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COST ACCOUNTS

IN PRINCIPLE AND PRACTICE

BY

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PREFACE

THE increasing competition and changed conditions of manufacturing have brought the subject of cost accounts very much to the front during recent years, and it is to meet the want, so often felt, of a book that gives the principles of the subject, and at the same time, is of practical utility, that the present book has been put upon the market. The present work does not claim to be original, for we are told that there is nothing new under the sun, but it does attempt, in the first part, to deal with principles, and in the second part, with actual practice. That it may be of service to the manufacturers of this country is the author's wish, for upon the success of our manufactures the ultimate supremacy of England undoubtedly depends.

Cost accounts are of fairly recent origin, and their existence has been necessitated owing to the complexities of modern commerce, and the growth of the factory system. Under these conditions it becomes more and more essential for a manufacturer to know exactly the circumstances under which he carries on his business, both in total and in detail, and it is to assist him to do this that cost accounts have become necessary, and may now be considered one of the most important factors in the administration of a modern manufacturing business.

There is no recognized definition of costing, and to give an accurate definition in a few words would be exceedingly difficult. Cost accounts may be described as a systematic and accurate record of the detail transactions relating to manufacturing, with a view to arriving at the actual cost, both direct and indirect, of the output of a factory or shop. They are quite distinct from the purely financial accounts, although the results shown by the cost accounts should be brought to as near an agreement as possible with the financial records. Cost accounts deal with the practical administration of a factory, and although affected by the commercial records, they are entirely distinct therefrom.

Cost accounts became necessary when information was required for estimating or tendering for important contracts, for which no

scale of prices was known to the contractor. To trust to luck was impossible, for it was essential that the price quoted should be low enough to have a reasonable chance of being accepted, and at the same time sufficiently high to cover the cost of the work, allowing for all indirect expenses, and a fair margin of profit.

When a system of cost accounts has been brought into existence, the results shown on a previous similar job can be used as a guide for quoting in future cases.)

Since this book was first written, the advantages of a scientific and accurate system have become better known, and this particular branch of accounting has greatly improved.

(Cost accounts endeavour to arrive at net results by analysis, showing as it were a series of small Trading and Profit and Loss Accounts, whilst commercial accounts endeavour to arrive at the same total result by the grouping of every class of expenditure.

In introducing a system, it is wise, as a rule, to proceed slowly at first, and to extend the system according to the necessity of the particular case. It is easier to adapt a simple system to peculiar circumstances than a complicated one, hence the advantage of proceeding with caution at the outset.

In order to arrive at the most useful and satisfactory results with the minimum of labour and expense, great care must be exercised in deciding what shall be recorded in total and what in detail, and since the costing system must give a complete history of each individual job, all instructions and orders should be committed to writing. For this purpose specially printed forms should be used suitable for each individual case, and the use of duplicating devices by carbon copies will be found of the greatest utility.

As far as possible foremen and workmen should be relieved of all clerical work, and any information that they are called upon to supply should be of the simplest possible nature.)

CONTENTS

| | |
|-------------------|-----------|
| PREFACE | PAGE V |
|-------------------|-----------|

PART I

| | |
|---|----|
| CHAP. | |
| I. NATURE OF COST ACCOUNTS | 1 |
| II. PURPOSES OF COST ACCOUNTS | 4 |
| III. GENERAL CONSIDERATION OF WAGES | 12 |
| IV. MATERIAL CONSUMED | 26 |
| V. ESTABLISHMENT CHARGES | 31 |
| VI. TERMINAL COST ACCOUNTS | 45 |
| VII. SINGLE AND PROCESS COST ACCOUNTS | 59 |
| VIII. SOME SPECIAL FEATURES | 66 |

PART II

A SYSTEM OF COSTING FOR MOTOR-CAR MANUFACTURERS, ETC.

| | |
|--|-----|
| X. WORKS ORGANISATION | 70 |
| X. DETAILED CONSIDERATION OF WAGES | 73 |
| XI. REPAIRS | 81 |
| XII. NEW WORK—WAGES | 87 |
| XIII. NEW WORK—MATERIALS | 98 |
| XIV. DETAILED CONSIDERATION OF ESTABLISHMENT CHARGES | 103 |
| XV. CONCLUSION | 106 |
| INDEX | 109 |

