with the managers of the principal departments and a few officials who are interested in welfare work. The object of the works council is limited to enquiries into any matters affecting the welfare of the workers outside all question of wages or management. All decisions are made by a majority vote and on the works council, and on all committees the workmen's representatives are greatly in the majority. On the works council is also co-opted a representative from the local Sailors' and Soldiers' Association, and trade union organisers are "ex officio" members of the council. The main council met at first on one evening per week, but as it has become thoroughly established it has been proposed to meet once a fortnight only. Each sub-committee reports to each main council meeting on its operation since the previous meeting. The decisions of the main council are put forward as recommendations to the general manager and managing director. The local representative of the Sailors' and Soldiers' Association succeeded in getting established by the firm a cobblers' shop for all sailors and soldiers formerly employed by the firm but now incapable of following an arduous occupation. This scheme was formed with a view to supplying boots to the workmen at approximately cost price. The chairman of the safety committee is the Chief Engineer of the works, with the Chief Electrical Engineer as an additional member, so as to have the advantage of his experience in electrical matters. The A.S.E. district delegate is, as indicated, an "ex officio" member of this committee. The committee not only considers accidents or dangerous occurrences which have occurred, but also makes tours of the works with a view to the prevention of accidents. The committee sits between 2 p.m. and 3 p.m. one day per week, this hour being fixed as the men from two shifts can be present as members or witnesses when necessary. An important



feature of this committee is that the men are encouraged to make suggestions in connection with improvements relating to any part of the works either with a view to rendering any operation safer or to increasing output. Workmen who have put forward successful ideas have been generously rewarded by the firm, and have been helped to patent any useful inventions and to place them on the market. This committee has been in operation since 1918, and its secretary states that the reduction in accidents for the year 1919 was approximately 27 per cent. as compared with the average for the preceding five years.

#### *Transmission Machinery.*

The reports of the Inspectors on this subject show little variation from those contributed in former years. The same type of accidents due to revolving shafting continue to occur to workers who approach a rotating shaft for the purpose it may be of oiling, shipping a belt on a pulley, executing some trifling repair in the vicinity which hardly seems to justify the stoppage of the shafting, or for the purpose of whitewashing or painting, in general to perform some small duty presumed to occupy only a few minutes. It is the brevity of the time to be spent in the neighbourhood of danger which partly accounts for the risks which workers will persistently run. Believing all men mortal but themselves, to save trouble and a little time in having the shafting stopped, they enter the danger zone and, if their clothing laps round the shaft, escape without fatal or very serious injuries is exceedingly rare. The dangers of even smooth rotating shafts one would imagine had been demonstrated sufficiently often to impress the industrial public, but it is evidently not so; responsible men such as foremen and managers who have never had experience of a shafting accident, are often sceptical of the dangers, the bare smooth shaft looks so harmless. To quote an instance of ignorance of danger on the part of a responsible person, an Inspector on visiting for the first time a new country saw mill noticed that unprotected shafting had been carried across the main department at a height of 18 inches from the floor. When he entered the building he was horrified to see the manager conducting a party of ladies over the premises, and they each in turn stepped over the rapidly revolving shaft, apparently in entire ignorance of the risks they were running. As further supporting the above statement, another authentic case may be quoted. The manager of a small flour mill, whose attention was directed by an Inspector to the grave danger of an unprotected shaft protruding through a wall into a passage way and about three feet from the floor, contended that there was no danger with a smooth shaft and proceeded to lean against it. The Inspector, while warning him of his danger, remarked that a tight coat such as he was wearing was certainly safer than anything loose which might lap, at which the manager, to show his incredulity of risk from what he considered a perfectly harmless shaft, doubled the tail of his white overall coat round the shaft before the Inspector could prevent him. The coat instantly caught, dragged the manager sharply against the shaft, pinned him there for a minute, then fortunately the coat tore and he was able to pull himself free, a pale and very scared man, with presumably an increased respect for the Inspector. This was a sharp lesson and one not likely to be forgotten, but it is difficult, apparently, for anyone who has not actually seen or had authentic evidence of a shafting accident to realise how serious the risks are; moreover, of all industrial casualties, these are perhaps the most harrowing in character; the victim's limbs are frequently torn off, and the head and trunk often fearfully mangled.

So affected and impressed was the occupier of one thread spinning mill in Scotland after a fatal accident of this character, which a number of horrified fellow workers witnessed, that he caused the whole of the overhead shafting in his three mills to be completely encased. There is not now a foot of shafting nor a coupling throughout these extensive mills but is protected by steel tubing hung from the ceiling, and every pulley has a belt hook or perch. Mr. Owner (Plymouth) describes a somewhat similar case. A workman who was about to lubricate a 2 inch shaft just over 6 feet from the floor, was standing on a raised plank of wood in order to reach the lubricator when the neck of his cardigan jacket was caught by the shafting and he was whirled round it and killed. After the accident practically the whole of the shafting in the works was fenced with paper tubing. It is conjectured in this case that the clothing probably first became entangled in a sticky mass of tallow on the shaft. Proceedings were instituted against the firm and a fine of £20 inflicted. Two cases are referred to by Mr. H. R. Rogers (Leicester). In the first the shaft was almost nine feet above the floor, but was over a bench in front of a row of windows. A woman, contrary to instructions, climbed on to the bench to draw down a blind which had stuck. Her hair was caught on the shaft, and she was so seriously injured that she ultimately died. Shafting running over benches or platforms is particularly dangerous as, although well above reach from the floor, it may easily be approached by unauthorised and inexperienced persons by mounting the bench. In the second case a shaft end pro-

jected through a wall at the height of about 8 feet above the floor, but at the time of the accident some loads of coal had been shot on the ground immediately underneath it. A workman, intending to do some repairs, climbed up on the coal in order to reach the roof, was caught by the shaft and received fatal injuries.

These examples could be multiplied greatly; such accidents occur every year and in practically every district, and much education of not only the workers but foreman and other officials, as well as improvement in fencing will be necessary before a substantial decrease of casualties can be expected. To assist in propaganda work and enlighten manufacturers and workpeople as to the ever present danger of shafting and mill gearing, a pamphlet on *Fencing and Safety Precautions for Transmission Machinery in Factories* has been prepared by the Home Office and is being widely distributed.

#### *Cranes.*

In order that some definite light could be thrown on crane accidents the whole of the reported cases from the Lanarkshire and Glasgow Districts for the years 1911 and 1918 were carefully analysed and classified. The two districts named contain the major proportion of cranes existing in the Division, and also have a good representation of every type of crane usually found in industry. Cranes, unlike most other machines or appliances, are met with in practically all industries of importance, other than those in which the material handled is relatively small or light. They are, however, predominant in iron and steel rolling mills, in marine, structural and general engineering, in boiler making, shipbuilding yards, foundries and docks, and it is in these industries that accidents are naturally most common.

Accidents reported in 1918 in the two districts named, were distributed as follows:—

Engineering Works	..	..	..	..	..	127
Foundries .. ..	..	..	..	..	..	32
Shipbuilding Yards	..	..	..	..	..	44
Docks .. ..	..	..	..	..	..	80
Constructional Works	..	..	..	..	..	41
Iron and Steel Works	..	..	..	..	..	156
Tube Works .. ..	..	..	..	..	..	16
Other Industries	..	..	..	..	..	63
Total .. ..						559 (including 25 fatal)

The total reported for 1911 was 449, including 12 fatal, and in 1918, as shown above. Of these, more than half could be classified as slight, the remainder were more or less serious in character, involving fracture of bones, severe lacerations, or crushing of some part of the body.

The distribution of accidents among different types of cranes was as follows:—

1911	1918	
193	254	In connection with overhead cranes.
215	232	In connection with jib cranes.
41	35	In connection with winches.
—	38	Type of crane indefinite.

Of the total persons injured in 1918, 474 were adult males, 52 male young persons, and 33 were women. The latter figure is likely to diminish or disappear as women are seldom employed now in connection with cranes, although they proved careful and reliable as drivers during the War.

By far the largest proportion of crane accidents, actually 387 out of 559, arises from the handling of the load, and such cases might be designated "slingers' accidents." These include crushes between load and ground, or load and fixed structure, between sling and load or sling and hook, by load or part of it falling, by failure of sling, slipping of sling, etc. Although many of them are slight in character, nevertheless slingers' accidents accounted for 12 fatalities in 1918.

Accidents which have the most serious consequences arise chiefly from collapse of structure of crane, overturning of crane, falling of jib, and those which are due to persons being crushed between fixed structures such as pillars and overhead travelling cranes. The latter are few in number, about 15 per annum in the two districts, but they are usually either fatal or very serious, and many attempts have been made to prevent them. Another type of accident, fortunately rare, and usually confined to steel works, arises through workmen being caught between the back balance weights of portable cranes when slewing, and



the bogie which, relative to the slewing part, is a fixed structure. Only six accidents occurred in this way in the two years covered by the enquiry, but as illustrating their seriousness, four prove fatal.

Analysis of crane accidents proves conclusively that many repeat themselves, and therefore can be assumed with certainty to occur again. Such types of accidents can, however, to some extent, when the danger is definitely recognised, be guarded against. Except with hand cranes few accidents are due to lack of fencing; prevention lies rather in the education of the worker and observance of certain rules framed to safeguard the inexperienced and careless.

The experience of Mr. John Law (Sheffield) who has a very large number of cranes of various types in his district, corresponds almost exactly with that of the Inspectors in Glasgow. He describes four fatal accidents on overhead cranes, all due to crushing between the crane carriage and roof uprights. In spite of more or less elaborate codes of rules relative to work in the vicinity of crane tracks while the appliances are at work, they appear to fail in some observance or other to prevent accidents which are almost invariably very serious. Floor and locomotive cranes, Mr. Law states, though more numerous than overhead ones, are responsible for fewer accidents, notwithstanding the ground they traverse over being constantly crossed by innumerable workers. They are, however, slower in movement and whistles, gongs, and other sound signals, as well as shunters, are employed to minimise or prevent any risk. Above all, each is controlled by a driver who, aware that workers are legitimately moving about on the railway tracks he is traversing, is constantly on the look-out. It is different entirely with the overhead crane driver: he must keep his eye on the shop below, watching carefully the path of the load he is carrying and noting the signals of the slinger directing him from the floor. Further, he cannot always see clearly the wide apart wheel tracks of his own crane, and knowing persons are not likely to be on the overhead rails, assumes the way is clear. It is thus workmen are caught. They only intend to be a few minutes in the vicinity of the rails: they take the risk and are caught by the silent and swift-moving crane. It is hoped, however, that some solution will be found for this difficulty; both members of the staff and builders of cranes are giving the subject close attention.

In addition to overhead crane rail casualties Mr. Wright (North-Eastern Division) comments on accidents due to overwinding and electrical accidents to persons doing repairs or painting in the vicinity of overhead trolley wires. Mr. Jones has had experience of a number of accidents due to unfenced cog wheels of hand cranes in the Bradford district, and other Inspectors mention cases of injury due to the rotating handles of the same make of crane. This is a very old type of accident, and is usually due to the dangerous practice of lowering the loads by the handles alone without using a brake. If the load takes control the handle is jerked out of the operative's hand, and if he fails to jump clear instantly he may be violently struck with the free revolving handle.

Mr. Walmsley (Midland Division) reports that the employment of women as crane drivers has been entirely discontinued in the Birmingham and Coventry Districts, as is the case largely throughout the country, and their places taken mainly by men returned from the Army. He states, however, that they are still employed in the New Holland Docks in Lincolnshire, and appear to give satisfaction to their employers.

### *Hoists.*

The remarks on this subject have been contributed by Mr. Jackson, H.M. Superintending Inspector, North-Western Division:—Statistics of hoist accidents for 1919 are available only for one Division, not for the whole of the country. These figures show a marked fall in the number of cases, both fatal and non-fatal, viz., from 195 (22 fatal) in 1918, to 145 (15 fatal) in 1919. It would be unwise to draw too definite conclusions from these figures, which cover a limited area for a period of two years, but an examination of them shows that the accidents to adult males during the period is practically constant and that the reduction is confined to cases of children, young persons and women. This is due probably to recovery from War conditions when, owing to the absence of the regular attendant, the hoist was used indiscriminately by all classes of workers or was put in the charge of a young or incompetent person. Many of the accidents to children and young persons reported in 1918 were caused by them interfering with the hoists, contrary to the rules of the works. In one case a child, eight years of age, was killed when he was taking his father's dinner to the mill, while no one was about he used the hoist to ascend to the room where his father worked and, when leaning over the cage to call to a brother, he was crushed between the cage floor and a door lintel.

The majority of hoist accidents are caused by (1) crushes between the tops of doors and the floor of the ascending cage; (2) crushes between the descending cage and the floor

of the room ; (3) crushes between the gate and the fencing of the well ; (4) falls through getting in or out of the cage while it is in motion, and (5) by catching on projections in the hoist well. The last item is the easiest to remedy as such projections can be made flush or bevelled off. The other four items would be much reduced, if not entirely eliminated, by the adoption of the recommendations made in the recently published Safety Pamphlet on the protection of hoists, viz., that every hoist should be so constructed (a) that the door cannot be opened until the cage is at rest opposite the floor of the landing, and (b) that the cage cannot be moved away until the door is closed and fastened. If, in addition, on the cage itself an interlocking door or gate were fitted, accidents due to causes named above should not be possible.

There has been a great improvement in recent years in the provision of automatic locking motions or hoist doors, but, like any other locking mechanism, they require attention if they are to be kept in proper working order. Mr. Jones (Bradford) refers to this and finds that the locks are frequently rendered inoperative by accumulations of dirt or rust, and for want of proper lubrication. He also points out that when a hoist is being installed proper consideration is not given to its suitability for the particular class of work for which it is intended, i.e., a hoist which would be suitable for a clothing factory may be quite unsuitable for the rougher work in a dye works. In the Huddersfield district Mr. Peacock reports on a fatal accident to a man by electric shock. The hoist was electrically controlled, but the wall plugs had become loose and the descending cage fractured the lock casing and detached the metal conduit carrying the electric cable, with the result that the gate became "alive" and a man received a shock when trying to open it. Both Mr. Peacock and other inspectors refer to defects in lock mechanism by their being so placed that the lock can be put out of action from outside the well. Locks of that description are not a safeguard but a source of danger.

The practice of suspending cages with a single rope apparently still obtains in some districts. Mr. Younger (Halifax) reports that, in his district, two cages suspended in this way have fallen in recent years, one with a fatal result. The periodical examination of suspension ropes and chains is of the greatest importance. Mr. Dunolly (Southampton) reports :—

"At inspections it has been found difficult to obtain reliable information as to the exact dates of examinations, if any, of hoist ropes, and inspections of the overhead gearing and pulleys. The maximum safe load for the cages is seldom specified, and where these are suspended and worked by wire rope it is difficult to arrive, by calculation, at the safe load for the cage. The safe loads of lifting chains can be calculated with some accuracy, because steels of high tensile stress cannot be welded into chain links and are not often used, and the maximum tensile stress can therefore be reckoned as that of ordinary mild steel ; but steel of very high tensile stress can be made into wire and into wire ropes, so that a comparatively small diameter steel rope can safely carry extraordinary large loads with perfect safety. The maximum safe load of a hoist should therefore be clearly indicated, especially as danger of failure may arise from slipping of the suspending ropes on the driving pulleys, and not from breakage. In one known case girls crowded into a hoist cage at the mealtime, so overloading the hoist that the cage slipped at great speed to the basement, giving them a very severe shaking."

Mr. Thomas (Walsall) also deals with this question in a report on a fatal accident at a cupola hoist in a foundry. He says :—

"The cage was connected from the four top corners by means of chains to a central ring to which the hoist rope was attached. The chains were not detachable and, in consequence, had never been taken off for examination or annealing. Two of the chains broke, allowing the cage to fall ; the breakage was undoubtedly due to crystallization, which would probably have been prevented by periodical examination. The hoist makers have now promised to make such chains detachable."

#### *Power Presses.*

Mr. Walmsley, H.M. Superintending Inspector, Midland Division, contributes the following :—

"There can be little doubt that scarcely any other kind of machinery is responsible for so many accidents as power presses, and certainly none has been more perplexing to occupiers of factories or factory inspectors with regard to the provision of safeguards which can be suitably adapted to the numerous types of presses in use, and to the various

kinds of work. Moreover, the accidents are often of a serious nature, resulting in the loss of fingers or hands. The causes of accidents may be grouped under four heads: (a) defects in parts of the presses; (b) inefficiency of the guards and other safety devices; (c) unsuitability of the working conditions; (d) want of care on the part of the workers or supervisors. Accidents arising from the first cause are generally due to the breakage of a spring or the wearing of a clutch key or the fracture of some part connected with the operation of the plunger or the ram. Such defects result in the press "repeating," *i.e.*, the descent of the plunger several times instead of only once in response to each movement of the operating lever. 'Repeating' is a fruitful cause of accidents. It is therefore of the utmost importance that the working parts of presses should be examined frequently. Many accidents due to the second cause may be attributed to the provision of safety devices or guards which, although satisfactory for certain operations, are not suitable for the particular work being done at the time of the accident. The lighting of press shops has an important bearing on accidents; if the natural or artificial light in these shops is inadequate or comes from the wrong direction in relation to any particular press, the operator cannot see clearly what is happening between the dies of the press. It must also be noted that want of care on the part of the workers, *e.g.*, by rendering safety devices inoperative, by removing or neglecting to adjust guards and by deliberately putting their hands round guards, has resulted in many accidents, as also has slackness on the part of supervisors who have failed to see that safeguards are in proper order before a press is used. In the past, efforts have been made to prevent accidents in two ways: (1) by the presses being controlled in such a manner as to keep both hands employed while the plunger is descending, *e.g.*, by two interlocking hand levers; (2) by the provision of guards for the plungers. The first method has been found to be unsatisfactory because the controls can be scotched or rendered inoperative by the workers. Greater reliance has therefore been placed on the provision of guards. But here difficulties began to arise for, though certain operations such as blanking, could be carried on successfully if the dies of the presses were surrounded by fixed guards, other operations such as 'raising,' 'drawing' and 'cupping' required the front or sides of the dies to be exposed while the articles were placed in position, thus providing opportunities for accidents if the presses 'repeated.' The difficulties have been overcome to a considerable extent by the introduction of automatic guards of various types some of which are of much value. One firm of power press makers has recently invented a safety device which gives promise of ensuring complete safety for the operators; its principal features are a locking device in the form of a thick stud which falls into a socket bored into the fly-wheel shaft, supplemented by a guard of the 'cage' type round the plunger. The press is actuated either by a pedal or by the guard itself, and until the guard has completely enclosed the dies, the locking gear for the shaft prevents the descent of the plunger containing the upper die. Another good safety device consists of a guard which is operated by means of a cam on the fly-wheel shaft, the guard comes into action before the plunger has begun to descend and removes the operative's hand from danger. This is especially valuable in the case of short stroke presses. A third safety device consists of a frame which automatically moves across the feed space in front of the tool and pushes away the hand should it be left in a position of danger. The frame is actuated by the plunger of the press through a rack and pinion gear, and has an advantage as the movement of the plunger can be magnified by using different gear. A movement of much importance has recently been made by the appointment by the Tin Box Trade Board of a Committee composed of manufacturers and workers in tin-box factories and representatives of the Factory Department of the Home Office to consider the information already in possession of the Inspectors, and to formulate proposals with regard to the prevention of accidents at power presses in the making of tin boxes and canisters. The Committee has been sitting since November last; it has examined the reports of more than one hundred accidents caused by power presses, and other documents in the possession of the Department; visited factories with the object of inspecting various types of presses and guards under working conditions; examined models, specifications and drawings of guards and heard the evidence of engineers and others having an intimate knowledge of power presses. In connection with this Committee, the work of the Factory Inspectors has been of special value since they were able to present to it the statistics which had been collected in special form for several years and which shewed the main facts relating to power press accidents in a plain and concise manner, and enabled the Committee to grasp at once the extent of the danger with which it had to deal. They were also able to place at the disposal of the Committee a vast amount of information in connection with the numerous types of presses and guards in existence; the purposes for which they were used, their weak and strong points; and their effect on output and accident prevention. Such information could be obtained only by Factory Inspectors and its presentation enabled the Committee

to do its work with greater thoroughness and without loss of time. A report is now being drafted, and it is hoped that the recommendations contained in it will not only assist in the standardisation of guards for power presses in tin box factories, but will also serve as a foundation for any future action that may be taken in connection with the larger question of fencing power presses generally."

"Quite apart from the injuries caused by the power presses referred to already, it has to be recorded that bicycle saddle blocking presses were responsible for a number of serious accidents during the year. In the second operation on the saddle, the machinist held the leather at the sides during the stroke of the press in order to keep the saddle in a correct position, and the worker's fingers were thus brought dangerously near the tools. A device has now been designed for holding the saddles mechanically and thus avoiding the proximity of the worker's hands to the tools during the stroke. The method is simple, the saddle is placed in the die in the required position, two clips slide up to hold the saddle in position at the back and front, the clips slide in tapered grooves in the end of the press, and they hold the saddle firmly. As a further safeguard, interlocking levers are being fitted to all presses so that both hands should be occupied during the operation of the press, and be kept away from the tools. No accident has happened since this device was fitted."

#### *Baker's Machinery.*

Concentrated attention was being given to the prevention of accidents from bakers' machinery prior to the War, and this has been resumed: every accident is being carefully investigated and classified. Owing, however, to the pressure of orders for new plant the machine makers have been unable to supply automatic safeguards for existing machines to any extent and some time must elapse before these become general. The two machines responsible for the most serious accidents are dough brakes and dough and cake mixers. A variety of guards have been designed for the former type of machine, but few have proved entirely satisfactory. The makers, however, are experimenting and it is hoped that something really efficient and simple in character will be evolved in the near future. The ordinary dough mixer which has been the cause of several fatalities can, however, be so constructed that a serious accident is almost impossible. Automatically locking covers for the protection of the revolving blades are now being fitted to new machines and adapted to old ones, but as stated above the makers find difficulty in coping with the demand. Mr. Taylor (Bradford) mentions a new type of mixer in which the blades are stationary and the casing or drum revolves. In this case the opening in the drum must perforce be closed when the machine is in motion. Another style of dough mixer or kneader is described by Mr. Lauder (Newcastle). It consists of an upright tub or container open at the top and having two vertical rods forked at the ends passing into the container. These forks mix and work the dough in the container by a slow vertical circular movement. There is no particular guard for the container and experience will show whether the machine is safer than the older drum type. This particular machine, with slight modifications of design, is being put on the market by several makers.

#### *Grindstones and Emery Wheels.*

Although overspeeding of grindstones and emery wheels is pretty generally recognised as the cause of fracture of the wheel it is surprising how many cases of definite overspeeding come to light. Users evidently make mistakes in calculating the velocity, or fail to allow for variation in the speed of the prime mover. Mr. Hird (Bolton), describing a fatal accident due to the fracture of an overspeeded grindstone, mentions that the stone itself was quite sound and properly mounted. The supposed peripheral speed understood by the firm to be about 4,700 feet per minute (actually too high for safety) was, owing to mistakes in measuring the sizes of the pulleys, and particularly to an error in the speed of the motor, considerably under-estimated. It was assumed that the speed of the motor was constant, and the fluctuations due to variations of voltage and to heating up had not been appreciated. The actual surface speed at the moment of fracture was probably over 5,700, and subsequent enquiries showed that the maximum speed allowed by other and larger users of the same class of stone was 4,000 feet per minute, which figure should on no account be exceeded. The stone which burst was provided with a wrought iron guard but the attaching straps were incorrectly fixed with the result that the shock had to be taken by a single bolt which failed to hold. The accident, as Mr. Hird remarks, demonstrates the absolute necessity for securing the guard as strongly as possible to its supports. In making inquiries into an accident due to the bursting of an overspeeded emery wheel, Mr. Topham (Rechdale), found that the *minimum* speed of a universal grinder was higher than the *maximum* working speed recommended by the makers. No test had been made to ascertain the speed at which

the machine was working and the guard for the emery wheel had been removed. The firm in this case was prosecuted and a penalty inflicted.

Although experience shows that cast iron guards for emery wheels are unsafe, as they are unable to withstand the disruptive action of a bursting wheel, makers still continue to supply them. Several Inspectors refer to this defective type of guard, and Mr. Goddard (Norwich) cites a case where the cast iron guard was broken by the flying parts of a burst wheel. Mr. H. R. Rogers (Leicester) reports that guards are provided in the majority of cases, but they do not comply with the recommendations set out in the official memorandum on the subject. The latter was issued in September, 1914, and the war naturally prevented rapid progress in the matter. Abrasive wheels were required in large numbers at short notice and it was more convenient and expeditious to supply cast iron guards from existing patterns than to construct others of wrought iron or steel. Several Inspectors, however, found a fair number of substantial cast steel guards were being supplied with emery grinders towards the end of the War, and presumably this type will ultimately become more common, especially for the heavier type of grinder. Mr. Mead (Birmingham) describes a new type of guard for internal grinding wheels which he saw in one works, and has recommended at others. The actual guard is fixed to a swinging arm actuated by means of a cam worked by the slide of the machine, the guard is held out of the way while the emery wheel is used inside the work, but it is automatically brought round so as to enclose the wheel as soon as it is removed from the work. The operator is thus protected should the wheel burst at any time and the wheel is also protected from accidental damage whilst not in use.

Mr. John Law (Sheffield), in his report on this subject, is satisfied that the bursting of natural stones is due to one or other of the three following causes:—

- (a) Natural flaws or unusual softness of the stone generally revealed on fracture as discolourations, including pebbles (raddles) or lamintion,
- (b) exposure to rain and subsequent frost, and
- (c) bumping and unduly rough handling at the quarry, on rail and in the hull.

No remedy is apparent for (a) but it is feared that pressure of demand coupled with shortage of labour and the system of remuneration in vogue at certain quarries of paying by "piece," but not paying for rejected stones, tends to less careful scrutiny and conscientious rejection of faulty ones. The danger (b) could be avoided by compulsory storage under cover, and (c) to a large extent by provision of proper overhead runways or other suitable appliances for getting the heavy stones into the troughs. It is rather remarkable that large stones burst more often than lighter ones run at the same peripheral speed. Natural stones, it is remarked, have fortunately gone out of use in spring blade grinding, and it is conceivable the same may happen in table blade grinding. The chief obstacle to this is the really heavy initial cost of large artificial stones in a system of working which makes each grinder the purchaser of his own equipment. Mr. Law mentions that the wheels used for "bolstering" and fork filing are only  $\frac{1}{8}$  in. in thickness and a little undue side pressure will scatter them in fragments. Such breakages are much commoner than is generally recognised. Mr. Rees (Sheffield) referring to the breakage of an artificial (Norton) wheel used in grinding pocket blades (their use is now universal for this purpose), states that the fixing of chains on the horsings of these wheels—a precaution often maintained by the grinder to be unnecessary, has everywhere been enforced. Mr. Rees incidentally mentions that he rarely finds cutlers' emery wheels unfenced.

Several Inspectors quote cases of bursting of emery wheels where no personal injury was done owing to the guards proving effective. The chief causes of fracture of these wheels are now pretty generally recognised, and it should only be a matter of time when, with efficient guards, accidents to operatives should be reduced to a small figure. It must be borne in mind, however, that in recent years the use of emery wheels has greatly extended in the metal industries; work which formerly was done by hand filing, is now executed more expeditiously and less laboriously by the convenient abrasive wheel.

#### *Laundries.*

Miss Taylor (South-Eastern Division), in a special report on laundries, states that the total number of accidents reported from all laundries during the year was 227, which, compared with previous years, shows a reduction from 353 in 1914 and 400 in 1912; but in view of the general remarks on page 12, it is not quite certain how far the figures can be taken as indicating the true position. On the whole, laundry accidents, being more or less serious, have probably been fairly well reported, and the Women Inspectors agree in thinking that the decrease in number is mainly due to improving fencing and a tendency to replace certain machines, such as wringers and several types of ironing machines by

others respectively less productive of accidents, such as hydro extractors, and American-made presses.

However, whether or not all accidents have been reported, an analysis of the figures prepared by Miss Taylor shows that a very large proportion of those reported have occurred to young girls. In the South-Eastern Division 33 per cent., and in the North-Eastern Division 60 per cent., of all the accidents were to girls under 18, the proportion of such girls being in normal times only 17 per cent. of the total number of women employed. In 1919, however, it is probable that the proportion of girls to women was still in excess of that in normal times owing to the very large numbers of women who left the laundries during the War to take up munition work and who had not yet returned.

The parts of the machinery chiefly responsible for accidents were the hot rollers of (a) calenders and multiple roller ironing machines (33 accidents), (b) shirt and collar ironing machines (34 accidents), (c) body linen ironing machines (5 accidents), the rollers of wringing and starching machines (26 accidents), hydro extractors, revolving cage (14 accidents), washing machines (18 accidents). In the North-Eastern Division the most serious accidents occurred on collar polishing machines which were being cleaned or clothed while in motion. This is a very dangerous practice to which attention has frequently been called in previous reports. Two accidents were to young and inexperienced persons (one to a child aged 12) left in charge of machines.

Accidents on washing machines have apparently not declined to the same extent as those on other machines, and unfortunately they have increased in severity. Nearly all were due to the operator's hand coming in contact with the inner cage, and a curious feature is the number of accidents caused by a ring on the operator's finger catching on a projection on the cage.

Three fatal accidents due to machinery were reported during the year. One was due to the bursting of a hydro extractor. A woman employed in the washhouse as a scrubber was struck by a piece of metal and died within a few minutes. The cause of the accident is rather obscure. There was no evidence that the cage was unevenly or excessively loaded, or that it was interfered with after being started, and the bursting therefore appears to have been due to the failure of the material of the cage and its supports under the stress produced by the centrifugal force.

A second fatal accident occurred on an inadequately guarded wringer. The operator's right hand was caught between the cold rollers. In her endeavours to free her right hand her left was also drawn in. She was an elderly woman and succumbed to her injuries.

The third was due to stepping over the unfenced end of an engine crankshaft. A woman went into the engine house to fetch a spanner which was hung on the wall, and in reaching for it her skirt caught on the shaft and her spine was fractured. She was found in the engine room by another woman, and died before a doctor could be fetched. This laundry was unnotified, and had not been visited by an Inspector until the notice of inquest was received.

#### *Steam Boilers.*

Reports from Inspectors show that there are very few boilers now in use in factory premises which are not insured and therefore periodically examined by expert boiler inspectors. Uninsured boilers are certainly rare in towns and industrial centres, but in a small proportion of cases in country districts the occupier continues to accept responsibility himself and has the boiler examined by what he considers a competent person—a boiler-maker, millwright, fitter or marine engineer holding the Board of Trade Certificate of a sea-going engineer. Every effort is made by Inspectors to warn occupiers as to the serious responsibility they assume in not having their boilers insured, and it has been found in certain cases that reluctance to insure is due to an erroneous impression that the annual charge per boiler for insurance is a high one. When an indication of the usual premium is mentioned they have, in more than one case, expressed surprise at its moderateness and decided there and then to insure.

During the War the legal limit allowed for the periodic examination of boilers had to be extended in certain cases by Order under the Defence of the Realm Regulations owing to the shortage of Boiler Inspectors and the urgent need for full boiler capacity to ensure output, but this was not done without first consulting those who had previously examined and knew the history of the boiler concerned. The insurance companies have now regained their full staffs, and such latitude will not again be necessary.

Although certain Inspectors mention cases where the person making the examination was of doubtful competency, Mr. Younger (Halifax) has had no such experience throughout his district. Mr. Beverley mentions one boiler explosion in the South-West London



district whereby a young person was killed while seated in the boiler house having breakfast. One of the horizontal tubes exploded, throwing hot water and live coals over him. The boiler was insured, and had been regularly examined; but it was of an old type, and owing to its construction it was very difficult to clean properly the outside of the upper rows of tubes, including the one which burst. Mr. Rogers (South-Western Division) mentions another case, that of a steam boiler in a small saw mill in West Wales which exploded, killing one man and injuring another. The premises were outside the provisions of the Factory Acts as no person was employed. This boiler had been purchased second hand about eight years previously, and had not been examined during that period. Mr. Wolfe (Southampton) had also one boiler explosion in his district, which wrecked a forge entirely, but fortunately only three persons were injured, not seriously, by flying fragments of brick. This explosion was remarkable for its violence and the amount of damage done to premises and plant. The boiler, one of the horizontal type, 30 feet long by 4 feet 6 inches in diameter, parted in the middle; one end blew about 30 yards up a hill, the other was driven through a house, demolishing it entirely, cannoned on to the side of another house and fell into some waste land. The boiler was not insured, but had been examined by a boiler maker. An explosion due to an unusual cause occurred in the North of Scotland. Mr. McNair (Inverness) thus describes the case. The explosion occurred at a portable saw mill occupied at the time in cutting up home timber, the entire boiler being thrown a considerable distance, killing the occupier's son, who was in charge, and injuring several other persons. At the Board of Trade inquiry evidence was adduced that one of the safety valves was completely choked, and the engineer who had examined the boiler the previous year and granted a certificate under Section 11, admitted that he had never opened this valve. He also admitted that he had not examined the boiler under steam. The Board of Trade Commissioners came to the conclusion that the boiler exploded through excessive pressure, and also expressed their opinion that the examinations made were not "thorough" examinations by competent persons as required by the Act. The occupier was ordered to pay £15, and the engineer who made the last examination £10, whilst a boiler maker who had previously made a partial examination was ordered to pay £5 towards the cost of the inquiry.

Mr. Goddard (Norwich) mentions a new application of the use of a small gas-heated steam boiler which is being met with in several of the boot and shoe factories. It is attached to the turn-shoe sewing machine, and is in substitution of gas heating at the stitching point, gas being the method of heating in the old type of machine. One advantage obtained by this system is that the fumes from the naked gas jet are abolished, but the boiler itself is heated by a bunsen burner, the waste gases from which are carried off by a flue pipe and discharged outside the work room. These boilers, though small, come within the scope of Section 11 and require to be periodically examined. Mr. Goddard adds that this system of heating will be applied to other similar machines in use in boot factories.

#### *Fire—Means of Escape.*

Although fatalities due to fire in industrial premises are, relative to the number of factories distributed over the country, comparatively rare, yet there is the ever-present possibility of death in one of its most dreaded forms, and of all the requirements of the Acts those dealing with the safety of buildings in case of fire require the greatest vigilance on the part of the Inspectors and local authorities. The following descriptions of fires involving loss of life in industrial premises during the year may serve to illustrate how easily such catastrophies occur and how they might be avoided. Mr. Parkes (North London) mentions that through a fire which occurred in his district three young lives were lost. The circumstances were somewhat unusual in that the fire broke out in a busy street in the heart of London, and within easy reach of a fire station, at a time in the evening when crowds of people are usually passing. The premises were occupied by several tenants as factories, workshops and warehouses, and the fire broke out in a lower warehouse. As the occupier of this warehouse had locked up and left his premises the fire had assumed serious proportions before the occupier and workers in the room above had any idea of what was occurring below. All but three of these workers escaped down the staircase in safety, but these three were afraid to venture, though encouraged by their fellow-workers to do so. They attempted to break the front windows at a comparatively low level, but apparently the firemen were too late to observe them. The case, as Mr. Parkes states, emphasises the additional fire risks on premises occupied by several tenants, some of whom may not be under the Factory and Workshop Act yet have inflammable material stored in the building adding to the common risk and jeopardising the safety of others working, it may be, on non-combustible material in

other parts of the building. A still more serious fire, involving the death of five persons and injuries to as many others, occurring in Manchester in October, is described by Mr. Seal as follows:—

“The fire broke out at 6.30 p.m. on the first floor of a corner building, which was five storeys in height above the street level and was occupied by four tenants. Fent sorting was carried on on the first floor, and the making up of wearing apparel on the other three. At the time of the outbreak there was no one at work on the first floor, about 20 people were at work on the second, the occupier only on the third, and 32 (16 males and 16 females) and 3 ‘visitors’ were on the fourth floor. Except for a slight mishap all on the second and third floors escaped, but by the time the fourth floor occupants became aware of the fire the main staircase was on fire and full of smoke. A rush was made for the outside fire escape, but when the emergency exit door was opened, the flames swept in there also and barred egress. Only one other way of escape remained, viz., a window 18 inches by 24 inches, and through this all except 4 women and 1 youth escaped on to the adjoining roofs, from whence they were safely rescued by the fire brigade. A search revealed the bodies of the victims who had apparently been overcome and suffocated by the smoke. The outside fire escape was a modern up-to-date one fixed in January, 1916. It had been regularly inspected by the local authority (twice within nine months prior to the out-break) and reported upon as being ‘in good working order.’ The premises were electrically lighted throughout, but fitted with gas stoves for heating and warming up irons, and there was nothing of a specially inflammable nature used or stored. Notwithstanding a searching enquiry, no direct evidence of the cause of the fire could be elicited at the inquest when the jury returned a verdict of ‘Accidental death.’ One outstanding feature was the extraordinary short space of time which elapsed between the discovery of the fire and its rapid spread through the whole building. The intense heat caused the windows, including those which gave on to the outside escape, to break early, and through them the flames rushed out, enveloped the staircase and cut off the means of escape.”

A fire fatality of an unusually painful nature happened at a small xylonite cutting factory in Sheffield. The foreman, in full view of persons outside, was burnt to death while struggling to escape through the ventilator of a first floor window. He had apparently dashed past the original fire zone to stop the electric motor, and by the time he had done so his return was cut off by the fire. The circumstances of another disastrous fire involving the loss of 12 lives, although occurring in premises not under the Factory Act, are described by Mr. Lauder (Newcastle). As, however, the question of the storage of celluloid is involved, and as this material is handled in considerable quantities in certain industries—for example, in cutlery and electric accumulator works—it appears desirable to record the facts connected with the fire. The building involved consisted of a basement and six upper floors. It was of modern construction, ferro-concrete, and entirely occupied as offices with the exception of the basement, which was tenanted by a firm of cinematograph film renters, who stored, cleaned and repaired films. The fire started in the basement and, owing to the ignition of the films, spread rapidly and fiercely. There was only one staircase to the building, and a lift passed up the centre of the stair. Flames and fumes from the burning celluloid rushed up the lift well to the top of the building, rendering the staircase almost like a fierce furnace, and made it impossible for those employed on the upper floors to escape down it. The poisonous fumes quickly found their way into the corridors and rooms on the various floors, and as a result 12 lives were lost by suffocation, burning and jumping from windows to the street below. The coroner’s jury, in giving their verdict, stated (1) that the fire originated either through film coming in contact with a lighted electric incandescent bulb, or by contact with a lighted match or cigarette; (2) that the building was not a suitable place for storing and repairing cinematograph film, having regard to the number of persons working on the floors above; (3) that the question of an emergency staircase for fire escape on all buildings of this description should in future receive the attention of the local authorities. Mr. Wright (North-Eastern Division) commenting on the above disastrous fire, and two others from the same cause which occurred in Sheffield, states that the dangers would be more easily combated if celluloid was only worked in rooms on the ground level with no buildings above. When once this substance takes fire it appears useless for the employees to attempt to extinguish it; the only thing to do is to escape from the room and leave the material to burn.



A fatality due not to fire but the use of a fire escape for the purpose of watching a "Peace procession" pass, occurred in the Bolton district. A rush of workpeople on to the escape caused it to collapse, and it was afterwards found that one of the brackets supporting the platform had been broken for some time, and under the unusual weight it gave way. Discussing this case, Mr. Hird says:—

"There is reason to fear that the factor of safety was not high enough. Apparently the structural strength of an escape is left entirely to the architect and the fire escape maker, and probably solely to the latter. It seems desirable that some definite standard should be drawn up as to adequacy and structural strength for the guidance of local authorities."

As to types of fire escapes Mr. Jackson (North-West Division) observes that in the past, when outside escapes were first provided, the general arrangement was an iron ladder without hand rails leading on to narrow platforms. More modern ones consist of an iron staircase with suitable hand rails and broad landing platforms. The older type, he observes, is quite unsuitable for premises where women are employed and should be replaced by the modern arrangement. He adds that few local authorities are, however, prepared to require this, having at one time approved of the older means of escape. Outside fire escape ladders should be zig-zagged from storey to storey, and not carried in a straight run down the side of the building. Mr. Jackson considers the latter type dangerous as, in the event of anyone falling, those behind push on and cannot well be held back. Where the numbers employed on each floor is large, the ladders should be wider at the lower storeys, otherwise the egress of those from the upper floors will be impeded.

There appears, judging by the reports of several Inspectors, to be great lack of uniformity on the part of local authorities in the performance of their duties in regard to fire escapes. In some instances it has only been possible to obtain adequate provision by repeated pressure on factory occupiers without the support of the district council. Mr. McCaghey (Keighley) mentions the difficulties he has experienced in bringing local authorities into line. As he states, the obvious intention of Section 14, Sub-section 1, is that new buildings should be made safe and should be so certified before commencement of occupation. In his district, however, there has been a somewhat inexplicable reluctance to issue the prescribed certificates of safety, the remissness extending back for several years, and even after the occupiers concerned have, at his instigation, asked for the statutory document. During the war local authorities were inclined to hold their hand, even after repeated requests to take action. He refers to one authority who could not be prevailed upon to take any action until he and the Superintending Inspector, Mr. Wright, attended a meeting of the Buildings Committee and placed the position fully before the members and intimated that the propriety of taking independent action under Sections 4 and 5 would be considered unless immediate steps were taken to issue certificates to those factories requiring and entitled to them, and to make a proper inspection of the factories, and to serve notices to provide additional exits where necessary. The result was a temporary improvement, but pressure has again been brought to bear on the authority to use their powers.

It is obvious that periodic inspection on the part of the local authorities is necessary after issue of a certificate to ensure that the conditions have not changed. Mr. Thomas, speaking of Walsall, states that if a "certificate is granted to a new factory or workshop no further action is taken to see that the means of escape are kept in working order, and the same applies to a dangerous factory which has been made safe." Mr. Werner (Stoke-on-Trent), dealing with the same subject remarks that expansion of trade makes the question of fire escapes a point for continuous observation, and instances a case where a full complement of new machines and workers were discovered located in top rooms previously used for storage purposes only. Mr. Ward (Derby) comments on the same lack of systematic inspection and instances cases where locks and fastenings to doors leading to outside staircases have been found by him so badly rusted, owing to inattention and infrequency of use, as to prevent the unfastening of the lock. In other cases passage ways leading to exit doors were found completely blocked by machines or goods, and notices indicating means of escape were conspicuous by their absence. Mr. Verney (North-West London) complains that the means of escape are sometimes most imperfectly particularised on the certificate issued by the local authorities, and the fact that a change in the manufacture may render dangerous a building that once was safe does not appear to be generally realised by the local authorities. He mentions a striking example connected with the use of celluloid. A button manufacturer who formerly made use of sheet metal was found to be using sheet celluloid in large quantities, with an entire

absence of the usual precautions, converting the factory into a death-trap in the event of fire, though it was previously safe. He also found, in more than one case, exits permanently built up at the instigation of the insurance company's surveyor, actuated, no doubt, by a desire to limit the area of damage in the event of fire, but without regard to the safety of the workpeople. In one instance the means of escape were so unintelligently specified on the local authorities' certificate that it was only Mr. Verney's recollection of a door having once existed that enabled him to realise that it had been improperly blocked up.

Enough examples have been cited to demonstrate the urgent importance of periodical and systematic surveys of factory premises by local authorities in order not only to examine and test the means of escape provided, but to ascertain what changes have taken place in materials being treated, processes carried on, or the distribution of the workers throughout the various floors.

Comparatively few local authorities have yet made bye-laws enabling them to take action in premises where less than 40 persons are employed. In the important district of Newcastle-on-Tyne Mr. Lauder states that none of the authorities have adopted bye-laws under Section 15 of the 1901 Act, nor have any been adopted in the Halifax district.

### *Explosions.*

The most disastrous explosion in 1919, involving the deaths of 12 men and injury to 7 others, happened in an oil tank steamer undergoing repairs in a dry dock at Cardiff. Summarised, the circumstances of the explosion are as follows:—The steamer, which was of 6,572 tons gross tonnage, after discharging her cargo at Thames Haven sailed for Cardiff and was dry docked for overhaul and repairs. Early one afternoon, while a number of workmen were seated on the hatch covers of one of the holds, and others standing near, a terrific explosion occurred in the interior of the ship blowing the men on the hatches up in the air, one falling over the roof of a building the others back on deck, and 12 succumbed to their injuries. A searching enquiry followed, and it was found that the explosion originated in the fore-peak tank, and not only damaged the tank but ripped open the collision bulkhead and spent itself through the hatchways of the fore-hold, above which the workers were congregated. The fore-peak tank was empty, and about five hours before the explosion a man-hole communicating with the pump room above had been removed preparatory to filling the tank with water for testing purposes. Certain repairs were being executed in this pump room and contrary to all instructions and regulations a naked light was used for illumination. There was evidence that oil had leaked into the fore-peak from a pipe communicating with the coffer-dam, and, this oil volatilising, had formed, with the air in the fore-peak tank, a highly explosive mixture. In ordinary circumstances the leakage of oil into the fore-peak would have been an impossibility, but unfortunately instead of filling the coffer-dam with water which would thus form an absolute seal between the tanks containing oil and the forepart of the ship, it was filled up for the voyage to England with a light crude oil. This misuse of the coffer-dam, designed as it is to safeguard the crews of oil-carrying vessels, was a serious irregularity, and this infringement of a safety precaution together with the clear disobedience of the other regulation referred to, namely, the use of naked lights, undoubtedly caused the explosion and the consequent serious loss of life.