ILLUSTRATIONS

| NO. | | PAGE |
|-----|---|------------------|
| 1. | TRADE ACCOUNT | 5 |
| 2. | STORES RECEIVED AND STORES ISSUED BOOKS | 10 |
| 3. | STORES LEDGER | 11 |
| 4. | WAGES CHART | 24 |
| 5. | GOODS INWARDS BOOK | 27 |
| 6. | TRADING AND PROFIT AND LOSS ACCOUNT | 34 |
| 7. | SUMMARY OF INTEREST AND DEPRECIATION | 38 |
| 8. | DEPRECIATION ACCOUNT | 41 |
| 9. | " " | 43 |
| 10. | TIME SHEET | 45 |
| 11. | WAGES SUMMARY | 47 |
| 12. | WAGES BOOK | 48 |
| 13. | MATERIAL SUMMARY. | 49 |
| 14. | PURCHASE ANALYSIS BOOK | 51 |
| 15. | COST LEDGER | 52 |
| 16. | BREWERY COSTING | 60 |
| 17. | " ACCOUNT | 61 |
| 18. | " TRADING ACCOUNT | 62 |
| 19. | TOOL REQUISITION | 71 |
| 20. | SHOP SHEET REQUISITION | 71 |
| 21. | ORGANIZATION CHART | <i>facing</i> 72 |
| 22. | TIME CARD | 74 |
| 23. | JOF CARD | 75 |
| 24. | ENGAGEMENT CARD | 76 |
| 25. | " PAY OFF " CARD | 77 |
| 26. | VIEW ROOM RECEIPT | 78 |
| 27. | WASTER NOTE | 78 |
| 28. | YELLOW SHEET | 79 |
| 29. | MASTER CARD | 81 |
| 30. | INSTRUCTION SHEET | 83 |
| 31. | OUTWORK TIME SHEET | <i>facing</i> 84 |

x

ILLUSTRATIONS

| NO. | | PAGE |
|-----|---------------------------------------|------------------|
| 32. | DISPATCH SHEET | 86 |
| 33. | PINK CARD | 88 |
| 34. | PROGRESS CARD | <i>facing</i> 88 |
| 35. | STOCK CARD | <i>facing</i> 90 |
| 36. | WHITE SHEET | 91 |
| 37. | WAGES ANALYSIS | 92 |
| 38. | SPECIFICATION AND SALE NOTE | 95 |
| 39. | PURCHASE REQUISITION | 98 |
| 40. | INVOICE STAMP | 99 |
| 41. | PURCHASE ANALYSIS BOOK | <i>facing</i> 98 |
| 42. | MATERIAL REQUISITION | 100 |

COST ACCOUNTS

IN PRINCIPLE AND PRACTICE

PART I

CHAPTER I

NATURE OF COST ACCOUNTS

THE principles of costing, like those of double-entry book-keeping, are applicable to all trades, though the details vary with every business, and the great difficulty that faces an author in dealing with the subject is, that if he generalizes, the book ceases to have any practical utility, whilst, on the other hand, if an attempt be made to deal with every trade, the volume of matter given destroys any chance the book may have of being read. Under these circumstances it is our intention to deal generally with the subject in the first part of this book, confining our attentions in the second part to a detailed consideration of a motor-car manufacturer's business. One of the advantages of this method of treatment is, that sufficient matter is given in the first part to enable an average man to adapt the system to his own particular circumstances, whilst in the second part we give an entire system, which is in actual practice in one of the leading motor-car manufacturer's businesses in the kingdom, with very satisfactory results. This system, too, is one that is applicable to any general engineering works doing constructional work and repairs.

(No system can be inaugurated and efficiently carried on without expense, and it is useless for a manufacturer to attempt to keep costs unless he is prepared to spend both time and money to secure efficiency. There is, however, a possibility of overdoing a system of costing, making the expense altogether out of proportion to the results attained, and there is also a possibility of underdoing a system of costing, with its consequent errors and misleading results.)

The ideal system is one by which a manufacturer may, without unnecessary labour or expense—

- (1) Ascertain whether or not a profit is being made.
- (2) Ascertain whether a reasonable profit is being obtained on each department or process.
- (3) Lay his finger on weak places both as regards waste of material and incompetent management.

In dealing with this subject many writers have attempted to agree and interlock the cost system *in detail* with the financial books. This we do not consider advisable or necessary, and think that when this is attempted the point is reached where the expense involved becomes out of proportion to the results attained.

Let it be understood, however, that the two systems, costing and financial, must be brought as nearly as practicable into agreement, but actual agreement in detail, we submit, is impossible, as will become abundantly clear as we proceed with the subject.

The subject of costing covers an exceedingly wide field and is comparatively little known, even to some of our ablest accountants.

The uses of costing may be stated as follows—

- (1) To throw light on past experience and to locate profits or losses on previous work.
- (2) To act as a guide for future transactions.
- (3) To compare different methods of manufacturing the same article.
- (4) To check employés, and prevent waste both intentional and accidental.

It will also be found to increase the interest of intelligent employés in their work, and thus ensure co-operation and mutual understanding between master and man.

The various elements of the cost of an article may be summarized as follows—

- | | | | | |
|-------------|---|--|---|---------------|
| Total Cost. | { | Prime Cost. | (1) Labour. | (2) Material. |
| | | | (3) Direct Expenses of Production and Motive Power, including Wages of Superintendents, Foremen, etc., proportion of Rent, Rates, Taxes, Gas, Water and Insurance; Depreciation and repairs to Plant and Buildings. | |
| | | (4) Indirect Expenses of Selling, Distribution and Administration, including office and warehouse upkeep, Travellers' Salaries and Commissions, Salaries of Directors and Managers, Bank Charges and Interest, Bad Debts, etc., etc. | | |

The absolute necessity of accurate records cannot be too strongly emphasized, laxity in this being fatal to any costing system ; hence all persons responsible for these records should be impressed with the fact that (correctness is as important as in recording cash transactions.)

Although it has been stated earlier that we do not consider it advisable or necessary actually to agree the cost system *in detail* with the financial books, it is nevertheless essential that an agreement in total should be attempted, and the differences between the two systems satisfactorily explained. In order to do this it is necessary that the cost records and financial accounts should be written up from the same data, and it will be noted in the detail system set out in the second part of this book, that the same records are always used.

The Profit and Loss Account prepared at the end of the year is carefully scrutinized, and the estimated profits shown by the costing system compared with the actual profits shown by the annual accounts.

In the chapter dealing with terminal cost accounts, a method is given whereby the costing system can be agreed in total with the financial records.

CHAPTER II

PURPOSES OF COST ACCOUNTS

IN dealing with cost accounts, and especially in inaugurating any system of costing, it is important that the purposes for which they are required should be clearly understood and constantly kept in view.) Many serious blunders have been made when these purposes have been overlooked, or relegated to an inferior position, and these errors of conception are likely constantly to arise when the form or method of costings has been drawn up by book-keepers or accountants having imperfect and elementary acquaintance with the business, and ignorant of the requirements of the managers. (It must be remembered that these accounts are not estimates for future work, though they are often confounded therewith, and that many questions which arise in preparing estimates are altogether eliminated when recording the after cost of the operations. Nor are they in any sense a substitute for the Profit and Loss Account,) even when they are used to explain losses or abnormal profits, since many considerations enter into an examination of the general Profit and Loss Account of the business, considerations of running or standing machinery, of full or short time, of idle workpeople, and of bank balances and overdrafts, which only in a secondary manner influence costings. An adverse financial position undoubtedly increases cost of production, but this financial position is much less the business of the works manager, who studies costings in detail, than of the proprietor whose interest is chiefly in aggregate results. It is therefore necessary that financial impositions, and other charges of a like nature should appear in a proper and definite form in the ultimate accounts of the company, and not be hidden away among materials, and wages, and running expenses of machinery, in an innumerable collection of costs of various contracts or jobs. This will be the more apparent from an examination of example No. 1, which is taken from the Trade and Profit and Loss Account of a mechanical engineering firm in the North of England. Wages, stores and materials actually consumed, are charged against the repairs, pattern-making, and manufacturing accounts; but this can be varied by commencing the Trade Account with the stock

on hand on the 1st January, and charging it with Wages paid, distributed under various departments of labour, and with all materials purchased, and ending on the credit side with the stock on hand on the 31st December. In both forms it will be seen that although the total profit of the firm (subject to depreciation) is shown, and details of various expenses given, from which percentages can be calculated, no information can be gathered as to the cost of the different contracts and jobs which have passed through the shops. (Yet it is the costs of these different contracts and jobs which primarily interest the works manager, whilst the wider outlook, the general results, the financial operations, the prospects of the general market, are of most importance to the proprietor or chief manager.)

We are thus impelled, in businesses of any magnitude, to two sets of accounts, giving the same ultimate results, but giving those results under different aspects. And just as it is necessary in various trades to arrange the wording and grouping of different classes of operations or expenditures in the Trade Account so as best to display their results, so is it equally needful to adapt the form of cost accounts to the requirements and conditions of the particular business to which they relate. It is almost impossible to devise any set of financial books which will be equally useful to the banker, the railway or steamship carrier, and the retail greengrocer; it is still more difficult to construct a model set of cost accounts which would be serviceable alike to the manufacturing chemist, the speculative builder, and the mechanical engineer. All these require to know the expenditure on particular sections of the work, if not on all, but each will desire such expenditure grouped in the manner most readily understood by him, and with such degree of detail as will best instruct him in the results of his own trade.