As reflecting the aftermath of the War three explosions, each resulting in fatalities, occurred in the hazardous operation of disassembling high explosive shells. This work was commenced at a Government factory in the Swansea district. The first involved the death of three women, and although the cause was not clearly established it was considered by experts that the explosion was due to an 18-pdr. shell being dropped nose downwards when being handed from a trolley into a protected cubicle where the work of breaking down was commenced. It appears that the shell which exploded was without the safety attachments which would have prevented detonation in the event of the shell being dropped. After this accident the system of examination was improved so as to prevent such shells being sent to the breaking down cubicle. The second explosion occurred through a shell with an obsolete and dangerous type of fuse escaping the examiners and being issued to the worker for drilling out the grub screw which could not be removed in the ordinary way owing to rust or other cause. The drill pierced the detonator composition. This type of accident could not occur with the later form of fuse, and the one which caused the explosion was not intended for drilling but for a safer method of handling. This accident was, again, due to a failure of the elaborate system of examination which was improved afterwards. The third case involved the death of one man while engaged in a cubicle removing gages from 18-pdr. shells. A wrench was generally used for un-

screwing, and about 90 per cent. of gages yielded to this method. Others were treated by fixing in a vice and operating on the gages by means of a hand wheel the spindle of which terminated in a head similar to a wrench. The operator during the latter process stands outside the cubicle and is protected by the sand box sides in the event of explosion. Gages which do not yield to this extra force are dumped into the sea. About 3,000 shells a day are dealt with. Examination of the cubicle after the explosion disclosed the presence of unauthorised tools, and suggested that the starting of refractory screws had been facilitated by tapping, a highly dangerous practice. Further precautions were taken after the accident.

The dangers arising from certain methods of phosphorising copper in the manufacture of phosphor bronze were brought to light through an explosion with attendant burning, and is described by Mr. Harston (Birmingham).

“A sealed iron pot containing phosphorus is heated by a coal fire. To this pot is attached an iron pipe leading to a plumbago pipe which dips into a crucible of molten metal. When the flow of phosphorus becomes too great, it is checked by cold water being thrown on to the iron pot. The only way of ascertaining whether the flow of phosphorus is going on is by means of a listening wire held against the iron pipe and the ear. The accident was apparently due to the flow of phosphorus being stopped by the cold water causing the molten metal to rise to a cool part of the plumbago pipe and there to solidify. The restarting of the flow of phosphorus caused an increase of pressure to such an extent that the plumbago pipe burst and the molten phosphorus was thrown over the workers. The injuries were rendered severe on account of the difficulty of extinguishing the burning phosphorus. The process appears to be accompanied by considerable danger on account of the absence of any trustworthy means of ascertaining the pressure in the vessel or pipes. At a similar works a Bourdon pressure gauge is used, but this appears to be unreliable as there is a similar danger of the gauge pipe becoming choked. Experiments are being made with a view to making the process safe.”

Two different explosions at a large chemical works resulting in the death of two men occurred in the manufacture of synthetic acetic acid and the circumstances are detailed by Mr. Ward (Derby).

“The cause of these mysterious explosions was, after lengthy and careful investigations by expert chemists employed by the firm, found to be due to the presence of minute traces of copper acetylide. The plant at which the explosions occurred was erected during the War period for the manufacture of synthetic acetic acid by a process new to this country, hence no data were available to the firm as to any special dangers which might arise in the various processes through which the materials passed and of course the necessary steps to avoid dangers inherent to the processes could only be determined by experience as the manufacture proceeded. The first explosion occurred in a cast-iron vessel in which acetic aldehyde was subjected to an oxydising process; after careful investigation it was thought that the explosion might have been caused by the disruption of copper acetylide minute traces of which might have been formed by the combination of free acetylene and the copper in the brass fittings attached to the vessel. The difficulty of determining the cause was enhanced by the paucity of information concerning the properties of copper acetylide and by the fact that repeated tests to detect free acetylene had led the management to negative its presence in the oxidising process. After this explosion which resulted in the death of one man and serious injury to another it was decided to remove all copper and brass fittings from these vessels. A few weeks afterwards another explosion occurred with fatal result whilst the purification vessels (used in the stage immediately subsequent to the oxidising process) were being dismantled. In this case the explosion occurred in a copper cylinder and the presence of copper acetylide was very definitely determined. These accidents therefore prove beyond doubt that copper or brass vessels or fittings should not be used in the manufacture of synthetic acetic acid owing to the practical difficulty of completely eliminating free acetylene.”

A number of explosions of a more or less unusual type are mentioned by several Inspectors. Mr. Roos (South-West London) describes one which occurred in a machine for polishing powdered aluminium. The door of the polishing machine room in this case was fitted with an interlocking device to prevent entry whilst the machines were in motion; but this was temporarily put out of action by two workers whilst trying a new machine-

and as a result they were burned by the flame of the explosion. The origin of the explosion is difficult of explanation as the machine was earthed and there should have been no risk of sparking from static charges of electricity such as appear to have given rise to some explosions in aluminium polishing machines in the past. However it is possible that a small particle of grit found its way into the powdered aluminium although this is difficult to account for as the powder was passed through a 1/200 mesh sieve before introduction to the machine.

An explosion involving the deaths of two men occurred in an aniline dye manufactory. Electrically driven drums containing loose iron bars were used for grinding dye substances and apparently whilst a charge of anachrome brown was being placed in one of these drums a violent explosion occurred which wrecked the grinding shed. Smoking and naked lights were strictly prohibited here, but matches were found in the pockets of one of the men killed and a partly smoked cigarette discovered among the debris. Mr. Jones (Bradford) reports on an explosion in the reduction of nitro-benzene into benzidine, the reducing agent being nascent hydrogen evolved by the action of caustic soda on zinc dust, and the District Inspector (Mr. Taylor) gives particulars of an explosion of carbonaceous dust in the casing of an elevator used for conveying dextrine. The bursting of a steam jacketed pan used for sugar boiling is described by Mr. Chastaney (Sheffield). The attendant in ignorance shut the outlet cock entirely, so that the vessel was subjected to full boiler pressure and gave way. The outlet tap for such vessels should be so constructed as to always leave a slight opening to allow a through passage of steam. This precaution was taken after the accident. An unusual explosion accompanied by burning in a plant for the purification of salicylic acid by means of sublimation in a current of hot air is reported by Mr. Brothers (Warrington). The precise cause is difficult to assign, but Mr. Brothers thinks the remedy lies in preventing too high a temperature in the sublimation vessel containing the impure material. Mr. Seal (Manchester) also refers to an internal explosion in the disintegrator of a dextrin works caused by some foreign substance getting amongst the material.

#### *Trade Agreements.*

While the reports of Inspectors do not show complete compliance with the requirements arrived at by agreement in the trades concerned, yet the position is hopeful. Makers of machines have found difficulty in supplying the protections specified in the respective agreements, as there has naturally been great pressure since the armistice in the textile machine making industry. Time however will rectify this and it is probable that by the end of the current year the necessary metal guards and fittings required will be available. Dealing with the woollen and worsted industry, Mr. Taylor (Bradford) complains that employers await inspection and instructions before complying with their own agreements and then do so somewhat reluctantly. He states, however, that the occupiers are not alone to blame as the makers still continue to send out machinery fitted with out-of-date and discredited guards. It is disappointing to find that one of the most useful and important requirements of the agreement for these industries, namely, that dealing with the periodical inspection of the machinery and plant by an appointed person appears to be to a large extent a dead letter. Mr. Jackson (North-Western Division) considers the *Cotton Spinning* agreement is pretty well carried out but, as in the woollen and worsted industries, there has been unavoidable delay owing to the War in getting guards fitted. One very important feature, however, is the appointment of an Inspector to visit the mills controlled by the Federation of Master Cotton Spinners' Associations to see that the standard fencing, &c., required by the agreement is maintained. The Federation is the Accident Insurance Company for most of the mills, and it is clearly in their interest to raise the standard of fencing in cotton mills as high as possible. The *Cotton Weaving* agreement is well observed except with respect to the provision of duck-bill guards and the stoppage of cleaning machinery in motion. Mr. Jackson mentions that improved types of guards are wanted for twill motion cogs, and although a guard to completely cover them has been put on the market, supplies have been held up by the iron moulder's strike. Advancement is also reported in connection with the *Print, Bleach and Dye Works* agreement, but it is slow. This agreement was only arrived at a few months before the War broke out and naturally during hostilities active compliance, where structural alterations were involved, was much impeded. Since the armistice labour difficulties have also hindered progress. Mr. Rogers (South-Western Division), reports considerable improvements as the result of the trade agreement in the *Tinplate industry*. Substantial compliance has already been effected and the Inspectors are bringing pressure to bear on those firms whose premises are below the required standard.

## CHAPTER III.

## DANGEROUS TRADES.

BY

G. STEVENSON TAYLOR, O.B.E., H.M. INSPECTOR FOR DANGEROUS TRADES.

The observance of the Special Rules and Regulations for dangerous trades is still below the pre-war standard. This is especially noticeable in connection with the maintenance of plant for the removal of dust, fumes and gases. During the war it has not been possible in many instances to have such plant repaired, and now, owing to the press of orders for repair work, considerable delays occur before the repairs can be executed.

Few deliberate evasions have been noted, and generally occupiers and managers appear to have done their best to comply with the requirements, and many have sought the advice of the Inspectors with regard to improvements and installations of ventilating and dust removal plant.

The reports from the Inspectors respecting the various codes of regulations are summarised below under each code heading.

*File Cutting by Hand.*

This industry is mainly carried on in Sheffield and South Staffordshire, and in it female workers are more numerous than male workers. Mr. Hield, who devotes special attention to the industry in the former town, reports a considerable decrease in the number of factories and workshops where it is now carried on. This is probably due to the fact that a number of file cutters found other and more remunerative employment during the war and have not returned since, although the demand for hand-cut files has been very brisk recently.

The regulations have generally been well observed and no case of plumbism amongst file cutters was reported during the year.

*Electric Accumulators.*

Many factories engaged in this industry were worked under considerable pressure during the war, and the large demand for accumulators for use on motor cars and motor cycles has tended to maintain this pressure. Considerable extensions have been made to several factories during the year. In the case of one new factory, which was brought to the notice of the Inspector by the notification of several cases of lead poisoning, the occupiers had failed to obtain a copy of the regulations or to comply with them. Proceedings were instituted and the firm fined £10 10s.

In several factories where extensions have been made, attempts to utilise the original dust extraction plant in connection with them have thrown an undue burden on the plant and resulted in a considerable falling off in its efficiency. In other factories the loss of efficiency in the dust extraction plants has been wholly due to lack of proper maintenance and cleaning. Mr. Clark (West London) mentions a case of this kind where the pasting benches were constructed with grids, and materials falling through these had been allowed to choke the exhaust pipes. The defects have now been remedied, and boxes which can be easily withdrawn and emptied have been fitted under the grids.

The same Inspector states that a case of lead poisoning, which occurred in one factory, was apparently caused by the worker inhaling the dust produced when the last traces of a lead compound were removed from a shovel by knocking it on the outside of an exhaust hood. This danger has now been met by the use of two-handled celluloid scoops, which are light in weight and allow the compound to run out freely.

*Docks.*

Several Inspectors refer to the enforced neglect of dock inspection during the war, owing to the absence of their staffs. The arrears have been overcome to some extent during the past year, but as Mr. T. C. Butler (East London) remarks:—

“The docks and ships have not yet reverted to pre-war conditions, and it is therefore difficult in reviewing the year’s work to institute comparisons or to draw correct inferences. The majority of ships had to be adapted to warlike purposes, which to some extent interfered with the precautionary measures taken before the war to safeguard the workers. However, as these ships return to normal use, they are being overhauled and brought into compliance with the law.”

Although reports show that there has generally been an increase in the number of non-fatal accidents, there has been an appreciable decrease in the number of fatal accidents which have occurred in connection with dock processes. The cause of this decrease is not quite clear, but it is possibly connected with the reduction in the number of working hours, which ensures that the processes are mainly carried on by daylight, and also tends to minimise fatigue. Only in a few cases could accidents be attributed to breaches of the regulations.

The lighting of several docks has been improved by the installation of new lighting systems on modern lines, including the increased use of large electric cluster lamps in place of the old oil or candle lamps on ships loading or unloading after dark.

Complaints are still made of the frequent losses of lifebuoys and life lines by the depredations of riverside thieves, and of the failure of the masters of foreign-owned ships to provide gangways in compliance with the regulations whilst in British ports. These masters seem to think that anything will serve as a gangway here, whilst admitting that good gangways are provided and maintained in their home ports. Proceedings have been taken in several instances, but difficulty often arises owing to ships sailing within a few hours of the discovery of an offence.

In the Stockton district, some difficulty has been experienced in getting gangways satisfactorily fixed when used in connection with small ships, owing to the rise and fall of the tides and to the proximity of travelling cranes to the quay edge. However, in most cases a solution has usually been found, but the same cannot be said with regard to the maintenance of gangways for ships loading coal under spouts. The frequent moving of heavy gangways is impracticable, and horizontal ladders are dangerous. Progress is being made in the matter, and it is hoped that satisfactory arrangements will soon be secured.

Neglect to repair broken rungs of hold ladders has been noted in a number of cases, especially on foreign-owned ships, and in a case at Cardiff where a workman was killed through his foot slipping from a defective rung, a British firm of shipowners were prosecuted and fined £50.

Although suitable gear is generally provided for lifting iron fore and aft and thwartship beams, men often climb out on these beams unnecessarily when they are being removed or replaced.

The annealing of chains, sling and other lifting gear used on board ships has been much neglected during the war and several prosecutions have been necessary, but the responsible persons appear to be doing their utmost now to get matters placed on a proper footing again.

The overloading of cranes is undoubtedly a very common breach of the regulations, but one which is difficult to detect in the absence of definite evidence as to the weight of articles lifted. This is often only revealed after a collapse has occurred. In one case at Southampton, where a man was injured by such a collapse, proceedings were instituted and the owners fined £10. Excessive overloading of electric cranes is often made possible by drivers and others removing the proper fuses in the electric circuits and replacing them by heavier ones. This is probably done to save the trouble of frequently renewing the proper fuses, as these burn out with a moderate overload on the crane motors.

Although boys under the statutory age limit of 16 years are rarely found driving cranes or winches, or giving signals to the drivers of these appliances, it appears to be a common custom, especially on foreign ships, to employ for these purposes boys who are just over the age limit. These boys often have a very slight knowledge of the English language, and this leads to their misunderstanding instructions. One fatal accident in East London must be attributed to this cause.

In Liverpool the most serious breach of the regulations was that of failing to fence or cover hatchways when not in use. This accounted for two fatalities in the district; these were followed by prosecution and conviction of the stevedores concerned. Pro-



ceedings were also instituted in Manchester and Hull for similar neglect. Although in the latter case, the defending counsel contended that the term "hatchway" only meant the opening from the top deck to a hold and not an opening on any deck, the bench, as in similar cases which have been previously taken in other ports, decided against this view and imposed a fine of £25 and costs.

In Newcastle-on-Tyne, owing to the boards supplied for coal guides becoming worn out or destroyed, hatch covers of ships being loaded with coal were improperly used for this purpose. Representations were made to the dock owners and remedial action has been taken.

#### *Self-acting Mules.*

The occasional absence of carriage wheel guards is the principal irregularity noted in connection with these regulations which have a wide application in Yorkshire, and Mr. C. F. Wright (North-Eastern Division) reports that in addition to the district staffs the Divisional Inspector's Assistant has devoted much attention to their enforcement. Difficulty has been experienced by occupiers, especially during the moulders' strike, in securing new carriage wheel guards to replace damaged or broken ones.

Mr. Peacock (Huddersfield) states that the regulations relating to fencing are generally fully complied with by the makers of new mules, but he frequently has to complain of neglect to maintain guards in position and in good repair. He mentions that the workers themselves do not assist in the maintenance of guards, as they should do in a matter so vital to their own safety, and this unfortunately is the experience of the majority of Inspectors. Doubtless, as Works Committees become more common, this apathy of the workers towards questions of safety will disappear.

In the Halifax district, Mr. Younger reports that the regulations are on the whole well observed, and no accidents were reported which could be attributed to any breaches of them. Proceedings were, however, taken against the occupiers of two woollen mills for failing to fence securely, in one case, front carriage wheels, and in the other case the back of a headstock.

#### *Wool Sorting and Combing and East Indian Wool.*

Mr. G. A. Taylor states that with a few exceptions these regulations are well observed in the Bradford district. 11 cases of anthrax were reported during the year, of which 5 terminated fatally. Each of these 5 fatal cases were of the internal and generalised kind. The 11 cases occurred at 7 different factories, 2 in which East Indian wool only was manipulated, 1 in which alpaca was the chief material used, and the others were heavy users of Persian wool and of East Indian goat-hair.

Mr. Peacock (Huddersfield) reports that the regulations applying to factories in which East Indian wool is used are generally found to be fully carried out so far as the terms apply, but in spite of these precautions 10 cases of anthrax were reported from 9 factories. The number of cases compares favourably with the two previous years, however, as in 1917, 28 cases occurred in the district, and 14 in the year 1918. He is informed by the principal users of East Indian wool that the wool has been arriving in much cleaner condition lately than was the case during the early stages of the War, probably owing to the fact that the Committee appointed by the Wool Control Board placed dirty wool in a low-priced category.

In the Halifax district the wool sorting and combing regulations apply at present to only one factory, the scheduled materials dealt with there being alpaca and mohair. No case of anthrax has occurred at this factory for a number of years past. The number of works under the code for East Indian wool increased considerably during the War owing to the extensive use of that material for Army blankets. The arrangements for the interception of the dust are not satisfactory in some of these places, but in many of them the Regulations are now in abeyance, the use of East Indian wool having been discontinued. No cases of anthrax have occurred in works under this code.

#### *Locomotives.*

These regulations have a wide application, and owing to the extensive networks of lines in many large steel and other works, a considerable amount of an inspector's time is required for their proper enforcement. The most frequent irregularities found relate to point rods, position of ground levers, the placing of materials near lines of rails, and to the riding on moving vehicles by means of a shunting pole. A shunter was prosecuted and convicted for the latter offence during the year, and it is at least suggestive that the man remarked that it was hardly fair that he should be convicted for doing something which is regularly done with impunity by railway and dock shunters.

Difficulty has been experienced by some occupiers in securing coupling poles of

pre-war quality, hence defective poles have frequently been found in use. Several accidents have been caused to shunters in the Sheffield District by their failure to use coupling poles, although these had been provided and were readily available.

#### *Horsehair.*

One fatal case of anthrax occurred in a North London factory to a man who had been sorting a parcel of horsehair from Archangel. The screen and exhaust system was new, and owing to the use of an unsuitable fan the velocity of the exhaust draught was much below the minimum of 300 feet per minute required by the regulations and quite ineffective for the removal of dust.

A written guarantee is generally given with each parcel of material purchased, that it has either come from a country outside the scope of the Regulations or been disinfected by an approved method. Complaints are made, however, that dealers or dressers frequently do not give sufficient information as to the methods of disinfection adopted.

In the South-Western Division there has been a great diminution in the amount of scheduled hair dealt with in most works under the code, and in many, no such hair has been handled recently.

#### *Casting of Brass.*

This process is carried on in widely varying classes of premises. The larger brass foundries, especially those of modern construction, by reason of their ample cubic space and ventilating arrangements are exempted from the requirements of the code; in the small foundries, which are sometimes independent factories, but often form part of engineering and other works, the regulations usually apply in full.

In the Halifax district, in the majority of the brass foundries, the exhaust draught required by Regulation 1 is almost invariably produced by fans in the upper parts of the shops. Only two casting shops there are situated below other work-rooms, and in these cases adequate ducts are connected to the fans and by this means the fumes are taken through the rooms to the outside air. In one large foundry efficient ventilation is secured by means of exhaust fans in or near the roof, in conjunction with plenum fans driving fresh air through gratings in the floor.

In contrast with this satisfactory report, Mr. Verney (North-West London) states that considerable difficulty has been experienced in securing compliance with the regulations especially in the small independent foundries. The occupiers of these, being in a small way of business, are reluctant to spend money on adequate ventilating and washing appliances. During the War it was not considered politic to take strong measures in dealing with several bad cases, but such measures will be necessary unless considerable improvements are effected.

Mr. Harston (Birmingham) reports that the system of removing fumes given off during casting, by means of a flexible tube attached to the crucible and communicating with a chimney stack, has not proved such a success as was hoped for some years ago, and has now gone out of use.

It is the common experience of inspectors to find that, whilst the provision of exhaust ventilation for the removal of fumes in brass foundries is generally appreciated by the employees, the same cannot be said with regard to the washing arrangements. These appear to be used for every other purpose but that for which they are provided, and it is not unusual to find the basins filled with tea leaves and other refuse.

#### *Vitreous Enamelling.*

There has been a steady increase in the use of leadless enamels in this process, and in the Wolverhampton district where it is carried on to a considerable extent, no cases of lead poisoning have occurred during the year.

#### *Nitro and Amido Derivatives of Benzene.*

Mr. Peacock (Huddersfield) has had much experience of these Regulations and reports that their application appears to have been very successful in preventing cases of poisoning, as no case of toxic jaundice has been reported since January, 1917. This can only be attributed to the more careful observance of the Regulations with regard to cleanliness and the improved methods of exhausting noxious fumes, together with the fact that, although the regulations only require medical examination of the workers once a month, most of the firms in this district have arranged for a weekly medical examination of all workers employed in the processes.



*Tinning of Metal Holloware.*

The reports from the Midland Division are not altogether satisfactory, and Miss Escreet in reporting upon cases of lead poisoning of women expresses her opinion, formed after seven years' experience of this industry, that in the Midlands at least, nothing but the bare minimum of compliance with the Regulations is ever attained. In all the cases of poisoning the women are old sufferers from lead, as in the Lye area they return over and over again to their old employment in spite of its danger. The intermittent nature of the employment is an undoubted factor in accounting for the few cases of poisoning; were full time ever worked on the process, it would seem impossible for workers to escape lead symptoms, especially as the "efficient draught" of the Regulations varies with the weather, and as the medical examination is, under this code, only held quarterly. She has experienced considerable difficulty with one firm, especially in regard to the maintenance of an efficient draught and to the regulations as to cleanliness.

*Grinding of Metals and Racing of Grindstones.*

This code applies to a large number of factories in the Sheffield district, and the following very interesting report upon the subject has been furnished by Mr. John Law, the District Inspector:—

- "As the whole question of Grinding Regulations is understood to be under review, not much can be written on observance of the present Regulations without embodying suggestions for improvement. It may be noted, however, that the officials of the Table-blade Grinders' Union have been in communication with the Department with a view to clearing the ground preparatory to reform in their working conditions. Increased space, more light, better standards of cleanliness, and adequate methods of handling grindstones, are their principal demands, founded on a tardy appreciation of high death and invalidity rates amongst their members. Whether their reforming ardour will include appreciation of necessary exhaust at wet-grinding processes remains to be seen.
- "The most noticeable feature in the cutlery trade is the transition—now practically complete—from the use of natural to artificial stones in spring-blade grinding. This has worked wonders in abolition of dust and swarf in this branch of the trade, and one has great hopes that further extension may notably modify the health conditions of the whole trade. Machine grinding and glazing of table-blades also is a feature which may profoundly affect the trade. The methods of manufacture, though not yet perfected for the highest quality of cutlery, have been greatly improved, and, effecting as they do very great economies in labour, promise well for the future. The dust and swarf problems of ordinary table-blade grinding disappear entirely in this new system. Machine-grinding in the razor-trade, on a different principle from the above, is now well established.
- "As to the observance of the Regulations, it has been again noted that the weekly cleaning of grinding-hulls is still by no means thorough. In many hulls it seems to have been very much neglected during the War; and even the pre-War standard which was not high, has not yet been recovered. Cleaning of the belt-races is often nullified to some extent by the fact that the cleaning of the spaces under the drums is neglected, because it is dangerous to approach the drums while they are running. Grinders are unwilling to wait for the engine to stop, to permit this cleaning to be done, before going to the warehouses for payment and with finished material, and they do not return afterwards. In many "wheels," the part under the drums is not concreted, and the drums are placed so near to the ground that access for cleaning is difficult. The result is that dust, paper, and other rubbish collects, and when work is re-started the loose laps of the belt stir up dust into the belt-race and so into the atmosphere of the room.
- "Great attention has been paid to dust-extraction plants, many of which had lapsed into very bad order during the War. The Regulations would be much more effective in this respect, with greater co-operation on the part of the workers. Fan-plants are liable to get out of order in many ways. The trouble, however, is often of a simple nature and one which the workman could himself remedy, or otherwise should report, but too frequently the matter is neglected, and hoods are thrown on one side, where in the general traffic of the shop they rapidly deteriorate.
- "After-War conditions threaten to have a strange effect on the question of dust-extraction in tenement cutlery factories. The prices of fuel and of upkeep have risen so high that some of the tenement-owners have found themselves unable to continue supplying power to their tenants; with the result that the latter have

been compelled to instal their own electric motors and are now occupiers of separate factories. Since the introduction of the Grinding Regulations, which place the onus of providing dust-extraction plant on the tenement-owner or other person supplying the power, one large dust-extraction plant for the whole factory has been general. In one such factory, the owner is continuing to use the fan for the benefit of the former tenants, but in others there is the prospect of a return to something like the old conditions, when each small employer had his own fan and dust-extracting appliances. Much of the present plant is rendered useless in these cases; there must be a wasteful multiplication of fans, and great difficulties in the disposal of the dust; altogether a heavy burden on an employer of this class, who often has but two or three employees. One must also expect a probable loss of efficiency in some cases, and certainly greater difficulties of inspection.

“Two causes have operated in late years to make certain cutlery processes much less unhealthy than formerly. One is the decay of hand-forging, and the large increase in the number of machine-made articles. Scissors and razors are now generally stamped out, and the article when it reaches the grinder is much nearer to its final shape and requires less grinding than the hand-shaped article; pocket-blades and table-knives, too, require less work, while dry grinding for these four classes of cutlery has almost disappeared. The second cause is that composition wheels of emery, carborundum, or similar material, have largely replaced sandstones in the lighter cutlery trades. For the grinding of scissors, razors and pocket-blades, composition wheels are almost universal. Their introduction has proved a great boon to the grinder, as they give rise to much less dust, while racing—a source of much ill-health and frequent loss of time—is practically a thing of the past. At present, sandstones are used for table-blades, files, etc., on account of the difficulty of obtaining composition-wheels of a sufficiently “kind” or soft nature. Several are, however, being used on trial, at the present time, and when that difficulty has been overcome, the sandstone should disappear almost completely.

“Several contraventions of the provisions as to racing, were discovered by Mr. Rees, who observed that of the three alternative methods for preventing the inhalation of dust, the respirator-method is that most generally adopted. But the respirator is often nothing more than a dirty handkerchief tied round the mouth of the worker, and it is to be feared that in many cases even this is not used. In two cases young persons remained at work in glazing operations whilst dry-racing was being done in the same hull. Faults in the design of new ventilating plants are still plentiful, *e.g.*, lack of inspection-doors, especially at bends; unnecessary multiplication of bends; and the bringing of the ducts under concrete floors, making access for cleaning and inspection very difficult. Several otherwise excellent plants have been found to be defective owing to lack of protection, as the metal duct is trodden on in places until it becomes quite flat and useless. Wooden trough protection has been recommended and obtained in several cases. Mr. Rees further remarks that the migratory habits of the grinders militate somewhat against the efficient working of the exhaust-appliances. One frequently comes across a tenant grinding the backs of razors without a hood on the exhaust-duct. Enquiry reveals the fact that the hull was designed for a fork-grinder, and that the hood originally supplied obstructs the light from the razor-grinder’s stone, and is generally unsuitable.

“The maintenance in an efficient condition of the appliances provided rests largely with the workers themselves; and such little details as the proper use of the slides, correct adjustment of the hoods, proper fixing of end-caps, add very materially, when observed generally throughout a large tenement, to the efficiency of the exhaust-draught. Finally, one notes with satisfaction the vast improvement effected in the recently built hulls. These have properly concreted and graded floors, with the drums above floor-level, thus obviating sunk belt-races, and making a very real advance on the old hulls, from the hygienic point of view. Improved natural lighting, as well as artificial lighting by electric lamps, warming by steam or hot-water radiators, and dry cupboards for clothing put off, are also found in these modern places.”

#### *Lead Smelting.*

The requirements of this code have generally been well observed, and in one works in the Wrexham district improvements have been made by which some of the manual

operations in the manufacture of yellow lead have been replaced by machinery, thus reducing the amount of exposure of the workers to lead dust and fumes.

Reference should also be made to the importance of keeping mess rooms in works of this kind completely separated from the parts where the manufacturing processes are carried on. In a mess room where the doors communicated with the blast furnace building, the dust from the ledges and rafters was found on analysis to contain  $1\frac{1}{2}$  per cent. of lead. The doors have now been altered to open into the outside air.

In South Wales some of the workers still give trouble by their occasional failure to use the mess rooms and lavatories provided, and to present themselves for periodical medical examination, while in the Newcastle-on-Tyne district the exhaust plant required by the Regulations was not provided in some works where extensions had been made during the war period and instructions on this matter were necessary. There has also been some irregularity as regards keeping the floors in good condition and with regard to the moving and depositing of lead material.

#### *Bronzing.*

This process is not carried on to the same extent as formerly, and in some districts has almost disappeared. Printers dislike using bronze powders; in small works its use is intermittent, and the arrangements as regards washing conveniences and protective clothing are liable to become neglected.

#### *Pottery.*

The reports from Mr. Werner, Mr. Garrett (Stoke-on-Trent) and Miss Anne Smith, who has been paying special attention to potteries in which women are employed, show that although this industry, like most others, had been disorganised by war conditions, there are indications of a real desire on the part of manufacturers to tackle the problems of reconstruction and to bring the equipment of their works up to a proper standard. There is, therefore, little doubt that most works will, in the near future, be better equipped for the observance of statutory requirements. Much good work has been done during the year by the Pottery National Council working in the closest co-operation with the District Inspector of Factories. Low solubility and leadless glazes are being increasingly used, thus simplifying both the observance and the administration of the Regulations. Glaring breaches of the law are comparatively rare, but in the Swadlincote district more irregularities were found than in the Stoke-on-Trent district; this was partly due to shortage of labour in the former.

Dealing with the Regulations in detail the following information has been received:—

*Clay Carrying.*—There has been a decided improvement in connection with this process. Automatic carriers are being introduced in a few cases, and the workers' demand that clay should be delivered to the work bench has led to the general provision of men for this work. It is hoped that similar progress will follow in respect of other systematic carrying, especially that of carrying heavy scraps.

*Mess Rooms.*—The limited space available in many potteries situated in densely populated areas continues to affect *inter alia* the question of mess room provision. Whilst additional examples of good mess rooms are found, in many cases they only just comply with the Regulations, and this may explain the reluctance of workers to use them. Seats with backs are rare, and few firms devote any attention to decorating and brightening the rooms.

*Dust Removal.*—The problem of emptying biscuit saggars in the most convenient way to comply with Regulation 7F has received much attention during the year. There was some misunderstanding on the matter, so it was brought by Mr. Werner before a meeting of the Associated China Manufacturers, with satisfactory results. Considerable progress has been made in the control of flint dust. Most firms now have installations for bedding and flinting, but much remains to be done in flat knocking and in emptying bedded ware from saggars after firing. Many casual workers still prefer to empty at the oven step, and some have gone so far as to refuse to empty at a bench fitted with exhaust draught, thus seriously handicapping firms who try to carry out the Regulation.

Exhaust installations for aerographing, towing, etc., show marked improvement and attention is mainly needed to secure proper maintenance of plants in good working order. New installations are required in several processes and some existing plants have been defectively designed.

*Ventilation of Drying Stoves.*—There is still much ignorance and indifference in regard to this problem, and the Pottery National Council, who have devoted much attention to the matter, have recently issued an Interim Report, which should be a valuable guide to all concerned.

*Temperature.*—Provided that the ventilation of drying stoves is adequate there should be no difficulty in complying with the 70° F. wet-bulb limit under all normal conditions; readings in excess of the limit are rare even in the summer months.

*Lavatories.*—Lack of maintenance of hot water appliances due to shortage of mechanics has been noted in a number of cases. Owing to the development of certain forms of decoration, notably ground-laying, additional washing conveniences have been required for females in some potteries.

*Floors.*—While compliance with the structural requirements as regards floors is now substantially complete, the old problems in regard to daily cleaning are still in evidence. A series of early morning and evening visits by the Inspectors disclosed a remarkable range of different standards as to what constituted a clean shop. Difficulty arises because the litter of moulds, boxes, etc., left on the floors prevents proper cleaning by the sweepers. Occupiers have therefore been urged to provide additional storage outside the shops for moulds not in use, and additional shelves in the shops on which moulds in use can be kept. Cleaning by a moist method is still a difficulty, and the use of damp sawdust is the only one which is found satisfactory.

The dangerous practice of brushing dipping-house floors before mopping or swilling them has been noted by Mr. Garrett. This defeats the whole object of the wet-cleaning rule, which is to avoid raising dust, and especially that containing lead compounds. Strong action must be taken by those in authority to stop such a reprehensible practice.

*Work Benches.*—The thorough daily cleaning of work benches by a moist method is generally well done by each worker in potters' shops cleaning his own section of bench. The same cannot be said of glost-placing shops, where the moist cleaning is usually scamped. In all places where lead-dipped ware is handled, scrupulous cleanliness is of the utmost importance if lead poisoning amongst the workers is to be avoided, and to ensure this Mr. Garrett has suggested to occupiers that the cleaning of glost-placers' benches should be carried out by the man who also cleans the glost-placing shop floors.

A good standard of cleanliness is now maintained in dipping-houses where lead is used, but unsuitable supports for tubs, such as old saggars with rough surfaces, are sometimes found in use.

*Cleaning of Boards.*—Mr. Werner is convinced that the majority of the new cases of lead poisoning which have come to light in recent years are connected with the use of improperly washed boards. Boards which have been washed in dirty water, dry with a thin film of lead glaze on them; this glaze becomes disseminated in the air as a fine dust as soon as the boards are handled, and workers in the rooms must inhale this dust. Under these circumstances constant pressure has been brought to bear on occupiers to instal sprays or other appliances which will ensure absolutely clean water being used on every board.

*Observance of Regulations.*—Mr. Werner states that the full importance of Regulation 27, as the key to proper compliance with the rest of the code, is still realised only by a limited number of firms. Doubtless the advantages reaped by the minority who have appointed really efficient Works Inspectors, and have given them every encouragement in their work, will in due course become so obvious that the firms who are at present content with the barest compliance with this Regulation will gradually be convinced that they are not alive to their own best interests. The spirit of the Regulation has certainly not been carried out yet by the majority of firms; too often the works manager is the nominal Inspector, and as he is always fully occupied with numerous other duties, it is not surprising if he carries out his functions under Regulation 27 in a perfunctory manner, and that he regards the report book in the wrong light as a record of his sins of omission and commission.

### *Shipbuilding.*

The Inspectors in all the important shipbuilding districts have submitted full and interesting reports upon this subject. These show that the difficulties experienced during the War in obtaining proper observance of the Regulations have now practically disappeared; lighting restrictions have been removed, and ample supplies of timber are available for the construction of staging.

In the Newcastle-on-Tyne district conditions in the industry have been abnormal during the year owing to strikes, observance of additional holidays, and stoppage of work on ships of war. These circumstances invalidate any comparison of accident statistics with those obtained in normal years. Nevertheless, Mr. Lauder is of the opinion that the numbers of accidents, both fatal and non-fatal, are diminishing, and attributes this result to better supervision exercised in the yards. Mr. Bennett (Stockton), however, finds the accident rate still high, with great variations in the rates between different shipyards. This is partially accounted for by the difference in the class of work done,

as the accident rates in repairing yards are usually lower than in yards confined to new construction. Mr. H. J. Wilson (Northern Division) reports that shipbuilding continues to be one of the chief accident producing industries, and as it is developing considerably in the division, Mr. Fotheringham has been deputed to make a special study of the industry and to report thereon.

Steel uprights and thwarts for stages have been introduced into a number of shipyards to replace the wooden uprights and thwarts in general use. Each steel upright is usually fixed in a concrete bed, and from its design forms a ladder giving easy access to the different stages. The thwarts have lips on their tops at both ends so that they cannot slip out of the uprights and planks cannot slide over the ends near the ship. This new type of support for staging undoubtedly eliminates several sources of accident associated with the erection and use of the old type.

As regards internal staging Mr. Fotheringham, writing of the Clyde area, states that the hanging stage is now becoming general. The usual type consists of two sets of two flat bars bolted or riveted rather more than the thickness of a plank apart and having bolts or rivets in their length to hold the staging planks in position. If this type of stage is suspended from the deck beams and locked so as to prevent swinging, it is very secure. Rope lashings formerly employed for hanging stages are rarely used now.

Gangways giving access to ships under construction have been much improved, and in some cases substantial steel framework has been constructed to carry them. This framework is clear of the staging and thus obviates the danger from thwarts crossing the gangway either at the level of the gangway or a few feet above it, as in the old method of construction. Mr. Dunolly (Southampton) has on several occasions found the rails removed from each side of the gangways at the top. This has usually been done to allow materials to be taken on board, and the rails have not immediately been replaced.

The lashing of ladders is now a well recognised precaution; where this cannot be adopted, a strip of wood nailed to the back of the ladder has been found satisfactory. Bent bar clips bolted to the ladder and hooking over the coaming, or chains secured to the ladder with grabs or holders on the coamings, are both excellent arrangements for securing ladders against slipping.

The Regulation as to the covering of ventilator and other deck openings is still indifferently observed in spite of considerable efforts on the part of many employers. In some cases a man has been appointed whose sole duty is to go round and replace the covers of openings, but accidents still arise from these sources. Painting a white border around deck openings has been tried in some yards, but with what success cannot be definitely stated.

Considerable improvements have been made in the lighting of ships, both electric lamps and portable acetylene lamps being largely used. The naphtha flare lamp still remains, however, and unfortunately adds its quota of accidents.

Mr. J. H. Rogers (South-Western Division) remarks that good first aid equipment is usually found now in shipyards. The standard laid down in the Welfare Orders has been urged and generally adopted, including, where necessary, the provision of an ambulance room.

The adoption in shipyards of various improvements outside the requirements of the Regulations, but which tend to reduce accidents, have been noticed by Inspectors. Such improvements include better roadways between berths, the use of "hammerhead" or cantilever cranes instead of winches for handling plates, and the use of pneumatic hammers, which are less likely to cause overbalancing to a riveter working on a stage than a hand hammer. On the other hand, the use of heavy pneumatic boring machines may increase the risk of accident.

A large firm of shipbuilders on the Clyde recently offered money prizes to their workers for the best "Safety First" suggestions. About 200 communications were received, but Mr. H. J. Wilson (Northern Division) expresses surprise at the paucity of really useful suggestions towards accident prevention emanating from the workers. This either indicates a lack of imagination on the workers' part, or an inherent difficulty in making improvements in shipyard practice.

#### *Refractory Materials.*

These Regulations were gazetted April 29th, 1919, and the reports received show that considerable progress has been made in securing compliance with them. Mr. John Law (Sheffield), who deals very fully with the subject, states that silica rock and ganister are generally broken in the open air. Respirators are provided for the men engaged on this work, but it is very doubtful if they are regularly worn. The use of wet brattice cloth when breaking material has not been considered practicable, as the cracks in the rock cannot be seen and more physical energy is therefore required in breaking it. Mr. Lloyd

Edwards (Wrexham) reports that at some silica brickworks the silica rock is received from the quarries already crushed, and after passing through rotary tube washers is ground wet. At two works in this district reconstruction schemes with suitable dust exhaust plant are being carried out. Where dust from stone-crushing machines is allayed by means of water or steam sprays, large roseheads must be provided and an ample supply of water or low pressure steam. On those plants with the crusher or cracker above the level of the grinding pan a decided advantage is obtained and labour economised. A chute from the cracker to the pan can be kept moist by the waste water from the former, whereas in the other case, with the cracker and pan on the same level, either (1) an elevator is needed to lift the broken stone and dust may be given off, or (2) the material must be thrown by hand, and if the excess moisture has drained off, similar dusty conditions may arise.

Various moist methods have been tried for cleaning silica brick drying floors; in the Sheffield area damping by means of a rose connected by flexible tube to the water supply has proved effective, but this has not been the experience in North Wales, where it is said that the drying bricks were spoilt by this method, and damping by means of watering cans has been generally adopted. Wet sawdust is often applied to brick moulds in place of the silica or brick dust formerly used to prevent the clay sticking to the mould, but in some works the moulds are merely dipped in water before filling.

Considerable difficulty has been experienced in checking the practice of throwing bricks in the process of setting and drawing silica brick kilns and in getting the men to wear the respirators provided. With the large kilns in use in South Wales, it is impossible to set or draw the bricks without throwing, unless an additional man is employed between the setter and the person delivering or receiving the bricks. The necessity for complying with the regulations has been pointed out to the employers, but there is difficulty in getting them to provide the additional man.

A good deal of propaganda work is necessary amongst the silica brickworkers to make them realise the danger of injury to health, but the medical examinations which are now being made under the Workmen's Compensation (Silicosis) Act should help to enlighten them.

#### *Hides and Skins.*

Mr. Younger (Halifax) reports that these Rules are established in three of the works engaged in the manufacture of buffalo hide pickers for looms, owing to the use of some hides from China. The only case of anthrax in the picker industry occurred in one of these works. The man affected had been working chiefly with Rangoon hides but might also have handled some from China. At one factory it was necessary to give instructions for proper places to be provided for the keeping of workers' food and clothing, but otherwise the rules appear to be well observed.

#### *Vulcanising of India Rubber by means of Bisulphide of Carbon.*

This process is commonly known in the trade as "cold-curing," and a fair standard of observance of the Special Rules is met with in most works. Examinations by the certifying surgeons, which the Rules require, show that the health of the workers is adequately safeguarded if, (i) efficient mechanical ventilation for the removal of the fumes produced is maintained, and (ii) the short spells in the workrooms required by Rule 2 are observed. The Rules are now, however, inadequate in certain important details in view of modern developments in the trade, notably as regards the use by certain firms of other solvents in place of carbon bisulphide. These solvents, such as benzol and certain chlorine compounds, introduce dangers to health commensurate with those attributable to carbon bisulphide, and their use requires regulation in the same way. The drafting of suitable Regulations to replace the present Rules is therefore under consideration.

This code has shown in a marked way the great value of mechanical ventilation intelligently applied in lessening the serious dangers which such a poison as carbon bisulphide would otherwise produce.

#### *Chemical Works.*

It is recognised that these Rules are quite inadequate to meet the conditions existing in modern chemical plants and shortly before the War new draft Regulations, based upon the safety precautions adopted in the best works, had been prepared, and it is hoped that these will be issued in the near future.

The existing Rules have been well observed, and in many works both during the War period and subsequently, the conditions have been vastly improved and the safety of the worker given more consideration. Improved types of rescue appliances have been provided and in some cases working clothes have been supplied by the employers.



*Aerated Water Bottling.*

Several Inspectors comment upon the increased use of the "low pressure" bottling machine as an important factor in the reduction of accidents in this industry. In Sheffield no accidents have occurred in any process covered by the Rules, but a few have occurred from the bursting of filled bottles by their accidental damage both when in and out of the boxes. Mr. Turner, writing of the West London district, refers to the unwillingness of some workers to wear face guards, especially during warm weather, and quotes the case of a woman who had lost the sight of one eye through failing to wear her face guard properly, and yet on a subsequent re-visit to the factory, was found doing the same thing and so running the risk of another accident.

*Tar Distilling.*

Several gassing accidents have occurred in tar stills in the North-Eastern Division, and Mr. C. F. Wright (Superintending Inspector) is far from satisfied with the observance of these voluntary Regulations or with the rescue and first aid appliances provided. In one case, two men entered a still contrary to instructions and without the pipe connections having been blanked off or the residual gases cleared by steam. One man was fatally gassed by sulphuretted hydrogen coming back from an adjoining still, and several other workmen were gassed in attempts to rescue the deceased. Had a waist-belt and life-line been used in this case, as provided for by the Regulations, the fatality would probably have been prevented.

## CHAPTER IV.

## USE OF ELECTRICITY IN FACTORIES.

BY

G. S. RAM, M.I.E.E., H.M. ELECTRICAL INSPECTOR OF FACTORIES.

In my last year's report I gave an account of the most noticeable developments in the use of electricity during the previous four years, covering the period of the War. During the past twelve months I have discovered little, if anything, in the way of novelty to chronicle. The most important fact is that the expansion in the use of electrical energy for all kinds of purposes, which received such an impetus during and on account of the War, continues unabated now that the driving power of war emergency has been replaced by purely industrial activity. Evidence of this continued progress is apparent in all branches of electrical work.

The demand for supplies for power purposes is far in excess of the present capacity of the public supply stations in many districts. This result is partly attributable to the high price of coal and uncertainty as to its delivery. Many factory occupiers, particularly mill owners in the woollen and cotton districts, who before the War could not be persuaded to adopt electrical driving, are now clamouring for it, and appear aggrieved that they cannot obtain supplies of electrical energy all at once. The effect on the supply undertakings is that many are overloaded and working without any reserve of plant. The difficulties are increased in many instances owing to the inferior quality of the coal obtainable, resulting in diminished steam raising capacity. In some districts relief has been sought, by electrically linking up different supply undertakings. This has no doubt permitted of a larger combined output, but the margin having been rapidly overtaken, the situation as regards overload and shortage of plant remains uneased thereby. Numerous extensions of generating stations are in progress, and schemes for new "super-stations" are under consideration. All such extensions and new schemes will henceforth be subject to the approval of the Electricity Commissioners appointed under the Ministry of Transport, with the idea that they shall be so designed as to afford the greatest common good in the most efficient manner. This aspect of the matter will no doubt be greatly facilitated by the powers conferred under the Electricity Supply Act, whereby the hitherto parochial limitations of areas served by individual supply undertakings may be removed.