The authors of some of the volumes in the "Accountants' Library" have very cleverly recognized the difficulty, and have made a grouping of cost accounts under five heads, namely—

MULTIPLE COSTS.—Applicable to undertakings where a number of products are involved bearing little or no apparent relation to each other in cost or selling price—such as engineering specialities, cycles, hosiery, boot, furniture, agricultural implements—in which

standardization in parts is carried to a high degree of specialization in manufacturing.

TERMINAL COSTS.—Applicable to undertakings where definite contracts are entered into, in which the costing is definite and terminating—such as engineers, shipbuilders, builders, and the like.

SINGLE COSTS.—Applicable to breweries, collieries, quarries, mines, and businesses in which there is a natural unit of cost, as the barrel, the ton raised, etc., etc.

PROCESS COSTS.—Applicable to chemical industries, food products, etc., in which conversion of material takes place, and there are principal and by-products, such as tanners, fellmongers.

OPERATING COSTS.—As railways, tramways, gas and water undertakings, electricity, and similar industries.

Separate chapters have been devoted to each of these groups with the exception of "Operating Costs," which may be disregarded, excepting such of them as fall under the sub-head of one of the complex trades; that is, of some form of engineering where tram-lines or light railways are sometimes used as an assistance for ulterior operations. The working expenses of railroads and tramways proper are of such an elusive character, and for their proper analysis demand much specialized and exhaustive study. The accounts also are so controlled by considerations of traffic management, and traffic audit, and the aggregate results can be so clearly ascertained from the ordinary records of the concern, that any treatment of such operating costs in an ordinary textbook would be superfluous and probably misleading.

Whatever division into trades, or groups of trades, be adopted, it is essential that cost accounts shall contain records of all the consumption of the firm during the period under review, whether such consumption be represented by cash, stores, or consumable obligations incurred. It is equally essential that nothing which partakes of the character of profit, whether divided or undivided, shall be included as cost of work. As many of these items of consumption are, and from their nature must be of estimated value, it is desirable that the period of accounts should be as brief as possible, and should not in any case exceed one month. Estimated values arise in such instances as depreciation of buildings and machinery, trade interest, and travelling expenses not recorded, which arise within, and are part of the cost of a given period, and

which are repeated, with possible variation, in each subsequent period. From this we may deduce the rule that *(the entire (total) expenditure of a firm during a given period, is the cost of the work (whether completed or in progress) executed by the firm during such period.)* This, however, only partly expresses the conclusion we must arrive at, for, as we shall see, such total expenditure must be divided over the different items of work executed, such items being, in many cases, not entire machines, products, or contracts, but minute subdivisions thereof.

(If cost accounts are to serve any real purpose, and to warn and guide the works manager in his arrangements, they must be accurate. Absolute mathematical accuracy is impossible, but the percentage of variation should never, under any circumstances, be a large one.) However, to ensure this relative agreement and accuracy, it is necessary that the cost accounts should be prepared from the same original records as the financial books. That is to say, the same wages sheets from which the men are actually paid, must either be used for the transfer to the cost accounts of the wages paid on each job, or compared and agreed therewith; and in the same manner the value of stores consumed must be extracted from the Stores stock cards, or compared therewith. Such charges as arise through the counting-house, and are there dealt with in the financial books, must be notified by the accountant to the cost accountant in some manner agreed upon. The manner of notification, and the amount of information given, will vary in different works, but there must be no estimating, no approximations to charges or allowances which do not appear in the wages list, stores books, or financial books.

(The secret of cost accounts is analysis—the dissecting of items in the aggregate into items in their elemental stage. The principal expenditures which demand such dissection are—

Stores and Materials,
Wages and Salaries,
Interest,
Depreciation.

It must be remembered that Interest on fixed capital, even when only a book-keeping entry, and Depreciation of buildings and machinery are really expenditure so far as cost accounts are

concerned—they are part of the expense of producing the finished article.

For the purpose of this analysis it is necessary, in most works, to keep three books in the storekeeper's office, namely, a Day Book for receipts (or Stores Received Book), a Day Book for issues (or Stores Issued Book), and a Stores Ledger. Suitable forms for these books are given below.

CHAPTER III

GENERAL CONSIDERATION OF WAGES

THE three main factors that make up the cost of an article are—

- (1) Wages (productive).
- (2) Material consumed.
- (3) Establishment charges.

We will now take these three in the above order and deal with each at some length.

There are many systems of remunerating the workman for his labour, the most satisfactory to both employer and employé probably being one based on some form of piecework. (A very satisfactory method is a combination of both day and piecework, whereby the man is guaranteed a minimum weekly wage, which he receives in any case for a full week, whatever work he may do.) Of course, if the man does not work a full week, he is paid only for the actual time put in ; for example, if the week be 53 hours and the man's rate 53s. per week, for a 53 hours' week he gets 53s. If, however, he puts in only 40 hours he receives only 40s. To this extent then the system is day work, but the piecework system included is this : all work given to a particular man is priced by the rate-fixer, the man's written order clearly stating the price per piece. The workman must then endeavour to do at least sufficient work at the prices fixed to cover his minimum or day rate. If he does more than this he earns a balance ; if he does less, he gets into debt, the amount of which debt must be discharged out of any subsequent balance he may earn.

For example, the man's rate is 53s. per week for a 53 hours' week ; he is given 106 articles to make at 6d. each. If he completes these in the 53 hours he has exactly covered his minimum wage, and there is no balance either one way or the other. Should he, however, do 110 of these articles in the 53 hours, he earns, and would receive, £2 15s., that is £2 13s. minimum wage plus 2s. balance. On the other hand, if he makes only 102 of the articles he would really only have earned £2 11s., but would nevertheless be paid £2 13s. for the week, and he would be in the firm's debt to the extent of 2s., which amount would have to be refunded out of any subsequent balance he might earn.

There are one or two objections to this method, though usually it gives very satisfactory results. To make it work successfully requires the services of a thoroughly competent works manager and rate-fixer, both of whom must understand the management and treatment of men, and appreciate the fact that (the interests of their workpeople are in reality bound up with their own.)

It is natural that the workman desires to make as much money as he possibly can, and it is equally natural that the employer should wish to obtain as much value as possible for his money.

Under this system, the tendency of the management is to fix a certain price for the making of a certain article, or the completion of a process, and then when the workman earns a big balance to reduce the piecework price. This causes the workman quickly to learn the total wages he is allowed to earn, without his piecework price being reduced, and in the end causes him to slack off. Now this is good neither for the workman nor the shop, and it is here that a competent manager has an opportunity to show his ability for management.

In any department of a factory, there are bound to be (fat and lean jobs) and it is generally easy to arrange not to alter the total wages paid in the shop, by taking from some of the fat jobs and putting a little more on the lean ones. By this means both workman and manager are satisfied and the business is settled amicably.

Unless something of this sort is done there will be constant friction between manager and workman. A workman, when given a new job, knows that on the time taken, the subsequent piecework price will be fixed, and he therefore does his best to make the job spin out as long as possible. This will enable him or his fellow-workmen easily to make a balance on future work of the same class.

Of course all work cannot be paid for by piecework, but in so far as it is possible, it is a distinct advantage to both workman and proprietor. The workman has an incentive to earn higher wages, and the employer can to a certain extent dispense with unnecessary supervision, the amount of wages earned or the debt contracted, automatically keeping him informed as to whether the man is doing his best or not.

The only possible means whereby the man can earn balance without doing his utmost, is by performing bad work. This is guarded against by a system of viewing, the work being passed by the

viewers or checkers before the man obtains his wages, the viewers' receipts being in fact the basis from which his wages are made up.

Another system of paying wages is the premium plan. Under this system a time is given for the performance of a certain process. Should the workman complete the job in less than the fixed time, he takes a proportion of the value of the time saved. For example, if the time fixed for doing a job be one hour, and the workman's rate is one shilling per hour, the value of the job in the rate-fixer's estimation is clearly one shilling. If the workman completes the job in half an hour, he obtains one half-hour's wages plus, say, half the difference saved, namely, three pence, which gives him a total wage of ninepence for the job. Thus the man is earning at the rate of one shilling and sixpence per hour, and the process which it was estimated would cost one shilling has actually been performed for ninepence.

By this method it will be clear that the gain to the employer is more than the actual cash consideration. (There is the gain due to the increased output from a given sized plant, and in the case of a large and expensive plant, the gain due to increased output may easily far exceed the gain due to the reduction of wages paid per piece.)

There are several variations of this premium system of paying wages, and since the treatment of wages is a very important factor in cost accounts, no excuse is needed for a somewhat detailed explanation of this premium system.

(The premium may be described as the monetary reward given to the workman, proportionate to the amount of time which he saves out of the given standard time allowed for doing a certain piece of work.) To make this more clear, let us take a concrete case. Take the example of a fitter receiving wages at the rate of one shilling per hour. He is given a job to do within a standard time of twelve hours. He completes the work in, let us say, ten hours; consequently he receives a premium on the two hours saved. That is to say, he receives payment for his ten hours' work at one shilling, plus a certain amount on each of the two hours saved.

As before mentioned, it is a perfectly natural desire on the part of both master and man to get as much as they can for themselves, the employé desiring to obtain as high wages as possible, the employer desiring to have as low a cost per unit of production as

possible. (The object of the premium system is to bring together these apparently opposite interests.)