Two new public supply generating stations of large capacity and on the most modern lines have been completed during the year, and are about to be put into operation.

The number of accidents reported during the year was 390, of which 28 were fatal. Owing to incomplete returns during the War period, comparison with the figures for the last few years is useless. Compared with the years 1914 and 1913, the total is less, the figures for those years being 450 and 512 respectively. The fatal cases are, however, greater, being 28 as against 20 in each of those years. The reduction in the total is satisfactory in view of the enormously wider use of electrical energy compared with that in the earlier years.

It will be seen from the table that the fatalities were, with one exception, all from alternating current. Most of them, 20 out of 28, were at low pressure, *i.e.*, not exceeding about 250 volts. With two or three doubtful exceptions, the shock was in all cases from one phase to earth. As most of the systems had the neutral point earthed, the shock could not therefore have exceeded low pressure. In seven of them the shock was received from lighting circuits connected between phase and neutral. This once more emphasizes the fact which I have repeatedly pointed out in previous reports, that a shock from alternating current at low pressures is vastly more dangerous than with direct current, although I often find that the contrary idea is widely held. This matter needs bearing in mind at the present time when there is so much talk about cheaper methods of wiring. The process of cheapening often begins by eliminating safeguards. Whether for factory or any other premises, where alternating current is used, the cheapening process should not be allowed to introduce any unnecessary risk of shock.

There is nothing unusual in the nature of the fatalities, similar ones have been described at length in many of my previous reports. Eight were from contact with the necessarily bare wires of overhead cranes or other travelling machines. Two were from hand lamps, one being the old type of hand lamp wherein the wire cage is attached to the lampholder. The other was just an ordinary metal lampholder attached to flexible wires. This latter arrangement is so readily rigged up that it is often used, even where safety types of handlamps are provided, but are perhaps not at hand at the moment. Two were due to current being switched on while persons were working on the circuit, the switches not being locked off nor any warning notice attached to them. Three, including two at high pressures, were in the testing departments of electrical manufacturing works. One of these was due to a mistake in switching. The other was due to a quite unnecessary and dangerous practice sometimes adopted in cable works. It appears that inspectors on behalf of the purchasers of cable, when attending high-pressure tests of the cables, are not prepared to accept the cable maker's assurance that the pressure is actually being applied to the cable, and require an ocular demonstration of this by means of a flash. The flash is produced by short circuiting the cable core to the lead sheathing. In this case a man entered the fenced-off danger zone to make the flash with a pair of insulated tongs and came into contact with the high-pressure connecting wires. It would appear that such demonstrations are not really necessary at all, but if required, they could be quite well arranged without any one having to enter the danger zone.

One fatality, not included in the table, as it was not an ordinary case of death from electric shock, was reported. The man had used a metal lampholder as a portable lamp on a 240 volt direct current circuit. The holder became live, and he received a prolonged shock and was severely burned in the hand. He died 16 months later from paralysis, attributable, according to the medical evidence, to the injuries he had received.

Amongst the non-fatal accidents, several occurred on extra-high tension systems. Five occurred to skilled persons, due to their own mistakes. In two cases they had forgotten to pull out the isolating switches protecting the oil switches on which they intended to work. In two others, where it was intended to earth dead conductors before working on them, live conductors were put to earth. Isolating switches were also operated in error whilst current was flowing. In five cases, unskilled persons were put to clean switchgear without proper supervision. Having completed the work they were instructed to do on dead portions of the switchgear, they proceeded without instructions to clean other parts which were live. These accidents again show the necessity for continuous supervision, unless all dangerous conductors are in locked cells. One accident in which two men were severely burned was due to the faulty arrangement of an isolating switch, whereby it was able to fall into contact after being switched off.

One accident was due to the use of a spanner on a high pressure switchboard close to unscreened conductors, and several others were caused by similar foolhardiness of persons when working on medium pressure switchboards. Totally ignorant persons are always liable to be a source of danger to themselves and others when employed in electrical stations, unless under strict supervision. There seems to be no limit to the extraordinary things they may do. Thus, a boy was employed to assist a fitter in the engine room of a large power station. He was told to connect up a portable 200 volt drill. Instead of seeking the nearest plug provided for the purpose, he climbed a ladder on to the switch gallery, got over a rail and entered a passageway of E.H.T. cells protected in front by screens 8 ft. high. He appears to have climbed a screen and attempted to connect the flexible lead to a 10,000 volt conductor. He was lucky in getting off with severe burns.

Three accidents were due to the explosion of oil switches, causing injuries from burns from the ignited oil.

One accident was due to a local inflammation of gases from secondary cells in a battery room. The ignition was caused by a man entering the room with a lighted cigarette. The battery room was faulty, in that there was practically no ventilation.

In my inspections I found, as usual, many examples of bad and dangerous work. These are by no means confined to factories where the occupier may have no technical knowledge, but occur also in electrical generating and sub-stations of public supply undertakings; e.g., exposure of high tension conductors within reach, not only in switchboard passage ways, but also in other parts of the premises accessible to anyone; potential transformers connected direct to the main bus-bars, without any isolating switches; open type alternating medium pressure switchboards with working platforms of iron plates without insulating mats. In some of the older stations which have been extended with good modern plant, old switchboards entirely unfitted for the present greatly increased power are retained in use. Occupiers of factories are often entirely dependent upon the contractors for putting in good plant in a proper manner. Even where good apparatus is supplied, dangers are

often introduced through ignorance. Thus, a number of cases were found where interlocked switch and fuse boxes were provided, the intention being that the fuse boxes could only be opened for renewal of the fuses when dead, but, in fact, they were connected the wrong way round so that the fuses would be always live and the interlock of no use.

Several prosecutions were taken for breaches of the Electricity Regulations, and penalties varying from £2 to £50 were imposed.

FATAL ACCIDENTS IN 1919.  
TABLE SHOWING PRESSURE AND SYSTEM.

Fatalities	Voltage of System.	Probable Voltage of Shock.	System.
1	11,000	6,350	3-phase
1	10,000	10,000	1 "
1	6,600	3,800	3 "
1	2,750	1,600	3 "
1	2,000	2,000	1 "
1	600	345	3 "
1	500	290	3 "
1	500	500	Direct
10	440	250	3-phase
7	400	230	3 "
2	350	200	3 "
1	200	200	2 "
—			
28			

## CHAPTER V.

## SANITATION.

BY

C. F. WRIGHT, O.B.E., H.M. SUPERINTENDING INSPECTOR OF FACTORIES,

AND

MISS SLOCOCK, H.M. SENIOR LADY INSPECTOR OF FACTORIES.

*Cleanliness and Hygienic Conditions.*

The keynote of the reports from practically all the divisions is the progress made during the year in getting factories back to their pre-war standard as regards limewashing and general cleanliness. During the period of the War repairs as well as limewashing were left almost in abeyance owing to the difficulties in obtaining labour and material, and the reports from all the Divisions show that there was a great falling off in the general standard of cleanliness. These difficulties have been gradually overcome, and there is discernible a desire on the part of both employers and workers for better hygienic conditions in all classes of workplaces. As Miss Constance Smith (North-Western Division) puts it, "the effect of the War has by no means everywhere worsened conditions. The higher level of sanitation and comfort required in munition and other works producing war material, and the strict conditions attached to Emergency Orders have tended to produce better surroundings in general and greater regard for cleanliness in particular in certain classes of factories, and especially in clothing factories. Hygienic experiments of the War period are being developed."

Evidence of improving conditions is furnished by the reference in several reports to the introduction of the vacuum cleaner as an aid to cleanliness.

Mr. Walmsley (Midland Division). At one large works in Birmingham, in addition to having a staff of painters continually at work, one man is employed exclusively in removing dust by means of a vacuum cleaner. The machine provided for the purpose is fitted to a small trolley, and comprises an electric motor driving a rotary suction pump which draws the air through a cylinder fitted with canvas diaphragms. Flexible tubing, with a suitable nozzle, is connected to the inlet of the cylinder and means for the removal of the dust collected in the cylinder are provided. The machine is taken to the place required, the cable from the motor plugged into a wall socket or connected with an ordinary lamp bracket and the nozzle operated over the surface of the beams, wall, &c. In this way the whole of the works, stores and offices are cleaned about once a week. A somewhat similar method has been adopted in another factory in Birmingham in which sand papering machines used for smoothing woodwork are provided with excellent exhaust for the removal of the dust, but in addition pipes have been taken from the exhaust system to other parts of the shop. Flexible tubes fitted with nozzles can be coupled to these pipes to act as vacuum cleaners for the removal of the dust which has escaped from the machines and settled in any part of the room.

Miss Escreet also refers to the successful use of a vacuum cleaner, and reports that the standard of general cleanliness is rising in the metal and engineering trade of Birmingham and the Black Country. Looking back to the years before the War, and comparing them with the year 1919, she considers that the state of the Birmingham and Black Country factories is now no worse, perhaps slightly better, than in 1913. The metal and engineering trades have never had a specially high standard of general cleanliness, but in spite of all War difficulties she thinks it may be said that the standard has slowly risen. Similarly Mr. Shinner (Bristol) refers to the excellent effect on the cleanliness of a cattle cake mill which has resulted from the provision of receptacles, known as sweep-holes, connected with an exhaust fan at the floor level, into which dust and dirt are swept and carried away by the exhaust draught.

Again, in considering this same question from the point of view of the workers, the following remarks by Mr. John Law, in writing on the Sheffield industries, are of special interest:—

Speaking generally, I have noticed a change for the better in regard to cleanliness; grinders and cutlers are becoming more enlightened as to the value of hygienic conditions, and realise more fully that good health is only compatible with cleanliness. One sees grinders wearing overalls when at work, and washing and putting on the clean collar of respectability before leaving the shop for home; the same improvement is noticeable among the buffers. That workers appreciate good conditions is strikingly borne out by the experience of a Sheffield firm of spoon and fork manufacturers who have converted a building which was formerly a laundry, into a buffing shop on modern lines. Dust-extraction plant has

been installed, overalls and head coverings are provided, there is a rest room and accommodation for outdoor clothing and a generous supply of lavatories, with hot and cold water and clean towels. The firm chose the site in a suburb hoping to tap a fresh supply of labour, but find that the majority of their workers come from considerable distances, passing many other buffing shops en route, preferring the better conditions here to the extra leisure gained by working nearer home.

A point to which more consideration might be given is the effect of brighter decoration in our factories and workshops. We have become accustomed to the plain whitewashed wall, relieved sometimes by a dado of black or other sombre colour, but this at best gives a dreary result. A well-chosen colour scheme would do much to improve the general appearance of the works, and might be made to provide more restful conditions, without undue interference with the light. It is gratifying to find that some employers, at all events, have begun to give attention to this side of factory life. For example, an effort has been made in certain textile factories in Scotland to make the rooms look more cheerful by painting the ironwork in bright colours; and one firm in particular is mentioned where, in a large mule spinning room, the iron supporting columns had, on the suggestion of the Welfare Supervisor, been painted in brightly contrasting colours with excellent effect. The usual drab appearance of such a room was completely changed; the general impression was one of cheerfulness, and brought with it the reflection how much a little touch of bright colour introduced in this way would do to enliven the gloomy interior of many of the older mills. Similarly in a flax mill in Belfast, Mr. Wilson was struck by the scrupulous cleanliness of not only walls, floors and staircase, but of the machines and metal fittings throughout the works. All bright metal work, even the brass and gunmetal bearings of the machines were kept highly polished. This necessitated much labour, but the general effect was most striking.

It must not be supposed, however, that these improvements are taking place automatically, or that constant vigilance and much solid work is not still necessary on the part of the inspecting staff. Many warnings have had to be issued, and some prosecutions taken; and the reports contain the usual crop of instances of unsavoury conditions, not infrequently in food factories, such as the East-end sweet shop, where scrupulous cleanliness is more than usually necessary. Unsatisfactory conditions are also specially referred to amongst the small workshops in East London, in respect of which, in one Borough alone, Miss Cave was obliged to send in a period of five months no less than 75 notices to the Local Authority in regard to the cleansing and repairing of walls, ceilings and sanitary conveniences.

Tenement factories, particularly those let out in small single rooms, as in the Sheffield cutlery trade, present special problems, and are very generally found unsatisfactory as regards hygienic conditions. Many of the Sheffield tenements have only been opened up again owing to the acute shortage of accommodation in the city, and many of the buildings now occupied as tenement factories were built from 150 to 200 years ago. Until 1914 attempts were made by the owners to keep the buildings in repair; but in the last five years some of the factories have reached a stage of decay which, if alternative accommodation were available, should be condemned. Mr. John Law thus describes the conditions:—

The worst conditions are still found in the tenement factories, and it is not remarkable to find shops with the number of broken windows exceeding the number of whole ones, and where the rain leaks through the roof, thus adding to the feeling of dirt and discomfort. The limewashing of cutlers' shops and grinding hulls for which the grinding regulations make the owner responsible is too often only done under compulsion. Hygienic conditions, which ought to be high for this kind of work, where lung diseases are prevalent, are in many cases distinctly bad, and remedy in the case of existing structures seems hopeless. It is, however, impossible to condemn them without depriving the tenant of the means of livelihood, owing to the present acute shortage of shops. Efforts are constantly being made by more enterprising firms to introduce what may be called "engineering" methods into the manufacture of cutlery, files, &c., and one may perhaps look forward to the time when most of the articles will be ground by compact machines and when the grinder will no longer sit hunched up over the grindstones, breathing in the damp and dirt in a clammy grinding hull, but will work under similar conditions to those in twist drill shops which are often models of cleanliness and good organisation.

In the clothing trade of Leeds Miss Ahrons experienced much difficulty in dealing with the question of cleanliness in the small factories:—

The great difficulty is in regard to buildings let out to a number of Jewish occupiers, where the staircases and sanitary conveniences are shared. It is almost impossible to enforce cleanliness of these common staircases and conveniences. It is difficult to put the onus on any special occupier in a building in which a number of workers from different factories are using the same conveniences, and in the case of two of these buildings in Leeds, owned by the Corporation, notices have been served again and again. As far as cleanliness is concerned prosecution is complicated by the difficulty of determining who is responsible in a building in which two or more different occupiers are constantly changing their name or place of business.



This same difficulty is referred to by other Inspectors, and as Miss Martindale points out, "it is easy for everyone in the building to shirk responsibility and to refer the Inspector to a mythical landlord who is supposed to send a woman to clean the stairs."

The reports from nearly all the Divisions have some reference to the condition of floors, and show that even where walls and ceilings of workplaces are clean, the floors frequently receive inadequate attention. Mr. Butler (East London) contrasts the dirty condition of the floors of a few confectionery works with the scrupulous cleanliness observed in others. Reports from the Midland Division draw attention to the indifference to cleanliness of workroom floors which, in many industries, is of far greater importance than limewashing, especially in bakehouses and other food factories. The frequent scrubbing of wooden floors is attended by undoubted difficulties, and in future more attention will require to be paid to the substance of which the floors are made.

Reports on Ireland show that the standard of cleanliness is well maintained, as the works were not affected by the War to the same extent as the English and Scottish factories. Inspectors who have worked in England, Scotland and Ireland, report favourably on the hygienic conditions in Ireland, especially in the stitching factories in Belfast, which showed evidence of a higher standard throughout, taking them as a whole, than is found in London. Mrs. Shaw, when visiting a small bacon curing factory in Dublin, was invited to look at the new gut-scraping shop, which was a new building, beautifully constructed, with a white tile lining, the tanks were of similar material, the floors impervious and made to drain properly. Quite an extensive building was contemplated, to include a cloakroom and messroom, while the gut-scraping room was said to be after the "best Danish model."

As regards bakehouses a tendency to close small ones, both in town and country, is noticed in the Midlands and also in Scotland, where the larger factory bakeries continue to develop on the system of mass production, particularly in the baking of loaf bread. These bakeries are unusually airy and hygienic and a great improvement on the old workshop bakehouse once so common throughout Scotland. As in the case of other works, sanitary conditions appear to have deteriorated generally throughout the country during the War, and several Inspectors draw attention to the unsatisfactory condition of the floors.

The effect of the stoppage of night work in bakeries has created a demand for larger premises and increased oven space, and it is reported as a consequence that in some parts of the country oven builders cannot promise delivery for six months after receiving the order. At the same time baking by day tends to increase the temperature in the bakehouse, and renders it necessary to provide improved ventilation during the hot weather.

#### *Washing Conveniences.*

Progress in providing washing conveniences generally, as apart from those required by law for certain industries and processes, is somewhat slow and disappointing, and employers are very apt to complain that where provided the conveniences are seldom used. Inquiry, however, almost invariably shows that in these cases hot water, soap and towels are lacking, and that no attempt has been made to arrange for necessary supervision. It is somewhat surprising that there has not been a greater demand on the part of the workers for provision of what appears to be such an elementary need. Miss Martindale, in writing on this point, says:—

Although I received more than a hundred complaints regarding the need for messrooms, cloakrooms, &c., I received none expressing the need for washing conveniences. Perhaps with shorter hours more demand will be made as the workers find that it will now be possible for them to go straight from their work to educational or recreative pursuits. On the other hand, it does not seem to have occurred to occupiers that workers might be glad to be provided with facilities for washing even where the trade is obviously dirty and unpleasant.

Employers are often ready to complain of a low standard of cleanliness amongst their workers, but they do not always realise that the first steps towards improvement should be taken by themselves by providing soap, towels and hot water. In a report on factories and workshops in the City of London Miss Coombes says:—

Although a large percentage of the factories I have visited have been places where the workers stay in for their mid-day meal, and are employed in making light and delicate dresses, blouses or neck wear, yet I have not seen one towel and very few pieces of soap provided for the use of the workers, and in the majority of cases the only convenience seems to be a small basin with a cold water tap. In some of the larger clothing factories several basins are provided, but these have an unused appearance, and I have been mystified at the apparent lack of connection between washed hands and dainty work. In a neck-wear room I mentioned the washing arrangements to the forewoman and she said, "There is the sink, but they do not want to wash," and on going out to the showroom the occupier with pride showed me

masses of finely tucked white chiffon frills, which as he remarked did not look as if hands had touched them. In trades where the work is of a dirtier nature, e.g., boxmaking, cigarette-rolling, and in packing works, I have found fewer washing conveniences than in the clothing works. In boxmaking it is particularly important that cleanliness should be encouraged by the provision of good appliances; the glue used is most unpleasant, and must cause discomfort to the workers, unless they are able to remove it from their hands before their mid-day meal and after work.

At the same time the reports do show that the advantages resulting from the provision of washing accommodation are coming gradually to be better appreciated. In new factories accommodation is provided almost as a natural course, and instances of excellent facilities might be quoted, such as those provided in a large chain works in the Midlands, where rows of basins have been installed back to back, down the centre of the room, with an ample supply of hot and cold water laid on above them, and rows of clean roller towels on stands behind, the whole installation being under the charge of a special attendant.

It is hardly possible to over-emphasise the importance of supervision. Some person must be made responsible for the cleanliness of the lavatories, and for their proper equipment. The workers cannot see to these matters themselves, and without supervision the accommodation provided is certain to become dirty and dilapidated, and on that account neglected. This point is pressed in the reports from all the Divisions, and much of the disappointment which has not infrequently followed from the provision of washing facilities must be attributed to the absence of adequate supervision.

### *Sanitary Conveniences.*

Reports show very great variation of standard throughout the country; in some factories there are ranges of modern conveniences equal to those provided in first-class buildings, in others the most primitive and insanitary arrangements are still found. The action taken by local authorities where Section 22 of the Public Health Act Amendment Act has been adopted, which is now the case in nearly all county boroughs and urban districts, varies as greatly as the accommodation provided. Some progressive authorities require a high standard of building, adopt the Order of the Secretary of State as their standard of accommodation, and inspect sanitary conveniences in factories regularly without waiting for notices from the Factory Inspectors; others allow plans to be passed, sometimes without reference to the Medical Officer of Health or the Sanitary Department, for new conveniences which are far below the standard of the Sanitary Accommodation Order as regards ventilation and privacy. In some towns water-carriage is insisted upon; in others it is required only in the case of new conveniences. Special attention has been given to this question throughout the year, and the general position can only be described as far from satisfactory. The old-fashioned pail closet, with all its attendant objectionable features, is still prevalent in many districts. Much of the accommodation is out of date, and can be remedied only by reconstruction on modern lines. There is too great a tendency to tinker up unsatisfactory conditions in order technically to conform to the standard of the Sanitary Accommodation Order, though the money thus spent is in many cases almost thrown away. This is particularly noticeable where attempts have been made to put an intervening ventilated space between the closet and the work-room, and in order to provide it the closet is reduced to a size almost too small for use. The problem is not, however, merely a factory problem. The conditions in the factories are often only a reflex of those existing in the homes of the workers, and it is obvious that where the latter are primitive it is difficult to secure a high standard in the works.

In illustration of these general remarks some extracts may be given from the reports of the Inspectors:—

*Miss Constance Smith (North-Western Division).*—“The irregularities found were discouragingly numerous, and in many cases of a serious character. They reveal a standard of sanitary accommodation which is a reproach to occupiers and local authority alike. Indeed, the latter should sometimes bear the heavier burden of the blame. Mills and factories too often reproduce the bad domestic conditions suffered to exist in the towns where they are situated. When a borough tolerates thousands of pail closets in the homes of its citizens, it is hardly surprising to find some of its industrial establishments equipped only with the same primitive form of sanitary convenience. In connection with 240 routine visits paid to cotton mills, 197 notices notifying 298 defects were forwarded to the sanitary authority. Many of the notices referred to contraventions under two, three or even more heads. While the general level of sanitary accommodation was in a good many places found low, it sank lowest in certain purely cotton towns. In one of these, successive visits to 19 mills yielded a record of grave irregularity in every one,

including 6 cases of inadequate provision, 1 of no separate accommodation for the sexes, 5 of offensive effluvia, 13 of no doors, and 7 of direct ventilation into workrooms."

*Miss Keely* was deeply impressed by the remarkable inferiority of the Lancashire standard. She says:—

"In the early part of the year I visited a large number of cotton mills in the Blackburn, Stockport and Wigan districts, and some of the conditions which I found were really horrible. One of the most unpleasant systems consisted of a set of conveniences on different floors of a mill communicating with an insufficiently covered cesspool outside the mill wall. These were supposed to be flushed by buckets of water, but this was apparently frequently neglected. In another mill tub closets opened directly into the workrooms. These irregularities are not confined to the cotton trade; for instance, some of the conditions in old felt hat works in Stockport are very bad. In the worst cases the age of the building affords some excuse, but unfortunately local public opinion has not yet attained the standard of the Secretary of State's Order of 1903. The requirement of separate doors is often considered to be an unreasonable fad, and one manager was surprised to hear that a set of water-closets which ventilated only into the card room, and had no screen or intervening space, was not satisfactory. He pointed out what an improvement they were on the set which they had replaced."

*Miss Andrew*.—"The absence of doors is not found only in old mills. One mill employing 250 women, which was built in 1913, had a row of ten beautifully tiled conveniences, but not one had ever been provided with a door. A large number of conveniences open directly into the card rooms and weaving sheds without any intervening space or screen. In a number of the newer mills in one district the doors of the conveniences were constructed partly of transparent glass, and in at least two cases in mule spinning rooms these conveniences were constructed two together, one facing the other, and the intervening space contained the drinking water supply for both sexes. The general unsatisfactory condition of the sanitary accommodation is by no means peculiar to the smaller factories. Firms which are leading the way in Welfare work are among the defaulters. One firm had a continuation school, a dental clinic and a welfare staff, but the sanitary accommodation throughout the mill was extraordinarily bad. In some departments the conveniences ventilated directly into the workrooms as there were no intervening ventilated spaces and the doors were not carried to the roof. In another mill, where a model canteen and a club house had been opened, every convenience in the spinning department ventilated directly into the workroom and in the weaving shed there were no doors to the conveniences. A mill with beautifully tiled staircase and passages and a model gassing room had conveniences without light, without ventilation and without doors."

The Inspectors in Leeds, Bradford and Halifax, report some improvement, and it is gratifying to learn that in Huddersfield a resolution has recently been passed to compel the conversion of all existing privy closets in factories and workshops to the water carriage system, but otherwise the same unsatisfactory conditions prevail in the North-Eastern Division. The accommodation in Stockton is reported not to be of a high standard, though the Sanitary authority deals promptly with complaints referred by the Inspector. Mr. John Law (Sheffield), states that sanitary conveniences are in many cases badly kept and that there is need for structural alteration in order to attain the desired standard as to lighting and privacy, and that this is so more particularly in the tenement factories. It is reported of the sanitary accommodation for women that the standard, which has never been satisfactory in the textile districts of Yorkshire, except in those mills where it has been modernised and brought up to date, has fallen during the War into a bad state and it has been necessary either to send notices to the local authority about structural matters or to instruct about general cleanliness in nearly every mill visited. Unfortunately the standard of the local authorities is still very often far below that of the Order of the Secretary of State and the Inspectors have to try to persuade officials of the local authorities that privacy is desirable for women workers, the supervision of the use of women's conveniences by a man overlooker being accepted by some of them as a matter of course. Miss Hastings found as regards the tenement cotton factories that it was necessary to send a notice to the local authority or to give instructions to the firm in every instance. In the woollen mills she also found bad conditions. In one mill most of the conveniences opened off the staircases, there was no water carriage system and the effluvia was so strong that it was extremely unpleasant to walk up the stairs. In several mills, doors were found off and entrances to conveniences unscreened. In one factory the women complained that the interior of the men's convenience was plainly visible and that though there was a door on the convenience it was never shut. In another factory the intervening space separating

the women's convenience from the workroom was fitted with pegs, and these were used by boys to hang their caps on.

Miss Ewart found similar conditions in tenement cutlery factories. The sanitary accommodation was structurally defective in 20 cases, affecting over 65 per cent. of the occupiers in these tenements. Privacy was most difficult to secure, the replies to two notices being that "screening was undesirable" or "not possible." In one case where she reported that there was no separate approach, the sanitary authority replied that there was "no necessity for a separate approach." Effluvia and insufficient means of ventilation was on the whole improved after the notification to the sanitary authority, but in two very bad cases the reply was that "Effluvia cannot be prevented in this type of trough closet."

Whilst in some of the largest towns in the Midland division the co-operation of the sanitary authority with the Factory Department is excellent, there is great difficulty in obtaining reasonable accommodation in many of the smaller areas. As in other districts the majority of local authorities seem to lack initiative and wait for the Factory Inspector to take the lead. In the Nottingham district there are a great number of pail closets still in existence though these are gradually but slowly being replaced by the healthier water carriage system. Mr. Wolte (Wolverhampton) states that in the Black Country sanitation is at a low ebb, except in two towns where the authorities are quite alive. All the Inspectors in the Midlands refer to the absence of any water carriage system in certain districts (not only rural) and urge the special importance of its introduction on account of the increasing difficulty of obtaining labour for the scavenging of pail closets. It is instructive to note that in a case quoted by Miss Mellor, where the condition of the pail closets in the factories and workshops in a certain village had continually to be brought to the notice of the local authority, the Council finds it difficult to retain a permanent Sanitary Inspector. A local sewage scheme exists, but apparently requires replanning and extending. Miss Mellor adds "In this and similar villages it is to be hoped that continual pressure by Factory Inspectors in regard to factory sanitary accommodation may lead to the development of an adequate sewage scheme for the benefit of the whole population." Miss Ann Smith found the standard of cleanliness in conveniences in the Potteries much lower than anything to which she had been accustomed in London or elsewhere. She reports, however, that the conveniences at 44 works which she visited a second time after an interval of a year had been on the whole better kept and she attributes this to the greater attention paid to sanitation in the district since the Armistice and to the co-operation of the local authority. An important feature of this co-operation has been an agreement to urge the appointment of a woman to supervise the cleanliness of the conveniences instead of the hap-hazard arrangement by which they are left to the care of the "odd man."

In the South-Eastern Division the standard of sanitary accommodation is on the whole higher in London than in many other parts of the country. The Borough Councils as a rule take steps to secure proper conveniences, but outside London the local authorities, as elsewhere, vary very much in their procedure.

In the South-Western Division likewise, varying standards, due to the difference in administration of the local authorities, are found. Some Medical Officers of Health do not agree that an intervening ventilated space is necessary where workers are not working near the conveniences, and in one case the local authority has permitted the erection of urinals inside a large boiler shop. Grave defects have been found in several steel and tinplate factories in South Wales. In some of these works the conveniences were not divided into cubicles, there were earth floors, the excrement fell into a ditch below the bar which formed the seat, and there was no artificial lighting, although night shifts are employed. Small country works are occasionally found without any conveniences at all, and in one case proceedings were taken and a fine of £5 imposed. As regards some of the smaller works in the Yeovil district Mr. Shaxby says:—

There is too often room for considerable improvement both in the kind of receptacle for excreta and in the precautions taken to prevent nuisance. One still finds in the worst places a mere pit in the ground—not always even lined with brick or concrete—which is emptied at uncertain intervals. The use of dry earth, ashes, or sawdust as a deodorant and to prevent flies spreading contamination is apparently not understood, and a supply of such material at a closet is rarely found. Lethargy and neglect play a part in these matters, however, particularly in such instances as that of a large creamery in a small town where the pail closets were in a state too disgusting for print.

Similarly, Miss Sadler found in the outlying country mills, especially in Devonshire, the sanitary conditions still incredibly and almost ludicrously antiquated.

*Temperature.*

Although reference is made in some reports to numerous cases of low temperature, said to be due to the general shortage of fuel and the necessity for economy in the use of both coal and gas, it is very satisfactory that the whole question of heating, especially in large factories such as engineering shops, appears to be receiving much attention, and information as to the installation in these works of the unit system of heating is made in reports from nearly every division. The advantages of the system are thus described by Mr. Lauder (Newcastle).

Each unit consists of a fan which forces the air under pressure downwards over steam heated pipes and so distributes the heated air at floor level where the effect is most felt by the workers. Each unit is self contained and the fan can either be driven by belt power or directly by an electric motor attached. The erection can either be arranged to stand on the floor or be attached to the wall of the workshop, if it is desired to save floor space. Additional units can be added in the most advantageous position so as to give the best results. Live steam at any pressure or exhaust steam can be used. By adopting this system the trouble occasioned by the erection of large steam pipes or of hot air ducts which obstruct light and get in the way of belting and shafting is removed. A further advantage is that if overtime is being worked in any shop or part of a large shop only those units which are actually necessary need be kept running and not the entire heating plant for the whole factory. If required the units can be so arranged that cool fresh air can be drawn into and distributed in the workshop in summer time. The unit can therefore be used in warming the air of the workshop in winter and cooling it in summer time.

That the position of the units is extremely important is emphasised in Mr. Walmsley's (Midland Division) report. He refers to the upholstery and painting department of a motor body works in which the distributing pipes were fixed to the ceiling. This method was found not to be successful. In the case referred to it caused such draughts that the workers stopped the fans and covered the inlets whenever possible. In order to obviate the "dry" feeling in the air, which is sometimes noted in shops heated by the unit system, one firm has introduced a slight amount of steam from jets near the roof and the workers maintain that the atmosphere is improved.

At the other end of the scale the primitive method of the open coke fire is still much in evidence for warming boiler shops and foundries, but this method is not so offensive as might be expected owing to the large air space and open nature of the shops.

Mr. Law comments on the temperature conditions in the grinding hulls of Sheffield :—

The means of heating adopted consist of a small open fireplace in the middle of the front wall or in a corner which can only give warmth over a radius of a few feet. The lack of glass in the window frames, the constant evaporation of water from the stones, troughs and floors, combined with the bad system of ventilation and lighting and the closed-in condition in many of these places give a feeling of dampness and rawness in wet grinding hulls which the small fire cannot overcome. A few of the more modern hulls are equipped with steam heating apparatus, and one recently opened has radiators at intervals. It is only by this system, or a similar one of hot air or closed flues through which furnace gases could be passed to the mill chimney, that adequate warmth can be obtained. The grinders themselves are now alive to this problem among others, and improved conditions are being demanded.

Trouble has been experienced in regard to low temperature in the sack factories in Liverpool, largely owing to the fact that the premises occupied are generally old warehouses with large doors on each floor, opening on to the street or yard, through which bales of sacks are received or despatched, with the result that the temperature in the room is frequently the same as that outside. Unfortunately, warehouse accommodation is at present exceedingly limited in Liverpool, and there is a tendency for sack repairing firms to migrate to the oldest and most dilapidated on the market, as the goods they handle are light and can be stored in premises which would be unsafe for other purposes. The problem of heating these buildings is often extremely difficult, but local heating by electric or gas radiators is being required, when general heating throughout the factory is impossible.

Textile factories present their special problems. Wool sorting shops are apt to be too cold, while in wool combing and carbonizing works high temperatures are found. Improvements in ventilation have bettered the conditions in wool combing and carbonizing shops, and high temperatures have also been reduced by the installation of electric light in place of gas, by increasing the air inlets, and by the extraction of the hot air near the point of origin. In cotton cloth tenement factories complaints have been made of non-compliance during the cold weather with the prescribed minimum temperature of 50° F. Conditions are naturally most unsatisfactory in the early mornings, although the later start, now universal, is having a beneficial effect. Warp dressers, reachers in, and weavers are unanimous that 50° F. errs on the low side and they are pressing for a minimum of 55° F.

The employers are in full agreement with this view, and a joint deputation of employers and operatives in the cotton trade, which was received recently by Sir John Baird, have

urged that the Act be amended accordingly. The point is to be dealt with in the coming new Factory Bill.

An interesting development for reducing the very high temperature associated with many of our most important industries is the douche system of air cooling. Under this system a douche of cool moving air is blown by means of fans into the space where the men are at work, and produces a cooling and refreshing effect. It has been installed with good results in many glass works, in the majority of the tinsplate works, in some steel works, in the tin soldering department of a chocolate factory, and in two nut and bolt works in the Walsall district where the forgers and boys helping them are exposed to high temperatures from the heating furnaces alongside which they work, and in a tube works in Scotland. Mr. May (Glasgow) reports that the employers and workers speak enthusiastically of it, and says "Whereas in previous years the men often left work in the early afternoon owing to the excessive temperature, they were able to put in full time last summer. One of the old hands remarked that there was no fatigue since the system was introduced." The close relationship between production and good working conditions is here clearly demonstrated, and undoubtedly much more can be done in this direction. Mr. Law (Sheffield) refers to high temperatures at furnaces, rolling mills and forges of all kinds which could obviously be reduced by the adoption of a douche system of cooling.

#### *Flueless Gas Stoves.*

During the War there has been some increase in the use of flueless stoves. There is much to be said against this form of heating, and it is at least questionable whether it conforms to the requirements of the Act. It is not necessary to prejudge this matter here, but it is generally admitted, even by the makers of the stoves, that they are only suitable where there is full and adequate means of ventilation. This is a point which the staff have been instructed to watch very closely. As a result, in the North Western Division, the occupier of a clothing factory was prosecuted under Section 7 (1) and fined £5 for failure to maintain proper ventilation in two rooms where the chief means of heating were flueless stoves. Air samples taken after three or four hours work gave, on analysis, results varying from 17.1 to 27.3 parts of CO<sup>2</sup> per 10,000 in one room and 18.5 and 20 parts in the other.

As a substitute for flueless gas stoves, Mr. McNair (Inverness) refers to a new electric steam radiator in which water is vaporised by means of the electric current and which appears to be in every way suitable for workrooms. These radiators can, he understands, be run at a cost of 2d. an hour.

#### *Lighting*

Progress is generally recorded in lighting both by electricity and gas. Diffused ceiling lighting appears to be coming more and more into vogue, and has certainly great advantage over some other systems of illumination, since, if the lamps are properly placed there is an absence of both glare and shadow. The arc lamp is disappearing and the "Half Watt" lamp taking its place. This lamp is described as the last word in efficiency, as it gives a brilliant light for small energy consumption. One objection to electric lamps of this type however, is the glare, but this can be overcome by use of proper shading—the indirect method of reflection being often adopted. The general question of shading both electric and incandescent gas lights has received the attention of the staff, and the better adjustment of light to the work is also frequently noted. Mr. Eraut (Belfast) comments on improved illumination in linen weaving sheds and in handkerchief hemming and embroidery work.

The concentration of light on the cloth being woven is effected by means of carefully shaded electric lamps, whereby the worker is protected from the glare, the reed space is thoroughly illuminated and at the same time sufficient lighting is provided for the gangways. In fine stitching it is obvious that a very efficient system of lighting is essential if the eyes of the workers are not to be strained, and this is being secured by means of lamp shades with a very acute cone angle which concentrates the light on the work immediately under the machine needle and leaves the worker's face shaded.

Similarly the high degree of accuracy necessary in the work in many of the factories in Coventry and Rugby makes good lighting imperative; there most of the factories are lighted by means of electric lamps, which are either of the arc type and fixed considerably higher than the workers heads, or of the metal filament type attached to flexible cables and taken to the machines which are in use, the worker's eyes being protected from glare by the use of adjustable coloured shades of metal or glass, frosted glass, or globes of the "Holophane" type. The introduction of a concentrated form of lighting is reported also in the Norwich boot factories, more particularly at the machine tables where it is now frequently found that the lamps are carried on standards affixed to the tables, and



so constructed that the light can be fully directed on the work and shaded to protect the operator's eyes from the glare. These lights are highly spoken of by the workers, who appreciate the absence of eye strain.

As an instance of bad lighting, Miss Sanderson refers to a clothing factory in which all the electric bulbs were hung about  $5\frac{1}{2}$  feet above the floor level. At the time of her visit the firm had just bought a new lot of shades in the hope that they would relieve the eye strain, but when she pointed out that even with these shades the greater portion of the electric bulb would still project below the shade the firm discarded them and procured others of a deeper shape; even so, owing to the position of the bulbs, it was found impracticable to shade them all satisfactorily without unduly darkening the room, with the result that the glare remained. She mentions the case as pointing to the necessity for providing separately for general lighting and the lighting of individual machines or parts of the work.

#### *Dust Removal.*

Very satisfactory reports have been received as to the solution of the problem of dust removal in the preparing departments of hemp, jute and flax mills.

Mr. Wilson (Northern Division).—"I wish to put on record here the very successful manner in which the dust trouble has been definitely remedied in the preparing department of flax, hemp and jute mills. I consider that the solution of the problem is one of the most successful with which the department has been associated. Knowing the conditions in these industries prior to the introduction of Regulations, and even during the later years when employers were making efforts to attack the problem, I have no hesitation in saying that to-day the preparing rooms of such textile factories have been completely transformed. As the result of many experiments carried out, frequently at a very considerable cost, ventilating engineers have arrived at a completely successful method of dust removal. Much study and careful thought has been given to this subject, and in the future there should not be much difficulty, since the machine makers, knowing the statutory requirements, can adapt their machines and arrange them in the mills to co-operate with the ventilation plant. A successful installation, however, is costly and is consequently less likely to be found in small premises or in scutch mills where operations are carried on for only a few months in the year. The problem of scutch mills, particularly the small works in rural areas, is still awaiting a satisfactory solution. The conditions in many are still unnecessarily bad, indeed, I consider them worse than are to be found in any other industry in the whole Division. Were it not that the workers spend a substantial part of every year in agricultural or open-air work, the results on their health would be much more marked."

Mr. Jackson (North-Western Division) comments on the position in cotton waste mixing and willeying and in cotton card rooms. The problem here is full of difficulties, and though conditions have improved in recent years, they are still not altogether satisfactory. He draws attention to a report from Mr. Walmsley (Oldham) on an improved system of stack mixing which has been adopted by a firm in his district, in which it is stated that "The waste is fed into a duct and is carried up to a settling chamber by means of a fan and deposited; when the dust has subsided the waste is then drawn out and again fed down a duct on to a lattice fed willow; there is thus very little handling and consequently little dust."

Mr. Jackson further discusses the question of dust in the cotton card rooms. Dust is given off both during the normal working of the cards and in increased quantities when they are being ground or stripped. In the past, attention has been confined too much to the removal of the dust given off during the operation of stripping and too little has been done to deal with it during grinding operations or with the general dusty condition of the rooms during normal working. The usual type of vacuum dust extractor used for stripping cannot be adapted to remove dust when grinding, and as it is used only during the stripping operations has no effect at all upon the dust given off in the ordinary course of manufacture. In a few card rooms the air is extracted along one side by means of fans, and warmed air is admitted on the opposite side, so that a 'scouring' action is set up, but the objection to this is that it necessitates the raising of the dust to meet the suction of the fans and causes consequent suspension in the atmosphere. What is required is its removal at the point of origin, viz: at the card itself. Any extracting plant which removes the dust only when stripping and which cannot be adapted for use during grinding operations, must be rejected as unsatisfactory. Complaint is made by several Inspectors that the strippers will not use the covers provided for the stripping brushes, on account of the extra work it entails. Such action is unfair to their fellow workers who are thereby compelled to breathe a dust laden atmosphere because these men are too lazy to use the means which have been provided—at considerable expense—to remove the dust.

## CHAPTER VI.

## INDUSTRIAL DISEASES.

BY

T. M. LEGGE, M.D., C.B.E., H.M. MEDICAL INSPECTOR OF FACTORIES.

During the year, the Whitley Councils made themselves felt and matters affecting health and special occupational diseases were discussed with, for instance, the Spelter Trade Joint Industrial Council, and the Interim Industrial Reconstruction Committee for the Patent Fuel Industry. Conferences were held with representatives of the manufacturers and operatives to consider the conditions in boot and shoe factories; and at Stoke-on-Trent I met, at their invitation, the Research, Inventions and Designs Committee of the National Council of the Pottery Industry, who were anxious to leave no stone unturned in ameliorating the conditions of pottery workers. Again, with Mr. Williams, conferences were held with the British Lampblown Scientific Glassware Manufacturers' Association, Ltd.

The periodic examination of briquette makers has been instituted, arrangements being made with Dr. H. A. Scholberg, pathologist of the Royal Infirmary, Cardiff; Dr. A. F. S. Sladden, pathologist of the Swansea General Infirmary; and Dr. W. W. Hellyer of Port Talbot. Opportunity was taken of addressing some 300 of the patent fuel workers in Swansea on the advisability of those employed more than 10 years in briquette manufacture submitting themselves to periodic medical examination to prevent any cancerous condition being allowed to advance so far as to be inoperable; a smaller meeting on the same lines was held in Newport. This examination must, at any rate for the present, be a voluntary one, but seeing that it is primarily for the benefit of the workers themselves, one hopes that they will not forego it. Indeed, at present treatment of the effects is all that can be done since the cause is as yet unknown, and this can only be secured by detecting cases in the earliest stages. In the effort to get at the cause, the Department is now working in conjunction with the Medical Research Committee and joint visits to Cardiff to see the nature of the lesions and conditions of work were made. The Department is indebted to Dr. Norman Walker for the help he has given from his knowledge of the somewhat similar condition prevalent among workers in the paraffin refineries of the shale oil works in Scotland; and to the skill of Miss Rae, for making wax models of the various stages of the malady, which have been very useful in demonstrating to employers, workpeople and others, the need for early treatment. In the Shale Oil Industry, as outlined in last year's Annual Report, a voluntary examination of the workers in the paraffin sheds is now being made.

On the various Welfare Orders drawn up during the year—Fruit Preserving, Oil Cake Mills, Gut scraping, Laundries—all questions as to the necessary First Aid equipments to meet the special needs of the industries concerned have been referred to us. In this connection special inquiries have been undertaken by Dr. Bridge into the effects on the skin caused by orange and lemon peeling in the making of marmalade, and by gut scraping.

Early in the year Dr. Collis held Conferences in different parts of the country to secure co-operation with the Tuberculosis Officers who had been appointed to make the periodic examinations under the Silicosis Act. For their guidance his Milroy Lectures on "Industrial Pneumoconioses, with special reference to Dust-Phthisis" were officially reprinted. Dr. Collis's 11 years' services with the Department terminated in 1919 on his appointment as Mansel Talbot Professor of Preventive Medicine, University of Wales, Cardiff.

In addition to the points already mentioned, Dr. Bridge has been engaged in an examination of the workers in the manufacture of clinical thermometers, has dealt with most of the difficulties arising in connection with the administration of the First Aid and Ambulance Orders (with supervision of the First Aid Inspectors); made detailed investigation of the injurious effects on the eyes and the temporary blindness following exposure to flashes in electric welding with Mr. G. Scott Ram, the Electrical Inspector; and made inquiry with Mrs. Bridge into the effect of "Oliver" Forges on women, without finding this such as to require their exclusion. With Mr. Jackson he inquired into the effects of dust in the early process of silk manufacture, and has made further investigations into poisoning from arseniuretted hydrogen in various industries.

In October and November I was absent in America attending the International Labour Conference held in Washington and subsequently giving a series of lectures and visiting industrial centres in various parts of the States. One of the subjects before the Conference was the employment of women and children in unhealthy processes, and of the Sub-Committee which discussed this, I was appointed Chairman. The report of this Committee was adopted by the Conference. As the time was so short and no definition of what was considered an unhealthy process had been given, discussion was limited to (1) intoxication by lead, (2) infection from anthrax, and (3) intoxication by carbonic oxide gas. All three affect men, women and children in industry, and the general principles of exclusion or limitation of the employment of women and children in them will hold good for practically all other unhealthy processes. The general principle which it was felt should be applied in the case of women was that only where interference with the function of maternity could be shown to exist should a bar be placed on their employment and lead is practically the only intoxication in which this danger is present. Generally, the conclusions as regards limitation of women's employment in lead industries were that (a) where lead is used in the pure metallic solid form either alone or in alloys (*e.g.*, soldering, letterpress printing, brass polishing) employment will be unrestricted; (b) where fumes and dust are incidental to the nature of the processes carried on and cannot sufficiently, in the present state of knowledge, be controlled so as to prevent risk of danger to the offspring they will be excluded; and (c) where fumes and dust are incidental but can be sufficiently controlled so as to minimise the particular danger they will be employed subject to adoption of the necessary precautions.