Under a system inaugurated by Mr. F. A. Halsey, an American engineer, at the works of the Canadian Rand Drill Company of Sherbrooke, a certain fixed premium per hour saved was instituted.) The system was very simple to work, but it was open to the defect, that under some conditions a man might earn so much as to tempt the master to cut prices, a temptation which must not be given way to, for if once cutting takes place, all confidence between master and man is destroyed, and the system ceases to give satisfaction, it being absolutely essential that the system should be regarded without suspicion by the men.

Under the above system, however, it is possible that the workman may earn such a big premium that the employer may be sorely tempted to cut the rates, and in order to overcome this difficulty a further method has been devised by Mr. James Rowan, of David Rowan & Co., Glasgow.

The principle of Mr. Rowan's system is this: (the man is paid a premium bearing the same percentage to the fixed rate as the time saved bears to the fixed time,) for example, if the man saves 50 per cent. of the standard time on a job, his rate of wages per hour is raised 50 per cent. If he saves 10 per cent. he receives 10 per cent. more wages and so on. If, for example, we take an extreme case, the man reduces the time by 90 per cent., he, of course, has his wages increased 90 per cent., but this is a very different matter from Mr. Halsey's plan, for under Mr. Rowan's system, (the workman can never quite double his rate, whilst under the Halsey method, in an extreme case, a workman might possibly earn twenty or thirty times his hourly rate.) For example, suppose the man takes one-third of the saving, and his rate is one shilling per hour, and that the standard time is 100 hours. Under the Halsey method the labour cost of the job is 100 shillings or £5. Now, suppose the workman reduces the time to one hour, he clearly saves 99 hours or £4 19s. His one-third equals £1 13s., to which has to be added his one hour day wages, namely, 1s., making his total wages for one hour's work £1 14s. Under such a circumstance, no employer could see his man walking away with £1 14s. per hour without reducing the rate, and it is this difficulty that is surmounted by Mr. Rowan's method.

There are, of course, certain conditions which would justify the

employer in reducing the rate, for instance, the introduction of a new and better machine, but even here (under the Rowan system it is probably advantageous to leave the rate alone, whilst under the Halsey method, as shown above, it would be impossible.)

(The introduction of the premium system makes both workman and employer fully alive to the necessity of keeping the plant in a thoroughly first-class order) for if the workman finds that his tools are not in the best possible condition, he is unable to save the time he might. He therefore draws the attention of the manager to the fact, and the matter is quickly put in order, which is a distinct advantage to both proprietor and workman.

It has been stated elsewhere that (to make (the system work well, the workman must thoroughly understand the principle, and be satisfied that the manager does not intend to commence a premium system in order to ascertain what can be done, and then to revert to the old piecework system, fixing the prices upon the information he has obtained by a trial of the premium plan. The workman is naturally a conservative being and views with great distrust any new ideas, and nearly always thinks, rightly or wrongly, that the manager is trying to take advantage of him)

One firm, Messrs. Barr & Stroud, of Glasgow, in order to allay these very natural fears on the part of their workpeople, went so far as to print a booklet for circulation in their factory, fully explaining the objects and advantages of the premium plan over other systems of payment.

The text of this system, which we are allowed to give in detail by permission of Messrs. Barr & Stroud, is as follows—

NOTES ON THE PREMIUM SYSTEM OF WAGE-EARNING

Before giving details of the premium system, we wish to point out some of the disadvantages of other systems.

It is held by many that the interests of employers and employés are necessarily antagonistic, because, these people say, the employer wants to pay as little as possible for a day's work. This idea, however, is entirely wrong; what the employer wants is cheap production, and he is quite willing to pay very high wages if by so doing he can cheapen production; or, in other words, what the employé wants is a high wage per day, and the employer will willingly pay this if he can get a small cost per job.

(1) *Time-work System*.—This system of paying wages is unsatisfactory for the following reasons: (a) There is no direct inducement to the employé to work harder than will just satisfy his employer. (b) There is no direct inducement to the employé to find better ways of doing the work in hand, as he naturally enough argues that the benefit arising therefrom will go, as a rule, to the employer. (c) Owing to the necessity of paying the least efficient workmen a certain minimum wage, an employer cannot afford to pay a first-class man a wage equal to his merit. (d) The employer constantly thinks that his employés do not work as hard or as attentively as they should. Very often he misjudges them from a momentary glance, since it is evident he cannot be watching them all day, and this feeling together with the suspicions which it arouses, strains the relations between the two.

(2) *Piecework System*.—One way out of the difficulties of the "time-work" system is the adoption of the "piecework system," and in certain classes of work it answers well; but it, too, has at least one very serious objection, viz., that known as "cutting of rates." That is to say, when a workman becomes very efficient at piecework, his pay becomes very high, while it may be necessary for the employer, from competition, or other cause, to reduce the selling price of his product. If he has still to pay the same price per piece to his employé, it is evident that he cannot reduce his selling price beyond a certain point; he therefore reduces the piecework rate, and immediately trouble ensues. In consequence of this cutting—which with unscrupulous employers is often resorted to without any just cause—the piece workman soon gets to know the point to which he may go without having his rate cut, and no longer works his hardest, but limits his output to keep below that point. This system has led to many bitter disputes.

(3) *Profit-sharing System*.—The system of profit-sharing by dividing amongst employés at given times a certain proportion of the profits is, perhaps, the worst system of any, though it has worked satisfactorily in some individual cases.

The following reasons against it may be stated: (a) Profits are not directly made by employés nor are employés directly responsible for losses; bad management of the commercial department, and excessive expenditure in "oncost" charges may account for losses or diminished profits, and over these the employé has

no control, and it is unfair that he should suffer from them. On the other hand, profits may be made by outside means, distinct from pure manufacturing, and it is not right that the employé should participate in these, since he has done nothing to earn them. (b) It is obviously impossible to allow everybody access to the business books, and hence the employé has to be content with a statement of divisible profits which he is unable to verify. (c) No special inducement is given to a good workman, as he shares just the same as an indifferent or lazy one the profits which he has more largely helped to make. (d) No profits are available for distribution till the end of some long period, usually a year.

Premium System.—In the hope of overcoming the difficulties of the systems mentioned, the premium system has been devised, and we believe it offers a satisfactory solution of most of them. It is in use in many shops in this country and in America, and works most satisfactorily. The results obtained in many shops have been printed in the *American Machinist* and elsewhere, and all testify to the benefits to be derived from the system.

The system may briefly be described thus: (Each man is paid a regular time rate of wages, but when a job is given out a certain time is allowed for each operation to be completed; if the operation is completed in less time, the employé becomes entitled to a premium varying in amount with the time saved. It will be evident from the above that while the employé may increase his wages he cannot lose money by the introduction of the system.

The system possesses two main advantages: (a) That it enables a workman to increase his wages by his own individual effort, and the increase is immediately added to his wages. (b) The increased wages to the workman mean also a reduced cost of production to the employer, and hence there is no inducement to "cut rates.")

The system as we propose to introduce it.—The details of the system as we propose to introduce it are as follows: The amount of premium will bear the same relation to the ordinary wages due for the time taken to complete an operation, as the time saved bears to the time allowed—for instance, suppose four hours be allowed in which to complete an operation, and it is completed in two hours, the time saved is two hours; the premium would thus be two-fourths (one-half) of the wages due, *i.e.*, if the rate of

pay be 6d. per hour, the employé would receive 1s. 6d. instead of 1s. for the two hours worked (= a rate of 9d. per hour) : or if the same operation was finished in one hour, the time saved would be three hours, or three-fourths of the time allowed, and the premium would be three-fourths of the wages due, = $10\frac{1}{2}$ d. for one hour's work (= a rate of $10\frac{1}{2}$ d. per hour). Small fractions, where these occur, would be thrown in to the advantage of the workman.

The following conditions would be observed: (1) The time allowed for any job will be fixed by the manager and heads of departments, and will be, as near as can be estimated, the time which an average workman would take to complete the work. Should it be found to be underestimated, it will be reconsidered before a similar job is again put in hand; but except in special circumstances, such as the introduction of new methods of working, or an obvious error in calculation, the time allowed will not be reduced. There will thus be every inducement to the employés to do the work in the least possible time. (2) The time allowed will include all time necessary to procure tools, set up machines, and obtain material for doing the job; but, of course, in the case of any extraordinary cause of delay, the time so lost will be added to the time allowed. (3) All work will be checked and passed by the foreman or shop inspector before being accepted, and the premium will only be paid after the work has been found satisfactory. In the case of dispute, the matter would be referred to the manager, whose decision will be final as to quality of workmanship. (4) In the case of overtime, the premium will be calculated on the wages due for the actual time worked, without taking the extra half-wages into account.

General Remarks.—(The largest premiums will, we expect, be earned by those workmen who arrange their work systematically, and who keep their tools in good order, and work their machines in a scientific manner) rather than by those who "hash." It must not be forgotten that in our class of work, quality is the first essential, and quantity the second. It is possible, however, to produce both.