In regard to mercury, the Committee urged that as experiments in France appeared to have been entirely successful in showing that the use of nitrate of mercury in the process of "carrotting" rabbit fur (*i.e.*, brushing the fur with a solution of the salt in question) is unnecessary, the question of prohibiting the use of mercury in hatters furriers' processes should be submitted to the International Labour Office, with a view to action at the next International Labour Conference.

On the subject of anthrax, the general Conference recommended that "arrangements should be made for the disinfection of wool infected with anthrax spores either in the country exporting such wool, or if that is not practicable, at the port of entry of the country importing such wool."

A further recommendation was "that each member of the International Labour Organisation which has not already done so should establish as soon as possible, not only a system of efficient factory inspection, but also in addition thereto a Government service especially charged with the duty of safeguarding the health of the workers, which will keep in touch with the International Labour Office."

Subsequently, at the invitation of President A. Lawrence Lowell, and the Fellows of Harvard University, I gave some lectures in connection with the development of a new Department of Industrial Hygiene in the School of Public Health. Before my return I had the opportunity of visiting a number of factories in the United States, and conferring with industrial physicians, research workers, social workers and others, who went out of their way to give all the information I required. I paid most attention in the factories to the arrangements made for the medical supervision of workers, the granting of certificates of fitness to young persons before employment, and to the nature of the exhaust ventilation provided for the removal of dust and fumes. The medical officers, Dr. Quinby at the Hood Rubber Works, Dr. Irvine Clark at the Norton Grinding Works, Dr. J. Britton at the International Harvester Works, and Dr. Banks at Thomas A. Edison's, Orange, N.J., gave me detailed accounts of the manner in which medical supervision was co-ordinated with the employment and other services. At Chicago I had the advantage of visiting factories with the two part-time Medical Inspectors of Factories, Dr. Gibson and Dr. Apfelbach, and of hearing from them the nature of their services. In Chicago also I had interviews with Mr. Jones, Chief State Inspector; and in New York with Miss Perkins, one of the Industrial Commissioners, Mr. Gerner, Chief State Inspector of Factories, and his technical adviser, Mr. Vogt, and three of the Medical Inspectors of Factories, including Miss Bell, the woman Medical Inspector.

To obtain information of the examination of young persons before industrial employment, I was present at the physical examinations made before issue of the "labour permits" in Chicago, Milwaukee and New York City. Subsequently I took part in a two days' conference at the Children's Bureau of the Department of Labour, Washington, which had for one of its objects the fixing of standards for the granting of certificates of fitness before employment.

At the invitation of the Rockefeller Foundation I was present at a conference in New York on the functions of industrial medicine and surgery, and there, with Dr. Gilman

Thomson as my guide, visited the clinic for disabled soldiers, sailors and civilians. This it is intended to make a permanent institution for those who may become disabled through accident, as in processes of manufacture, or transportation, or through explosions, street accidents, &c. In Toronto I met Professor McLeod, Chairman of the Industrial Fatigue Research Board of Canada, and Dr. Bott; and in New York conferred with Professor F. S. Lee, author of the well-known book "The Human Machine."

In the next Chapter is an account by Dr. Bridge of an inquiry he has made into "Twisters' Disability in the Cotton Trade: Commonly known as Twisters' Cramp," in which an altered condition of the muscles of the hand (and particularly of the thumb) is produced.

To the table of notifiable industrial diseases will in future be added cases of (a) epitheliomatous ulceration due to tar, pitch, bitumen, mineral oil or paraffin, or any compound, product or residue of any of these substances; and (b) chrome ulceration, the provisions of section 73, 1901, having been applied to them by Order. About them the following remarks may be useful.

Table 1.—Notification of poisoning by Lead, Phosphorus, Arsenic and Mercury, and of Toxic Jaundice and Anthrax (under s. 73, 1901).

DISEASE AND INDUSTRIES.	REPORTED CASES.*									
	1919	1918	Average. 1915-1917	Average. 1912-1914	Average. 1909-1911	Average 1906-1908	Average 1903-1905	1902	1901	1900
Lead poisoning .. .. .	207 <sup>26</sup>	144 <sup>11</sup>	349 <sup>21</sup>	522 <sup>33</sup>	576 <sup>35</sup>	619 <sup>30</sup>	601 <sup>23</sup>	629 <sup>14</sup>	863 <sup>34</sup>	1,058 <sup>38</sup>
1 Smelting of metals .. .. .	24 <sup>5</sup>	15 <sup>1</sup>	44 <sup>2</sup>	39 <sup>4</sup>	49 <sup>4</sup>	45 <sup>2</sup>	31 <sup>1</sup>	28	54 <sup>3</sup>	34 <sup>1</sup>
2 Brass works .. .. .	—	1	2	7	7	9	10 <sup>1</sup>	5	6 <sup>1</sup>	3
3 Sheet lead and lead piping .. .. .	2 <sup>1</sup>	—	3	6	8 <sup>1</sup>	9	9	12	17	17 <sup>1</sup>
4 Plumbing and soldering .. .. .	10	24 <sup>2</sup>	21 <sup>1</sup>	32 <sup>3</sup>	30 <sup>1</sup>	21 <sup>2</sup>	24 <sup>2</sup>	23 <sup>1</sup>	23	9
5 Printing .. .. .	10 <sup>1</sup>	8 <sup>1</sup>	15 <sup>2</sup>	27 <sup>1</sup>	29 <sup>2</sup>	24 <sup>2</sup>	16 <sup>2</sup>	19	23 <sup>1</sup>	18 <sup>2</sup>
6 File cutting .. .. .	—	2	5 <sup>1</sup>	13	12 <sup>1</sup>	11 <sup>1</sup>	19 <sup>3</sup>	27	46 <sup>7</sup>	40 <sup>3</sup>
7 Tinning .. .. .	2	2	3	11	17	18	13	11	10	5
8 White lead .. .. .	10	—	25	27 <sup>1</sup>	36 <sup>2</sup>	86 <sup>3</sup>	105 <sup>1</sup>	143 <sup>1</sup>	189 <sup>7</sup>	358 <sup>6</sup>
9 Red lead .. .. .	15	2	12	5	11	8	9	13	14	19
10 China and earthenware .. .. .	21 <sup>3</sup>	11 <sup>1</sup>	21 <sup>6</sup>	56 <sup>10</sup>	76 <sup>7</sup>	109 <sup>8</sup>	96 <sup>3</sup>	87 <sup>4</sup>	106 <sup>5</sup>	200 <sup>3</sup>
10a Litho-transfers .. .. .	—	—	—	1	1	6	4	2	7	10
11 Glass cutting and polishing .. .. .	—	1	—	2 <sup>1</sup>	3 <sup>1</sup>	4 <sup>1</sup>	2	8 <sup>2</sup>	11 <sup>3</sup>	7
12 Vitreous Enamelling .. .. .	1	—	4	8	14	6	3	3 <sup>1</sup>	9	11
13 Electric accumulators .. .. .	48 <sup>2</sup>	16	45 <sup>4</sup>	41	27 <sup>1</sup>	24	29	16	49 <sup>1</sup>	33
14 Paints and colours .. .. .	11	3	15	21	26 <sup>1</sup>	32	43 <sup>1</sup>	46	56	56 <sup>1</sup>
15 Coach building .. .. .	11 <sup>3</sup>	12 <sup>3</sup>	31 <sup>2</sup>	71 <sup>4</sup>	90 <sup>6</sup>	75 <sup>4</sup>	60 <sup>4</sup>	63 <sup>1</sup>	65 <sup>4</sup>	70 <sup>2</sup>
16 Ship building .. .. .	8 <sup>2</sup>	9 <sup>2</sup>	21 <sup>2</sup>	32 <sup>3</sup>	28 <sup>3</sup>	21 <sup>1</sup>	35 <sup>1</sup>	15 <sup>1</sup>	28 <sup>1</sup>	32 <sup>2</sup>
17 Paint used in other industries .. .. .	9 <sup>3</sup>	15	19 <sup>1</sup>	45 <sup>2</sup>	50 <sup>1</sup>	44 <sup>2</sup>	41 <sup>2</sup>	44 <sup>1</sup>	61	50 <sup>5</sup>
18 Other industries .. .. .	25 <sup>1</sup>	23 <sup>1</sup>	63 <sup>3</sup>	77 <sup>2</sup>	62 <sup>3</sup>	67 <sup>3</sup>	54 <sup>1</sup>	64	89 <sup>1</sup>	86 <sup>4</sup>
Phosphorus poisoning .. .. .	1	3	3	—	1	1	1 <sup>1</sup>	1 <sup>2</sup>	4	3
Arsenic poisoning .. .. .	4	3 <sup>1</sup>	11 <sup>2</sup>	4	7	12 <sup>1</sup>	4	4	1	22 <sup>3</sup>
Mercurial poisoning .. .. .	7	9	14	14	10	7	6	8	18	9
Toxic Jaundice .. .. .	3 <sup>3</sup>	34 <sup>10</sup>	132 <sup>34</sup>	—	—	—	—	—	—	—
Anthrax .. .. .	57 <sup>2</sup>	72 <sup>3</sup>	83 <sup>13</sup>	57 <sup>7</sup>	57 <sup>11</sup>	57 <sup>13</sup>	52 <sup>13</sup>	38 <sup>3</sup>	39 <sup>10</sup>	37 <sup>7</sup>
Wool .. .. .	34 <sup>5</sup>	53 <sup>5</sup>	51 <sup>7</sup>	33 <sup>5</sup>	30 <sup>5</sup>	22 <sup>5</sup>	22 <sup>5</sup>	12 <sup>2</sup>	6 <sup>4</sup>	9 <sup>2</sup>
Horsehair .. .. .	3 <sup>1</sup>	4 <sup>2</sup>	4 <sup>1</sup>	6	7	12 <sup>3</sup>	9 <sup>2</sup>	10 <sup>2</sup>	9 <sup>1</sup>	12 <sup>3</sup>
Handling of hides and skins .. .. .	16 <sup>1</sup>	14 <sup>1</sup>	22 <sup>3</sup>	14 <sup>1</sup>	17 <sup>3</sup>	15 <sup>3</sup>	16 <sup>3</sup>	11 <sup>5</sup>	20 <sup>5</sup>	9 <sup>1</sup>
Other industries .. .. .	4 <sup>2</sup>	1	3 <sup>1</sup>	4	2 <sup>1</sup>	93	6 <sup>3</sup>	5	4	7 <sup>1</sup>

\* The principal numbers relate to cases, the small figures to deaths. Fatal cases not reported in previous years are included as both cases and deaths.

**EPITHELIOMATOUS ULCERATION.**—In general, ulceration of the skin is a term used to define a raw surface forming on the skin which, in industrial employment, is not infrequently set up by the substances handled. Under appropriate treatment, at no matter what age, such ulceration usually heals quickly, and, should it recur, will again heal with rest and treatment.

In the case of those handling tar, pitch and paraffin, however, especially when the workers are over 35 years of age and have worked for about 10 years or more, the ulceration following on the skin irritation set up may not heal, but spread over a large area of the

surface of the skin and extend downwards into the flesh; it is then to be regarded as epitheliomatous or cancerous, and this is the condition to be notified. This form of ulceration occurs with relative frequency on the scrotum. The only method of treatment for these ulcers likely to be successful is operative, which should be undertaken as early as possible, and roughly the need for operative interference is a criterion by which to judge of the need for report.

Many workers coming into contact with the substances named are prone to inflammations of the skin, such as plugging of the orifices (hair follicles and sebaceous glands), leading to hard red raised lumps on the skin (papules) often with a black central spot (blackheads). These are most marked on the forehead, neck and outer surface of the arms. Sometimes the continued irritation causes scattered patches of pigmentation or reddened areas on the face or forearms, or quite small warts form without ulceration or extension into the surrounding skin. These conditions do not come within the definition of "epitheliomatous ulceration," and it is not the intention that they should be notified.

**CHROME ULCERATION.**—If chrome compounds and their solutions remain in contact with the broken skin (and sometimes even with a very sensitive skin in the absence of an obvious broken surface) they give rise either to a general eczematous ulceration or a circumscribed ulcer known as a "chrome hole." Both these conditions, when *definitely ulcerative*, are reportable.

**LEAD POISONING.**—The figures given in Table 1 show an increase as compared with the phenomenally low figures for 1918—unavoidable with the return to ordinary trade. The industry which now stands out as the one exposing workers to the greatest risk of plumbism is not that of the manufacture of white lead, pottery or coach painting, but the manufacture of electric accumulators. Seeing how large is the proportion of the cases occurring in the one operation of pasting (20 out of 48), effort should be directed by manufacturers to accomplishing this by mechanical means. In this country experiments have been made in the past in this direction but have not proved so successful as would appear to be the case in America, where I found that in the larger works pasting machines are, to some extent, taking the place of hand pasting. Trimming, wire brushing, filing and lead burning account for nine cases, and where lead burning and wire brushing are done at fixed points exhaust ventilation is imperative.

As right notions of the causation of lead poisoning are of first importance I emphasise again my belief, after perusal of some 25,000 reports on cases which have occurred in the past, that locally applied exhaust ventilation is the sheet-anchor in the protection of the workers from leady dust and fume, and that these alone are the causative agents. In the cases for the past year, for instance, there is a note of one man whose duty it was to whitewash the red lead room, before doing which, however, he *brushed the red lead off the walls with a stiff broom*. He had only been employed three months when he contracted lead poisoning. In an electric accumulator factory a man, employed four months only, suffered because "pasted lead plates were being ground off at the edges on an emery wheel with no exhaust ventilation fitted."

Attention should be called to the high proportion of fatalities—28·1 per cent. over the five years 1915–19—among the few cases reported in the pottery industry. As the proportion of fatalities to all reported cases over the same period is 7·2 per cent., suspicion might be aroused that several cases were occurring in which there was failure to notify. This is not so, the explanation being that the fatalities (and I am careful to include all that come to our knowledge from the copies of death certificates supplied by district registrars) relate in nearly all cases to diseases such as chronic nephritis or cerebral hæmorrhage—sequelæ of lead poisoning contracted many years previously. Thus, one of the fatalities relates to illness contracted (and reported at the time) eight years previously, and in another case 26 years previously the man having never entirely recovered from an attack of encephalopathy in 1891.

With regard to the employment of women and young persons under 18 years of age in lead processes, the following are the actual terms of the recommendations approved by the International Labour Conference:—

"The General Conference recommends to the members of the International Labour Organisation that, in view of the danger involved to the function of maternity and to the physical development of children, women and young persons under the age of 18 years be excluded from employment in the following processes:—

- (a) In furnace work in the reduction of zinc or lead ores.
- (b) In the manipulation, treatment, or reduction of ashes containing lead, and in the de-silverising of lead.

- (c) In melting lead or old zinc on a large scale.
- (d) In the manufacture of solder or alloys containing more than 10 per cent. of lead.
- (e) In the manufacture of litharge, massicot, red lead, white lead, orange lead, or sulphate, chromate or silicate (frit) of lead.
- (f) In mixing and pasting in the manufacture or repair of electric accumulators.
- (g) In the cleaning of workrooms where the above processes are carried on.

It is further recommended that the employment of women and young persons under the age of 18 years of age in processes involving the use of lead compounds be permitted only subject to the following conditions:—

- (a) Locally applied exhaust ventilation so as to remove dust and fumes at the point of origin.
- (b) Cleanliness of tools and workrooms.
- (c) Notification to Government authorities of all cases of lead poisoning, and compensation therefor.
- (d) Periodic medical examination of the persons employed in such processes.
- (e) Provision of sufficient and suitable cloakroom, washing, and messroom accommodation, and of special protective clothing.
- (f) Prohibition of bringing food or drink into workrooms.

It is further recommended that in industries where soluble lead compounds can be replaced by non-toxic substances, the use of soluble lead compounds should be strictly regulated.”

**PHOSPHORUS POISONING.**—One case of phosphorus necrosis was reported from the factory in which phosphorus and its compounds are manufactured. The case was unusual in that duration of employment had been for four years only, and the man was employed in the drying and finishing room for phosphorus sesquisulphide. Here there would only be exposure to phosphorus fumes when firing occurred. This is the first case that has occurred in this department. Necrosis involved the right lower jaw.

**ARSENIC POISONING.**—Of the four cases of arsenic poisoning reported during the year, three were due to arseniuretted hydrogen gas. Two occurred at a chemical works (in the early part of the year) to men working on a reduction plant. An additional safeguard in the form of a valve feed for the ice was subsequently added since when no further cases have occurred. Periodic examination of the workers on all reduction processes has been continued by Dr. Wignall of Crumpsall, Medical Officer to the Works. The urine of the workers has been watched for an increase in the arsenic content, and it is significant that this has been found in men who did not make any complaint of ill-health.

The third case was reported from a paper mill where a tin reducer was affected. This, though of milder type, is similar in all respects to the case reported in 1912.

Although no cases were reported during the year from processes such as the manufacture of zinc salts, recently some have occurred in this industry and in indigo dyeing. These are still under investigation, but they are difficult to foresee in view of their occurrence in processes which have been carried on under the same conditions for many years without accident. Explanation may lie in the arsenic content gradually increasing in the vessels to a degree which facilitates the combination of the two elements, or the acid and metal used may at the time of accident contain a higher percentage of arsenic. Where processes cannot be carried out under effective localised ventilation there is no doubt that the use of arsenic-free metal and acid is imperative.

**MERCURY POISONING.**—Of the seven cases three occurred in the manufacture of philosophical instruments. Reference has already been made to the inquiry now in progress for bringing this process under Regulations. Two cases were due to the manufacture of fulminate of mercury in explosive works, and two occurred at a process in a smelting works referred to in last year's Annual Report.

**TOXIC JAUNDICE.**—All three cases were due to T.N.T. poisoning, and all proved fatal. In one case—a woman aged 25—death from atrophy of the liver followed eight months after cessation of work in a National Shell Filling Factory. The second case was that of a shell examiner, aged 47. The case was unusual on account of the apparently slight contact the man had with the material when examining shells. His illness began



in November, 1918, with headache, breathlessness, loss of energy, abdominal pain and frequent vomiting. He had dermatitis of both hands and his lips were blue, but jaundice was always absent. Examination of his general condition and blood in April, 1919, showed nothing unusual. The opinion of the medical men who saw him was that he was suffering from debility, with moderate dilatation of the heart and anæmia, probably, though not certainly, the result of T.N.T. poisoning. He remained in much the same condition, and even on the 15th July he was stated to be able to do light duty. He was at work on the 26th July, but on the 28th he was found to be very ill, and died on the 30th. The post-mortem examination showed jaundice and much atrophy of the liver. The third case was a man, aged 49, who began work as a mine filler in September, 1918. In November he became jaundiced, and died on the 31st May, 1919. The liver weighed 42 ozs., there was advanced fatty disease and areas of fibrosis. No jaundice was found at the post-mortem, but purpuric spots were seen on the trunk and parts of the limbs.

**ANTHRAX.**—I append a summary of the cases of anthrax in 1919 on lines similar to that carried on continuously for the 15 years 1900 to 1914. Publication of brief details of the cases in the past has proved useful. There must, unfortunately, be a gap for the years 1915 to 1918, due to the War, but nevertheless, those interested in the subject can find details for all reported cases in wool for the years 1896 to 1917 inclusive, in the Anthrax Committee's report.

No.	Locality.	Sex.	Age.	Occupation.	Severity. R.=Recovery. F.=Fatal.	Situation and Symptoms.	Treatment. E.=Excision S.=Serum.	Material.	Remarks.
1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	<i>Wool.</i> Ravensthorpe ....	M.	17	Condenser minder	R.	Left cheek ....	S.	English cowhair, pulled stockings; yellow vicanere, Kandahar and "Khurasan."	No anthrax bacilli found bacteriologically, but typical clinically.
2	Mirfield ....	F.	14	Weaving army blankets.	R.	Right forearm	S.	Vicanere, Joria, Kandahar, Egyptian, Persian and other noils from Bradford, English cowhair and shoddy.	
3	Bradford ....	M.	72	Willey minder (scoured wool).	R.	Forehead ....	S.	Grey mohair matchings, alpaca.	
4	Birstall ....	F.	16	Weaving blankets.	R.	Right wrist ....	S.	Shoddy, woollen waste and East Indian.	
5	Bradford ....	M.	25	Card jobber ....	R.	Right side of face and eyelid	S.	Baghdad fleeces and pieces, alpaca.	Very severe case; enormous swelling of face and neck. Persian found to be infected.
6	Bradford ....	M.	65	Wool runner ....	F.	Pulmonary ....	Nil	East Indian goat hair, black and grey (skin), Persian wool, fawn and brown Baghdad (skin fleece), alpaca.	Out of 73,451 lbs. of fawn and brown Baghdad, 303 lbs. of blood-stained material were removed in the process of sorting. Out of 24,000 lbs. of fawn alpaca 93 lbs. were removed.
7	ShIPLEY ....	M.	56	Opener and sorter; cleaning out dust cyclone.	R.	Front of neck	S.	East Indian Cashmere....	Out of 9,408 lbs. of East Indian Cashmere, 24 lbs. of blood-stained material were removed in the process of sorting.
8	Dewsbury ....	F.	56	Yarn doubler ....	R.	Right hand ....	S.	East Indian wool, woollen card waste, and English cattle hair.	Woollen card waste found to be infected.
9	ShIPLEY ....	M.	15	Wool runner, scoured wool bin to carding machines.	R.	Right ring finger.	S.	Persian grey (Karadi), grey and brown (Baghdad), East Indian wool, Persian locks.	Out of 32,557 lbs. of grey Persian, 403 lbs. of blood-stained material were removed in the process of sorting.
10	Bradford ....	M.	41	Warehouseman....	R.	Neck ....	S.	Persian wool (Baghdad fleeces and pieces), China camel hair, black goat hair (Mediterranean).	
11	Bingley ....	M.	71	Card feeder ....	R.	Right forearm	Spontaneous cure.	East Indian wools, white and grey, English, Australian cross-bred, grey Scotch.	White East India wool found to be infected. No anthrax bacilli found bacteriologically, but typical clinically.

No.	Locality.	Sex.	Age.	Occupation.	Severity. R.=Recovery. F.=Fatal.	Situation and Symptoms.	Treatment. E.=Excision S.=Serum.	Material.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
12	Dewsbury	F.	14	Packer	R.	Right ear	S.	Vicanere, Kandahar, Joria, English and American cow hair, haslock, pulled stockings and serges.	
13	Shipleigh	F.	48	Finishing box minder.	F.	Neck	0.3 gm. of kharsivan intravenously serum unobtainable	Persian wool, Baghdad brown.	Out of 120,478 lbs. Baghdad wool, 22 lbs. of blood-stained material were moved in the process of sorting.
14	Mirfield	M.	51	Willeyer	R.	Back of neck	S.	Joria, Kandahar, Vicanere, Harnai, Bibruk, English cattle hair and American chevette.	
15	Bradford	M.	51	Blender	F.	Pulmonary	Nil	East Indian wool, Joria, cow hair, card waste, and noils, &c. <i>Description of wastes</i> —Goat hair, pulled waste, camel hair, waste, shoddy and brown hair	
16	Shipleigh	M.	18	Warehouseman and sorter.	R.	Left elbow	S.	Persian wool, grey Baghdad and grey Bussorah.	Out of 53,638 lbs. Baghdad and Bussorah, 1,074 lbs. of blood-stained material were removed in the process of sorting.
17	Liversedge	M.	28	Carder	R.	Left side of neck.	S.	Not stated	No anthrax bacteria found bacteriologically, but typical of anthrax.
18	Bradford	F.	40	Card feeder	F.	Pulmonary	Nil	Persian wool, brown Baghdad.	Out of 27,529 lbs. brown Baghdad wool, 7 lbs. of blood-stained material were removed. All wool had been sorted before being sent to the combers.
19	Mirfield	F.	21	Cloth cutter and weaver.	R.	Temple	Spontaneous cure.	Costume cloth (75 per cent. cotton, 25 per cent. worsted) at first factory. Dyed wools only at weaving of rugs (chiefly East Indian wool) at second factory.	
20	Mirfield	M.	23	Shoddy filler	R.	Right lower eyelid.	S.	Dust from East Indian wool.	
21	Batley Carr	M.	51	Willeyer and blender.	R.	Neck	S.	Yellow Kandahar and yellow vicanere.	
22	Bradford	M.	59	Blender and packer.	F.	Pulmonary	Nil	East Indian wool, vicanere, quality "low."	
23	Heckmondwyke	M.	62	Scouring yarn	R.	Left forearm	S.	Yarn blend of white and yellow Joria, yellow vicanere, marwar, Scotch and willeyed brush waste, white English cattle hair.	
24	Earlsheaton	M.	52	Willeyer and cleaning out dust chamber.	R.	Right eyebrow	S.	East Indian wool, Joria, vicanere, China sheep, English haslock, Bradford spinners' waste.	
25	Heckmondwyke	M.	45	Willeyer	R.	Right cheek	S.	East Indian, Bradford waste, New Zealand.	
26	Bradford	M.	32	Card jobber	R.	Right arm	Spontaneous cure.	Black and grey East Indian goat hair (skin), alpaca, grey and brown (fleece), East Indian wool (skin), cross-bred (pieces), Scotch (skin).	Blood-stained material removed in process of sorting follows: grey paca, 123 lbs. of 25,055 lbs.; E. dad, 48 lbs. of 9,406 lbs.; brown alpaca, 78 lbs. of 11,669 lbs.
27	Bradford	M.	18	Opening bales	R.	Left arm	S.	East Indian goat hair, East Indian wool, brown Baghdad.	
28	Earlsheaton	M.	52	Blending and cleaning out dust chamber.	R.	Left jaw	S.	East Indian, New Zealand.	
29	Liverpool	M.	65	Warehouseman	R.	Wrist	E. and S.	Baghdad	
30	Liverpool	M.	52	Warehouseman	R.	Chin	E. and S.	East Indian	
31	Witney	F.	54	Woolpicker	R.	Neck	E. and S.	East Indian, Bradford waste.	

Locality.	Sex.	Age.	Occupation.	Severity. R.=Recovery. F.=Fatal.	Situation and Symptoms.	Treatment. E.=Excision S.=Serum.	Material.	Remarks.
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Kidderminster ....	F.	15	Winder ....	R.	Cheek....	S.	Government yarn (origin uncertain).	
Glasgow....	M.	19	Willeyer and Teaser.	R.	Forehead ....	E.	East Indian ....	
Kilmarnock ....	M.	33	Carder ....	R.	Right leg ....	No Special	East Indian ....	
<i>Horsehair.</i>								
Liverpool ....	M.	—	Fireman ....	R.	Neck ....	S.	North and South American.	Horsehair dried on boiler top.
North London ....	M.	58	Drawer ....	R.	Temple ....	E. and S.	Siberian ....	
North London ....	M.	54	Foreman curler....	F.	Side of neck ....	E. and S.	Russian ....	
<i>Hides and Skins.</i>								
South London ....	M.	38	Handling hides....	R.	Left side of neck.	E. and S.	Indian hides ....	
South London ....	M.	30	Unhairing ....	R.	Left side of neck.	E.	Cape goat skins ....	
Yeovil ....	M.	32	Skin slitting ....	R.	Neck ....	E. and S.	East Indian skins, Aden skins.	
Nottingham ....	M.	39	Hair washing ....	R.	Midway between sternum and umbilicus.	E.	Goat skins, probably from Africa.	
London ....	M.	30	Labourer in skin warehouse.	R.	Face ....	?	Probably Siberian hair, but skins also handled.	
Godalming ....	M.	27	Liquor colouring paddleman.	R.	Left elbow ....	E.	Karachi hides ....	
Runcorn ....	M.	56	Flesher ....	R.	Face ....	E.	Madagascar, South American, Nigerian.	
Todmorden ....	M.	47	Unhairing ....	R.	Forearm ....	E.	Chiefly Rangoon buffalo hides, also Singapore and China.	
Liverpool ....	M.	39	Discharging hides	F.	Upper eyelid....	E.	West Coast of Africa ....	
Liverpool ....	M.	43	Discharging hides	R.	Neck ....	S.	South American ....	
East London ....	M.	23	Trucking dried skins.	R.	Forehead ....	E.	Not known ....	
Leeds ....	M.	35	Soaking hides ....	R.	Face ....	S.	Buffalo hides from India, Mombassa hides.	
Leeds ....	M.	—	Handling hides....	R.	Left jaw ....	S.	British East African hides, Cape goat skins	
Tilbury ....	M.	45	Hide unloader ....	R.	Neck ....	E. and S.	Calcutta....	
Manchester ....	M.	46	Warehouseman....	R.	Neck ....	E.	German West Africa ....	
Leeds ....	M.	29	Soaking hides ....	R.	Forehead ....	S.	Rangoon and Karachi...	
<i>Other Industries.</i>								
East London ....	F.	31	Fastening bags on mincing machine.	F.	Neck ....	Nil	See remarks ....	Would handle meat from tallow mills in different parts of the country, usually in compressed cakes.
Sheffield....	M.	45	Horn cutter ....	F.	Left cheek ....	Nil	Indian buffalo horns ....	
Liverpool ....	M.	18	Discharging cargo (no wool or hides).	R.	Wrist....	E.	Not ascertained ....	
Leeds ....	M.	27	Packing cow hair and South African goat hair.	R.	Cheek....	S.	English cow hair and South African goat hair.	

The Anthrax Disinfection Committee was appointed in 1919: (1) to advise as to the arrangements to be made for the establishment of a trial disinfecting station as recommended in the report of the Departmental Committee on Anthrax; (2) to carry out therein the disinfection of such infected materials as may be directed by the Home Office, and, subject to any instructions which may be given by the Home Office, to control the working of the station; (3) to make recommendations as to the construction, equipment and working of the stations to be erected for carrying out completely the disinfection of infected material as recommended by the Departmental Committee; and (4) to advise on any other matters which may be referred to them from time to time in connection with the scheme. With the formation of this Committee the Anthrax Investigation Board of Bradford has dissolved feeling that the object for which it was appointed had largely been attained.

In looking back over the record of the 14 years' work accomplished, the Board may well feel satisfied. Having been in close touch with it throughout this period, I cannot forbear saying how valuable the work has been to the Factory Department. Part of the success may be due to the fact that the stimulus for its creation came from within and was not imposed from without. At any rate, it is a signal instance of a branch of a large industry attacking the particular problem in a scientific manner and in the right spirit, producing reports which were a model of conciseness, and never prejudging the issue,

nor losing hope of ultimate success. Their final report says the objects of the Board had been: (1) investigation of anthrax generally; (2) determination more precisely of the class of wool and hair from which the danger of anthrax arises; and (3) discovery of means of prevention. They consider clinical experience in the past has shown that a fatal termination is now a rare event, provided the necessary medical attention be available and the disease recognised at an early stage. This may be due to the efficiency of the serum treatment of anthrax combined with enforcement of physiological rest, which, they say, has been well established; while grave doubts have been cast on the utility of the excision of external anthrax, save perhaps in the earliest stages. As a matter of fact, at the Royal Infirmary, Bradford, at the General Infirmary, Dewsbury and at Kidderminster Infirmary, excision is no longer practiced.

In the attempt to define precisely the classes of wool and hair in connection with which the danger of anthrax arises on bacteriological lines (which have been conducted throughout by Dr. F. W. Eurich, Bacteriologist to the Board and Hon. Consulting Pathologist at Bradford Royal Infirmary) the Board has accomplished much. At the time the Board started the following was the order in which materials were classed according to danger: (1) Mohair, (2) Persian locks, (3) Persian wool, (4) Turkey mohair, (5) Alpaca, and (6) Camel hair. Although East Indian wool and goat hair were suspected from cases which had occurred in handling these materials, there was no bacteriological evidence of anthrax spores having been found in them. As a result of investigations the order would now be East Indian goat hair, Persian wool, East Indian wool, Turkey mohair, Russian camel hair, Cape mohair, Alpaca. Anthrax, indeed, has been found in several other classes of wool such as Russian, Egyptian and Syrian, and in blends, scoured materials, slipes, tops, rovings and yarn, and even finished cloth.

The following is a summary of the samples tested between 1908 and 1919.

	No. Tested.	Anthrax.	Per cent.
Alpaca ... ..	2,122	49	2.3
Mohair ... ..	3,616	329	9.1
Egyptian Wool ... ..	74	9	12.2
East Indian Wool ... ..	909	94	10.3
Persian Wool ... ..	3,276	205	6.3
Goat and Camel Hair ... ..	452	62	13.7
British and Colonial Wool ... ..	121	1	0.8
Various ... ..	258	6	2.3
Blends ... ..	239	26	10.8
	11,077	781	7.2

Lastly, the Board state that in their attempt to secure disinfection of wool and hair without damage to the material they had not been able to get further than to be sure that (1) steam disinfection was inapplicable, (2) formaldehyde was the only disinfectant at present known likely to be effective, and (3) the chief obstacle to effective disinfection was the difficulty of breaking down dried blood clots and so exposing the spores; but these problems have now been solved by the "Duckering Disinfection Process" as described in the Anthrax Disinfection Sub-Committee's Report.

FUMES AND GASES.—Below is a tabulation of the cases reported in 1919 as accidents due to escape of gas. The figures for previous years are given in order that comparison can be made. Three cases due to arseniuretted hydrogen gas do not appear as they have been included under Arsenic Poisoning.

	1913.	1914.	1917.	1918.	1919.
Carbon monoxide ... ..	597	62 <sup>9</sup>	99 <sup>18</sup>	54 <sup>13</sup>	85 <sup>12</sup>
(a) Blast furnace ... ..	20 <sup>3</sup>	20 <sup>6</sup>	22 <sup>6</sup>	17 <sup>3</sup>	33 <sup>6</sup>
(b) Power ... ..	21	21	32 <sup>3</sup>	21 <sup>3</sup>	19 <sup>1</sup>
(c) Coal ... ..	9 <sup>4</sup>	7 <sup>1</sup>	20	10 <sup>4</sup>	10
(d) Other ... ..	9	14 <sup>2</sup>	25 <sup>4</sup>	6 <sup>3</sup>	23 <sup>4</sup>
Carbon dioxide ... ..	12 <sup>1</sup>	3 <sup>1</sup>	1	5 <sup>5</sup>	3 <sup>1</sup>
Sulphuretted hydrogen ... ..	8 <sup>1</sup>	22 <sup>3</sup>	11 <sup>4</sup>	7 <sup>1</sup>	3
Sulphur dioxide ... ..	1	1	2	1	7
Chlorine ... ..	1	2	3	4	9
Nitrous fumes ... ..	—	9 <sup>3</sup>	62 <sup>5</sup>	27 <sup>7</sup>	5 <sup>2</sup>
Ammonia ... ..	3	4 <sup>1</sup>	4 <sup>1</sup>	6 <sup>1</sup>	8
Benzol, naphtha, anilin ... ..	6 <sup>3</sup>	4 <sup>2</sup>	4 <sup>2</sup>	7 <sup>4</sup>	9 <sup>3</sup>
Tetrachlorethane ... ..	—	25 <sup>4</sup>	—	—	—
Other (ether, actone, acetic anhydride, &c.) ... ..	—	—	4	1	3

Study of the cases again brings out the necessity for equipment with proper rescue appliances always available and *used by the worker*, the danger of working alone, and the risks often run by the rescuers.

*Carbonic Oxide Gas.*—This gas usually accounts for much the largest number of cases, and 1919 was no exception to the rule. The most striking case was that in which three men—C. Workton, H. Ball, and E. Naylor—were awarded the Edward Medal for saving the life of a steeplejack repairing the brickwork at the top of a chimney in Sheffield. The chimney was 150 feet high. Of the three men named one had been employed as an “erector,” that is in staging, scaffolding, &c., another was a slater and the third an old soldier who had at one time been employed as a steeplejack labourer. On passing up the ladder towards the summit, the men found that 7 feet from the top the ladder ended, while over their heads their jutting out, to a distance of 14 inches, the chimney crown. This had to be negotiated by climbing on steel straps that ran round the shaft. This serious obstacle overcome, they reached the rim of the shaft. On this rim, 9 inches wide, they applied artificial respiration for 20 minutes, until the man was semi-conscious. In the meantime a canvas ambulance sling had been passed up by means of a rope running over the light pulley attached to the top of the ladder. The affected man was then buckled and roped in this sling and while two of the men lowered the weight another, who had scrambled back to the ladder, steadied the man until the rope hung over the top rung. This was the most difficult part of the rescue owing to the danger of a slip or break as the extra weight came on the light top ladder at the beginning of the descent.

A fatal case in which five rescuers were temporarily gassed, occurred at a blast furnace to the foreman, described as a “zealous workman,” who ascended with another workman to a gallery 40 feet from the ground to stop a leak. Only after very prolonged artificial respiration, combined with oxygen administration, was the second workman brought round.

*Blast Furnace Gas.*—Of the 33 cases due to this gas, containing 25 per cent. of carbonic oxide, nearly all occurred in repair work or cleaning tubes, flues, &c. In one case, when tapping, the direction of the wind drove the fumes into the man’s face; in another a crane driver was overcome at some distance away from the gas escaping from the manhole cover; and in a third a man was overcome while cleaning a flue by escape of gas from an adjacent furnace.

*Power and Suction Gas.*—Starting the suction gas engine accounted for three cases, escape from tubes and flues for three, and repair to tubes and engines also for three. The one fatal case resulted from the operation of charging the producer plant, the wind blowing the gas into the worker’s face. Five women were affected in a polishing shop from the adjoining engine house, where a joint in the exhaust pipe of the gas engine had become detached. In this case the gas travelled through the space around two shaftings.

*Coal Gas.*—Two fitters were fatally gassed (and also a fire brigade officer and a fireman who went to their rescue) when removing a hand hole cover preparatory to fixing a new one.

*Other Sources of Carbonic Oxide.*—Only one of the 23 cases under this head was fatal, due to coke fumes from a brazier which a watchman, in spite of warning, took with him into his shelter. Thirteen women were slightly gassed by escape of fumes from a coke stove and five men similarly were slightly affected by fumes from a rivet fire when working in a confined space on a ship.

*Carbon Dioxide.*—In a fatal case of asphyxiation due to carbon dioxide given off in a fermenting vessel in a brewery, the deceased workman entered the vessel on a Sunday afternoon when he was the only man on the premises. He had been warned not to enter the vat until the following morning, but he was known to be a willing worker and it was thought it was this spirit which had prompted him to start cleaning the vat when he did. The occupiers agreed that (1) a notice should be posted up requiring that no one should enter the vat without some other person being present, and (2) every vat should be tested with a candle before it was entered.

*Toluene.*—In a case of gassing while engaged in cleaning a tank which had contained ammoniacal liquor and toluene, the report stated that a Siebe Gorman’s Gasman’s respirator (which enables a man when engaged on such operations to breathe the outside air) was ordinarily used, but on the occasion in question the man neglected to wear it. In other somewhat similar cases which have occurred recently owing to insufficient precautions in the cleaning of tanks the following instructions have been given:—

- (1) The period of "airing" should be six days.
- (2) That to clean out the mud in the tanks, they should be filled with water and steam blown through the water until it boils. It is important that the steam pipes should go to the bottom of the tank, and that means should be adopted, by stirring or otherwise, to ensure a thorough emulsion of the mud.
- (3) If a tank has been standing for any length of time, it should be filled up with water and then emptied immediately before anyone enters it.
- (4) No one should be allowed to enter or work in a tank unless wearing a face piece or helmet with indiarubber piping attached and communicating with the outside air (such as a Denayrouze or Siebe Gorman apparatus), or a self-contained breathing apparatus by means of which a person using it in a poisonous atmosphere breathes ordinary air, or air mixed with oxygen.
- (5) Anyone entering a tank should wear a life belt with a line attached, the end being held by a person on the outside of the tank.
- (6) A cylinder of oxygen, with proper connections and face piece, should be kept ready for use.

*Anilin.*—A case of anilin poisoning was due to skin absorption by the liquid splashing on to the face and hands of a workman engaged in pouring anilin oil from a carboy into a tank. He was wearing canvas gloves which could have afforded him no protection.

**DERMATITIS.**—An inquiry of some interest was made by Dr. Bridge into cases of dermatitis which occurred among men engaged in wire drawing and manipulating the wire by hand, which is unusual. Two distinct forms of lesions were found—one an inflammatory condition of the palms of the hands and the other distinct circular ulcers, known as "soap holes." In the works in question the wire is wound on a revolving drum after passing through a die, the operator manipulating the wire so as to allow it to pass through without kinking. The wire sent from the makers is coated with lime to prevent rusting. In handling the wire there is considerable friction on the palms of the hands which, together with the lime, produces the inflammatory condition. The men are also exposed to numerous injuries which, if untreated, allow the lime to act on the raw surface; this action and the septic infection which follows produce circular ulcers. Attention to cleanliness and the early treatment of all small injuries minimises the risk of the "holes."

Dermatitis from zinc chloride used as a flux was investigated. The condition affected girls employed soldering small parts of flash lamps. Considerable carelessness was observed among the operatives who took little or no care to prevent splashing. The means provided for washing left a good deal to be desired. Greater care in work, improved washing accommodation and an ointment applied to the hands prior to work rapidly reduced the number of cases.

Other industries where dermatitis has occurred have included those using coal tar dyes, formic acid in the preparation of skins and essential oils in the manufacture of toilet soap.



## CHAPTER VII.

TWISTERS' DISABILITY IN THE COTTON TRADE; COMMONLY KNOWN AS  
TWISTERS' CRAMP.

BY

J. C. BRIDGE, F.R.C.S., ED., H.M. MEDICAL INSPECTOR OF FACTORIES.

Investigation of an occupational disability such as that brought about by writing, telegraphy or twisting is attended with considerable difficulty, more particularly so in regard to the latter which is a peculiarly specialised occupation.

In accordance with instructions I made an inquiry into this condition as affecting twisters, and from the outset of the inquiry it became evident the twisters themselves had generally recognised that, in a small proportion of their number, a condition of the hand is produced by twisting which either entirely prevents them following this occupation, necessitating their finding other employment, or compels them to work under a disability which precludes them from earning a wage commensurate with their previous earnings.

It has been usual on interrogating a twister with many years experience to learn that he is familiar with one or more cases of fellow workmen who have had to give up this trade because "he could not twirl." Among the older men some of their friends, who suffered in this way are now said to be dead, so that the condition would appear to have been known for many years.

From the commencement I was led to think that quite an appreciable number of twisters had been obliged to give up their occupation while still in their prime, and take up other work on account of some disability connected with their employment. My inquiry has confirmed this conclusion; I have obtained evidence which shows that when the twisters commence this occupation they suffer in some measure from pain and tenderness of the muscles particularly called into use. This is accompanied by a cramp similar in all respects to that experienced by an individual exercising a group of muscles abnormally, and one which is experienced by all manual labourers or athletes, the latter more particularly, in that a group of muscles is called into play which, in every day life, is used only to a limited extent. The analogy holds good for twisters, who, when they first commence the work, use muscles which in every day life are exercised but little. This condition, however, is transient and so general that it gives no indication as to the fitness or otherwise of an individual to continue this employment. A cold workroom also produces a stiffness, alluded to as cramp, in an experienced man.

The disability which permanently prevents a twister from following his employment after many years, is entirely different. Either there is actual inability to perform the work at all or the workman's capacity is so impaired that the wage earned is much reduced. This condition is a permanent one, and treatment, though it alleviates does not produce a permanent cure, *i.e.*, a capacity to earn a full wage.

Below I have endeavoured to define what is meant by twisting and to outline the operation of twisting and the complex muscular action which this work entails.

*Definition of Process.*

Twisting, looming, or twisting in, are terms used for the process of joining the ends of the warp (longitudinal threads) of a woven piece with those of a new warp.

To obtain the intersection of the transverse threads (weft) required in weaving it is necessary to depress or elevate the threads of the warp. This is accomplished by an apparatus composed of a series of healds. Each heald consists of a shaft and central eye, and through the latter each individual thread of the warp is threaded or "drawn in." Before commencing to weave, each thread of the warp must be threaded through the central eye of the heald. The number of threads to each warp varies, usually between 2,000 and 2,500. This number requires to be threaded through the eyes of the healds. When the weaving of a warp is completed, the loose end of the warp threads may either be withdrawn from the eyes of the healds, and the threads of a new warp threaded through the healds, or the thread ends of the old and new warp joined together by "twisting,"

so that the new warp threads may be drawn through the eyes of the healds ; in this way avoiding re-threading the healds.

#### *The Operation of Twisting.*

This operation is usually carried out in a separate room away from the weaving, though for certain cloths it must necessarily be done in the weaving shed at the loom. For the former, the threads of the warp are cut, leaving the threads of the finished warp passing through the eyes of the healds. The operator sits in a frame with the ends of the old warp on one side and the ends of the new warp on the other. A number of threads are taken from the new and old warp, and inserted into a ring attached to a belt fastened round the operator's waist. The position of the twister himself and of his hands is not unlike that assumed by the banjo or guitar player. The twisting hand represents the playing hand, while the right hand, which selects the threads from the frame, corresponds to the fingering hand. The left hand is almost universally used for the process of twisting. The threads to be joined are selected by the thumb of the left hand and the index finger of the right hand. The left hand carrying a thread on the ball of the thumb is brought to the middle line of the body and the index finger of the left hand takes up a corresponding thread from the right hand. The finger and thumb are approximated and the two threads broken off from the central ring. By a rolling movement of the thumb on the index finger the two ends are twisted or joined together. This operation is repeated at a varying rate depending on the skill of the operator. A skilled workman may join as many as two thousand ends in one hour. The series of movements of the finger and thumb, of the wrist and arm, necessary for this operation of twisting are complex, and I have endeavoured to outline the movements involved.

#### *Movements of the Arm and Hand required in Twisting.*

The forearm is bent at a right angle with the upper arm, which latter is approximated to the trunk. The forearm is almost fully supinated, the wrist extended with the thumb in a similar position, and the index finger slightly flexed. In this position the thread is gathered on to the thumb. The wrist is then flexed and adducted, the forearm brought to a position midway between pronation and supination, in this way bringing the hand to the middle line of the body. The index finger is extended to gather the thread from the right hand. Flexion of the index finger at the metacarpo-phalangeal joint approximates finger and thumb. Further flexion of the index finger takes place at the proximal interphalangeal joint, the thumb being held stiff. Finally, the terminal phalanx of the thumb is flexed, while the index finger is fully flexed at the proximal interphalangeal and metacarpo-phalangeal joints, bringing the palmar surface of the terminal phalanx of the thumb upon the dorsal surface of the second phalanx of the index finger. This latter movement produces the final twist or twirl of the thread.

This brief analysis is sufficient to show that a very large number of muscles are brought into action, not only some of the large muscles of the forearm, but also the smaller muscles of the thumb. In addition to the muscles which actually produce the particular actions, special muscles, which fix the intermediate joints for the performance of the fine and unusual movements, are also called into play. For example, to produce the final twirl, the first phalanx of the index finger is fixed and the two terminal phalanges flexed upon it, for which purpose the adductor muscle of the thumb is very largely brought into action.

#### *Comparison with Writers' Cramp.*

It is important to observe that the small muscles of the thumb which are found to be in use during the act of twisting correspond very closely to those which are in use during the act of writing, and, as regards writers' cramp, it has been stated "the finer the movements, if they are confined to the smaller muscles of the thumb, the greater is the risk."\* Writing, however, may be, and often is, performed without using the finer muscles ; on the other hand, in the operation of twisting, muscular action of the finer muscles is necessary in order to produce the union of the two ends of the thread by twisting them together. There is therefore an *a priori* reason for believing that a condition of occupational cramp or an inability to perform a series of muscular actions necessary for twisting analogous to writers' cramp would exist.

In determining any abnormal condition there are two main features to be observed : firstly, subjective symptoms, or symptoms experienced by the individual affected ; and secondly, physical signs which can be observed by the inquirer. The former are easily obtainable ; the latter, in many instances, owing to their undefined character, present difficulties.

\* Dr. C. H. Grumbaum, Evidence before Committee on Compensation for Industrial Diseases, Cd. 6957, p. 74, 1913.

The following summarises the symptoms and signs found among the men examined :—

*Subjective Symptoms.*

Pain would appear to be a common feature at the commencement of the disability. This when it occurs is most generally referred to the base of the thumb; in some cases it extends up the arm, but this is not common. Tenderness of the muscles is very general; swelling at the base of the thumb is sometimes complained of and is probably a concomitant symptom independent of the condition. Actual cramp is rare. Only two men complained of this symptom and stated they were unable to straighten out their thumb. Weakness and loss of power of the thumb is the prominent symptom rendering impossible the final rolling over of the twisted ends of the thread in such a way as to produce a firm junction ("unable to finish twirl").

In only one case was any condition described which approached in any way to a spasm of the muscles.

*Physical Signs.*

Quite an appreciable number—50 per cent.—of the men selected for examination, and who were said to be affected, showed an unusual flattening or apparent wasting of the thenar eminence (ball of thumb) or small muscles of the thumb. It is almost impossible to be certain of the actual existence of wasting of the muscles without previous knowledge of the condition of the muscles prior to the man engaging in this particular occupation, but I am inclined to the opinion that wasting of these muscles does sometimes occur in this occupation and, when present, indicates definitely that the muscles of the thumb have become altered and have lost their power of action to a greater or less extent.

*Period of Employment before Symptoms occur.*

No definite length of employment elapses before symptoms appear. The time varies from 5 to 35 years, and is independent of the age when the occupation was first commenced.

*Predisposing Cause.*

The inquiry elicited no definite information on this point, and I would offer no observations. The subjects examined presented no features which one can comment upon, except that the condition appeared in ordinary healthy individuals; some were total abstainers, none as far as I could ascertain drank alcohol to excess. No particular history of rheumatic affections was given.

*Causation.*

I am inclined to the opinion that there are two factors in the causation of this disability. The similarity between this and other occupational neuroses is so striking that the generally accepted explanation of a widening in the controlling mechanism of the central nervous system would seem to apply equally to twisters' cramp. I think, however, that the local symptoms are more pronounced in twisters' cramp, and believe that in addition to a nervous lesion, a chronic inflammation of the muscular tissue (chronic fibro-myositis) is set up. This would account for the tenderness of the muscles, and might be the cause of the later development—wasting. This would, I think, better explain those cases where the wasting is slight, and where the worker suffers no disability.

*Conclusions.*

An altered condition of the muscles of the hand particularly of the thumb is produced in certain individuals by the continued operation of twisting. The main symptoms are subjective, though in some cases evidence may be obtained from wasting of the small muscles of the thumb. The subjective symptoms are not necessarily associated with pain, but there is a universal one which can only be described as the loss of power "to finish the necessary twirl."

The points of difficulty in the diagnosis of this form of cramp which have to be considered are practically the same as are met with in writers' and telegraphists' cramp, and were considered in detail by the Committee on Compensation for Industrial Diseases, which dealt with these diseases in 1908.

*Malingering.*

This naturally presents greater difficulties to determine than in the allied conditions affecting writers and telegraphists. It would, however, be possible for a skilled operator to detect an attempt at malingering in the same way as can be done in telegraphy.

*Age.*

Twisters pursue their occupation until a great age, as it is an occupation demanding little general physical exertion. It is agreed that the speed of the worker diminishes with advancing years, and this might possibly induce a small percentage to seek compensation for a disability which is not directly due to the particular employment. In the case of age, however, the wage is reduced because the speed of the whole operation is reduced, and not because there is inability to do a particular part of the work effectively, *i.e.*, the joining of the two thread ends by the final twist.

*Twisting by Machinery.*

A machine to do the work done by twisters has been, for some years, on the market, and has superseded hand twisting in a fair number of mills. Its use is likely in the future to be further extended. Where plain cloths are concerned, it would appear satisfactorily to replace hand labour. So far, no machine has been devised to replace twisting for cloths described as "fancy."

## CHAPTER VIII.

## WELFARE IN FACTORIES AND WORKSHOPS.

BY

MISS A. M. ANDERSON, C.B.E., H.M. PRINCIPAL LADY INSPECTOR OF FACTORIES.

*General Progress of Welfare.*

In the Annual Report for 1918, a full account was given of the introduction and development of welfare up to that time, with details of Orders made under the Act of 1916, and their observance, and of the aid given by explanatory pamphlets issued by the Home Office. Some account was also given of the work of employers and workers on their own initiative, and of the professional organisation and university training of welfare supervisors. It is therefore unnecessary now to do more than report the progress made during 1919, so that the two reports may be read together by those desiring to follow the subject closely.

A general account was also given in the Report for 1918 of the introduction of ambulance and first aid into factories. A report by Dr Bridge on the progress made since under these heads will be found in the next chapter.

Welfare Orders were made during 1919 for *fruit preserving works* and *oil cake mills*. Orders were issued in draft for other industries, the most important of which are *laundries*, for which an Order was finally made in April, 1920, after much negotiation; *gut scraping and washing* and processes incidental thereto; the manufacture of *hollow ware* and the *process of galvanising*.

The preparation of these Orders and subsequent negotiation with the trades has entailed a great amount of work on the part of the staff, particularly at headquarters. Much time was also expended in 1919 on preliminary enquiries and the preparation of an Order for improving conditions in the herring pickling trade in the counties of Norfolk and Suffolk, where the work is carried on only during October and November. That enquiry showed the need for additional powers to require *rest-rooms*, and an Order extending subsection 9 of Section 7 of the Police, Factories (Miscellaneous Provisions) Act, 1916, was issued early in the current year.

Two very useful new welfare pamphlets were published by the Home Office, on *Welfare, and Welfare Supervision in Factories and Workshops*,\* and on *First Aid and Ambulance at Factories and Workshops*,† while the pamphlet on *Ventilation of Factories and Workshops* should also assist in improving conditions. A great welcome was given to the first of these, especially by welfare supervisors, and it has certainly helped to strengthen their position and influence for good in the factories, and to clear up ideas among employers and managers as to the nature and aims of good welfare work. A pamphlet on *Seats* is in draft; it will shortly appear and should be very helpful.

Nearly all the Inspectors speak, in varying terms, of marked progress in introduction of welfare conditions and measures, either legal or voluntary. This new disposition is attributed by some of them to impetus given by work done in munition factories during the War; by others, to the realisation by employers of the more harmonious relations that can be established with the workers and the greater efficiency gained by the provision of more comfort and better conditions of work, and by others to the widened outlook and new spirit of comradeship in young employers lately returned from the War.

Unquestionably strong interest is shown by workers in the matter, especially in the less organised trades, and Inspectors are often asked by them as to when they may hope for an Order to apply to their particular trade. This attitude certainly has good influence towards progress.

Mr. John Law (Sheffield) reports that messrooms, canteens, lavatories, cloakrooms and ambulance rooms are now found in many factories other than those to which Welfare Orders apply.

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\* Published by H.M. Stationery Office, London. Price 2d. net.

† Published by H.M. Stationery Office, London. Price 6d. net.

"In practically all new factories most of these things are provided for, and it begins to be realised that such conveniences are as needful a part of the 'lay-out' as any other. In older factories where room is scarcely available except by closing down part of the plant, progress must be slow, unless compulsion is brought to bear either by the issue of special Orders or by the fact that the best type of worker will seek that factory which provides best for his creature comforts." In a works in the Wolverhampton district "it has been seriously stated that thanks to the efforts of the Supervisor, there is no necessity to advertise for female workers. They come and ask to be employed as they know their interests are looked after."

This is also the experience in various well-equipped factories in other parts of the country regarding which it is said they "get the pick of the labour in the neighbourhood."

While in the main the Inspectors speak of progress in introduction of welfare, there are considerable exceptions, perhaps most notably in the textile trades. On the whole the woollen trade has made a rather larger number of voluntary and interesting welfare experiments than the cotton trade, showing what can be done by voluntary effort, in old as well as new mills. And yet, while the movement is generally backward in cotton factories, there are excellent examples there, too, and it is a very hopeful sign that the first item for discussion at the International Cotton Trade Conference at Zurich was "Welfare." The slowness to move with the times in these things, in cotton factories, is not confined to the main Lancashire districts, *e.g.*, Burnley, Bolton, Leigh, etc., where "there is, with one or two exceptions, practically no welfare work" (Miss Andrew). In Yorkshire also

"The standard of comfort in the cotton factories with few outstanding exceptions is low . . . . In the tenement weaving factories on the borders of Yorkshire and Lancashire the only attempt at welfare provision is the steam kettle, which is found in each shed and of which the occupiers are inordinately proud, although the District Inspector had difficulty in getting them installed. The occupiers of these weaving sheds do not believe in pampering the workpeople. They tell one that a factory is not a place for comfort but for work, and will by no means admit that a little more comfort might mean more work. Many of the men weavers take up the same position . . . . There are no facilities at all for heating food . . . the idea of a messroom which should be common to the whole tenement was not favourably received. This opposition to a common messroom may, however, be overcome as was the original opposition to the steam kettle." (Miss Hastings.)

Other fields in which no general progress can be reported, apart from that required by Orders, is in various metal industries in the Midlands, and generally in many small miscellaneous factories all over the country.

"The influence of locality is interesting, and is strikingly shown on comparison of two different sides of the Birmingham district. In one the tone has been set high, and the occupiers vie with one another in offering amenities to their men and women workers; in the other the factories are squalid, little or no attempt is made to improve working conditions and indeed the Inspectors' efforts have to be concentrated on obtaining the observance of the ordinary provisions of the Factory Act, rather than on additional suggestions for welfare. The only way to raise the level of conditions in factories such as these is by Order, and much is to be hoped for the Black Country from the Hollow-ware and Galvanising Welfare Order." (Miss Escreet.)

A very large part of the time of Inspectors throughout 1919 has been absorbed in bringing into operation Welfare Orders already made, as well as in the preliminary enquiries alluded to above.

"The Laundry Trade draft Order was received with enthusiasm. Occupiers have remarked that it was just what was wanted for the industry and ought to have been required years ago; the workers also were greatly delighted on hearing that it was already under discussion." (Miss M. C. Anderson.)

Inspectors have also been busy responding to requests for advice from occupiers who are desirous of making provision for welfare. The women Inspectors have also gladly given a good deal of time to newly appointed women welfare supervisors who seek their counsel and help.

The earliest Order for welfare under the Act of 1918, applying to factories in which tin or terne plate is manufactured, and where the conditions are very rough and work heavy, is now complied with in most of the factories, and the necessary work is in progress to secure observance in the remainder in a very short time. The provision as regards suitable aprons and clogs is carried out, but many structural alterations have had to be made and difficulties as to materials and labour have impeded this part of the work. Mr. Hilditch and Miss Sadler are agreed that the results, as regards appreciation of the workers, are somewhat disappointing. The latter have commented favourably on buildings and equipment, but in the Swansea district have as yet made little of the use of them that was intended, and in some instances appliances have been roughly handled. Somewhat more advantage is taken of the facilities in other districts. Evidently time is needed for a change of habits, and probably also, as Miss Sadler suggests, improved supervision of a homely kind that is acceptable to the workers. Mr. Hilditch has had interviews with trade union officials with a view to arousing interest of the workers in reasonable use of the accommodation.



In glass works the welfare requirements of another early Order are reported to be substantially carried out in various directions and delay in structural alterations which has been granted on account of war-time difficulties is expected to come to an end shortly. Temporary provision for accommodation for clothes was in some cases in the South-Western Division made too far away from the hot work rooms, and in these accommodation is being provided adjoining the furnaces (Mr. Rogers).

In works in which bichromate is in use, compliance is not yet reported as good, generally, but in the Bristol district "fair compliance has been obtained" (Mr. Rogers).

In fruit preserving and oilcake making works, steps are being taken to secure compliance, the work has been completed in a few places, and progress is reported in others.

### *Drinking Water.*

Routine enforcement of the Order dated October 9th, 1917, has now made it well known, and less adverse criticism as to details has been encountered in 1919 than in 1918. Although drinking water has been nearly always more or less available, cases of difficulty have been met with in getting water supplies which were not from public mains certified by local authorities or, where the available supply was condemned, in getting firms to provide facilities for a supply from the nearest main. That the Order has been beneficial is shewn by the following extracts:—

"In one case the supply was obtained from a hillside below a cemetery, and had been used for consumption in private houses for many years. In two cases successful prosecutions were taken for failure to provide a proper supply of water. The firms had been warned more than once before proceedings were taken." (Mr. Jackson.)

"In the country districts of Leicestershire the consequences of the Order have been far reaching. In one village the wells used by several factories were condemned when application was made for the certificates required under the Order. One firm promptly arranged for a supply from the nearest town main, but others were not anxious to incur the expense involved. Under pressure from the Factory Department to provide 'wholesome' drinking water, these firms are finding it necessary to stir up the local authority, and it is to be hoped that the result will be an efficient service of pure drinking water to all factories and houses in the district. In the neighbouring hamlet there were five cases of typhoid and not a single uncondemned well in the village: The district Sanitary Inspector deprecated the enforcement of the Order on the only factory to which it applied, on the grounds that the well on these premises had been condemned for nine years. Here again it is to be hoped that the administration of the Order in a single factory may lead to a much needed reform of the drinking water supply for the whole village." (Miss Mellor.)

In some works, though there was a supply of water, it was delivered at unsuitable or insufficient points. The instalment of bubbling fountains is mentioned by some Inspectors, but generally there is no marked improvement in this direction, and a very large number of workers provide their own drinking cup as they object to a common cup, and cups provided by employers are apt to get lost or broken, supervision in this matter being defective.

### *Canteens and Messrooms.*

Although progress is reported, and various excellent examples in individual factories are given, on the whole the effect of the Inspectors' observations is that by far the greater part of the work of securing adequate provision of canteens and messrooms in factories generally needing them (where not under Orders) remains to be achieved. The Home Office pamphlet on "Canteens and Messrooms" has been found very useful especially to follow up and sustain interest of occupiers, after a visit of inspection when the matter has been under discussion, and to direct attention to points of detail necessary for success and yet liable to be overlooked.

There is sometimes undoubted desire to make better arrangements where these are poor and the necessity for messrooms in various industries is recognised, but improvement is hampered by the shortage of accommodation and the difficulties in the way of obtaining building materials and labour. Mr. Brown, Edinburgh, gives interesting examples of co-operation between adjoining firms and factories:—

"At Granton I found that the employees in two adjoining factories were allowed to use the canteen in an ironfoundry, and I was instrumental in securing a similar privilege for the workers in a shipyard near by. The Managing Director at the foundry welcomed these customers from outside as the increased numbers helped to reduce the on cost charges. At Hawick I was able to arrange for the workers in a weaving and a hosiery factory to have the use of a canteen in a woollen mill. A firm of printers in Edinburgh asked if I would approach three other firms in the vicinity with a view to providing a joint canteen in a central position. One firm had just started a canteen and regretted they had not sufficient accommodation for workers other than their own. The remaining two firms have the matter under consideration."

Mr. Brown mentions many industries in which he has found considerable development as regards provision of canteens, particularly engineering, wire making, iron founding, brass founding, gas works, india rubber works and woollen mills, classes of works in which such provision was most essential during the War and most influenced by the welfare campaign of the Ministry of Munitions and other special agencies. He gives a long miscellaneous list of industries, including paper making, fancy box making and stationery, drugs and ink making, brewing and beer bottling, job dyers and rag sorting, in which mess-rooms are more frequently found than canteens, and the experience is no doubt paralleled in other parts of the kingdom. "In these messrooms there is usually a hot plate or stove for warming food, and in some cases an attendant cooks food brought by the workers." Mr. May (Glasgow) finds that the provision of a canteen is not always desired by the men in large engineering works, or possibly by their wives, who "prefer to give the men a good meal at home in the evening."

In Leicester, unattached to any factory, but centrally situated and controlled by the Civic Recreation Council, is a dining hall and recreation room (open 12 noon until 2.15 p.m.) where workers may take their midday meals to be heated or cooked. Knives, forks, etc., are provided and light refreshments can be obtained, and a small weekly charge is made to cover expenses (Mr. Eatock).

A good example of a canteen provided for employees in a comparatively small cotton mill is described by Miss Dunch:—

"A brewery warehouse with shop and house attached was taken on the opposite side of the road. The original kitchen was then fitted up with gas ovens, boilers, &c.; the shop became the men's messroom and on the first floor the women's dining room was arranged, and a small room for members of the management to take their meals in. A cook was placed in charge, seven women and girls help her, one girl keeping the books, &c. Some 80 workers stay to dinner, and an excellent meal is served very reasonably. A feature, which is particularly appreciated by the workers, is the serving of bacon, &c., and porridge and treacle for breakfast. The employees told me that they could get a very good breakfast for 5d., and it was therefore not worth going home. It is remarkable that this mill is in the middle of the town, and the usual excuse for no messroom or cooking accommodation is that workers prefer to go home; but this experiment proves that if good food is obtainable many of the workers prefer to remain than to rush to their homes in the time allowed. Cork linoleum is laid on the floors and the tables are covered with American cloth. Chairs are provided for all diners. A hoist brings up the food from the kitchen to the upper rooms."

A strong development has shown itself in the clothing factories in the North-Western Division and in North London towards introduction of messrooms, with or without canteen, but in any case with provision for cooking and not merely heating food, as well as cloakrooms and washing accommodation. This follows the similar development in Leeds reported in 1918.

"The accommodation varies, and messroom furnishings are often plain to severity, but the standard shows signs of rising and firms putting up new premises are disposed to adopt an improved pattern or welfare building and equipment."

"In a large factory in the North-Western Division, employing 3,000, chiefly women, a dinner of meat or fish, vegetables and sweet can be obtained for 6d., a sum not covering actual cost, but the Manager says 'the value of it goes into every sleeve and collar made.' Since the institution of this canteen fainting attacks which used to vary from 2 to 10 a day have fallen to about one a week: 'the truth is the girls were underfed.' This canteen is run by a Manager appointed by the firm, assisted by a committee of Stewardesses elected by the women workers. There is a separate canteen for the men." (Miss C. Smith.)

Miss Martindale draws attention to the, yet, frequent absence of even elementary provision for a messroom in many workshops in London, and in City factories and workshops not within reach of a restaurant with prices which girls and women can afford.

"In the course of routine visits in the City, Miss Coombes enquired into the question of canteens or messrooms in 154 workplaces—employing 3,800 women and girls. She found canteens provided in two, kitchen or messroom with women employed to cook in eight, a gas cooker in corner of workroom in 30, and no arrangement in 100. These 100 places included factories and workshops where the workers definitely all have the hour for dinner, and either go out to restaurants near, or to their homes or heat up food on gas rings under glue pots or on iron heaters or the fire (if any)."

"Miss Coombes, however, found one small canteen for 60 persons provided by a firm as a War Memorial. This canteen was in charge of a superior cook and there was a charwoman for the rough work, and it was run by a committee of employees. The highest price for the dinner was 1s. and the lowest 6d., charges being graduated according to earnings, and the dinner consisted of meat and two vegetables and pudding. All from the Managing Director to the office boy or new recruit in the workroom had the same dinner and sat in the same rooms, and there was a small lending library attached to the canteen. The balance sheet for the canteen was displayed monthly and the workers were interested in the accounts." (Miss Martindale.)

As regards messrooms in Ireland Mrs. Shaw says:—

"Recognition of the importance of these is growing, and progressive firms are making arrangements for them. Generally speaking, however, the standard is not good. In certain instances excellent canteens

or messrooms of a high type are found, but the average is low. Where messrooms are in use they are frequently dirty, badly lighted and ventilated and badly furnished. Many of these unsatisfactory messrooms are only used for the few minutes required 'to make the tea,' and the workers troop out again with cans and pots to the workrooms where they sit and eat. The workrooms are often much superior to the messrooms in light, airiness and warmth, and one can hardly blame the girls for preferring to use them at meal times when permitted. This custom, however, of using the workrooms as messrooms is not good; the workers require a change and the rooms require airing, but it points to the fact that the workers do appreciate light and air, &c., and gravitate naturally to the more pleasant rooms."

*Protective Clothing, Accommodation for Clothing, Washing Conveniences.*

In all the seven Orders now applying to particular industries or processes these matters come under regulation, either because the nature of the materials handled makes it desirable—such as bichromate of potassium or sodium—or because the conditions of the work are hot, dirty, heavy or otherwise inconvenient and require special clothing, or protection for the workers' own clothing, and means of maintaining cleanliness—as in manufacture of oilcake, preparing and boiling fruit and other departments of fruit-preserving works, sorting rooms in laundries, &c. Baths may on written request by not less than half the workers be required in oilcake mills.

From the Midland Division it is reported that in bichromate of potassium and sodium works the protective clothing is of a poor standard.

"One recent case of chrome poisoning in its early stages was investigated, and disclosed that the compliance regarding provision of rubber gloves had been practically nil. Many damaged and torn gloves were produced, but not one whole glove. The firm alleged great heedlessness and wilful damage against the workers, and referred to the poor quality of the gloves purchased. It was a curious thing that the wearers of the torn gloves were found to be working with hot material and in connection with hot liquid not containing chromate, which suggested that given adequate provision workers in chrome would not be heedless in the matter."—(Mr. Eatock.)

In connection with oilcake mills it is reported from Norwich that though no demand for baths had reached the District Inspector, at least one firm were providing baths at a cost of £11 a head or £1,110 in all.—(Mr. Beard.)

In glass works the provisions with regard to erection of cloakrooms having been deferred to the end of the War, compliance is not yet complete. Plans have now been prepared for excellent accommodation, and it is hoped that the work will be completed in the current year.—(Mr. Wright.)

In Scotland "on the whole the requirements of the Welfare Order in glass works as regards women are complied with," and in the case of one firm provision is being made for canteens, cloakrooms, &c., "for men and women in excess of the standard required by the Order."—(Miss Meiklejohn.)

As regards fruit-preserving works great variation in the standards as to protective clothing and accommodation for clothing, in both the North-Western and North-Eastern Divisions, is reported by Miss Hastings:—

"It varied from the rough sacking aprons—worn with dirty-looking skirts and shawls—provided in one factory, to the excellent provision in another of waterproof aprons, boots and leggings for wet processes, and white cotton dresses for dry and clean processes. In the majority of fruit-preserving factories, before the issue of the Welfare Order, protective clothing was provided for persons on wet processes only. In several of the larger factories good cloakrooms heated with steam pipes, and with a peg for each worker were provided. In no instance have I found lockers. In many of the smaller factories no provision at all was made—not even pegs on doors or in passages. In one factory a good cloakroom was provided with a large open fire. A rail for drying wet clothes was placed in front of the fire, and a woman divided her time between the cloakroom and messroom and kept both clean. In several of the larger factories excellent basins with hot and cold water laid on were fitted up in the different departments. This, however, was the exception. In many factories the occupier pointed out as washing accommodation the tank where the dirty jars were washed and the buckets used by the finishers for dipping the cloths with which they wiped the filled jars. Basins are now being fitted up in all the fruit-preserving factories visited. The difficulty of obtaining hot water where none is laid on is being overcome in various ways. Steam is often utilised; in one factory it is laid on like hot water."

In a laundry in Derbyshire Miss Slocock found that the occupier, who with some ingenuity had purchased rubber bags used in explosive works at one of the sales of the Ministry of Munitions, had made each bag into two excellent aprons for the women in the wash-house. They were tight, but "being rubber should last a long time."

In Lancashire . . . . "In the large majority of cotton mills there are no facilities whatever for washing, except the drinking water tap, and the same remark applies to factories of almost every kind, with the exception of clothing factories and those in which they are required by Special Regulation or by Section 75. Even in clothing factories there is frequently only one basin to as many as from 20 to 50 workers, and one rarely finds hot water laid on, or soap and towels provided. Satisfactory arrangements are seldom made for cleaning the basins, and in many cases they appear to be used chiefly as receptacles for tea-leaves."—  
(Miss Sanderson.)

In Ireland very little has been done with regard to protective clothing except that under special regulations in the mills wet spinners are provided with waterproof aprons. The position is even less advanced as regards cloakroom and washing accommodation in general.

"Unless some steps are taken workers of good standing will refuse more and more to take up 'dirty' work, and either the processes will have to be remodelled or these trades will die out, to be taken up by less fastidious people, or a class of low-grade workers will be created. Few people, one thinks, can have any right idea of what it is to be asked to work in a continual atmosphere of damp and dirt such as wet spinners do. Standing all day with bare feet (usually) on a damp floor, in a temperature which may be over 80° F., weighed down by a waterproof apron, is an existence far from ideal. Above the worker's head, on a peg hang her shawl and skirt; her boots lie on the window sill beside her. At the sound of the whistle at 6 p.m. she hastily dons skirt, boots and shawl, often twisting up her hair as she goes, and, unkempt and unwashed, hurries down from the hot rooms into the airy streets . . . . Some few firms provide cloakrooms for the spinners, but none, as far as I have observed, provide really satisfactory washing accommodation."—(Mrs. Shaw.)

Further information on Washing Conveniences appears in Chapter V. on Sanitation.

#### *Seats.*

Orders have been made requiring facilities for sitting to be provided in oilcake making, fruit-preserving and in laundries, for those female workers whose work is done standing. In fruit-preserving works also it is required that all persons engaged in fruit peeling, sorting, picking and finishing, and covering filled vessels, shall be provided with seats so that they may do their work sitting. This latter provision came into operation chiefly in the summer of the current year. Any objections met with were—

"Usually encountered where conditions were poor. In some cases the occupier said that seats had been provided but had not been used or had been destroyed. It often turned out that these seats were unsuitable, or had been made of poor material . . . . In one factory an excellent result had been obtained by subdivision of processes. Four sets of women were employed in the room—fillers, cutters, ti-ers and parcellers. The fillers and parcellers stood, the cutters and ti-ers sat, but the former changed with the latter at fixed intervals so that all sat for part of the day."—(Miss Hastings.)

The seats clause in the draft laundry Order was in 1919 the one most attacked with criticism by employers in the Midlands, and this occurred, Miss Mellor says, even when the Inspector could go round the laundry with the manager at the luncheon or tea interval and show him girls balancing on the edge of an upturned clothes basket or hanging on at the back of the calender. Miss Ahrons is of opinion that the important matter in laundries will be access to seats in the intervals, now that working hours have been so largely reduced. A good deal of misunderstanding Miss Escreet finds to be still persisting among occupiers of factories who have not yet grasped the principle that use of seats can be so organised as to conserve the strength and power of the workers, and not to hamper their speed and efficiency. Mr. Walmsley observes that the provision of movable seats might be a source of danger in case of fire should workers make a rush for the exits, and concludes that seats that are attached to machines and swing out of the way appear to be the most desirable sort to provide wherever possible.

In Ireland there is little progress to report. Mrs. Shaw says:—

"The stitching trade is already equipped with seats, although the hard, small pedestal

seat, so often now supplied for the machinists, cannot be very comfortable. In the weaving and spinning trade seats are not found to any great extent, but at least one large firm here is experimenting in new seats for weavers and winders although they are not yet in use. In a sack factory I found box seats with wooden platforms to protect the feet from the cold floor."

In the North-Eastern Division Miss Slocock says:—

"It was a pleasant surprise to find chairs provided for nearly every woman worker in a cotton spinning mill, and to find them freely used and much appreciated, and a still greater surprise to be told by the works manager that the women could watch their machines better when seated. In the tenement cotton factories on the borders of Yorkshire and Lancashire it was found that a few weavers had 'buffets' and others sling seats at the end of the loom, but the majority had no seats."

#### *Voluntary Welfare in Shale Oil Works.*

An agreement was secured by Mr. Wilson in the Scottish shale works, where welfare arrangements were a matter of some urgency not only for the men but also for their homes, and the results after a year's trial are gratifying, as appears from his account of the observance of the rules, which provide among other matters for protection of the workers from dust and fumes of spent shale; for suitable shelters, protective clothing, spray baths; for periodical medical examination by the certifying surgeon, first aid and ambulance, with special treatment for skin affections; and for appliances for enabling persons to breathe ordinary air when in a poisonous atmosphere. He says:—

"The provision of spray baths required by rule No. 4, perhaps the most important of all the rules after that relating to the periodical medical examination, has necessarily taken some time, but two installations are in operation and a third almost completed. These baths are of the very highest standard, quite equal to what is provided in the best hydropathics, and what is particularly gratifying, they are made full use of by the workers. Employers and employees both agree that they have proved an unqualified success, and at a conference I had with representatives of both, I was informed that further bath accommodation would be provided in the near future for men employed at the tips and retorts, both dirty occupations.

"Where the baths and ambulance rooms have been completed the voluntary Welfare Regulations are strictly complied with, and it is only a matter of time when all the works concerned will be satisfactorily equipped. The paraffin shed men can now go home absolutely clean, wearing their ordinary clothing which in working hours is kept in lockers through which warm air is always circulating. It is quite obvious that the homes of the workers benefit immensely from the change, as formerly each man travelled to and from work in clothing soiled, and in the lower extremities, saturated with oil."

#### *Enquiry into Welfare in the Fish-curing Industry.*

This industry, which for many years before 1914 largely engaged the attention of both men and women Inspectors, owing to the special character and hardships of the work, fell almost into abeyance during the War. On the return of peace resumption of work followed, and in the autumn of 1919 attention was strongly drawn to the aggravated difficulties for the migratory fish-curing girls arising partly through an enhanced shortage of available housing accommodation. In large centres for this highly seasonal trade, such as Yarmouth and Lowestoft, the problems had in a lesser degree existed before, and there had always been difficulty in adequately regulating the conditions and hours of work by a Factory Act mainly devised for ordinary manufacturing industries.\* New possibilities, however, of better regulation through requirement of welfare under the Act of 1916 had meanwhile arisen, as an outcome of the great difficulties of war-time industry.

Miss Martindale, in speaking of Yarmouth and Lowestoft, says without hesitation that welfare provisions are "more urgently needed" for the exceptional and exhausting conditions of this work than in any other trade. Mr. Taylor (Norwich) endorses emphatically her view and that of Miss Coombes, who largely aided in the necessary detailed investigations, that the conditions are probably harder than in any other industry where women are employed.

"The work is carried on during October and November in the open on the beach, or in sheds of which three sides are usually open to the weather. This year the workers found serious difficulty in getting lodging accommodation and many were housed from thirty to forty-five minutes' walk from their place of work. Thus many miles of walking at meal-times and in the morning and evening were added to their long hours of standing at the farlanes. Many of the workers suffer

\* See report on voluntary action, Annual Report of the Chief Inspector of Factories for 1913, pages 6 and 95.

from salt sores due to salt penetrating into open cuts made by the knives used for gutting the fish, sores which are so serious as to require medical treatment. The Inspectors were unanimous in reporting on the need for mess and rest rooms, medical treatment in first aid stations, cloakrooms and washing conveniences, and at a conference which was held in Yarmouth and which was attended by representatives of the curers, workpeople, social workers and Government officials from other Departments, these recommendations were warmly supported and the provisions of a Welfare Order were agreed upon. At the same conference the imperative need of dealing with the lodging accommodation for the migratory workers by the provision of additional accommodation and by the registration and inspection of the existing lodgings was emphasised, and it is to be hoped that this important matter will be adequately dealt with before the next season." (Miss Martindale.)

"During the latter end of the War period we were giving attention to some of these points, but the absence of the curers, the uncertainty as to the conditions under which the trade was to be re-established, and a general lack of information made it difficult to make much headway. The difficulties were also increased in Yarmouth, where there was the most crying need for improvements, by the attitude of the Corporation, who are the owners of the ground on which the plots are situated. That body were not unsympathetic to our views, but they were influenced by the adverse state of the financial affairs of the Borough, and could not see their way to fall in with the suggestions made by us to improve the working conditions in the yards before the 1919 season commenced. They, however, agreed to be represented at the conference to discuss welfare matters with the curers.

"Very little real progress was made before curing began. Immediately the season started a combination of circumstances arose which rendered the whole question very acute. Owing to the railway strike many of the migratory workers who came from the north, were a long time on the journey, being held up, in some cases, for days, in different parts of the country, and some of them suffered considerable hardships. On reaching Yarmouth and Lowestoft they encountered other difficulties. As it is not the custom for these people to arrange for lodgings in advance, the late arrivals found it extremely difficult to obtain lodgings of any kind. Many had to spend time—in some cases days—in looking for rooms, in the meantime sleeping at any place—some in drifters in the harbour—where friends or interested persons could get a bed for them. Many of the less fortunate had to take lodgings where they could find them and had to live at considerable distances from their work. As far as possible motor and other vehicles were pressed into service for their transport to and fro, but this was not possible for many who, after hard work under trying circumstances, had to spend the greater part of their meal intervals in walking. Others found it impossible to get home for their meals and had to spend the whole day in the open without sufficient shelter or means to obtain hot food. Their troubles were further accentuated by the state of the weather which during the greater part of the season was wet, cold and windy.

"The housing question was of course out of our province and was dealt with by the Ministry of Health, but this matter and that of welfare are to some extent interdependent and at the conferences and subsequent meetings arranged for by the Home Office a representative of the Ministry of Health was present.

"At the conferences referred to agreement was reached on the more important welfare points. The principal minor points left over were those relating to the best form of gutting trough and the best form and size of selection tub, both from the point of view of reducing fatigue, the prevention of draughts in the curing yards and the size of the packing barrels." (Mr. Taylor.)

A memorandum on *Fatigue* has been sent to the trade for consideration, and the matter is being followed up in the current year.

#### *Supervision, Co-operation of Employers and Workers, and Outstanding Schemes for Welfare.*

There is a decided growth in numbers and classes of factories where trained supervisors are met with by the Inspectors, and it is evident that appreciation is spreading amongst employers of the real value of training and knowledge in management of the social, health and welfare sides of factory life. It is, however, as yet, in but a relatively small proportion of the total number of, even large, factories that they are found. Thus, any evidence of



concerted action among employers in taking up and working out such ideas as those suggested in the Home Office pamphlet on Welfare and Welfare Supervision has special value for stimulating advance in this field.

In Dumbarton, Mr. May reports, a joint association has been formed by all the large employers in the town with a welfare supervisor and staff for the benefit of apprentices and boys under 18 numbering 1,200. Most of the boys go home to meals, and a canteen which was started was so little used, owing to objection by the mothers, that it has been temporarily suspended.

"A summer camp has been held for some time at Lamlash, and now land has been acquired on the Clyde for the erection of a week-end home, to accommodate 32 boys and their officers. Preference will be given there to boys out of health, and a reasonable charge made. Arrangements have just been made for every boy, before engagement, to interview the supervisor, who goes in to their educational and medical record, and where necessary, sees the parents, especially in the case of apprentices. When a boy wishes to leave or is dismissed, he also interviews the supervisor, and sometimes the latter is able to bring about the retention of a boy at his former work, or his transfer to another department.

"In a large engineering works an association has been formed whose activities include literature, swimming, gymnasium, games, social club, choral and dramatic society and canteen. The scheme is worked by committees of the men, the works manager being president. He speaks very highly of the value of the association. One hundred and twenty men out of 650 employed use the canteen regularly, a larger proportion than during the War." (Mr. May.)

As is suggested by the latter case, from Mr. May's report, it is not only through the services of professional supervisors that good voluntary and compulsory welfare is being built up. It is a striking indication of the vitality of the whole movement that all kinds of methods are coming into play and are being spontaneously worked out according to the circumstances and needs of the place and industry.

In a large stationery factory in the London area some of the features of what the employers called the "Personal Service Department" are suggestive in this connection. At the head of the department we found a manager and two assistant managers, of whom one was a woman, and it was organised in several sections each with its appropriate form of direction; for example, the Employment Section which dealt with wages and staff questions, engagement and dismissal of workers and generally with trade union matters, was directed by the managers and delegates from the Whitley Works' Council. The health section dealt with ventilation, general sanitary conditions of the rooms, accidents and first aid, ambulance brigade, hospital and convalescent treatment and was presided over by the managers and the health officers of the factory. The club section dealt with the canteen and social entertainments and sports, and it was managed by a committee, half of whom were chosen by the firm and the other half composed of directly elected representatives of the workers. The education section was responsible for the continuation classes for boys and girls employed in the works and their regular attendance at them. It was directed by the management and education officers.

In a moderate-sized woollen factory in Bradford with a skilled and enthusiastic welfare supervisor a similar keynote of personal service is found under entirely different circumstances. The works' magazine for the furtherance and support of the manifold welfare activities of what one must call the "community" is called, simply, "Service." Canteen, rest and recreation rooms, ambulance and first aid, and the various necessary provisions for good personal hygiene are admirably developed, and in the weaving sheds I was struck by the convenience and comfort of ample and good washing appliances set in alcoves, at intervals, right round each shed.

In a laundry and dry cleaning works employing over 300 persons in North-East London, Miss Taylor found the destinies of welfare confided to the charge of a Works' Committee consisting of the manager and twelve members elected by all the employees, foremen and workers. She says that "the manager speaks with enthusiasm of the improved relations and the general increase in interest and communal responsibility that has resulted," and that "in its proposals the committee seems eminently practical." It is the custom of the sub-committee for the management of the canteen to invite any complainant to serve on the sub-committee until the matter is rectified.

In a large iron and steel works in Cardiff Mr. T. O. Edwards found an important welfare scheme under the control of a general welfare committee. He says:—

"The extent of the scheme may be gathered from some of the duties imposed on the Boys' Welfare Superintendent, in addition to those during working hours, viz.: (1) drilling cadet corps, 400 strong; (2) supervising arrangements for works orchestra; (3) member of the general welfare committee, which arranges lectures, whist drives, concerts, &c.; (4) ambulance classes; (5) games. There is a large hall attached to the excellent canteen, built in the centre of the extensive area covered by the various departments, which is used for concerts, &c. There is also in course of construction a large hostel which will contain about 80 beds, a canteen, billiard and reading rooms, baths, and a hospital in charge of a trained nurse for the benefit of the residents."

Women shop stewards are in some cases being given responsibilities by employers for seeing that the Acts and Orders are observed as regards women employed and for reporting irregularities.

In two instances, but in different parts of the country, Inspectors were, by direction of the manager, met by the woman shop steward and conducted round the factory.

In numerous cases firms are acquiring acres of ground, sometimes adjoining the factories, as recreation grounds, variously laid out as tennis courts, cricket grounds, bowling greens, croquet lawns. Evening classes in physical culture and dancing are met with in many places, and sometimes medical officers supervise these things.

A good example of welfare in a cotton mill in Burnley employing 800 workers predominantly women, is given by Miss Andrew. The model canteen and club house is managed by a committee of nine members of whom three are nominated by the firm and six elected by the workers who have taken a lively interest in working out the rules. The canteen which supplies 75 per cent. of the workers, has been developed under the expert advice of an experienced manageress, and meals are served at small tables with chairs. The club is used after work hours for recreation until 10 p.m. every day except Sundays, and plans are being considered by the firm for the addition of billiard and reading rooms, and for tennis and bowling greens on adjoining ground.

In at least three factories—there may be many more—it is reported that a common dining room, of the character either of a good restaurant or a college dining hall, serves the whole factory without class distinction, from the managing director downwards.

In Ireland the whole position as regards supervisors and supervision is entirely different from that in Great Britain. So far as Mrs. Shaw knows definite work of this kind (apart from the munition factories) has only been carried out in a very few factories. She says: "It is satisfactory that a good standard of supervision has been set from the commencement of this kind of work," but that there is a good deal of prejudice to be overcome even amongst the more progressive firms and a somewhat apathetic attitude on the part of the workers." At the same time she says:—

"Many Irish employers have long been interested in the welfare of their workers and proud of their factories and mills, and this interest and pride have shown themselves in buildings of excellent architecture, with lofty light rooms, well-floored and generally good. In the country districts one is sometimes surprised at the good conditions which prevail. At two fairly large jam and confectionery factories, recently visited in connection with the Jam Welfare Order, I found one employer stating that as well as carrying out the requirements of the Order he hoped to put in baths for the workers, and in the other, that a recreation hall was to be built. This shows the spirit in which the Order is being received, although it may be some time before these extras are in use." (Mrs. Shaw.)

## CHAPTER IX.

## AMBULANCE AND FIRST AID.

BY

JOHN C. BRIDGE, F.R.C.S.ED., H.M. MEDICAL INSPECTOR OF FACTORIES.

Reports have been received from each of the Superintending Inspectors and from the Principal Lady Inspector regarding the general observance of the Welfare Orders, but in addition to inspections by the ordinary district staffs the three First Aid Inspectors, Mrs. Bridge, Miss Footner and Miss Davies have been entirely engaged since March, 1919, in administration of the First Aid clauses of the Orders (Miss Davies, only until August, 1919, when she relinquished her appointment). In all they visited 1,102 works subject to Orders, and 135 works not subject to Orders but where information was desired regarding First Aid arrangements.

The results of the work of the First Aid Inspectors is given in detail in the tables appended. Table I shows the extent to which the Orders have been observed and enforced, Table II shows the principal irregularities found in connection with First Aid Boxes, Table III the principal irregularities found in connection with ambulance rooms, Table IV the qualifications of persons in charge of First Aid boxes, and Table V the qualifications of persons in charge of ambulance rooms.

There seems to be general agreement in all the Divisions that considerable progress has been made in complying with the Order and that it is in the main acceptable to occupiers. It would also appear that the workpeople appreciate the advantages to be derived from an Order of this nature. One large engineering firm in Bristol wrote: "We would add that our First Aid room is a great asset to our works, as the wounds and lacerations (slight) which are received by our employees become well after two or three visits to our First Aid room"; and another wrote: "I have not had a wound dressed here become septic for many months. The only cases I get have become septic before they are seen." In three instances prosecutions have been taken for failure to comply with the Order, two in the Midland and one in the North-Western Division, in all of which convictions were obtained.

Special inspections for First Aid have been carried out by Mrs. Bridge and Miss Footner in the South-Eastern, South-Western, North-Eastern and North-Western Divisions. Miss Davies, during the time she was in the Department, largely confined her attention to the Midland Division. The assistance afforded by the First Aid Inspector is referred to by Mr. Williams.

*First Aid Boxes.*

The chief point in connection with First Aid boxes, as these reports show, is the irregularity in maintaining the supply of sterilised dressings. As a general rule, in all Divisions it would seem that, although the boxes are originally supplied with sterilised dressings, when the stock is renewed unsterilised dressings are obtained.

The high percentage of irregularities regarding "contents" (see Table II) is probably due to ignorance of what constitutes a "sterilised dressing." The lay mind often regards a roll of lint impregnated with an antiseptic as such, and much of the time of the First Aid Inspectors has been occupied in instructing on this point. The "person trained in First Aid" is usually very conservative and it is hard to persuade him that the new form of dressing is in any way superior to that used for so many years. In many cases some of the district staff have visited with the First Aid Inspectors with considerable advantage to the former. Miss Footner states that the sterilised dressings on the market are clumsy and that there are not enough shapes and sizes to suit all cases. This has been a matter which has been taken up by myself with the manufacturers, and various suggestions have been made to them with a view to remedying these defects. In Birmingham it is suggested that finger stalls should be added to First Aid boxes, as in one factory, where an injured finger was dressed with lint and a bandage, the frayed ends of the bandage were caught by a milling cutter and three fingers cut off. It is not stated whether this was a sterilised dressing, but if so, with improved dressings such as have been suggested to the manufacturers, accidents of this nature should not occur.

Many firms supply other articles in the boxes (lint, bandages, iodoine, iodine solution, &c.), in addition to those required under the Order. Mr. Jackson, commenting on this, doubts whether it is desirable or not. He thinks not, "as it will lead to ordinary dressings being used instead of the sterilised ones." With this opinion I heartily agree except in the case of iodine solution, and it needs to be emphasized that boxes should contain only the equipment required by the Order, or at most supplemented by iodine and bandages; at any rate, until the persons in charge of the First Aid boxes have acquired the habit of utilising the sterilised dressings.

Throughout the Divisions failure to post up the name of the person in charge of the box is universal, and suggestions have been made that this provision might be more strictly complied with if it were sufficient to post the name of the person in charge in a conspicuous place, such as the time office. There should be no difficulty in posting in each room the name of the individual in charge of the box; although, as reported from the Northern Division the name of the person is generally well known, it is desirable to have the name posted up in the workroom of the person responsible for each box, in order that some person may be held responsible for the keeping of the box and to whom one could look for doing so.

Mrs. Bridge finds that in spite of the leaflet a considerable amount of washing of wounds is still carried on. She thinks that if the leaflet merely explained how to clean wounds with iodine and left out "do not wash" this might improve matters. This also is being considered with a view to the issue of an amended leaflet which will lay down the general principles for the treatment of wounds, rather than the "Do not" form in which the leaflet is now issued.

Relaxation in respect to the provision of the First Aid boxes has been asked for in a fair number of cases where an ambulance room is provided. Miss Anderson refers to the prevalence of applications for relaxation in the Midland Division, while in the North-Eastern Division relaxation has not been asked for to the same extent. In the South-Eastern Division even where ambulance rooms have been provided there is a tendency to provide boxes in various parts of the factory as a formality, although all cases are treated at the ambulance room. Probably this arises from ignorance of the power of the Chief Inspector to grant exemption from the provision of boxes where the ambulance room arrangements are satisfactory. Mrs. Bridge has found, where she has visited after relaxation has been granted, that the conditions laid down have been carried out. The recognition of ambulance rooms in lieu of boxes is reported by Mr. Williams to have worked well, and in one case one occupier asserts that there has since been a definite reduction in the number of septic wounds.

#### *Ambulance Rooms.*

Considerable progress appears to have been made in the provision of ambulance rooms, although there are a few firms outstanding who have not complied with the Order in this respect. In some cases the difficulty of space has arisen and in the South-Eastern Division the building of one ambulance room has been delayed owing to the failure to obtain the Priority Certificate for certain parts.

In Walsall two of the larger works are without proper ambulance rooms, but they are in hand; in Stoke-on-Trent, of the 12 ambulance rooms required, 10 have been provided and the other two are in hand; in Leicester in one works an ambulance room has not yet been built; in Derby, out of 14 factories requiring ambulance rooms, seven have been provided, in five building operations are in progress and in two plans are being considered. In Lincoln and Wrexham ambulance rooms are now provided wherever required.

In Manchester the provision of ambulance rooms is not to the required standard in two cases, and no provision has been made in a third. In Blackburn no ambulance room has been provided in one works owing to want of space, but it is intended to provide an ambulance room when alterations which are about to be made to the offices take place.

In Bolton suitable provision has not been made in three works, but Mr. Hird has this in hand and hopes soon to bring the firms into line.

Mr. Walmsley (Oldham) says that where an ambulance room is provided the men prefer to go there, particularly if a trained nurse is in attendance, rather than to get their wound dressed in the workshop, even if only a trivial one, but on the other hand, Mr. Hird (Bolton) complains that the workers do not appreciate the objects of the order, and slight injuries are not brought to the notice of the officials until too late. Mr. Wright reports that the larger works much prefer that First Aid should be administered in the ambulance room rather than use First Aid boxes, and it is reported that in one or two instances, although not employing 500 hands, firms have equipped such stations. The time wasted in rendering First Aid from boxes is stated to be considerable, and this is the

main reason why such preference is shown. Such an objection is, I consider, largely due to ignorance of the value of a sterilised dressing for immediate use before treatment in the ambulance room.

With regard to the general conditions of the ambulance rooms, of 70 visited by Miss Footner in the North-Eastern Division, none could be singled out as perfect although some were satisfactory. Mr. Wright reports that the construction and equipment of the ambulance rooms in his Division is on the whole quite satisfactory. In one or two cases default still exists, but the excuse offered in such instances is the difficulty of building materials and labour. Mr. Williams reports that in his Division one of the most satisfactory features appears to be the excellence of the ambulance rooms provided.

The persons in charge of the ambulance rooms would appear generally from the reports, to be only fairly satisfactory. Miss Footner considers that the ambulance room attendants have done excellent work in the North-Eastern Division under difficult conditions. She found that the First Aid men take more interest in stretcher drills and parade work than in detailed care of the ambulance room and attention to minor injuries. Generally the women attendants had a higher standard in attention and care of the ambulance room. Mr. Wilson states that a fair number of experienced women nurses have been appointed in charge of ambulance rooms.

#### *Records.*

Mr. Wright reports that records have been appreciated and that the management has in more than one instance expressed great surprise at the number of accidents that had occurred, and this has focused attention more fully on the causation. In one works in the Bradford District, records of 500 cases per month were found, and in the Huddersfield District 360 cases were dealt with in the same period. Very few of these occurrences were reportable under the Notice of Accidents Act. Such instances are worthy of record, as if brought to the notice of other occupiers they act as a stimulus to others to keep full records of all the accidents which occur in their works.

#### *First Aid Training.*

Most of the reports refer to some extent to the lack of training amongst those in charge of the First Aid boxes and ambulance rooms. First Aid training has been considerably neglected during the period of the war, but it would appear that now a considerable revival of First Aid classes is taking place. Miss Anderson reports that First Aid training is given in many of the larger works, but in the smaller ones there is practically no teaching given. Mrs. Bridge finds it surprising how entirely the value of the sterilised dressings is neutralised by the ignorance of the person applying them. Often the First Aid work is relegated to the foreman, who has had no training, but has had 20 years' experience of boracic lint, &c., and sees no reason to change his method.

It has been necessary for the First Aid Inspectors to give instruction in the use of sterilised dressings to a large number of persons to whom such instruction has been an innovation. The educational work has been of the greatest value, and until this form of dressing is universally taught in First Aid classes, the continuance of this work seems most desirable. It requires technical knowledge to be able to instruct and to give advice on the many points which arise and with which people unacquainted with a technical subject of this sort are unable to deal. The value of the First Aid Inspectors has been very considerable in this respect, quite apart from enforcing strict compliance with the terms of the Orders. Several firms have written expressing appreciation of the advice given by the Inspectors at their visits. Reports from various Divisions show, however, that men returning from the army appear keen on the use of sterilised dressings and take considerable interest in attention to cleanliness and the way in which the dressings are prepared, in order to maintain cleanliness. Many of the Inspectors report interviews with Trade Union officials, and have enlisted their sympathy in connection with the training of their members. Mr. Seal (Manchester) was informed by the Secretary of the National Union of Brassworkers and Metal Workers, that whilst a number of their members are qualified to render First Aid, he agrees that there may be works where no such member is employed. He recognises the importance and value of workmen's co-operation and will promptly bring the matter before the members of his Union urging on them the extreme desirability of this qualification, and will ultimately try and see that no works are without its quota of qualified First Aid men. Mr. Wright reports that in the larger works First Aid training is on the increase owing to the influence of welfare supervisors.

In the Huddersfield district a good start has been made by the Technical School Committees, who have organised a series of classes, and there is promise of additional public classes being held during the winter in various parts of the North-Eastern Division.

In Stoke-on-Trent training classes have also recently been started. Attention of many Trade Union officials has been drawn to this subject, and it is expected that their influence will also result in further improvement. The Sheffield Federated Trades Council proposes to take the matter up with interest in the near future.

Mr. Rogers (South-Western Division) reports that employers have been urged to institute training classes and the subject of First Aid has been discussed with many Trade Union representatives, who have promised to bring the matter before their members. Mr. Harding reports on one large factory where classes were kept up throughout the War period. Several of the Inspector's reports show that considerable inducements have to be held out to persuade workmen to join the First Aid classes. Mr. Wilson reports that in one or two instances there has been reluctance in providing an ambulance room where the works were in close proximity to a large hospital, but this has been confined to Belfast.

TABLE I.

## Extent to which orders have been observed.

	(1) Regular at 1st visit.		(2) Irregular at 1st visit.		(3) Regular at revisit.		(4) Irregular at revisit.		(5) Reported regular by firm.		(6) Regular by re- laxation.		(7) Total made regular.		(8) No infor- mation.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
S.E. Division ...	153	38.1	248	61.8	68	27.4	43	17.3	80	32.2	19	7.6	167	67.3	38	15.3
S.W. Division ...	12	50.0	12	50.0	2	16.6	—	—	1	8.3	1	8.3	4	33.3	8	66.6
Mid. Division ...	113	50.6	110	49.3	8	7.2	6	5.4	39	35.4	10	9.0	57	51.8	47	42.7
N.E. Division ...	173	56.5	133	43.4	14	10.5	7	5.2	66	49.6	6	4.5	86	64.6	40	30.0
N.W. Division ...	54	40.9	78	59.0	8	10.2	3	3.8	27	34.6	6	7.6	41	52.5	34	43.5
N. Division ...	12	75.0	4	25.0	—	—	—	—	—	—	—	—	—	—	4	100.0
Total ...	517	46.9	585	53.0	100	17.0	59	10.0	213	36.4	42	7.3	355	60.6	171	29.2

TABLE II.

## First Aid Boxes—Irregular.

	(1) No provision.		(2) Number.		(3) Position.		(4) Contents.		(5) Main- tenance.		(6) Notices.		(7) Contents regular but not used.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	No.		
S.E. Division ...	63	25.4	46	18.5	3	1.2	162	65.3	40	16.1	170	7		
S.W. Division ...	5	41.6	—	—	1	8.3	3	25.0	2	16.6	5	1		
Mid. Division ...	13	11.8	22	20.0	1	0.9	78	70.9	23	25.4	103	14		
N.E. Division ...	30	22.5	12	9.0	4	3.0	84	63.1	59	44.3	182	57		
N.W. Division ...	27	34.7	2	2.5	2	2.5	43	55.1	20	25.6	60	6		
N. Division ...	1	25.0	1	25.0	—	—	3	75.0	3	75.0	10	—		
Total ...	139	23.7	83	14.1	11	1.8	373	63.7	152	25.9	530	85		



TABLE III.

## Ambulance Room—Irregularities.

	(1) Not provided.		(2) Size.		(3) Equip- ment.		(4) Cleanli- ness		(5) Lighting.		(6) Person in charge not available.	
	No.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	
S E Division ...	3	8	8.8	23	25.5	2	2.2	2	2.2	2	2.2	
S W Division...	1	—	—	1	12.5	1	12.5	1	12.5	1	12.5	
Mid. Division.	7	2	3.2	19	30.6	8	12.9	1	1.6	3	4.8	
N.E. Division...	5	3	3.8	27	34.6	13	16.6	—	—	—	—	
N.W. Division	5	7	11.8	14	23.7	4	6.7	1	1.6	6	10.1	
N. Division ...	—	—	—	2	40.0	2	40.0	—	—	—	—	
Total ...	21	20	6.6	86	28.4	30	9.9	5	1.6	12	3.9	

TABLE IV.

## First Aid Boxes—Persons in charge.

	(1) Trained.		(2) Untrained.		(3) Not Specified.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.
S.E. Division ...	175	43.6	139	34.6	24	5.8
S.W. Division ...	11	45.8	4	16.6	4	16.6
Mid. Division ...	120	53.8	84	37.2	6	2.6
N.E. Division ...	140	45.7	116	37.9	20	6.5
N.W. Division ...	62	46.9	40	30.3	3	2.2
N. Division ...	7	43.7	8	50.0	—	—
Total ...	515	53.4	391	40.6	57	5.9

TABLE V.

## Ambulance Room—Persons in charge.

	(1) Fully trained Nurse.		(2) Partly trained Nurse.		(3) Trained in First Aid.		(4) Untrained.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
S.E. Division ...	31	34.4	18	20.0	33	36.6	6	6.6
S.W. Division ...	1	12.5	1	12.5	2	25.0	3	37.5
Mid. Division ...	22	35.4	9	14.5	23	37.0	5	8.0
N.E. Division ...	14	17.9	10	12.8	53	67.9	1	1.2
N.W. Division...	15	25.4	5	8.4	29	49.1	4	6.7
N. Division ...	2	40.0	—	—	3	60.0	—	—
Total ...	85	28.1	43	14.2	143	47.3	19	6.2

## CHAPTER X.

## EMPLOYMENT: HOURS OF WORK.

BY

W. WILLIAMS, H.M. SUPERINTENDING INSPECTOR OF FACTORIES, AND MISS MARTINDALE,  
H.M. SENIOR LADY INSPECTOR OF FACTORIES.

*Hours of Work.*

From an industrial point of view one of the most remarkable effects of the war is the general reduction in the hours of work, which now rarely exceed an aggregate of 48 a week. This reduction, which has been accomplished without legislation, and, in most trades, without serious friction between employers and workers, has been adopted in almost all industries. Even in fish-curing and in laundries, where strict limitation of hours was at one time considered to be incompatible with the existence of the industries, agreements have been made for a 48-hour week. In a few districts, however, laundries and establishments engaged in needlework have not conceded shortened hours, while some of the Jewish tailors in East London are still showing that they do not consider themselves bound by any convention limiting hours of work. Moreover, in Gt. Yarmouth very long hours of work were still occasionally observed in herring pickling, giving reason for the remark of a Highlander to the Inspector "We are the last slaves to be freed." Difficulties have, of course, arisen owing to the great change in periods of employment. Means of transport have, in some cases, failed to correspond with the new hours of work, and the habits of workers as to meals have, in many instances, rendered the new meal-times unwelcome. Time will doubtless smooth out these difficulties.

Commonly the total weekly number of hours of work (including meal-times) is either 47 or 48, although in some works this total is reduced to 44 or even less. As regards the distribution of these hours, there is considerable diversity of practice, not merely in different districts but even in the same district. Broadly, the systems adopted may be divided as follows:—The five-day week (no work on Saturday), the single-break day (with only one substantial pause for a meal), the double-break day (with 2 meal-times), or the shift system. The selection of the particular system to be adopted has frequently been left to the majority of the workers.

*Five-day Week.*

The system of limiting work to five days a week has been adopted fairly commonly in Jute Mills, Bleaching and Dyeing Works, and is also in operation in many works outside these industries. The general reduction of hours affected Saturday and left such a short working period on that day that many employers considered that it was not worth while to open their works between Friday and Monday. The Saturday hours are said to be better utilised if added to the other days of the week, and some of the firms who have adopted this system are very pleased with the results, although at least one employer is said to have reverted to the six-day week. The favour in which the five-day week was held in one establishment was shown by a vote of the workers of whom 200 were for and only 2 against its adoption. In one works the system was adopted for the summer only, when an early morning start was not objected to. It was thought that during the winter work on Saturday should be resumed with a corresponding shortening of the hours on the other five days. However, at the approach of winter the workers were consulted but they decided in favour of the five-day week even in the winter. The long week-end break is appreciated by the workers, particularly by those who assist in house work or who live at some distance from their work, and also by many employers who are able to utilise this break in overhauling or repairing plant.

*Single-break Day.*

This system, which is probably the one most commonly adopted, is generally associated with a start at about 8 a.m. and a cessation of work at about 5.30 p.m. on five days a week and at about 1 o'clock on Saturday. The principal objection to this plan arises from the long interval between breakfast and dinner. Some workers, who have been accustomed

to work before breakfast, find a difficulty in making a good meal before going to work, while others, not affected in this way, through lying in bed too late or through other reasons, are unable to obtain a substantial breakfast before leaving home. In any case where the factory is at a considerable distance from the worker's residence, the interval between breakfast and dinner, is felt to be too long for the average operative. In order to overcome these objections, workers are frequently allowed to partake of refreshment during the morning—sometimes during a definite pause of 10 or 15 minutes, sometimes without any recognised cessation of work. Many employers who have introduced these short pauses are satisfied that production has not suffered thereby. Cases are reported of employers sending round tea with biscuits or bread and butter to their operatives at about 10 a.m., these refreshments being sold at cost price (or less).

#### *Double-break Day.*

In order to shorten the spells of work and to avoid interference with established practice as to hours of meals, many works have retained two substantial breaks for meals in the course of the day's work. Under this method the work generally commences about 7 a.m. and ceases at 5 or 5.15 p.m. (about noon on Saturday), with  $\frac{1}{2}$  hour for breakfast at about 8.15 and  $\frac{3}{4}$  hour for dinner at about 12.30. In many cases at the request of the workers themselves the double-break day was resumed after a trial of the single-break system, partly due to their preference of the shorter spells of work and partly owing to the fact that the ordinary meal-times were not interfered with.

#### *Beneficial Effects on the Workers of Shorter Hours.*

The reports received from Inspectors show that the shortening of the working hours has had a beneficial effect on the operatives, perhaps more so than any other recent improvement in industrial conditions. The old system of long, dreary, monotonous toil is rapidly giving way to a new system of reasonable hours, so that soon it may be hoped that the overworked man or woman in the industrial world will rarely be found. On all sides workers are securing by their own efforts shorter hours, and many letters are received asking whether periods well within those allowed under the Factory Acts are legal.

Perhaps the classes of workers upon whom shorter hours will have the most beneficial effect will be the growing girl or boy on whom long periods of employment told hardly, and the worker possessing some vision and aspiration towards a fuller life. Regarding the former class the effect of reduced hours and the later morning start is more immediately evident. The pre-war hours of work often entailed very long absences from home—as, for example, in certain cotton districts where young boys and girls residing a long distance from the mills used to leave home before 5 a.m. and did not get back until 7 p.m. They were attracted to the mills by the high wages they could obtain there, and the long day was due to the want of good means of transit between their place of residence and the places where they worked. Now tram and train services frequently fit in better with the new hours, and the shortened day reduces the strain on the growing boy and girl. The gain to married women is also very great as is shown by the eagerness with which the older women in laundries respond to remarks about the shortened hours. It is a relief to them to be enabled to spend long evenings in their homes, and not have the early starts in the mornings.

With regard to the effect of shorter hours on time-keeping and absence from work, although it must be acknowledged that time-keeping depends largely on the character of the individual, and on the organisation, tone and discipline of the factory management, still it is not surprising to hear that better time-keeping has been the result of discontinuing work before breakfast. As far as absence for sickness and other reasons are concerned, there seems no doubt that a shorter working day results in the worker staying out less frequently. In one large factory the average daily absentees numbered some years ago 40; now, with a 44-hour week, the average number of daily absentees has dropped to 10. In a large laundry the Inspector reports there was a marked improvement in attendance, not only less sickness, but fewer cases of absence for general reasons such as attending to home affairs, the worker being better able to cope with these under the new hours of work.

Some interesting particulars of the reduction of lost time which followed the change to shorter hours at a large engineering works have been furnished. At this factory until last year the hours worked were 6 a.m. to 5 p.m., with 8 to 9 a.m. and 1 to 2 p.m. for meals, making a total of 54 hours. Last year the 47-hour week was adopted—7.30 a.m. to 5 p.m., with one hour for a meal at 12.30. In this factory about 1,200 men and boys were employed before the change, and on the average there were over 800 "quarters"

lost weekly. This means that at least 800 workers commenced as late as 9 a.m. instead of 6 a.m. once a week, which was obviously an enormous hindrance to the work of others who came to work in time. In a typical week a few months ago only 18 half-days were lost by the present staff of 1,500 men and boys. They were allowed grace until 7.40, after which they were shut out until the afternoon. Formerly only two to three minutes' grace was allowed at 6 o'clock, when the late-comers were shut out until 9 a.m.

With regard to the effect on health of the shortened hours, perhaps sufficient time has not yet elapsed for any marked improvement to be noted generally, although the improvement in individuals is evident. Less fatigue and overstrain is found in factories, and one Inspector reports that, although more men are employed in engineering and allied trades, the accident list has not increased, and it is claimed that fatigue is non-existent; while another Inspector reports that the manageress of a laundry stated that she noted a perceptible decrease in sickness when she changed from the 8 a.m. to a 9 a.m. start.

It is also perhaps too early to generalise on the effect of the shorter hours in increasing the workers' taste for healthy recreation. It is reported that workers are appreciating the fact that they have now time to work in their allotments and gardens, and to play games or to go for country rambles, while the leaders of some social clubs report bigger attendances in all classes, both technical and educational, and say that the members come to the classes fresher and keener than they were in previous years and make steadier advance.

Some occupiers and social workers have realised that the real well-being of the worker cannot be accomplished merely by working shorter hours, although this is a first and essential step as it frees the spirit and leaves some bodily and mental energy at the end of the day for recreation and education. Instead, they realise that the form this education and recreation is to take must be decided largely by the tastes of the workers, as individuals, and that a taste for healthy recreation and for education in varied forms can be encouraged by successful efforts or organisations in these respects in the factory and in outside clubs. Accordingly we have cases reported of successful works schools being carried on in factories, apprentices being allowed one day off a week to attend classes in technical and general instruction, and of firms who encourage outdoor exercises, games and recreations of all kinds. There is still, however, very much to be done in this direction, as the opportunities for wholesome recreation among the industrial classes, especially working girls, is at present very inadequate.

Clearly, the shorter working week brings with it new problems and responsibilities to both employer and worker.

#### *Effect on Production.*

The reports disclose wide differences of experience as to the effect on production of the shorter hours. Frequently it is impossible to make a fair comparison of output before and after the shortening of hours of work, owing to other changes in conditions. Among these changes may be mentioned alterations in machinery or organisation, extensions of work necessitating the employment of much untrained labour, scarcity of workers (particularly of skilled workers), irregular supplies of materials, changes in quality or class of product and in systems of payment.

When the production depends almost entirely on the speed of machinery—as in cotton or woollen spinning—the output is said to be reduced in a proportion nearly, if not fully, corresponding to the reduction in hours. In other machine operations which call for constant alertness on the part of the operator (*e.g.*, weaving) output has not suffered to this extent, and, in exceptional cases, has scarcely been affected at all. In a third class of process, where output is largely or entirely dependent upon the exertion of the worker, there is frequently no loss in production; indeed, in one wholesale tailoring establishment an increase of 40 per cent. is reported (partly due to reorganisation); while in a boot factory, where the hours of work were reduced from 52 to 48 per week, there was a considerable increase in output. Unfortunately, a few of the reports indicate an extremely unfavourable result in some works, where the shortening of hours has been followed by a reduction in the hourly rate of production, and for this result no adequate explanation has, as a rule, been given.

In order to prevent or to reduce a decline in production, some employers have improved methods of work, and the two following instances may be quoted. One case is that of a silk spinning and weaving factory, where, although the hours of work were reduced from 49 to 44 per week, the output was increased. Careful records were kept of the output of each machine and worker, and any deficiency in individual output was closely investigated. This frequently brought to light slight defects in machinery which might otherwise have escaped attention, and further disclosed the fact that temperature had

a considerable influence on production. It was also found that some of the workers were not fitted for the work upon which they were engaged, and transference to other duties gave better results. Better methods of training young workers have also been adopted. Further, excellent arrangements have been made for the care of the operatives, including the appointment of a welfare staff and the provision of a rest-room. The second instance refers to the arrangements for cleaning machinery in a cotton weaving shed containing 1,200 looms. As a rule, this cleaning is done by the weavers, and on Saturday morning the machinery is stopped for this purpose for half an hour before the recognised time for ceasing work. In the case in point the weavers do no cleaning whatever. Instead, the occupier has provided 10 men cleaners, four being disabled ex-Service men and six elderly ex-weavers. For this service each weaver pays 3*d.* per loom per week, and the arrangement is stated to be highly satisfactory to both parties. The weavers are saved much dirty and uninteresting work, and the looms and shed are in a very much cleaner condition than obtains under the old system. The employer nominally loses £15 per week on this arrangement, but he and the workers are the gainers by a greater output of better quality. Incidentally, the new system removes the temptation to weavers to clean looms while in motion and thus reduces the risk of accident.

### *Shift System.*

The reduction in output due to the shortening of hours and to other hindrances to successful industrial operations came at a time of urgent demand for manufactured articles of nearly every description, and the problem of how to meet this demand exercised the mind of nearly every manufacturer. It was obviously impossible to make an immediate expansion of factory buildings and machinery, so the problem could only be solved by utilising the existing plant to the fullest possible extent by means of relays of workers. Accordingly, a system of working in shifts was adopted in many works. As regards men over 18, this system is in accordance with the law, but, for "protected" persons (that is, for women and young persons), it is under ordinary conditions prohibited by the Factory Acts. Temporary powers were, however, given to the Secretary of State enabling him to authorise two day-shifts of "protected" persons, and, in pursuance of these powers, the required authority was given in suitable cases, subject to strict rules for securing proper conditions for the workers. Generally, under this authority, the first shift works from 6 a.m. to 2 p.m., and the second shift from 2 to 10 p.m., an interval of half-an-hour being allowed for a meal in the course of each shift. The shifts usually change over weekly, and as the first shift stops work at 12 or 1 p.m. on Saturday, and the second shift does not usually work on Saturday afternoon, the actual hours worked are only 44 and 37½ on alternate weeks.

This two-day-shift method of working was at the end of May 1920, in operation in about 200 works employing in the aggregate 15,000 women and 3,400 young persons. This method of working has clearly been of much value in securing greatly increased production at a lower cost and in preventing unemployment. The ordinary law, by prohibiting the work of women in two shifts, adversely affects the value of women in the labour market and in several instances, the temporary abrogation of this law led to the employment of women on processes from which they would otherwise have been debarred. Much greater use would have been made of shifts if the authority for their employment could have been made permanent. In many cases the cost of obtaining and training workers (including supervising staffs) was too great to be incurred for a system of work which would only be authorised for a limited period.

There is some diversity of opinion as to the desirability of different shifts of workers. Employers have welcomed the opportunity of working on this system as it has meant increase of output and the employment of a double set of workers, thus enabling them to retain the services of more of the workers who were employed during the war. By this system also it has been possible in some processes to continue the employment of women on work in substitution for men. In one case, particularly (an iron foundry), where the work had been carried on in an unsatisfactory manner by men, the employment of women on 2 short shifts proved to be such a success during the war that the Managing Director desired to continue it permanently. It was found that, not only had the output at once increased, but had even risen above pre-war level. Again, in a Glass Works it has been found possible to continue the employment of women by arranging two day shifts for them, the boys working the third (night) shift, alternating one week with the morning and the next with the afternoon shift.

This system has also been found very helpful in cases of (1) a bottle neck department in a factory, (2) delivery of machinery delayed by strikes, (3) abnormal conditions such as the increased cost of tin, making the demand for cartons more than can be met by working

machines 48 hours in a week. On the other hand employers have found drawbacks to this system—it has often been impossible to duplicate the management and the 16-hour day frequently involves long hours for the staff. This, of course, is a temporary difficulty. So far as machine work is concerned there is difficulty arising from the fact that each machine has to be shared by 2 people.

Although many of the workers, particularly married women, have appreciated the shorter hours and freedom from work in the mornings or afternoons, still, the two eight-hour shifts have not found universal favour amongst them. The early start in the morning and late stop at night, the difficulties of transit at these times, the different hours for meals from those usually taken in their homes, which this system entails, have all militated against the popularity of the system. The workers of the first shift find they want a meal about 8 a.m. as often the 6 a.m. start means that they come to work breakfastless, so usually two breaks are allowed for meals during the shifts. The weekly change over of the shifts also does not find universal favour, as it effectually prevents any consecutive engagements, such as clubs, meetings or evening classes. Among the girls and young women there seems to be an objection to anything which interferes with the evening's pursuits, even in alternate weeks, and a feeling that a morning off is inadequate compensation to a girl living at home, as she is invariably expected to spend it in helping in household duties.

In spite, however, of the objections to shifts, the opinion seems to be steadily growing that, with the reduced hours of employment of each worker and the increased cost of plant, material and labour, the system will, at least for a time, be necessary, if the required increased output is to be produced at a reasonable price.

In some cases, certainly, the system has become popular amongst the workers. In one Works where only certain sections of the workers are on the system, there is great competition among them for transfer to these sections, while, in another, the Welfare Worker informed the Inspector that she made this transfer a kind of "prize for her best workers."

Although the usual arrangement of the 2-shift system is 6-2 and 2-10 where women are concerned, shifts are arranged on other systems—for example, 2 shifts of 6-1.30 and 1.30 to 9, and 6 a.m. to 1 p.m. and 1 p.m. to 8 p.m. have been found in operation: For men in a wire-drawing mill 2 shifts of 6 a.m. to 2.30 p.m. and 2.30 p.m. to midnight have replaced the system of 2 shifts of 12 hours, while, in other works, 3 eight-hour shifts have taken the place of 2 shifts of men and boys who worked 10-12 hours daily and nightly in alternate weeks. In the iron and steel industry in smelting, rolling and forging, the three eight-hour shift system has been adopted to a considerable extent for men, although sometimes only 2 shifts are worked out of the three—owing in some cases, to the shortage of skilled men.

Owing to trade demands adult male weavers are working night shifts in rug weaving in the Worcester district, while in artificial silk works, three eight-hour shifts are in operation.

Very little has been done to arrange for double shifts in the textile trades. One or two doubling shifts are being run on this plan and a trial was made in a weaving shed but fell through as women could not be employed and sufficient men weavers could not be obtained. It was proposed to reduce the speed of the looms and increase the number of looms each weaver would look after, the hours to be 7-1.30 (less  $\frac{1}{2}$ -hour for a meal) and 1.30-8.30 (less  $\frac{1}{2}$ -hour for a meal). This plan was tried experimentally and was said to give a better output per loom per hour.

#### *Illegal or Exceptional Hours of Working.*

Illegal night work has been somewhat prevalent and night shifts of women and young persons (and even of a child) have been found in such trades as sweet-making, cigarette-making, bakeries, etc., without, of course, any sanction. Night work for women and young persons during the war was so common that in some cases it has been difficult to make employers realise that such employment was practically unheard of before the war and was contrary to the trend of all industrial legislation. Some successful prosecutions for this offence have been taken and heavy fines imposed. In one case a young person employed as a stoker's mate worked in one week 100 $\frac{1}{2}$  hours less 8 hours for meals, being employed on Sundays and at night, while in another it was found that women had been working from 8 a.m. on Friday till noon on Saturday, a continuous period, except for short breaks for meals, of 28 hours. In a glass bottle factory boys were found employed from 7 p.m. on Fridays to 1 p.m. on Saturday afternoon, and again from 7 a.m. on Sunday to 7 p.m. the same day.

In the East End of London it has been found necessary to caution and prosecute for illegal employment after 8 p.m. Jewish tailors, who, in many cases, have not conformed



to the general shortening of hours, while, in the West End, an interesting prosecution was taken for employing women, in making theatrical costumes on theatre premises for 74½ hours a week (including Sunday) for 4 consecutive weeks. The Counsel for the defence argued, however, that this workshop was outside the jurisdiction of the Factory Acts because (as in the appeal case of *Curtis v. Shinner*) the work carried on there was not for direct gain, the costumes being used in the theatrical production and not sold by the employers who were the Managers of the Theatre. The Magistrate adjourned the case for a fortnight so that this argument might have due consideration. As, however, it seemed impossible to meet it, the cases were withdrawn, the Magistrate, however, making it clear that the spirit, if not the letter, of the law was being infringed, and that fresh legislation was needed to cope with such cases.

The illegal employment of women and young persons on Sunday has been far too common and has resulted in a fair number of prosecutions. One particularly bad case came to light in which the occupier, who posed in Court as a philanthropist, procured boys from a Home for illegitimate children with the ostensible object of teaching them a trade and acting during their training as a father. These boys were employed from 8-8 (Monday to Thursday), 8-6 Friday and Saturday) and 10-1.30 on Sunday. They lived alone in a house attached to the factory and were allowed a key of the door and practically had complete freedom of the streets after their day's work.

During the summer months at seaside resorts Sunday work was found prevalent in photographers' workrooms and several successful prosecutions were taken; while, in isolated cases, long hours have been worked, as, for example, 6 a.m. to 8 p.m. Monday to Friday with short day on Saturday—such employment continuing for many weeks on end.

*Dairies.*—One trade in which long hours were worked systematically last year was the dairy industry, which expanded considerably during the war owing largely to action by the Ministry of Food with a view to increasing cheese making. Formerly the bulk of this work was done on the farms, but, during the war, farmers found it more profitable and convenient to sell their milk, and consequently cheese making was largely transferred to the factories. The extreme pressure on the dairy industry during the war made it necessary to vary the hours permitted under the Factory Act by a General Emergency Order, which allows the weekly limit of 60 hours work to be distributed over the 7 days of the week subject to the condition that the period of employment on Sunday must not exceed 8 hours including ½-hour for a meal, and, on the other days, 12 hours with 1½ hours off for meals. In many of the factories the hours reached 56-60 hours weekly last Spring and Summer, much shorter hours being worked in the Winter when many dairies close altogether. Although a few factories arranged a six-day week for individuals by increasing the staff, and some have allowed a half day off weekly, while others introduced overlapping day shifts (some of the workers commencing later than the others and stopping later), the great majority have worked 7 days a week, the usual arrangement being a period of employment (including mealtimes) of 8 to 11 hours for Monday to Saturday and 5-8 hours on Sunday. The Dairies themselves are open for much longer periods than these, often from 7 a.m. to 9 p.m., or later at busy times, and in many cases some of the workmen have attended during the whole period the dairy was open. In one case it is reported that the firm used up all the overtime under S.50 and then asked for a special order to cope with the work.

Although, of course, the amount of overtime worked under S. 49 has decreased to a marked degree all over the country, still in the Northern Division the number of firms working overtime is considerable and the number of occasions on which overtime was notified in 1919 almost approximated ⅓ths. of the overtime worked throughout the Kingdom.

The general opinion is that the shorter hours have led to less time cribbing than formerly although more meal-time work by the weavers themselves is being carried on in one district.

#### *Spells and Meal-times.*

The shortening of the hours and re-arrangements of the periods of employment have not shortened the spells of work as much as is desirable, and in many factories workers are being employed for spells of 4, 4½ or even 5 hours, although experience has shown the undesirability of long spells of continuous work. In few occupations is it possible to continue work for a long period at a stretch without output suffering owing to fatigue on the part of the worker. Especially is this the case in monotonous work, such as packing food, medicines, etc.

Many firms have realized the value of a short break in the course of the morning and

afternoon, and these breaks have generally been found to mean increased output. In other works, arrangements have been made to provide workers who come from long distances with refreshments on arrival at the factory, so as to ensure that the workers are not being employed breakfastless.

In some provincial districts the mid-day interval has been lengthened to  $1\frac{1}{4}$  or even  $1\frac{1}{2}$  hours to allow the workers to go home for their dinner. This has been much appreciated and not only ensures in many cases to the worker a better meal, but also a cheaper one, an important matter in these days of high prices. In London a lengthened mid-day meal would not be appreciated so much, as many of the workers live too far from their work to make their return possible, but in small towns and country districts occupiers would be well advised to give this matter their consideration.

More might also be done for married women, especially nursing mothers, by arranging periods of employments and intervals suitable for them. In some women's industries arrangements have been made to allow married women to come later and leave earlier, both at the dinner hour and at night, than unmarried workers. A case is reported of a clothing factory where a custom has been established that all nursing mothers are allowed to "clock out" for half-an-hour during the morning and afternoon spells in order that they may attend to their babies. Their hours are 9 to 6, with breaks 11 to 11.30 and 1 to 2 and 4-4.30, and they are not allowed to return to work until 3 months after their confinement. Day workers lose their time wages and pieceworkers their piece work rates, but the Manageress stated that the mothers find the arrangement such an advantage that they are glad to avail themselves of it. In the case of workers living at a distance they arrange to have the baby taken care of near the factory and if necessary the Manageress helps them to do this.

#### *Employment of Children.*

During the war there was a considerable amount of illegal employment of children in many districts, the children working in the factories before and after school and even during the dinner hour. The reports from the Inspectors show that this still continues occasionally, especially during the holiday time and on Saturdays. Children of 10-12 years of age have been found in laundries, while in Scotland as well as Gt. Yarmouth little boys have been found in kippering and fish-preserving works, assisting in box-making. Their employment is probably largely due to their parents sending them to work on account of the comparatively large wages they can earn at present. In Gt. Yarmouth two little boys aged 12 and 13 were found at work making boxes after school hours. They were working at a feverish pace as they were paid on piece work rates and earned each about 12/- a week. One of the little boys, although suffering from swollen glands and evidently in wretched health, was spending much of his "free" time, when he should be playing out of doors, in a loft above a kippering workshop making boxes.

## CHAPTER XI.

## NIGHT EMPLOYMENT OF YOUNG PERSONS.

BY

W. K. BEARD, H.M. INSPECTOR OF FACTORIES.

A general survey has been made of the position regarding the employment of young persons at night, in the different industries where such employment is permitted by the Act, or by Orders made thereunder. The following summary has been prepared from the reports submitted from the different Divisions.

## BLAST FURNACES.

## I.—NUMBER OF YOUNG PERSONS EMPLOYED AT NIGHT.

Besides the production of pig iron, this exception covers the smelting of zinc, copper, lead and nickel; in these latter trades the employment of boys at night appears to be more at and about the calcining furnaces than at the blast furnaces proper.

In some blast furnaces coke ovens are run to produce the coke required, and a by-product recovery plant deals with the gas from the coke ovens. All these processes come within the scope of the section.

A considerable number of blast furnaces are standing at present, so that only about half are employing boys at night. Some employers consider the work unsuitable for young persons and refuse to employ them. It is certain that most of the work is too heavy for boys; the numbers employed are, therefore, few, and the work done is light and subsidiary, and not in the nature of training for a skilled trade.

The figures obtained from the enquiry were as follows:—

Works in which young persons are employed at night ..	67
No. of young persons under 16 years .. .. .	148
No. of young persons over 16 years .. .. .	354

## II.—OCCUPATIONS AND PROCESSES ON WHICH YOUNG PERSONS ARE EMPLOYED AT NIGHT.

(1) *At or about the Furnaces*, as furnacemen's helpers, watering pigbeds and preparing moulds; grouting ladles; weighing ore (non-ferrous metals); calcining furnace attendants (non-ferrous metals); pump and hoist attendants, and scrap picking.

(ii). *Coke Ovens and Recovery Plant*.—Plastering and brushing charging holes; at coal bunkers; in the sulphate house.

(iii). *Transport and Labouring*.—Sweeping, errands, odd jobs; hooking on locomotive; working aerial rope way; filling coke and ore.

(iv). *Subsidiary*.—Boiler firing; taking samples; ore briquetting (only the kiln is continuous).

## III.—CONTINUITY OF PROCESS.

The continuity of process is generally speaking absolute, and there is considerable difficulty in getting men to do what is known as boys' work on Sunday and at night. This has led to some difficulties in the change over of shift at the week-end.

In some cases this is done by one turn working a 16-hours shift. This is illegal for boys under 18 years of age, and has been forbidden.

In some cases men do the most essential work on one Sunday shift, and the rest is left over to boys on the next shift.

In the Midlands no young persons are employed on Sunday.

#### IV.—NEW METHODS, ETC., AS AFFECTING EMPLOYMENT OF YOUNG PERSONS.

There is little change in this respect, but self-discharging bunkers and dust collecting plant have slightly reduced the numbers of young persons.

### IRON MILLS.

#### I.—NUMBER OF YOUNG PERSONS EMPLOYED AT NIGHT.

The definition of an Iron Mill brings within the scope of the section a variety of different trades of which the following are the most important :—

Steel manufacture, both open hearth and converter processes.

Steel rolling into bars, plates, sheets, wire, rails, etc.

Production of puddled iron from piled scrap and the subsequent rolling into bar, rod, or strip.

Tin plate.

Nearly every works in the kingdom has been visited, and except for about 130 which are shut down at present, nearly all employ boys at night. The figures obtained are :—

Works in which young persons are employed at night	..	337
No. of young persons under 16 years	.. ..	6,705
No. of young persons over 16 years	.. ..	7,310

#### II.—OCCUPATIONS AND PROCESSES ON WHICH YOUNG PERSONS ARE EMPLOYED AT NIGHT.

(a) *Furnaces, Gas Producers, Boilers, etc.*—Firing small furnaces and boilers ; \*attending to gas-producers ; assisting furnacemen (as door lads, water lads, mould washers, etc.) ; filling annealing pots. Assisting puddler (\*scrap piling, underhand puddling, wheeling slag and cinders). Assisting converter men, putting scrap into cupolas, brushing and branding ingots, stopper making and working lids in soaking pits.

(b) *Forge, Hammers and Shears.*—Ingot heaters and door lads ; bull doggers ; ingot haulers. Assisting hammer men (chain lads, pullers round, etc., and tool holders). \*Scrap cutting ; \*sawing, \*shearing, \*stamping and \*pressing.

(c) *Mills and Rolls.*—Rollers' assistants, generally behind the rolls (various terms are used to describe operations which are similar, e.g., strikers, backers, straighteners, heavers up, hookers up, runners out, putters in, takers out, catchers). Operating controls on heavy mills ; operating guide rolls ; brushing and scaling plates ; marking and gauging ; sand throwing and as water trough boys.

*Tin Plate.*—Cleaning ; assisting tinner ; rising—receiving tinned plates and passing to cleaning machine ; \*opening sheets (warm) ; cold rolling and shearing ; labouring.

(d) *Transport and Machinery.*—\*Operating conveyors, travelling tables, cranes, winches, roller and skid gear, and locomotives ; bogie lads ; working electric controls ; assisting engine men, greasing ; water softening.

(e) *Subsidiary Processes necessarily carried on at Night.*—\*Stocktaking ; checking ; weighing ; \*chemists and laboratory assistants ; testers' assistants ; grinding ; \*bundling hoop iron ; labouring.

(f) *Subsidiary Processes carried on at night but not necessarily so.*—Turners, fitters, electricians, smiths, and rough roll turners. Ingot breaking ; clay grinding ; grab driving ; coke weighing ; gagers. Filing, punching, chipping, etc., rails ; tube cutting ; wire drawing. Scrap cutting ; cold rolling ; shearing, sawing and cutting off. Cellar lads.

#### III.—CONTINUITY OF PROCESS.

The necessity of keeping the furnaces continuously heated, to avoid loss of heat or waste of coal, renders night work necessary.

Rolling of billets which have lost the heat of casting is not necessarily continuous, and many mills only work two eight hour shifts, with a few stokers in during the third.

\* These processes are not necessarily carried on at night in all works. It depends on the conditions.

The size of the plant is often an important factor in this connection; electrical furnaces are a good case in point. If the furnace is small, the operation can be completed in one shift; but with the larger furnaces the process necessarily overlaps more than one shift, and continuous running becomes necessary.

Again from the list of processes it will be obvious that a number of operations, which are not continuous in themselves, have been recorded as necessarily carried on at night because of their intimate connection with a continuous process. In some cases duplication of plant would obviate the necessity, if space and capital allowed.

In other cases such as cold rolling, shearing, rail finishing and some of the subsidiary processes there seems to reason for night work except want of space and machinery.

As far as the employment of young persons is concerned, there is little variation of practice where the conditions are similar: but the conditions vary very greatly. Some of the work is arduous, and in such cases occupiers would agree that lads of 16 years or 18 years are young enough.

#### IV.—CHANGES IN MACHINERY, ETC., AFFECTING THE EMPLOYMENT OF YOUNG PERSONS.

The adoption of mechanical charging machines, magnet and other electric cranes, and various improved methods of transporting goods, have reduced the amount of labour required, but have not generally lessened the numbers of boys employed at night, as the appliances being simpler can the more readily be operated by boys. In some cases, however, *e.g.*, by the use of strip conveyors, which dispense with "runners down," the number of boys has been reduced.

The use of electrical driving for auxiliary machinery has increased the number of boys, as they can operate the controls, which are simpler than steam controls; but a centralization of switches in some cases has caused a reduction.

In tin plate mills automatic "Risers" introduced about 20 years ago are in use in about half the mills; these displaced a number of young persons. Many employers prefer the old hand arrangement, as the automatic appliance often gets out of order and sometimes damages the plates.

A new type of multiple automatic tinning machine was introduced about three years ago in a few tin-plate works. This displaces 80 per cent. of the labour employed on the ordinary machine and affects men and boys equally.

These changes on the whole have not materially affected the employment of boys at night.

### REVERBERATORY AND REGENERATIVE FURNACES.

#### I.—NUMBER OF YOUNG PERSONS EMPLOYED AT NIGHT.

Young persons are employed under this exception in copper and yellow metal rolling mills, tube mills, and iron and steel forging, and drawing mills which do not come within the definition of an Iron Mill; also in coke ovens. The conditions in works coming under this Order are similar to those described under the Iron Mill and Blast Furnace sections. Only half the factories visited were actually employing boys at night; and the figures actually obtained were:—

Works in which young persons are employed at night	59
No. of young persons	666

#### II.—OCCUPATIONS AND PROCESSES ON WHICH YOUNG PERSONS ARE EMPLOYED AT NIGHT.

(i). *At Furnaces.*—Opening doors and trolleying material.

(ii). *At Rolling-mills, Draw-Benches, etc.*—\*Cold rolling; behind hot rolls; assisting at draw-benches, hot shears and saws; wire winding; hook boys, bell boys.

(iii). *Coke-oven and Recovery-plant.*—Daubing doors; \*assisting in sulphate house.

(iv.) *Transport; Engine Driving.*—Crane, pump and electric motor driving. Scrap removing.

(v). *Sundry.*—Assisting casters; pickling; \*hammer drivers (not always continuous); tang cutters; \*rivet heaters; \*tube screwers; \*working power presses and \*boiler staying.

\* These are continuous only by reason of shortage of space or machinery.

### III.—CONTINUITY OF PROCESS.

Many of the so-called reverberatory furnaces are now gas fired, and are not necessarily kept in continuous operation to avoid waste of fuel; they can be, and are shut down at any time. These furnaces, are generally flat-topped, with side ports for the admission of gas, and differ materially from the coal fired reverberatory furnace.

### IV.—NEW METHODS AND MACHINERY.

There appears to be no material change.

## PAPER MILLS.

### I.—NUMBER OF YOUNG PERSONS EMPLOYED AT NIGHT.

There is at present a certain shortage of material, on account of which some mills are precluded from working a night shift. A number of small factories, too, are run by water power; variations in the head of water make a full night shift impossible, so that young persons are seldom employed. Hence it comes about that about 20 per cent. of the paper mills are not employing boys at night at present. The figures obtained by the enquiry are:—

Works in which young persons are employed at night ..	177
No. of young persons under 16 years .. .. .	1,010
No. of young persons over 16 years .. .. .	1,311

The work on which these boys is employed is light, easy and in most cases intermittent; they are nearly all employed in the actual paper making processes under the supervision of a man, to whose interest it is that the boy learns his job, and who almost certainly started in the same way himself, as did his foreman and probably the works manager. The trade is even now a skilled craft and a boy must start young. If he is to get his training on the day shift only, some man must work perpetually on the night shift, and this men will not do. In some mills a boy learns every branch of the trade, but this is not common.

At the present time the change from two shifts to three has exhausted the supply of skilled men, and boys have been pushed forward to fill the vacant places on the shift.

The proportion of boys is about 20 per cent. so that all who choose can become skilled men eventually.

### II.—OCCUPATIONS AND PROCESSES ON WHICH YOUNG PERSONS ARE EMPLOYED AT NIGHT.

The main processes in the manufacture of paper are the same in all mills, but all differ in detail according to the sub-division of machinery, the nature of the raw material, and the grade of paper manufactured. For example, boxboard and brown wrapping are made from pulp on one long machine, and delivered as cut and finished sheets at the "dry" end. In the better class papers, sizing, drying, supercalendering, and reeling or cutting may all be done on separate machines, and if there is sufficient plant on the day shift only. Again, assisting in the beater house is usually light and intermittent; but in an up-to-date newsprint plant the work is so heavy that a boy would be of little use. Apart from such considerations the practice as to employment of boys is very consistent. In the list following the processes are given in each section in their natural order:—

(a) *Occupations of Young Persons on Shift Work.*—Kolly boys (edge runner attendants); grass dusters and preparers; assistants on breakers, beaters and potchers. Press-pâte boys (making half-stuff); attendants at strainers (pickers, scrapers and rubbers). Paper-machine men's assistants (felt and press boys, shaving or broke boys, sheet carriers, wet end or dry end boys, back tenters, knotter boys). Tub sizing. Assisting at "metal coating." Waxing.

(b) *Processes carried on by Shifts in some Mills and by Day only in others.*

Sheet Catching or Laying.—In some mills automatic layers are used, but it is doubtful if they could be employed in every case. In others the cutting is done on a machine separate from the actual paper making machine, and these can and often are run by day only.

Cutting, Trimming, Splitting.—Are done by day if there are enough machines, and if they are not done on the actual paper making machine.

Taking off, Sizing, Colouring, Spraying and Calendering of leather board, *i.e.*, a highly compressed board.

Corrugating, soda recovery, laying felts for hand-made paper.

### III.—CONTINUITY OF PROCESS.

The successful making of paper depends on the maintenance of uniform conditions, and it is difficult to see how the essential uniformity of pulp, and smooth running of machinery could be obtained without long runs.

Again, the starting up of a machine takes some time; the time lost in preparing for the start on Friday or Saturday, and in getting saleable paper through on Monday morning is estimated at one to four hours, with an average of two hours. This includes changing felts, which has to be done at least once a week, but not heating of cylinders. There is no Sunday work, and it seems unnecessary, as the process must stop occasionally for changing or washing felts.

In each individual mill it is easy to say which processes must be run continuously; but as has been indicated above, the sub-division of machinery varies so much that what is a separate process done by day only in one mill, in another is done on a machine which must be run continuously. Again, if "half stuff" or "press p $\hat{a}$ te" is made theoretically this breaks the continuity, but in practice no advantage is taken of the possibility.

The following is the usual practice (processes are arranged in order and only the usual ones given):—

*Day Work.*—Rag sorting, cutting, boiling.

*Continuous Work.*—Breaking, bleaching, washing, staining, "half stuff" or "press p $\hat{a}$ te" making, beating, straining, paper making, drying, reeling.

*Sometimes continuously run.*—Sizing, supercalendering, trimming, and re-reeling, cutting.

*Day Work.*—Guillotine cutting, examining, counting, packing, dispatching.

There seems no tendency to employ boys at night in processes which are not essential to paper making except:—

(1) Special coating and waxing.

(2) Leather board.—In this the wet sheet wraps round a cylinder until the required thickness is obtained, when it is cut off in the form of a sheet which is subsequently pressed hydraulically, dried, sprayed, sized, coloured and rolled till a very close tough board results. There is no continuity after the rough board is in the drying chambers; some mills work by day only and there can be little loss in stopping the short machine on which the rough sheet is made.

(3) Asbestos board.

### IV.—NEW METHODS AS AFFECTING EMPLOYMENT OF YOUNG PERSONS.

Automatic sheet layers can hardly be considered a new device; but general improvements in machinery have reduced the amount of labour required.

## LETTERPRESS PRINTING.

### I.—NUMBER OF YOUNG PERSONS EMPLOYED AT NIGHT.

The use of this exception is confined to one factory in London printing legal documents, and four newspaper offices in Manchester; in some cases the application of the Act is doubtful. The figures obtained are:—

Works in which young persons are employed at night ..	5
No. of young persons under 16 years .. .. .	8
No. of young persons over 16 years .. .. .	5

### II.—OCCUPATIONS AND PROCESSES ON WHICH YOUNG PERSONS ARE EMPLOYED AT NIGHT.

Apprentice compositor. Breaking up old formes. Messengers from the editorial department.

### III.—CONTINUITY OF PROCESS.

There is none.

### IV.—NEW METHODS AND MACHINERY.

This exception has been little used for a long time. The general improvements in machinery especially for composing, and the natural tendency against night work, have operated to obviate the necessity of its continuance.



## GALVANIZING SHEET METAL AND WIRE.

### I.—NUMBERS OF YOUNG PERSONS EMPLOYED AT NIGHT.

Only about a third of the factories are employing boys at night at present. The scarcity of orders accounts for this to some extent. On the other hand in some cases the Order has been interpreted too widely so as to include articles made of sheet iron and wire, and even others such as chains, thimbles, eyes, etc.

The following figures were obtained :—

Works in which young persons are employed at night ..	24
Number of young persons employed .. .. .	335

### II.—OCCUPATIONS AND PROCESSES ON WHICH YOUNG PERSONS ARE EMPLOYED AT NIGHT.

(a) *Sheets*.—Conveying sheets to and from galvanizing room. Taking off galvanized sheets from the machine. Boshers (at cooling troughs). Driers. Examiners.

(b) *Wire*.—Carrying fuel and wire. “Swift” boys (removing reels from machines). “Block” boys (putting wire on to the swift and feeding the machine). Labourers.

### III.—CONTINUITY OF PROCESS.

The process seems to be mainly carried on continuously to save fuel, and minimise loss through oxidation, as the galvanizing baths have to be kept continuously in a molten state.

The lads are learning the trade to some extent, but no high degree of skill is needed.

### IV.—NEW METHODS AS AFFECTING EMPLOYMENT.

No change is reported.

## ELECTRICAL STATIONS.

### I.—NUMBER OF YOUNG PERSONS EMPLOYED AT NIGHT.

Enquiries have been made in all stations, in which it was considered likely that young persons were employed. The exception is used only in a few small to medium-sized stations in the smaller towns. The figures obtained are as follows :—

Works in which Young Persons are employed at night	85
No. of young persons employed .. .. .	191

Employment is practically always on the three-shift system.

### II.—OCCUPATIONS AND PROCESSES ON WHICH YOUNG PERSONS ARE EMPLOYED AT NIGHT.

Volt lads.—Regulate voltage and record meter readings. Some do a little more and are called switchboard attendants. They are found in stations where there is only one engineer on a shift; if he is called away from the board they carry on till he returns, or call him if necessary.

Oilers and cleaners. Coal trimmers and assistant stokers. Battery fillers.

These boys are not being trained as a rule, and the apprentices work on the day shift only. They are used as cheap labour, and at eighteen years or thereabouts they lose their employment. The station engineers do not favour their employment, partly for this reason, and partly because they would prefer more responsible persons.

### III.—CONTINUITY OF PROCESS.

Current is mostly generated continuously; but work in the evening and still more so on the night shift, is much lighter than during the day.

## CHINA CLAY WORKS.

There are very few works on the Registers. No young persons are now employed in these, and the men work by day only.

This trade is mostly done in direct connection with quarries or mines, and under inspection by the Mines Department.

## GLASS WORKS.

## I.—NUMBER OF YOUNG PERSONS EMPLOYED AT NIGHT.

In nearly every glass works advantage is taken of the special exception allowed by Section 55, and male young persons of 14 years and upwards are employed during the night. The exceptions are few and unimportant, and are generally due to shortage of labour. In the case of a few pot furnaces on special work it is found more economical to found (melt) by night and blow by day; and at Stourbridge some table-ware firms do all their melting at the week-ends, and manufacture by day only. Small chemical and medical apparatus, blown from tubing, is also made by day only, chiefly by women and girls. This subject is dealt with later under continuity of process.

Nearly every glass works in the kingdom has been visited, and the figures obtained are as follows:—

Works in which young persons are employed at night .. ..	233
Number of young persons under 16 years .. ..	4,772
Number of young persons over 16 years .. ..	2,723

The proportion of young persons employed is high; in the South-Eastern Division it is estimated at 44 per cent. of the total, and the proportion of those under 16 years at 27 per cent. of all shift workers.

It is obvious that the trade cannot absorb such a percentage of juvenile labour, and it has been ascertained that many, probably more than half of these boys, never actually become skilled glass workers. In one group of five factories employing 227 boys only 20 are taken on as apprentices in an average year.

## II.—OCCUPATIONS AND PROCESSES ON WHICH YOUNG PERSONS ARE EMPLOYED AT NIGHT.

*Mouth-blowing.*—Gatherers\* (learners); pipewarmers; footmakers\*; servers for blowers; blowing (lower grade work); wetting off; knocking off; cleaning irons; assisting finisher and, in non-union shops, finishing the bottle neck.\*

*Tube-drawing.*—Post-boy\* (helping drawer); cutting up; fanning.

*Pressing and Machine Blowing.*—Gatherers\*; pressers\*; blowing (with compressed air); transferring and sticking up.

*Sheet and Drawn Glass.*—Ladle boy, assisting blower; block boy; carrier; assisting flattener (pusher and lehr drawer).

*Plate and Rolled Glass.*—Ladle boy; pusher boy (at rolls); lehr drawer.

Bookers or markers down; examiners and glass lookers; assistant polishers, disc boys and rouge wheelers.

*Annealing.*—Takers-in and takers-off; stackers and lehr drawers.\*

*Subsidiary Processes.*—Stokers and assistant stokers; batch boys.

The list is a long one on account of the variety of articles made, and the almost infinite variation in details of manufacture and method consequent on this, but no single works would employ boys in more than a few of these categories. Where similar conditions obtain, there is little variation in practice in different factories so far as employment of boys is concerned.

Very few boys are employed at night on processes which could be deferred till the next day. The only important exception to this is the grinding and polishing of plate glass.

## III.—CONTINUITY OF PROCESS.

There is nothing of a continuous nature in the manipulation of molten glass even if automatic machines are employed. The claim that continuous working is necessary is based solely on the exigencies of the glass making or founding. For this two types of furnace are in use:—

(1) *Tank furnaces*, to which batch (sand, alkali, &c.) or cullet (broken glass) are continuously supplied, and from which molten glass is being constantly withdrawn for use, must be constantly fired, and are never allowed to cool until they are taken down for

\* These are generally men.

repairs. Economy of fuel demands continuity of work. Furthermore, the quality of the glass deteriorates if kept too long lying in the tank. Tanks are used where large quantities of glass are needed, and the quality need not be the best.

(2) *Pot furnaces.*—These consist of three to six fireclay pots set in a suitable arch, and holding 3 cwt. to 1 ton of glass per pot. Each pot is used out in turn and refilled, while the gang or “shop” pass on to the next pot.

Under certain conditions depending on the time taken to found (melt) and the time taken to work out the pot, it is possible to do all the melting by night and all the blowing by day. Where this can be arranged the system is economical, and might with advantage be extended; but it would necessitate considerable alterations in plant, including the provision of double lehr space.

In Stourbridge tanks are superseding large pots, but they are being run on the pot system, *i.e.*, a week-end melt, and day work until the tank is empty. This is a special table-ware trade, and the system has not extended to the higher grades.

Pots generally are used for small quantities, or where the highest grade glass is made.

In view of the above considerations it is necessary to carry on the manufacture of glass continuously to secure economy in fuel. The continuity may be assumed to continue until the glass has been taken out of the lehrs (annealing ovens).

#### IV.—NEW METHODS AND MACHINERY.

Great changes are taking place in the glass trade at the present time, and it is difficult to foresee what effects they will have. The introduction of American machinery, now proceeding, will no doubt increase the output per head, but it is less certain that it will decrease the proportion of juvenile labour.

The Owens full automatic bottle machine, of which there are not more than two or three in the country, is being run entirely by men, and there is no doubt that these machines will absorb a considerable quantity of the demand which is now met by hand work. From this we have in downward range of automatic qualities the Hartford Fairmont, the Miller and the O'Neill types for jars, and the Forster type for bottles. As worked at present these machines would, on the whole, increase the proportion of young persons; but they do offer possibilities of reduction in the future, inasmuch as the output is concentrated at fewer points, and the problem of mechanical conveyors to the lehrs is simplified. Conveyors are said to be in use in America, and since at least half the boys are engaged in carrying to the lehrs, their introduction here would largely remove the need for juvenile labour.

The “press and blow” hand machine which is now more common has largely increased the proportion of young persons. Up to and over 50 per cent. of those employed on such work are juveniles. In such works mechanical conveyors would be possible only by very considerable reorganisation.

Mouth blowing will no doubt remain, but it is open to question whether certain of the lads who act simply as attendants on the men—as mould boys, iron boys, knockers off, pipe warmers, &c.—could not be dispensed with wholly, as has been done already in some shops.

On the whole there have been no changes tending to decrease the number of young persons, but rather the reverse. The future, however, does present possibilities, but until these are realised it will be very difficult to replace the younger boys. Men would not be nearly so handy as takers in, and I do not think they would consent to do what is known as lads' work.

### PRINTING, NEWSPAPERS.—SECTION 56.

#### I.—NUMBERS OF YOUNG PERSONS EMPLOYED AT NIGHT.

This exception is little used, and there are probably only about a dozen factories in the country, in which night employment is substituted for day employment on one or two occasions during the week.

Works in which young persons are employed during any part of the night ..	49
Number of young persons employed .. .. .	74

II.—OCCUPATIONS AND PROCESSES ON WHICH YOUNG PERSONS ARE  
EMPLOYED AT NIGHT.

Type setting,\* linotype and stereotype,\* proof pulling.

Printing and folding, and cleaning machines.

Dispatching, carrying papers from machines,\* tying parcels; dispatching\*; taking parcels to the station; messengers.\*

III.—CONTINUITY OF PROCESS.

There is none.

IV.—CHANGES IN METHODS AND MACHINERY AS AFFECTING EMPLOYMENT.

The decrease in night work is attributed to:—

- (1) Increase in number of linotypes and monotypes.
- (2) Substitution of rotary for flat-bed machines.
- (3) Smaller papers.
- (4) Fewer papers.
- (5) Trade union restrictions and high cost of overtime.

## CHAPTER XII.

## THE SILK INDUSTRY.

BY

JOHN JACKSON, O.B.E., H.M. SUPERINTENDING INSPECTOR OF FACTORIES,  
NORTH-WESTERN DIVISION.

Unlike the other textile trades the silk trade is spread over the country at large. Its chief centres are at Brighouse and Bradford in Yorkshire, Macclesfield and Congleton in Cheshire, Leek in Staffordshire, and Braintree in Essex, but isolated silk mills are to be found scattered about in many other parts of the country.

The silk trade is divided into three branches, viz., throwing or spinning of raw (or reeled silk); silk waste spinning; and silk weaving. The making of artificial silk is a distinct industry, the spun fibre is used with other classes of silk in weaving, but it is not proposed to deal here with the spinning process which, in its initial stages, pertains more to a chemical than to a textile process.

*Silk Throwing.*

This branch of the trade is also known as "reeled silk spinning," and the work done is similar to that in a fine cotton doubling mill. The reeling of silk from the cocoon is not carried on in this country, it is all done abroad and the silk is imported in the hank or skein. In cocoon reeling, three, four or five threads are drawn off the cocoon and reeled together; they are not twisted in any way but adhere to each other by the natural gum in the fibres.

The processes of silk throwing carried on in this country consist of (1) winding from the hank to a bobbin; (2) clearing, to take out soft places and knots; (3) "doubling," which is a process of fold winding by which two, three or more threads of the cleared yarn are wound on to a bobbin and (4) spinning or twisting. The machines used in the first three are like those used for similar purposes in other branches of the textile trades. They are simple machines which, with proper protection to the cog and bevelled gearing driving the spreading motion, call for little fencing, but many of the machines in use are very old and are not so safe as more modern machinery of this type. For instance, many are direct driven off a low line shaft running along the mill wall, protection is necessary for this shaft and for the bevel wheels by which the frames are driven. Frequently the frames have no independent starting and stopping motion, and the whole line of frames has to be stopped if repairs are necessary to any one of them. The method of twisting or spinning the "doubled" threads is done in the opposite way to that in cotton doubling, *i.e.*, the bobbin containing the untwisted thread is rotated and the thread, drawn off by a flyer, is wound on to a swift or reel on the top of the frame which has a definite rotation relative to the speed of the spindles, and can thus be regulated to secure the number of turns or twists per inch desired in the thread. The twist is put in both ways, *i.e.*, right hand or left hand, according to the class of yarn to be made, viz., warp threads, known as "organzine," or weft threads, known as "tram." The only dangerous parts of the machine are (1) the driving end which, like the winding frames, is often a direct drive from a low shaft and wants suitable fencing; (2) the train of wheels connecting the swift on the top of the machine with the roller from which the spindles are driven—these wheels require guarding, and the usual plan is to fence them with a fender guard made of open bars, through which it is possible to put a hand and reach the wheels, therefore these guards should be covered with close wire netting or plated opposite the wheels and on the top; (3) the wheels driving the spreader—these wheels are generally within reach of the frame attendant, and should be protected with complete covers.

The hanks or skeins of silk are taken from the reel or swift and boiled to remove excess of gum, then they are wound on to bobbins for warping or on to pins (or pirns) for weft, or made up into hanks of suitable size for dyeing, etc.

*Spun Silk Spinning.*

This is also known as "waste silk spinning," as the material from which the finished yarn is made is the waste from cocoon reeling or other processes in connection with raw silk.

The process can be divided into two: (1) that dealing with long fibre waste and (2) that with short fibre. The machinery and operations used for the first of these are similar to those in the worsted trade, those in the second are similar to cotton spinning.

In spinning both long and short fibre waste the waste first undergoes a washing process to remove the natural gum. It is packed into small canvas bags and boiled in an alkaline solution, then taken out and dried. Many of the boiling plants are open pans from which steam escapes in dense clouds and only in a few cases have means been adopted to remove the steam. Where this has not been done the boiling rooms are unsatisfactory and the conditions under which work has to be carried on are unhealthy; there is also the risk of accident by slipping on the wet floor of the room. In most mills drying is done in a room (often built over the boiler house) heated with steam pipes and provided with racks on which the washed silk is hung up to dry. As these rooms have to be entered to fill and to empty them, those engaged in the operation are subject to excessive heat and great changes in temperature. In a few cases mechanical means have been adopted for drying, viz., either slow travelling lattice or canvas bands, or a drying stove, similar to that in common use in laundries, where the undried material is hung on a rack which can be pushed into and drawn from the stove for the purpose of filling or emptying, thus avoiding anyone having to enter the stove itself. Some such means should be adopted in all cases.

In spinning long fibre waste the dried material is first put into a filling machine, which is similar to a breaker carding engine, and it is on this machine that a large percentage of the serious accidents in this branch of the trade have occurred. The machine consists of a feeding band, fluted feed rollers, and a cylinder covered with rows of long teeth. The silk fibres are caught by these teeth as the cylinder revolves and at the necessary intervals the machine is stopped to detach the fibres from them. The fibres are cut off horizontally and are clamped between two boards, forming what is technically known as a "book." The book then passes on to the dressing frames. The fencing of the cog wheels on filling machines is generally imperfect; in some cases the cylinders are not covered in at all, in others on the top only, thus allowing the escape of a considerable amount of dust into the room. Where covers are provided a door is made to give access to the cylinder teeth, and in opening this door, before the cylinder has come to rest, serious accidents have been caused. Similar doors are provided on the covers of cotton carding engines and these are secured by "locks" which prevent their being opened until the cylinder is *at rest*. Similar safeguards are needed on silk filling machines and the cog wheels should be provided with complete covers—partial guards only increase the risk of accident.

The dressing frame is one of the most important machines in this branch of the trade. The type in general use is the "flat" dressing frame. This consists of an endless band across which, at regular intervals, strips of wood to which card clothing is nailed, are fixed at right angles. The dressing machine is provided with a long under-frame into which the "books" of fibre from the filling machine are fitted and tightly screwed up. This frame is mounted on wheeled supports so that it can be easily pushed under or removed from the dressing machine; it is also pivoted in the centre to enable it to be readily turned round. The under frame, filled with "books" of fibres, is pushed below the endless band of card strips and is raised until the card clothing comes into contact with the fibres, so that the short fibre can be combed out. The frame is then reversed and the other side of the "book" comes into contact with the card clothing. The combed long fibres left in the books are called drafts; these are removed and passed on to the spreading machine. The waste, or short fibre, is known as "noils."

The cog wheels on most flat dressing machines are badly fenced; complete covers over all cog wheels and plated or guarded driving pulleys are needed on them, but are seldom provided. That small, but most dangerous thing, a projecting set-screw, is to be frequently found on the collars and pulley bosses of these machines; if they cannot be made flush they should be provided with a guard to make them safe.

The flat dressing frame is the one which is generally used in this country, but on the Continent, in America and in Japan, a circular machine, known as the "Grenoble" machine, is in use. In this machine the "books" are fastened round the periphery of a cylinder which revolves, the card clothing being stationary. It is contended by the British spinners that the drafts made on a Grenoble machine are inferior to those made on a flat dressing frame and the cost of production is therefore increased. One thing in favour of the Grenoble machine is that it is not so costly to operate as a less skilled attendant is needed. Other types of dressing machines have been devised and are used by individual firms, but the flat and the Grenoble types are the only ones whose use is general.

Both the process of filling and that of dressing give rise to dust. The amount given off varies greatly according to the class of waste being used, but even the best classes give off sufficient dust to cause a haze in the rooms. In some cases exhaust ventilation



has been applied to the machines to remove the dust, but as most of these installations were put in years ago when the principles of dust extraction were not so well understood as they are to-day, they are generally unsatisfactory. Enquiries were made by Dr. Bridge into the health of the workers in these processes, and he came to the conclusion that the dust was of an injurious nature and that action under Sec. 74, requiring its removal, was justified. Something might be done to eliminate the dust by the adoption of a better system of boiling or by passing the dried waste through an opener (coupled to an exhaust to remove the dust), in the same way that the cotton fibre is treated.

The drafts of dressed fibre are taken from the dressing machine to the spreading machine, there they are placed by hand on a slowly moving lattice, passed through feed rollers and are combed out by a gillhead—similar to that used in the worsted trade. The combed fibres are wound on to a narrow revolving drum from which they are cut in the form of a broad band, in length equal to the circumference of the drum. As has been noted about other silk machinery, the cogs on the spreader are only partially guarded but complete covers are required for them, as accidents are not uncommon owing to a worker's sleeve getting caught in these badly fenced cogs, when cutting the finished lap off the cylinder.

The laps from the spreading machine are next passed through the lap machine by which the short laps are made into a continuous sliver. The machine is something like a derby doubler in a cotton mill. The cogs are generally only partially guarded, complete covers should be fitted to them.

The next process, that of drawing, is similar to cotton drawing, except that there is a moveable gill-head on the machines, to comb out the short fibres. These machines come next to the filling machines as accident producers in the silk industry. The accidents are generally caused by workers' fingers getting caught in the feed rollers or the gill box. The fencing of the cog wheels is generally unsatisfactory, like that on the spreading and lap machines and, in addition, there is on each machine a low shaft (in some cases about 3 ft. from the floor, behind the sliver cans), which should be provided with a cover.

The slivers from the drawing frame are next passed through slubbing and roving frames. These are similar to those used in the cotton trade and similar protection for the different parts is required. In cotton mills these machines cause a large percentage of the accidents in each mill, the cause being the practice of cleaning the machines while they are in motion. In the silk industry, owing to the greater length of the fibre, there is less need for such cleaning, and accidents are therefore less frequent than in cotton mills.

The spinning process, which follows, is done on ring, cap or flyer frames. These frames are similar to those used in the cotton and the worsted trades. The cotton frame is generally better guarded than is the worsted one, on which "nip guards," instead of complete covers, are the common type of guard provided for ingathering cog wheels. Most of the frames have single tin rollers but, where double tin rollers are used, guards similar to those in use on cotton spinning machinery should be provided. The off ends of the frames should be plated, to prevent access to the tin rollers, and the guards at the gearing end carried low enough to protect efficiently the carrier wheels.

In spinning short fibre waste the machinery used is similar to that in the cotton trade, and the precautions to be taken to avoid accidents are the same. The washed waste fibre is passed through a combined opener and lap machine, then through roller and clearer or revolving flat cards, through combing, drawing, slubbing and roving frames, and is spun on either ring or flyer frames, or on self-acting mules. Most of the machines are old and present many points of danger, which have been dealt with in the cotton trade by the Agreement\* arrived at in 1912.

As in cotton spinning, the dust made by the lap machine is drawn away from the machine and blown into a dust chamber. The dust in the card room is bad, particularly at the cards and at the combing machines. For roller and clearer cards, exhaust ventilation is needed, also for the process of stripping and grinding on the revolving flat cards. Hoods with suitable trunks connected to an exhaust fan should be fitted over the combing machines on lines similar to those which have been successfully applied to drawing and combing frames in the flax industry.

After being spun, both long and short waste fibre passes through subsidiary processes, *e.g.*, gassing, winding, reeling or warping, according to the purpose for which the yarn is required. The gassing process is the only one that calls for special mention, it causes a high temperature in the rooms, the air of which is full of particles of partly-burnt fibre. A very efficient system of mechanical ventilation, combining both a plenum supply of

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\* Report on Conferences between Employers, Operatives and Inspectors, concerning the Fencing of Machinery, Prevention of Accidents, and Temperature in Cotton Spinning Mills. By G. Bellhouse, H.M. Superintending Inspector of Factories. Price 3d.

air below the frames and an exhaust immediately above the burners, is the only way to make these rooms satisfactory. Frequent cleaning is necessary to remove the "fluff" which settles on any ledges or projections in the room.

The weaving branch of the trade is similar to that in other textile industries. All the usual types of looms, underpick, overpick, twill, tappet, circular box, drop box and jacquard are to be found in use, as well as a few automatic (Northrop) looms. The width of the pieces is narrower than those in the cotton trade, and the speed at which the looms are run (about 120 picks per minute) is much less. This may account for the small number of accidents due to flying shuttles, but the smooth texture of the silk fibre is also a contributing cause. In several mills there have been no shuttle accidents during the past ten years, although the provision of shuttle guards is exceptional. The most serious accidents have been caused by workers' clothing getting caught on unfenced shafting over jacquard looms, or by the fall of loom weights which had been tied up with string.

The smallware branch of the trade calls for little remark. The looms used are the usual smallware type and, except where they are crowded too close together and have the tappet rods fixed outside the balance wheel, they present few points of danger. During recent years a considerable trade has sprung up in braided goods. The machines used are similar to those in use in other branches of the textile trades and those used for insulating wire. The low shafts require protection as well as the cogs which drive the spindles.

Printing, bleaching and dyeing is carried on both as a branch of silk manufacture and as a separate industry. A fair amount of hand block printing is still done. In both the bleaching and dyeing houses the worst features are badly drained and uneven floors and the absence of means for properly removing steam. Hydro extractors are used, but covers for them are not provided in many cases. The boiling tanks are generally high enough to prevent anyone falling into them, but the steam and water cocks are often so awkwardly placed that it is necessary to lean over the vat to reach them. In bleaching silk piece goods the cloth is not manipulated in rope form (as in the cotton trade), but each piece is treated separately, as in dyeing. The machinery used is similar to that used in this branch of the cotton industry, and the same precautions are necessary.

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\* See Report of Conferences between Employers, Operatives and Inspectors, concerning Fencing of Machinery and other Safeguards, and Ventilation in Cotton Bleaching, Dyeing and Printing Works. By J. Jackson, H.M. Superintending Inspector of Factories. Price 2d.

## CHAPTER XIII.

## JOINT INDUSTRIAL COUNCILS AND TRADE BOARDS.

BY

GERALD BELLHOUSE, C.B.E., H.M. DEPUTY CHIEF INSPECTOR OF FACTORIES.

It has been the practice of the Department, as each new Council is formed, to get into touch with them, and to offer help and co-operation in the consideration of questions relating to the health, safety and welfare of the workers. It is unfortunate, however, that the great majority of the Councils have been so busily occupied with questions relating to hours and wages, that they have given little consideration to other matters bearing upon the conditions of employment.

At the same time excellent work has been accomplished by some of the Councils, acting in conjunction with representatives of the Factory Department, of which a brief account may be given.

*Pottery Trade Council.*

This was the first Council to get to work, and of their own initiative they very quickly began to interest themselves in factory conditions. Mr. Werner, the Inspector for the Stoke-on-Trent District, was co-opted as a member of the Council, and has thus had full opportunity of assisting in this particular side of their work. He has furnished the following account of what has been accomplished:—

“ In addition to an immense amount of work concerned with supplies of raw material, transport, foreign competition, trade marks, legislation, piece-work prices and operatives' average earnings, employers' average profits in relation to turnover and capital, education, apprenticeships interrupted by war service, training of disabled soldiers and sailors, and other questions connected with the resettlement of ex-Service men, the National Council have dealt with the following matters more directly touching on the functions of the Factory Department:—

- “ (1) *Health Conditions in Factories.*—Two separate pamphlets were prepared, giving hints on the preservation of health, suggestions as to how to avoid making and breathing injurious dust or contaminated air, and advice in regard to securing the fullest advantages of the provisions in force respecting ventilation, cleanliness, &c., of pottery shops. These pamphlets have been circulated among the operatives.
- “ (2) *Potters' Drying Stoves.*—As it was felt that unsatisfactory types of drying stoves have contributed largely to the production of an unhealthy atmosphere in potters' shops, even when the Regulation as to direct ventilation to the open air is complied with, an investigation was undertaken by a special committee. After numerous visits to factories, and discussions of the problems involved, this committee has published an Interim Report in which most valuable information is given regarding modern types of stoves which are not only far healthier for the workers, but which also utilise the heat for drying with less wastefulness. This report advocates totally enclosed types of stoves for all new erections, and also offers suggestions as to practical methods of improving the types of stoves at present generally in use. The committee expresses the definite opinion that no stoves can be regarded as sufficiently ventilated unless back-draught from the stove into the workroom is practically eliminated. This, in effect, lays down a very high standard, and if all potters' stoves can in the near future be brought into line, it should result in a very material improvement in the average health conditions of potters' shops. The committee, in the course of their investigation, were necessarily brought into touch with other problems of heating and ventilation, which they hope to follow up in due course.
- “ (3) *Welfare.*—The National Council have approached the whole subject of welfare with considerable interest, and arranged in the first place for Dr. Eichholz

to deliver a lecture on health, and for Dr. T. M. Legge to speak on welfare. Both these addresses were delivered to a full meeting of the National Council, to which additional manufacturers and others interested were specially invited. In addition, the Council arranged for a public lecture on welfare work, which was given by Dr. E. L. Collis in December last. The interest displayed throughout in this subject has led to the appointment of welfare supervisors in several of the larger factories.

- “(4) *Police, Factories, &c. (Miscellaneous Provisions) Act, 1918.*—A committee of the Council have had under consideration for some considerable time the drafting of a set of welfare regulations which the National Council should be asked to approve as suitable for the pottery industry. Many of the clauses are still under consideration, but the manufacturers have signified their agreement with the operatives on the general principle that a code of welfare provisions should be adopted in the industry; when the discussion on drafting has been completed, there is little doubt that a code will be evolved which will include most of the provisions of the welfare orders already applied in other industries, but modified where necessary to meet the peculiar conditions of the pottery industry.
- “(5) *First Aid.*—The first aid provisions of other welfare codes were at once accepted without modification. In view of this, efforts were made in advance by the Secretary of the National Council to provide for pottery first aid classes; in this the Council secured the sympathetic support of the Stoke Education Committee, and first aid classes for pottery operatives have been conducted during the session 1919–20 at the Hanley Technical School. The Council arranged for the opening lecture of the series to be delivered by Dr. J. C. Bridge
- “(6) *Pottery Regulations.*—The war-time relaxations of these Regulations were introduced by agreement between the employers and operatives before the formation of the National Council, but the question of the date of their termination was referred to the Council. After careful consideration the Council unanimously recommended 31st October last as the date on which the latitude should cease. This recommendation was duly acted upon, and its wisdom has been amply demonstrated by the comparative smoothness of the transition back to pre-war conditions.
- “(7) *Works Committees.*—The Council have done all in their power to encourage the formation of Works Committees on sound lines, and a number are now getting into working shape. While the Council anticipate that Works Committees will deal with a much larger range of subjects than would come within the scope of a Safety First Committee, they have not lost sight of the desirability of including a close attention to the prevention of accidents in the routine duties of this Committee. As compared with many other industries, pottery factories generally have a low accident incidence. Many, however, of the accidents which do occur are of a nature which could be best dealt with by an energetic Works Committee. For example, accidents arising from the use of defective ladders or “horses” could be reduced to a minimum if Works Committees would arrange for the periodical examination and testing of all such apparatus.
- “(8) *Particulars.*—The question of applying the Particulars Clause to the pottery industry has been brought before the Council, and has been referred by them to a suitable sub-committee. As in the case of welfare, the associated employers have accepted the principle, and the committee are at present engaged in drafting paragraphs to meet the conditions of piece-work in the potteries. These will shortly be submitted to H.M. Chief Inspector for an opinion as to whether they could be embodied in an Order applying the Particulars Clause to potteries, if and when such an Order is made.”

*Building Trade Council.*—Opportunity was taken to attend an early meeting of this Council, and to suggest the appointment of a special sub-committee to consider questions of safety and welfare. The suggestion was at once adopted, and a thoroughly representative Safety and Welfare Committee appointed. Arrangements were made for Mr. W. Williams (Superintending Inspector, South-Eastern Division) to work in conjunction with them, and he has also acted as Secretary to the Committee.

They first took into consideration the question of safeguarding wood-working machinery, and to assist them in this work they invited the Councils for the saw-milling, furniture and packing-case making industries, and also the National Federation of Saw

Mill Proprietors of Great Britain and Ireland, and the Amalgamated Society of Wood-Cutting Machinists, all of whom are equally interested in this subject, to appoint representatives to serve on the Committee. The dangers arising from this class of machinery were carefully investigated, and far-reaching proposals were made for standardising the protection of this dangerous machinery and for improving working conditions, which when brought into operation will certainly mark an important advance. The proposals have since been approved by the whole Council and are now under consideration with a view to the establishment of Regulations under Section 79 of the Factory Act to give them statutory effect.

Having disposed of this question, they proceeded to a consideration of the dangers connected with building operations.

*Boot Trade Council.*—Early in the year, a conference of employers and workers in the boot and shoe industry was held in the Home Office to consider the hygienic conditions under which the trade is carried on, with special reference to the report of the Medical Research Board on the prevalence of tuberculosis in the industry. The conference made proposals for securing a higher standard of sanitation, and, towards the end of the year these proposals were reviewed by a Committee of the Joint Industrial Council for the boot and shoe trade, which had been established since the Home Office conference was held. In the main the proposals were approved, but some of the points call for technical investigation and are still under consideration by a Sub-Committee, who are being assisted in this work by Mr. G. S. Taylor, the Inspector for Dangerous Trades.

*Furniture Trade.*—The Council appointed a Committee to consider a report on the conditions of work in glass bevelling. Complaints had been made that the conditions were unsatisfactory and a special enquiry was undertaken by Mr. Beard (East London). His report furnished evidence as to the need for improvements, and it was found advisable to consult the Council as to the manner in which these could best be effected. The Committee's report contained important recommendations relating to cleanliness, ventilation, lighting, and general welfare conditions, but some of their proposals cannot be enforced under the existing law. Copies of the report have been issued to the Inspectors, with instructions to take all practicable steps to give effect to the recommendations that have been made.

*Patent Fuel Industry.*—The Interim Reconstruction Committee for this industry have been urged to take into consideration again remedial measures for the elimination of "pitch cancer." In addressing them, Dr. Legge pressed the importance first of research work in order to discover, and, if possible, remove the root cause of the disease, and, secondly, of arranging for periodical medical examination of the workers, and more particularly of those who have been in the employment for 10 years or more and are over 40 years of age. He pointed out that this is the least malignant form of cancer, and if removed at an early stage ought not to shorten life. Owing to the fact that workmen sometimes were reluctant to undergo an operation or refrained from seeking medical advice until the disease had reached such a stage as to be inoperable, he urged the workmen concerned to submit to a quarterly medical examination. This the patent fuel workers consented to do at meetings called by their trade union officials. The employers at once expressed agreement and, acting in consultation with Dr. Legge, have appointed special surgeons at each centre to carry out this. At Cardiff and Newport the examinations are made by Dr. H. A. Scholberg, Senior Pathologist to Cardiff Infirmary and late Medical Referee on Industrial Diseases for South Wales, and at Swansea by Dr. A. F. S. Sladden, Pathologist to Swansea General and Eye Hospital. Both of them are working in co-operation with the Medical Research Committee. Owing, unfortunately, to some hesitation on the part of the workers to avail themselves of the advantages offered—largely due to misapprehension of the nature and objects of the examination—so far, many who ought to be examined have not yet presented themselves. Meetings convened by the trade union secretaries have been addressed by the Medical Inspectors and District Inspectors with a view to remove these misapprehensions. At these meetings the patent fuel workers show the greatest interest in the subject, but interest must be maintained if better results are to be looked for in the coming year.

*Tin Box Trade.*—A committee was appointed by the Trade Board to consider the question of the prevention of accidents, and more particularly of those due to power-presses. Representatives of the Factory Department were invited to meet them, and it was decided after some preliminary discussion that, as a great deal of information on the subject was already in the possession of the Factory Department, the Committee should confer with the Inspectors, and after a full investigation formulate proposals for the reduction of

accidents in the future. This committee are still actively at work, but expect to present a report at an early date.

In addition to these definite pieces of work, opportunity has also been taken to consult the councils on such questions as Welfare Orders, and the termination of Emergency Orders which had been in operation during the war. Their assistance has been most helpful and has been greatly appreciated.

This record supplies encouraging instances of the kind of work which might so usefully be undertaken by Councils generally. It is work in which both sections of industry are equally interested, and it is work therefore in which unanimous decisions may confidently be expected. It is hoped that the example thus set may be followed by other Councils.



TABLE 1.—Inspectors' Districts, 1919.

District.	Area. Square Miles.	Census. Population. 1911.	Works.†		Works under special inspection (also included in cols. 4 and 5.)		Prosecutions.†† (Tables 8-9.)	Accidents.			Dan-gerous Occur-rences.	Cases of Poison-Ing. (Table 7.)	Notices Received, other than Overtime Reports. (Table 4.)
			Factories.	Work-shops.	Regula-tion** and Special Rules. (Table 10.)	Humid Textile Fac-tories under s. 96.		Fatal.	Reportable on basis of one day of incapact-tation.	All.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
S. London....	1,215	1,986,657	4,685	5,491	2,292	—	63	33	1,020	3,043	29	12	4,242
S.W. London ....	1,031	1,361,863	2,524	3,445	1,425	—	10	14	367	930	6	4	1,782
W. London ....	888	1,549,527	3,885	4,357	2,368	—	16	17	788	2,129	14	6	2,845
§ West London (Special)	(25)	—	433	2,168	114	—	36	—	12	24	2	—	839
N.W. London ....	263	752,625	2,556	3,460	1,611	—	54	11	404	845	7	—	1,328
N. London ....	499	1,239,898	6,165	7,420	3,402	—	21	26	652	1,619	35	11	2,822
N.E. London ....	827	821,299	1,841	3,319	917	—	23	2	400	988	20	2	1,719
E. London ....	335	1,184,133	2,901	4,426	2,234	—	59	71	1,230	5,061	27	20	6,803
Kent ....	1,525	1,045,591	2,627	2,831	1,226	—	9	8	809	2,912	2	14	3,787
Reading ....	1,474	470,278	1,101	1,804	489	—	4	3	191	410	3	1	650
Northampton ....	1,837	598,680	2,485	2,269	1,259	—	—	12	618	1,158	2	3	1,376
Norwich ....	3,024	761,578	2,187	4,068	953	2	2	8	278	797	4	1	1,831
Ipswich ....	1,758	472,492	1,337	1,701	556	1	2	4	292	835	2	4	966
Bristol ....	2,287	995,768	2,924	3,529	1,098	—	7	13	779	2,169	6	6	3,165
Gloucester....	1,084	323,630	957	1,120	355	—	11	3	202	471	1	—	735
Yeovil ....	1,745	339,823	1,067	1,366	341	—	4	3	92	201	1	2	439
Southampton ....	1,957	1,031,702	2,387	3,394	1,119	—	23	16	360	2,036	6	1	2,465
Plymouth ....	3,748	991,667	2,299	3,717	969	—	30	10	272	963	6	2	1,637
Swansea ....	3,535	669,460	2,151	2,983	825	—	29	30	563	3,209	—	15	3,848
Cardiff ....	1,252	1,239,291	2,231	3,671	1,213	—	17	63	572	3,044	5	3	3,990
Dublin ....	15,191	1,856,994	1,975	2,224	939	—	—	8	237	823	6	1	1,714
Cork ....	8,815	951,529	1,384	1,679	468	—	6	3	111	396	6	1	963
Birmingham ....	504	1,083,865	5,819	3,017	4,234	—	71	34	1,961	4,790	13	8	6,984
Coventry ....	454	302,579	1,051	871	798	2	—	9	572	1,241	1	1	1,771
Worcester ....	1,534	363,846	1,094	1,246	511	—	2	5	263	576	6	6	973
Wolverhampton ....	1,495	687,874	2,764	4,310	1,642	—	2	20	1,058	3,117	10	3	3,890
Walsall ....	312	303,457	1,044	945	625	—	6	17	516	1,678	—	4	2,022
Stoke ....	709	533,710	1,860	1,525	935	2	26	17	514	1,966	11	22	2,682
Leicester ....	985	496,899	2,426	1,810	874	1	8	12	672	1,192	—	—	2,478
Nottingham ....	844	604,098	2,266	2,223	949	1	24	14	461	1,246	5	1	2,805
Derby ....	815	608,944	1,852	1,411	771	3	36	17	733	2,251	7	5	3,153
Lincoln ....	2,665	563,960	1,687	2,010	655	—	31	16	516	1,669	19	—	2,017
Wrexham ....	3,225	512,170	1,481	2,806	639	1	3	7	117	910	1	1	1,554
Leeds ....	2,069	1,148,763	3,782	2,280	1,999	3	7	33	1,125	3,094	20	8	4,422
§ Leeds (Special)	(2,222)	—	822	1,182	692	—	38	2	50	91	—	—	735
Hull ....	992	413,806	1,400	1,615	775	—	26	15	393	1,492	9	—	2,163
Sheffield ....	641	996,002	4,530	1,928	3,351	—	40	60	1,904	5,485	584	4	6,894
Huddersfield ....	147	341,049	2,150	1,374	1,410	—	6	19	706	1,421	8	15	2,365
Halifax ....	143	224,213	1,704	837	1,396	17	16	7	446	899	5	1	2,206
Bradford ....	153	399,559	2,301	1,433	1,337	16	15	19	517	1,183	13	15	4,067
Keighley ....	756	155,400	1,050	542	494	9	18	6	241	479	2	1	1,155
Newcastle ....	2,572	1,694,528	2,884	3,648	1,680	—	32	65	2,047	8,594	601	11	10,429
Stockton ....	1,622	659,662	1,451	1,308	807	—	—	69	1,314	5,862	15	2	6,724
Manchester ....	87	1,131,478	4,717	4,715	3,308	22	16	57	1,544	4,323	9	30	6,440
Stockport ....	700	563,027	2,178	1,975	1,081	34	29	21	845	2,527	4	2	3,132
Oldham ....	81	371,799	1,431	916	932	54	7	19	865	2,092	4	—	2,362
Bolton ....	108	367,253	1,437	1,128	979	54	8	29	764	1,952	2	1	2,340
Rochdale ....	94	227,348	1,132	738	863	32	17	7	557	1,178	1	—	1,452
Wigan ....	213	402,754	865	972	435	16	10	5	413	1,178	2	1	1,388
Warrington ....	508	451,893	1,087	1,103	642	—	3	8	896	3,829	7	1	4,129
Liverpool ....	342	1,302,405	2,956	3,997	1,785	—	16	93	1,043	3,469	21	13	4,833
Blackburn....	126	254,387	1,222	878	943	13	8	12	339	818	4	—	1,186
Burnley ....	107	267,194	1,383	999	1,100	1	20	9	268	616	2	—	741
Preston ....	3,063	800,608	2,389	2,420	1,245	15	9	25	787	2,820	11	1	3,984
Glasgow ....	4,446	1,077,119	2,955	2,642	1,723	1	25	85	1,768	6,782	2	5	8,795
Lanarkshire ....	—	873,550	2,089	1,298	1,219	2	28	62	1,194	4,482	20	—	5,095
Kilmarnock ....	3,810	429,713	1,398	1,544	316	—	2	21	292	752	1	3	1,876
Edinburgh ....	2,370	667,614	1,880	2,019	1,368	1	38	20	463	1,215	1	3	2,018
Stirling ....	737	301,444	729	740	298	1	—	10	222	728	2	2	1,321
Dundee ....	3,871	673,498	1,988	2,049	1,078	—	24	39	614	1,310	5	—	2,880
Aberdeen ....	2,983	414,587	1,482	1,789	639	—	5	7	294	838	7	—	1,586
Inverness ....	11,581	323,379	823	1,340	152	—	—	1	16	51	1	—	280
Belfast ....	4,625	1,129,869	2,706	2,436	1,124	—	20	33	434	1,567	3	—	6,590
Londonderry ....	3,956	451,827	1,017	1,136	225	—	9	1	62	195	2	—	607
§ Institutions (Special Districts)	—	—	70	140	—	—	—	—	1	2	—	—	30
England ....	50,328	33,649,571	109,155	115,375	61,976	307	921	995	33,097	99,721	1,569	245	141,373
Wales ....	8,012	2,420,921	5,863	9,460	2,677	1	49	100	1,252	7,163	6	19	9,392
Scotland ....	29,798	4,760,904	13,351	13,426	6,793	5	122	245	4,863	16,158	39	13	23,861
Ireland ....	32,587	4,390,219	7,085	7,476	2,756	—	35	45	844	2,981	17	2	9,874
United Kingdom	120,725	45,221,615	135,454	145,737	74,202	313	1,127	1,385	40,056	126,023	1,631	279	184,500

§ Under the charge of Lady Inspectors.

|| Monmouthshire is included in Wales.

† Including 259 "institution" works, under s. 5, 1907. Docks, wharves, quays, and warehouses (s. 104), "buildings" (s. 105), railway lines and sidings (s. 106), men's workshops, homework premises, and factories and workshops under the charge of H.M. Inspectors of Mines are not included.

\*\* Other than codes for docks, and for the use of locomotives.

†† Items of prosecution in respect of Scotland information.

TABLE 2.—Complaints Received, 1919.

Complaint.  (1)	Division or Branch.								Total.  (10)
	South Eastern.  (2)	South Western.  (3)	Midland.  (4)	North Eastern.  (5)	North Western.  (6)	Northern.  (7)	Lady Inspectors  (8)	Textile Particulars Inspectors.  (9)	
<b>Source—</b>									
Anonymous ...	198	54	79	51	103	85	193	1	764
Official ...	166	17	21	39	23	12	109	4	391
Operatives ...	76	45	60	106	126	70	426	42	951
Other ...	104	26	20	29	48	23	99	1	350
	544	142	180	225	300	190	827	48	2,456
<b>Subject—</b>									
Forms, &c. ...	74	3	8	4	6	4	17	—	116
Sanitation ...	226	46	94	126	163	82	558	—	1,295
Safety ...	80	19	20	38	23	20	69	—	269
Employment ...	215	61	49	67	107	67	179	—	745
Particulars ...	3	3	5	3	1	6	21	48	90
Truck ...	8	1	1	—	8	4	28	—	50
Other (including those outside Act) ...	60	27	18	15	11	19	437	—	587
	666	160	195	253	319	202	1,309	48	3,152
<b>Number verified ...</b>	<b>315</b>	<b>65</b>	<b>96</b>	<b>149</b>	<b>140</b>	<b>98</b>	<b>385</b>	<b>29</b>	<b>1,277</b>

TABLE 3.—Contravention Notices issued to Occupiers, 1919.

Subject.  (1)	Division or Branch.								Total.  (10)
	South Eastern.  (2)	South Western.  (3)	Midland.  (4)	North Eastern.  (5)	North Western.  (6)	Northern.  (7)	Lady Inspectors  (8)	Textile Particulars Inspectors.  (9)	
Forms, &c. ...	13,844	6,963	8,291	6,881	4,957	4,658	2,575	—	48,169
Sanitation ...	5,128	2,104	3,191	3,104	1,875	2,018	4,028	—	21,448
Safety ...	8,884	5,497	4,940	5,861	5,021	3,973	2,183	—	36,359
Employment ...	4,107	1,769	1,861	1,863	1,220	1,299	3,171	—	15,290
Miscellaneous ...	2,845	1,295	1,166	1,131	1,406	667	4,061	585	13,156
	34,808	17,628	19,449	18,840	14,479	12,615	16,018	585	134,422

TABLE 4.—Notices and Reports received other than Overtime Reports, 1919.

Description.	Section.	Number received.	Description.	Section.	Number received.
(1)	(2)	(3)	(4)	(5)	(6)
<b>Special Exception Notices—</b>			<b>Occupation Notices</b> ....	127	22,372
<b>Overtime—</b>			<b>Accidents</b> { Occupiers' notices	4, 1906	126,023
<i>Ordinary</i> ....	49	970	{ Certifying Surgeons'	8, 1916	1,131
<i>Laundries</i> ....	2 <sup>b</sup> , 1907	40	{ reports	5, 1906	1,631
<i>Perishable articles</i> ....	50	24	<b>Dangerous Occurrence Notices</b> ....		
<i>Incomplete process</i> ....	51	—	<b>Poisoning</b> { Occupier	73	225
<i>Water mills</i> ....	52	—	{ Certifying Surgeon	73	279
<i>Prevention of damage</i> ....	53	—	{ Practitioner	73	140*
<i>Fruit preservng</i> ....	41	32	{ Registrar	—	38
<b>Period of employment—</b>			<b>Notices under Regulations and Special</b>		
<i>9 a.m. to 9 p.m.</i> ....	36	4	<b>Rules—</b>		
<i>Eight hours on Saturday</i> ....	30	—	Proposing additional Special Rules	—	—
<i>Turkey-red dyeing on Saturday</i> ....	44	—	Excess of Humidity { Cotton Cloth		
<i>Jewish works</i> ....	47	—	{ factories	—	—
<i>Fish curing</i> ....	41	194	Limit of Humidity { Flax	—	—
<i>Creameries</i> ....	42	21	{ Hemp and Jute	—	—
<i>Laundries</i> { Different periods	2 <sup>1c</sup> , 1907	21	Plans ....	—	—
{ Extended periods	2 <sup>1a</sup> , 1907	103	Exemption { Files	—	—
<i>Women's workshops</i> ....	29	11	{ Heading of yarn	—	—
{ Glass works	55	47	{ Brass	—	115
{ Lace factories	37	5	{ Tinning	—	—
<i>Male young persons.</i> { Bakehouses	38	40	{ Bronzing	—	10
{ Newspaper printing	56	11	{ Pottery	—	—
{ Other works	54	119	<b>Annual Reports</b> { Certifying Surgeons	122	1,813
Substitution of short day ....	43	2,986	{ Appointed Surgeons	—	100
Substitution for Sunday ....	48	663	{ Medical Officers of Health	132	406
Separation of sets { Holidays	45	16	{ (for 1918) ....		
{ Meal hours	40	355	<b>Notices from Medical Officers of</b>		
Employment in meal hours....	40	81	Health	133	1,436
Five-hour spell in certain textile	39	63	<b>Notices of Inquests</b> ....	21	1,527
factories	1	652	<b>Notices of Time Lost in Water Mills</b> ....	52	15
Exemption, limewashing			<b>Humidity</b> { Beginning	93	20
<b>Notices of Change of Hours</b> ....	{ 32	2,471	{ Ceasing	93	4
	{ 2, 1907 }		<b>Humidity Records</b> ....	92	8,758
<b>Notices of Change in System of Em-</b>					
<b>ploying Children</b> ....	32	—			
<b>Holiday Notices</b> ....	35	9,528			

\* In addition to 40 notices of poisoning among house painters and plumbers, not employed under the Acts.

TABLE 5.—Notices to District Councils, 1919.

District. (1)	Representations (ss. 5, 14 <sup>b</sup> ).											Occupation of Workshops. (s. 127 <sup>a</sup> ).	
	Air Space: over-crowding. (2)	Ventilation. (3)	Effluvia. (4)	Cleanliness. (5)	Sanitary Conveniences. §		Drainage of Floors. (8)	Fire.		Other.			Total. (13)
					F. (6)	W. (7)		Over 40. (9)	40 and under. (10)	F. (11)	W. (12)		
S. London	1	4	1	65	43	36	—	6	14	6	11	187	395
S.W. London	3	6	—	4	30 <sup>1</sup>	11	1	5	4	3	8	75	212
W. London	7	27	2	129	58	82	—	—	83	—	16	404	361
W. London (Special)	12	38	3	64	35	76	—	5	9	6	7	255	419
N.W. London	1	5	1	67	60 <sup>1</sup>	41	—	7	20	7	—	209	250
N. London	5	4	1	154	90	86	1	38	258	6	9	652	526
N.E. London	3	31	—	270	52	159	3	9	41	6	72	646	323
E. London	26	100	7	373	100 <sup>1</sup>	332	10	14	113	6	112	1,193	629
Kent	3	3	—	81	34 <sup>2</sup>	21	—	2	9	—	7	160	361
Reading	1	—	—	17	14 <sup>2</sup>	9	—	2	4	—	3	50	63
Northampton	—	—	—	—	20	1	—	—	—	—	—	23	39
Norwich	5	3	2	28	30	46	5	—	9	—	—	128	327
Ipswich	—	—	—	1	22 <sup>1</sup>	4	—	—	4	—	—	31	28
	67	221	17	1,253	588 <sup>3</sup>	904	20	90	568	40	245	4,013	3,933
Bristol	3	1	—	79	88 <sup>2</sup>	21 <sup>1</sup>	1	21	16	3	1	234	341
Gloucester	1	1	—	23	13 <sup>9</sup>	1 <sup>2</sup>	—	3	3	—	—	45	83
Yeovil	2	1	2	25	26 <sup>10</sup>	9 <sup>4</sup>	—	3	4	1	—	73	47
Southampton	—	2	—	1	63 <sup>2</sup>	3	2	5	4	6	1	87	116
Plymouth	4	18	—	157	91 <sup>17</sup>	35 <sup>5</sup>	1	8	5	3	5	327	174
Swansea	1	1	—	23	113 <sup>33</sup>	9	—	1	—	—	—	148	171
Cardiff	1	1	1	55	91 <sup>2</sup>	19	—	3	—	1	2	174	323
Dublin	4	4	3	32	48 <sup>25</sup>	16 <sup>30</sup>	—	1	3	1	4	116	68
Cork	—	1	—	29	25 <sup>36</sup>	9 <sup>1</sup>	—	1	2	—	—	67	102
	16	30	6	424	558 <sup>136</sup>	122 <sup>33</sup>	4	46	37	15	13	1,271	1,425
Birmingham	2	4	—	141	288 <sup>3</sup>	42	—	18	28	3	2	528	477
Coventry	—	—	—	6	21 <sup>5</sup>	2	—	2	—	—	1	32	63
Worcester	1	—	—	45	16	5	—	1	—	—	—	68	109
Wolverhampton	—	—	—	34	116 <sup>3</sup>	18 <sup>2</sup>	—	—	1	12	8	189	161
Walsall	—	1	—	13	119	9	1	2	5	—	—	150	70
Stoke	1	2	—	33	142 <sup>1</sup>	2 <sup>1</sup>	—	8	1	—	—	189	150
Leicester	—	1	—	112	22 <sup>8</sup>	11	—	2	9	—	—	157	227
Nottingham	—	3	—	70	137 <sup>15</sup>	75 <sup>6</sup>	—	16	4	—	3	308	337
Derby	—	—	3	177	98 <sup>3</sup>	39	—	—	1	—	1	319	163
Lincoln	1	2	—	79	39	22	—	—	2	—	5	150	100
Wrexham	—	6	—	111	24	10	1	2	—	—	12	166	206
	5	19	3	821	1,022 <sup>38</sup>	235 <sup>9</sup>	2	51	51	15	32	2,256	2,063
Leeds	1	16	13	95	75	23	—	3	4	1	5	236	431
Leeds (Special)	2	10	1	12	138 <sup>3</sup>	35	1	18	32	8	5	262	114
Hull	1	8	—	28	5	20 <sup>1</sup>	—	—	1	—	6	69	306
Sheffield	—	12	3	62	88 <sup>1</sup>	11	—	13	13	7	4	213	166
Huddersfield	—	2	—	34	88 <sup>1</sup>	7	—	5	6	5	—	147	273
Halifax	—	1	—	38	79 <sup>1</sup>	12 <sup>1</sup>	—	26	—	2	—	158	162
Bradford	—	6	6	47	50	26 <sup>1</sup>	1	10	16	2	—	164	369
Keighley	—	—	—	17	63 <sup>5</sup>	7	—	21	1	—	9	118	40
Newcastle	3	9	3	96	77 <sup>2</sup>	72	—	8	4	—	12	284	522
Stockton	1	39	4	46	34 <sup>5</sup>	67	—	1	4	—	7	203	272
	8	103	30	475	697 <sup>18</sup>	280 <sup>3</sup>	2	105	81	25	48	1,854	2,655
Manchester	—	—	—	4	104	4	—	40	66	7	—	225	390
Stockport	—	—	—	2	107	—	—	13	5	1	—	128	60
Oldham	—	—	—	12	41	1	—	6	1	—	—	61	19
Bolton	—	—	—	1	38	3	—	1	—	—	—	43	—
Rochdale	—	—	—	8	55	—	—	1	1	—	—	65	—
Wigan	—	1	—	17	67 <sup>1</sup>	1	—	6	1	—	—	93	23
Warrington	2	—	—	15	42 <sup>2</sup>	13	—	6	5	2	—	85	52
Liverpool	1	20	1	24	58	52	1	—	51	—	2	210	384
Blackburn	—	—	—	7	28	2	—	7	2	1	—	47	70
Burnley	—	—	—	8	14 <sup>1</sup>	1	1	3	2	1	—	30	8
Preston	1	—	6	157	33 <sup>1</sup>	27	1	1	1	1	23	251	444
	4	21	7	255	587 <sup>5</sup>	104	3	84	135	13	25	1,238	1,450

§ The notices represented by the small figures at the right of cols. 6 and 7 are not statutory, s. 9 being in force; they are sent merely for the information of the Local Authority. The numbers are additional, and are not included in col. 13.

TABLE 5—continued.—Notices to District Councils.

District. (1)	Representations (ss. 5, 14 <sup>f</sup> ).											Occupation of Workshops. (s. 127 <sup>g</sup> ).	
	Air Space: over-crowding. (2)	Ventilation. (3)	Effluvia. (4)	Cleanliness. (5)	Sanitary Conveniences.§		Drainage of Floors. (8)	Fire.		Other.			Total (13)
					F. (6)	W. (7)		Over 40. (9)	40 and under. (10)	F. (11)	W. (12)		
Glasgow .....	1	2	—	32	56	3	—	3	2	—	4	103	217
Lanarkshire .....	5	8	1	46	38 <sup>2</sup>	25 <sup>3</sup>	—	2	6	1	8	140	79
Kilmarnock .....	—	—	—	—	—	—	—	—	—	—	—	—	105
Edinburgh .....	—	13	—	45	4	1 <sup>9</sup>	2	3	—	—	3	70	86
Stirling .....	—	—	—	12	4 <sup>5</sup>	4	—	—	—	—	—	16	34
Dundee .....	2	1	—	99	4 <sup>2</sup>	4 <sup>19</sup>	—	1	—	—	1	112	165
Aberdeen .....	—	—	1	15	1 <sup>6</sup>	4 <sup>46</sup>	2	—	—	—	—	23	172
Inverness .....	2	1	—	15	— <sup>5</sup>	— <sup>38</sup>	2	—	—	—	1	21	58
Belfast .....	—	12	2	6	83 <sup>15</sup>	10 <sup>7</sup>	1	8	8	2	—	132	58
Londonderry .....	—	2	1	3	14 <sup>12</sup>	1	—	4	3	—	—	28	2
	10	39	5	273	204 <sup>47</sup>	47 <sup>140</sup>	7	21	19	3	17	645	976
England .....	94	381	59	2,978	3,151 <sup>109</sup>	1,582 <sup>24</sup>	30	368	867	106	345	9,961	10,656
Wales .....	2	8	1	189	228 <sup>35</sup>	38	1	6	—	1	14	488	700
Scotland .....	10	25	2	264	107 <sup>20</sup>	36 <sup>122</sup>	6	9	8	1	17	485	916
Ireland....	4	19	6	70	170 <sup>88</sup>	36 <sup>23</sup>	1	14	16	3	4	343	230
United Kingdom .....	110	433	68	3,501	3,656 <sup>252</sup>	1,692 <sup>185</sup>	38	397	891	111	380	11,277	12,502
¶Lady Inspectors .....	7	23	2	110	1,495 <sup>78</sup>	165 <sup>1</sup>	1	128	72	5	—	2,008	—

§The notices represented by the small figures at the right of cols. 6 and 7 are not statutory, s. 9 being in force; they are sent merely for the information of the Local Authority. The numbers are additional, and are not included in col. 13.

||Monmouthshire is included in Wales.

¶Also included in district summaries above.

TABLE 6.—Medical Examinations, 1919.

A.—Examinations by Certifying Surgeons for Certificates of Fitness.

Ages.	Areas.	Examined.		Certified.			Rejected.		
		Number.	Increase or Decrease per cent. compared with 1913.	Males.	Females.	Total.	Males.	Females.	Total.
(1)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Children under 14.	United Kingdom ...	31,060	— 24·5	14,754	15,279	30,033	271	756	1,027
	Lancashire ...	20,771	— 9·1	9,996	10,010	20,006	187	578	765
	Yorkshire ...	4,685	— 55·5	2,261	2,318	4,579	38	68	106
	London ...	53	+ 307·7	10	43	53	—	—	—
	Warwickshire ...	91	+1416·7	54	32	86	5	—	5
	Staffordshire ...	331	+ 0·3	157	169	326	3	2	5
	Cheshire ...	1,976	— 27·3	946	995	1,941	16	19	35
	Rest of England*	133	— 39·3	81	48	129	—	4	4
	Wales*	44	+ 158·8	22	22	44	—	—	—
	Lanarkshire ...	1	—	1	—	1	—	—	—
	Rest of Scotland	22	— 52·2	12	9	21	1	—	1
	Antrim ...	2,424	— 35·1	969	1,351	2,320	20	84	104
	Rest of Ireland ...	529	— 42·1	245	282	527	1	1	2
	Young Persons between 13 and 14 intended to be employed full time.	United Kingdom ...	71,087	— 23·0	33,932	35,066	68,998	630	1,459
Lancashire ...		26,212	— 23·6	12,131	13,136	25,267	192	753	945
Yorkshire ...		18,946	— 21·6	9,285	9,218	18,503	158	285	443
London ...		264	— 36·4	134	113	247	8	9	17
Warwickshire ...		2,325	+ 45·2	946	1,285	2,231	46	48	94
Staffordshire ...		5,454	— 27·0	2,566	2,765	5,331	51	69	123
Cheshire ...		2,163	— 19·7	938	1,187	2,125	12	26	38
Rest of England*		12,360	— 26·2	5,792	6,333	12,125	80	155	235
Wales*		891	— 43·6	713	134	847	28	16	44
Lanarkshire ...		361	+ 203·4	237	96	333	19	9	28
Rest of Scotland		879	— 36·0	638	189	827	16	36	52
Antrim ...		929	— 31·0	436	437	873	12	44	56
Rest of Ireland ...		303	— 35·0	116	173	289	5	9	14
Young Persons between 14 and 16.		United Kingdom ...	344,940	— 12·9	148,619	185,579	334,198	3,081	7,661
	Lancashire ...	53,276	— 8·1	20,657	29,943	50,600	567	2,109	2,676
	Yorkshire ...	32,304	— 21·1	15,745	15,863	31,608	286	410	696
	London ...	56,204	— 5·4	18,399	35,204	53,603	669	1,932	2,601
	Warwickshire ...	24,950	— 8·0	10,933	13,266	24,199	295	456	751
	Staffordshire ...	14,979	— 24·5	7,280	7,490	14,770	78	131	209
	Cheshire ...	8,807	— 18·1	3,849	4,812	8,661	41	105	146
	Rest of England*	84,893	— 10·9	40,435	42,387	82,822	655	1,416	2,071
	Wales*	6,820	— 9·3	3,971	2,734	6,705	48	67	115
	Lanarkshire ...	20,225	— 15·3	8,830	10,938	19,768	220	237	457
	Rest of Scotland	29,793	— 21·7	13,280	15,884	29,164	140	489	629
	Antrim .....	7,258	— 17·6	3,249	3,859	7,108	32	118	150
	Rest of Ireland ...	5,431	— 16·2	1,991	3,199	5,190	50	191	241
	All Ages—United Kingdom ...	447,087	— 15·6	197,305	235,924	433,229	3,982	9,876	13,858

Of the 13,858 rejections (col. 9) 9,268 were on medical grounds (including imperfect growth or impaired use of limbs 363, defective sight or disease of eyes 1,047, deafness 175, mental defect 64, disease of heart or lungs 535, anæmia or debility 470, infection 438, disease of skin 753, want of cleanliness 4,439, other medical reasons 984). The remaining 4,590 rejections were on account of age 426, want of evidence of age 3,896, other non-medical reasons 268.

The statistics are based upon the reports of 1,813 Certifying Surgeons. The remaining 529 failed to furnish reports, but with few exceptions these represent unimportant districts.

\* Monmouthshire is included in Wales.

## R.—Examinations by Certifying (or Appointed) Surgeons in Dangerous Trades.

Industry.	Examinations.		Persons Suspended from Work.			Rejections on first examination as unfit.	Suspensions ended by Certificate.
	Males.	Females.	Males.	Females.	Total.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>UNDER REGULATIONS OR SPECIAL RULES—</b>							
Pottery ... ..	23,598	22,404	10	12	22	12	2
Glaze and colour mixing ... ..	2,552	159	—	1	1	—	—
Dipping ... ..	3,781	5,870	3	5	8	—	—
Majolica painting, glaze-blowing ... ..	144	1,237	—	2	2	3	2
Ware cleaning... ..	255	2,743	—	1	1	2	—
Glost placing ... ..	11,967	2,065	3	—	3	—	—
Ground laying, colour dusting ... ..	398	2,194	—	—	—	—	—
Colour blowing ... ..	333	4,163	—	1	1	—	—
Litho transfer making ... ..	130	1,388	—	—	—	—	—
Other lead processes ... ..	3,739	1,360	4	—	4	4	—
Biscuit-ware scouring and emptying	—	279	—	—	—	—	—
Carrying clay ... ..	296	927	—	—	—	3	—
Wheel-turning... ..	3	19	—	2	2	—	—
† White Lead ... ..	64,423	10,796	53	1	54	28	24
† Lead Smelting ... ..	33,132	588	80	2	82	§5	54
† Vitreous Enamelling ... ..	1,332	471	2	1	3	—	1
† Tinning of Hollow-ware ... ..	1,271	342	1	4	5	—	1
† Electric Accumulators ... ..	20,278	3,321	63	1	64	§19	14
† Paints and Colours ... ..	10,933	3,155	32	6	38	§9	12
† Heading of Yarn ... ..	187	458	—	—	—	—	—
† Nitro and Amido Derivatives of Benzene	5,839	6,355	75	26	101	26	71
Vulcanizing Indiarubber ... ..	1,831	1,394	6	7	13	§2	1
† Bichromate ... ..	3,031	—	10	—	10	*—	4
** Trinitrotoluene ... ..	2,261	3,843	15	5	20	3	16
	168,116	53,127	347	65	412	104	200
<b>VOLUNTARY—</b>							
Rubber Mixing ... ..	587	8	—	—	4	—	2
Chrome Tanning... ..	1,444	360	14	8	20	—	20
Radiator Tinning ... ..	4	3	— 2	—	—	—	—
Mercury Compounds ... ..	198	—	—	—	—	—	—
Bronzing ... ..	12	107	—	—	—	—	—
Rolling Painted Plates ... ..	64	—	—	—	—	—	—
Doping ... ..	1,267	7,919	—	26	26	7	22
	3,576	8,397	16	34	50	7	44
	171,692	61,524	363	99	462	111	244

\* No provision.

† Examinations made by an Appointed Surgeon, who is not necessarily the Certifying Surgeon.

§ By voluntary arrangement.

\*\* These examinations were made in pursuance of the Special Rules issued by the Ministry of Munitions.



TABLE 7. Reported Cases of Poisoning (s. 73), 1919.

The *principal numbers* are those of attacks (fatal or otherwise) reported during the year, and not reported, so far as is known, in the 12 months preceding such attacks. The *small figures* at the right are those of deaths ascertained during the year, whether included (as attacks) in previous tables or not. Information as to fatal issue is received from the local Registrars of Deaths, and from the Coroners if an inquest is held.

Of the 279 reported attacks, 140 were notified by medical practitioners (s. 73<sup>1</sup>), and 225 by occupier (s. 73<sup>2</sup>).

Further details will be found in the Report of the Medical Inspector and in Table 1.

Disease and Industry.	Adults.		Young Persons.		Children.	Total.
	M.—Males F.—Females } (1)	M. F. (2) (3)	M. F. (4) (5)	(6)		
Lead Poisoning ... ..	185 <sup>2b</sup>	19	2	1	—	207 <sup>2b</sup>
Smelting of Metals ... ..	24 <sup>5</sup>	—	—	—	—	24 <sup>5</sup>
Brass Works ... ..	—	—	—	—	—	—
Sheet Lead and Lead Piping ... ..	2 <sup>1</sup>	—	—	—	—	2 <sup>1</sup>
*Plumbing and Soldering ... ..	10	—	—	—	—	10 <sup>0</sup>
Printing ... ..	9 <sup>1</sup>	—	1	—	—	10 <sup>1</sup>
File Cutting ... ..	—	—	—	—	—	—
Tinning of Metals ... ..	—	2	—	—	—	2 <sup>0</sup>
Vitreous Enamelling ... ..	1	—	—	—	—	1 <sup>0</sup>
White Lead ... ..	10	—	—	—	—	10 <sup>0</sup>
Red Lead ... ..	13	2	—	—	—	15 <sup>0</sup>
Pottery ... ..	13 <sup>8</sup>	8	—	—	—	21 <sup>8</sup>
Glass Cutting and Polishing ... ..	—	—	—	—	—	—
Electric Accumulators ... ..	44 <sup>3</sup>	2	1	1	—	48 <sup>3</sup>
Paints and Colours ... ..	10	1	—	—	—	11 <sup>0</sup>
Coach and Car Painting ... ..	10 <sup>3</sup>	1	—	—	—	11 <sup>3</sup>
Ship-building ... ..	8 <sup>2</sup>	—	—	—	—	8 <sup>2</sup>
*Use of Paint in other industries ... ..	7 <sup>3</sup>	2	—	—	—	9 <sup>3</sup>
Other Industries ... ..	24 <sup>1</sup>	1	—	—	—	25 <sup>1</sup>
Mercury Poisoning ... ..	5	2	—	—	—	7 <sup>0</sup>
Barometer and Thermometer making ... ..	3	—	—	—	—	3 <sup>0</sup>
Furriers' and Felt Hat Works ... ..	—	—	—	—	—	—
Explosives Works ... ..	2	—	—	—	—	2 <sup>0</sup>
Other Industries ... ..	—	2	—	—	—	2 <sup>0</sup>
Phosphorus Poisoning ... ..	1	—	—	—	—	1 <sup>0</sup>
Arsenic Poisoning ... ..	4	—	—	—	—	4 <sup>0</sup>
Paints, Colours and Extraction of Arsenic ... ..	—	—	—	—	—	—
Other Industries ... ..	4	—	—	—	—	4 <sup>0</sup>
Toxic Jaundice ... ..	2 <sup>2</sup>	1 <sup>1</sup>	—	—	—	3 <sup>3</sup>
†Anthrax... ..	45 <sup>0</sup>	6 <sup>3</sup>	1	5	—	57 <sup>0</sup>
Wool ... ..	23 <sup>3</sup>	5 <sup>3</sup>	1	5	—	34 <sup>5</sup>
Horsehair ... ..	3 <sup>1</sup>	—	—	—	—	3 <sup>1</sup>
Hides and Skins ... ..	16 <sup>1</sup>	—	—	—	—	16 <sup>1</sup>
Other Industries ... ..	3 <sup>1</sup>	1 <sup>1</sup>	—	—	—	4 <sup>2</sup>
	242 <sup>34</sup>	28 <sup>4</sup>	3	6	—	279 <sup>38</sup>

\* In addition to those included in the Table, 40<sup>17</sup> cases of lead poisoning were reported among house painters and plumbers, not employed under the Acts.

† In addition, 2 cases among dock labourers were reported.

TABLE 8.—Prosecutions, 1919 : District, Offence.

The small (included) figures in col. 2 relate to prosecutions by Lady Inspectors, and those in col. 5 to cases in which costs were paid by defendants. Col. 6 includes all cases withdrawn otherwise than as in cols. 4 and 5.

District.  (1)	Cases.  (2)	Result.				Convictions, &c. (Cols. 3, 4, and small figures in 5).								
		Convictions.  (3)	Withdrawn.		Dismissed, &c.  (6)	Forms.  (7)	Sanitation.  (8)	Safety.  (9)	Employment.			Particulars.  (13)	Obstruction.  (14)	Truck Acts.  (15)
			On payment of costs.  (4)	For amendment or on conviction on alternative charge.  (5)					Adults.  (10)	Young Persons.  (11)	Children.  (12)			
S. London ....	63	60	—	1 <sup>1</sup>	2	2	—	2	11	44	1	—	1	—
S.W. London ....	10	9	—	1	—	1	—	7	—	1	—	—	—	—
W. London ....	16 <sup>10</sup>	15	—	1	—	—	—	4	10	1	—	—	—	—
W. London (Special)	36 <sup>38</sup>	7	—	—	29	—	—	—	7	—	—	—	—	—
N.W. London ....	54 <sup>8</sup>	54	—	—	—	2	1	1	37	12	—	—	1	—
N. London ....	21 <sup>3</sup>	21	—	—	—	2	—	2	9	8	—	—	—	—
N.E. London ....	23	22	—	—	1	1	—	3	10	8	—	—	—	—
E. London ....	59 <sup>10</sup>	57	—	—	2	6	—	11	14	26	—	—	—	—
Kent ....	9	8	—	—	1	—	—	2	—	6	—	—	—	—
Reading ....	4 <sup>4</sup>	4	—	—	—	—	—	1	—	3	—	—	—	—
Northampton ....	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Norwich ....	2	2	—	—	—	2	—	—	—	—	—	—	—	—
Ipswich ....	2	2	—	—	—	—	—	1	—	1	—	—	—	—
	299 <sup>71</sup>	261	—	3 <sup>1</sup>	35	16	1	34	98	110	1	—	2	—
Bristol ....	7	7	—	—	—	—	—	2	4	1	—	—	—	—
Gloucester ....	11	6	—	3 <sup>3</sup>	2	1	—	7	—	1	—	—	—	—
Yeovil ....	4	3	—	1	—	—	1	2	—	—	—	—	—	—
Southampton ....	23	22	—	—	1	7	—	4	1	10	—	—	—	—
Plymouth ....	30	27	1	—	2	6	2	6	—	11	3	—	—	—
Swansea ....	29	29	—	—	—	2	—	4	6	14	3	—	—	—
Cardiff ....	17	17	—	—	—	2	—	3	4	5	2	1	—	—
Dublin ....	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cork ....	6	6	—	—	—	—	—	2	—	4	—	—	—	—
	127	117	1	4 <sup>3</sup>	5	18	3	30	15	46	8	1	—	—
Birmingham ....	71 <sup>49</sup>	70	—	1	—	6	4	5	6	38	11	—	—	—
Coventry ....	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worcester ....	2	2	—	—	—	—	2	—	—	—	—	—	—	—
Wolverhampton ....	2	2	—	—	—	—	—	—	—	1	—	—	—	—
Walsall ....	6 <sup>6</sup>	6	—	—	—	—	—	—	—	6	—	—	—	—
Stoke ....	26	26	—	—	—	—	—	2	9	13	2	—	—	—
Leicester ....	8	8	—	—	—	—	—	—	—	4	4	—	—	—
Nottingham ....	24 <sup>16</sup>	21	2	1 <sup>1</sup>	—	2	—	1	6	11	4	—	—	—
Derby ....	36	29	4	—	3	5	—	1	10	17	—	—	—	—
Lincoln ....	31 <sup>3</sup>	30	—	1 <sup>1</sup>	—	1	—	1	4	25	—	—	—	—
Wrexham ....	3	2	—	—	1	1	—	—	—	1	—	—	—	—
	209 <sup>74</sup>	196	6	3 <sup>3</sup>	4	15	6	10	35	116	22	—	—	—
Leeds....	7	4	3	—	—	—	—	—	3	4	—	—	—	—
Leeds( Special)	32 <sup>38</sup>	38	—	—	—	4	—	—	3	31	—	—	—	—
Hull ....	26	26	—	—	—	7	—	4	4	9	1	1	—	—
Sheffield ....	40	40	—	—	—	15	4	4	3	14	—	—	—	—
Huddersfield....	6	6	—	—	—	1	—	2	—	2	1	—	—	—
Halifax ....	16	16	—	—	—	1	—	5	2	6	2	—	—	—
Bradford ....	15	11	—	4	—	1	4	2	3	1	—	—	—	—
Keighley ....	18 <sup>3</sup>	18	—	—	—	—	—	5	10	1	2	—	—	—
Newcastle ....	32 <sup>9</sup>	28	1	2	1	2	—	6	7	14	—	—	—	—
Stockton ....	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	198 <sup>50</sup>	187	4	6	1	31	8	28	35	82	6	1	—	—
Manchester ....	16 <sup>8</sup>	16	—	—	—	—	—	4	4	8	—	—	—	—
Stockport ....	29 <sup>24</sup>	29	—	—	—	—	—	—	—	15	14	—	—	—
Oldham ....	7	7	—	—	—	2	2	3	—	—	—	—	—	—
Bolton ....	8	8	—	—	—	—	2	5	—	1	—	—	—	—
Rochdale ....	17 <sup>6</sup>	17	—	—	—	1	2	8	—	6	—	—	—	—
Wigan ....	10 <sup>8</sup>	10	—	—	—	—	—	2	5	3	—	—	—	—
Warrington ....	3	3	—	—	—	—	—	—	3	—	—	—	—	—
Liverpool ....	16 <sup>16</sup>	15	—	1	—	—	—	—	11	4	—	—	—	—
Blackburn ....	8	8	—	—	—	—	—	4	—	4	—	—	—	—
Burnley ....	20	20	—	—	—	2	—	—	—	12	4	—	—	—
Preston ....	9	9	—	—	—	—	1	2	5	1	—	—	—	—
	143 <sup>61</sup>	142	—	1	—	5	7	30	28	54	18	—	—	—

TABLE 8—continued.—Prosecutions, 1919: District, Offence.

District.	Cases.	Result.				Convictions, &c. (Cols. 3, 4, and small figures in 5).									
		Convictions.	Withdrawn.			Forms.	Sanitation.	Safety.	Employment.			Particulars.	Obstruction.	Truck Acts.	
			On payment of costs.	For amendment or on conviction on alternative charge.	Dismissed, &c.				Adults.	Young Persons.	Children.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	
Glasgow .....	25 <sup>24</sup>	23	—	—	2	—	—	1	16	6	—	—	—	—	
Lanarkshire .....	28 <sup>10</sup>	28	—	—	—	—	—	—	13	14	1	—	—	—	
Kilmarnock .....	2	1	—	—	1	—	1	—	—	—	—	—	—	—	
Edinburgh .....	38	38	—	—	—	10	—	3	—	25	—	—	—	—	
Stirling .....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Dundee .....	24	24	—	—	—	—	—	—	—	23	1	—	—	—	
Aberdeen .....	5 <sup>1</sup>	5	—	—	—	—	—	—	1	4	—	—	—	—	
Inverness .....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Belfast .....	20 <sup>17</sup>	20	—	—	—	1	1	1	3	5	2	7	—	—	
Londonderry .....	9 <sup>9</sup>	8	—	1	—	—	—	—	6	—	2	—	—	—	
	151 <sup>61</sup>	147	—	1	3	11	2	5	39	77	6	7	—	—	
England .....	921 <sup>256</sup>	849	11	17 <sup>6</sup>	44	80	25	123	201	384	50	1	2	—	
Wales .....	49	48	—	—	1	5	—	7	10	20	5	1	—	—	
Scotland .....	122 <sup>35</sup>	119	—	—	3	10	1	4	30	72	2	—	—	—	
Ireland .....	35 <sup>26</sup>	34	—	1	—	1	1	3	9	9	4	7	—	—	
United Kingdom ...	1,127 <sup>317</sup>	1,050	11	18 <sup>6</sup>	48	96	27	137	250	485	61	9	2	—	
¶Lady Inspectors .....	317	284	—	2	31	10	1	3	95	137	31	7	—	—	
¶Inspector of Textile Particulars .....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

|| Monmouthshire is included in Wales.  
 ¶ Also included in District summaries above.

TABLE 9.—Prosecutions relating to Regulations and Special Rules, 1919.\*

Code and Subject. (1)	Occupiers or Workers (O. or W.) (2)	Cases. (3)	Result.				Penalties.	
			Convictions. (4)	Withdrawn.		Dismissed, &c. (7)	Total. (8)	Average (Col. 4 only.) (9)
				On payment of costs. (5)	For amendment or on conviction on alteration native charge. (6)			
<b>Electric Accumulators—</b>							£ s. d.	£ s. d.
Air space ... ..	O.	1	1	—	—	—	5 0 0	5 0 0
Lavatory basins ... ..	O.	1	1	—	—	—	5 0 0	5 0 0
<b>Docks, &amp;c.—</b>								
Affixing Regulations ... ..	O.	1	1	—	—	—	—	—
Access to ship at wharf or quay ... ..	O.	4	4	—	—	—	5 17 0	1 9 3
Access to hold ... ..	O.	1†	1	—	—	—	49 14 0	49 14 0
Annealing chains ... ..	O.	4	3	—	—	1	2 10 0	0 16 8
Register of chains ... ..	O.	5	2	—	3	—	—	—
Overloading machinery ... ..	O.	1†	1	—	—	—	9 14 0	9 14 0
Fencing open hatchways ... ..	O.	3	2	—	1	—	20 0 0	10 0 0
<b>Self-acting Mules—</b>								
Fencing ... ..	O.	5	5	—	—	—	17 9 0	3 9 10
<b>Locomotives—</b>								
Riding by means of coupling pole ... ..	W.	1	1	—	—	—	0 14 6	0 14 6
<b>East Indian Wool—</b>								
Dust ... ..	O.	1	1	—	—	—	4 13 6	4 13 6
<b>Electricity—</b>								
Affixing Regulations ... ..	O.	2	2	—	—	—	3 5 0	1 12 6
Protection of apparatus ... ..	O.	1†	1	—	—	—	16 13 0	16 13 0
Protection of conductors ... ..	O.	2	2	—	—	—	3 8 0	1 14 0
Protection of portable apparatus ... ..	O.	3‡	2	—	1	—	59 9 0	29 14 6
Working space and access ... ..	O.	2	2	—	—	—	6 11 0	3 5 6
Authorised person to supervise work ... ..	O.	1†	1	—	—	—	4 16 0	4 16 0
Affixing electric shock placard ... ..	O.	1	1	—	—	—	4 15 0	4 15 0
<b>Grinding of Metals—</b>								
Dust ... ..	O.	3	3	—	—	—	9 19 6	3 6 6
<b>Lead Smelting, &amp;c.</b>								
Employment after suspension ... ..	O.	1	1	—	—	—	2 0 0	2 0 0
<b>Cotton Cloth Factories—</b>								
Temperature ... ..	O.	2	2	—	—	—	9 6 0	4 13 0
<b>Pottery—</b>								
Floors ... ..	O.	1	1	—	—	—	2 14 0	2 14 0
Total { Occupiers ... ..		46	40	—	5	1	242 14 0	6 1 4
Workers ... ..		1	1	—	—	—	0 14 6	0 14 6

\* All the cases relate to factories or docks.

† Under s. 136.

‡ Two under s. 136.

TABLE 10. Works or Departments under Regulations or Special Rules, 1919.

Code.	Division.						Total.
	South Eastern.	South Western.	Mid-land.	North Eastern.	North Western.	Northern	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>Regulations—</b>							
Felt hats ... ..	1	—	2	—	32	—	35
File-cutting by hand ... ..	4	3	70	181	48	10	316
Electric accumulators ... ..	26	—	7	1	5	—	39
Docks, &c. { separate premises ... ..	1,310	869	350	309	496	545	3,879
{ parts of F. or W. ....	926	389	257	444	288	100	2,404
Self-acting mules ... ..	6	102	43	595	945	140	1,831
Wool sorting, combing, &c. ... ..	—	—	2	58	1	2	63
Flax ... ..	1	18	—	17	5	287	328
Locomotives ... ..	363	640	661	861	548	682	3,755
Paints and colours ... ..	41	21	57	35	44	31	229
Heading of yarn ... ..	—	—	—	—	15	4	19
Hemp and jute ... ..	14	21	1	19	12	125	192
Horsehair ... ..	116	33	54	71	58	44	376
Casting of brass { under exemption 1 ... ..	199	203	428	247	252	208	1,537
{ not under exemption 1 ... ..	209	74	406	160	139	69	1,057
Vitreous enamelling ... ..	11	—	25	6	10	10	62
East Indian wool... ..	5	1	12	110	14	24	166
Electricity ... ..	17,010	5,773	9,982	9,727	9,376	6,418	58,286
Nitro-benzol, &c. ... ..	3	2	3	9	11	4	32
Tinning of metals ... ..	18	5	90	8	11	10	142
Grinding of metals ... ..	62	30	178	1,576	51	24	1,921*
Lead smelting, &c. ... ..	14	15	9	11	11	4	64
Bronzing ... ..	312	87	251	113	217	141	1,121
Cotton cloth factories ... ..	—	2	—	234	1,389	41	1,666
Pottery manufacture and decoration ... ..	24	47	434	36	19	36	596
Bichromate ... ..	—	—	—	—	1	6	7
Shipbuilding ... ..	20	71	6	67	19	62	245
Refractory Material ... ..	2	14	21	56	1	7	101
<b>Special Rules—</b>							
Chemical works ... ..	137	219	149	201	233	124	1,063
Vulcanising indiarubber ... ..	17	—	2	—	24	4	47
Aerated water ... ..	554	577	392	388	335	303	2,549
White lead ... ..	6	1	2	6	4	1	20
Hides and skins ... ..	34	8	7	9	31	3	92
	21,445	9,225	13,901	15,555	14,645	9,469	84,240

\* Including tenements of tenement factories

TABLE 11. Administration of the Factory Acts, 1909-1919.

Subject. (1)	1919. (2)	1914. (3)	1909. (4)
Authorised Staff (Inspectors and Assistants) ... ..	222	222	200
Expenditure* (excluding Central Office Clerks and Pensions)	£127,961	£103,594	£91,322
Registered Factories and Workshops. {			
Factories ... ..	135,454	123,058	112,479
Workshops ... ..	145,737	153,797	151,270
Total† ... ..	281,191	276,855	263,749
Works under Regulations (other than those for docks, &c.) and Special Rules.	77,957	67,650	26,165
Docks, &c. (Registered Occupiers) ... ..	3,879	4,168	3,921
Warehouses ... ..	4,606	4,672	4,724
Humid textile factories under s. 96 ... ..	313	315	272
Works under Particulars Section. {			
Textile {			
Factories ... ..	8,376	8,204	7,586
Workshops ... ..	2,411	2,059	1,796
Non-textile ... ..	28,016	28,678	20,788
Effective visits to {			
Factories ... ..	147,379	187,840	158,956
Workshops ... ..	145,601	238,594	215,462
Other places under the Act ... ..	8,924	15,676	24,598
Places not under the Act ... ..	20,335	28,632	25,721
Effective visits before or after legal hours ... ..	20,804	42,629	46,370
Factories and Workshops visited {			
Once ... ..	135,148	182,175	?
More than once ... ..	44,331	71,545	?
Prosecutions (cases) ... ..	1,127	2,852	3,723
Certifying Surgeons ... ..	2,342	2,364	2,233
Medical Examinations. {			
For employment of {			
Children under 14 ... ..	31,060	?	38,569
Young Persons ... {			
13-14 ... ..	71,087	?	76,483
14-16 ... ..	344,940	?	269,554
Under Regulations, Special Rules, &c. § ... ..	233,216	?	210,565
Accidents reported {			
Fatal ... ..	1,385	1,287	946
On basis of one day of incapacitation ... ..	40,056	51,276	39,020
On basis of one week of incapacitation ... ..	84,582	107,309	77,534
Dangerous Occurrences (s. 5, 1906) ... ..	1,631	2,595	940
Poisoning reported by {			
Occupiers ... ..	225	433	442
Certifying Surgeons ... ..	279	511	625
Practitioners ... ..	140	312	409
Notices received other than Overtime Reports ... ..	184,500	290,044	267,437
Notices to District Councils. {			
Representations (ss. 5, 14 <sup>b</sup> ) ... ..	11,277	9,889	8,198
Occupation of Workshops ... ..	12,502	13,261	21,863
Contravention Notices (to occupiers) ... ..	134,422	192,001	162,418

\* The expenditure is that of the financial year commencing April 1st.

† Docks, wharves, quays, warehouses (s. 104); "buildings" (s. 105); railway lines and sidings (s. 106); men's workshops, homework premises, and factories and workshops under the charge of H.M. Inspectors of Mines, are not included.

§ Including examinations made by Appointed Surgeons and voluntary examinations