Lastly, we wish to mention that our reasons for introducing the system are as follows—

First, to reduce the cost of production of our output. By so

doing we expect to be able to procure more work, thereby employing more hands, and also to enable us to meet that competition which is every day becoming keener. Secondly, to increase earnings. In every shop, so far as we have heard, into which the system has been introduced, it has resulted in a considerable increase in the earnings of the employés. As explained above, it cannot in any case reduce the earnings. A general rise has taken place, due to the premiums, and it is our earnest wish that all our employés should receive the highest wages possible. Thirdly, to stimulate the employés to take a greater interest in their work. With an immediate prospect of deserved reward, we are certain that better methods of doing many jobs will be devised. Fourthly, to sustain and improve the efficiency of our plant. The system will, we believe, lead to the employés suggesting improvements and pointing out defects in machinery and tools which can and should be immediately remedied.

We trust that the scheme will meet with the hearty co-operation of all. Difficulties are sure to occur at first, but with a little forbearance and patience these will be overcome, we think, to the advantage of all. The system will be started gradually, and only on certain classes of work, but in time we hope to extend it to nearly every manufacturing operation. We need not add that we shall be very pleased to explain in greater detail any points that may not be clearly set forth above.

An objection that is sometimes brought forward is, that if under this premium system one man can do the work of two, one must necessarily be thrown out of employment. The argument has also been used against piecework and against every improvement that has been introduced into an industry, and it is not our intention to answer this charge, but merely to quote Mr. Sidney Webb, who writes: "If every member of the Amalgamated Society of Engineers turned out 25 per cent. more work and was duly paid for it, this would be to the advantage of all the men, as well as to that of the employers of the whole community. There is no fixed quantity of engineering work to be shared. The demand for machinery of every kind is indefinitely expansible and grows every day with every lowering of price. If every man's productivity were suddenly doubled, we should all be better off, not worse."

Everyone who has studied economics knows that this is an

absolutely just and accurate statement. There are other variations of the piecework system, a fundamental departure being made by Mr. Taylor in his differential piece-rate system. His method is to standardize all conditions in the shop, and then to determine a minimum time in which each job can be done. He then allows an increase of 20 per cent., 25 per cent., 30 per cent., or even more, according to the class of work, for attaining standard time. Let us take for example a 20 per cent. increase. The workman receives 5 pieces to do in 5 hours, and his wages for the time are 5s. The workman, if he completes in the 5 hours' standard time receives 5s. plus 1s., namely, 6s. for the 5 pieces, or 1s. 2^d. each. For less than 5 pieces the maximum hourly rate is 1s., that is, 1s. each. If the workman only completes 4 pieces in the 5 hours he receives only 4s.; his wages are therefore only 9^d. per hour. It will be seen from the above that Mr. Taylor's system awards a big premium for efficiency, and a heavy penalty for inefficiency. To work successfully it is necessary that the original times fixed should be accurate.

A still further variation is the Gantt Bonus System, which was introduced by Mr. Gantt at the works of the Bethlehem Steel Company. Under this system, if the workman reaches the standard time he is given a bonus of 25 per cent. above normal wages for the time. If he does still better he is given half of what he makes; if he does not reach standard time he is only paid 75 per cent. of normal wages for the excess time. This latter system has not, however, met with complete success with the workmen or their trade union officials.

Another method is one perfected by Mr. Emerson and applied in the shops of the Santa Fé Railway. This system is very similar to the Halsey method, but instead of paying the workman only a part of the time saved, he is entitled to be paid in full for all the time he saves and an additional bonus of 20 per cent. for all the time he works, for having co-operated with the management.

For example, if a man whose rate is 1s. per hour, completes 200 hours of jobs in 100 hours he receives—

| | | | | | | | |
|--------------------------------|----|----|----|----|-----|---|---|
| 100 hours at 1s. | .. | .. | .. | .. | £5 | 0 | 0 |
| 100 hours saved at 1s. | .. | .. | .. | .. | 5 | 0 | 0 |
| 20 per cent. on 100 hours' pay | .. | .. | .. | .. | 1 | 0 | 0 |
| Total | .. | .. | .. | .. | £11 | 0 | 0 |

If, however, the workman does not co-operate with the management so as to make the shop and himself efficient, he does not receive as much extra pay, but a smaller amount, until at 67 per cent. he only gets day-work rate. For 100 per cent. efficiency, the increase is 20 per cent., and for each 1 per cent. increase above 100 per cent., the pay also increases 1 per cent., at 120 per cent. efficiency, therefore, the pay is increased 40 per cent. Below 100 per cent. the pay table, as given in *The Engineering Magazine*, is as follows—

| <i>Efficiency per cent.</i> | <i>Additional per cent.</i> |
|---------------------------------|---------------------------------|
| 67 | 0 |
| 74 | 1 |
| 80 | 3.27 |
| 85 | 6.17 |
| 90 | 9.91 |
| 95 | 14.53 |
| 100 | 20 |

In most of these systems of paying wages their excellence or otherwise lies in the accuracy with which the proper rates are fixed in the first instance.

The old-fashioned method of arriving at the price to be paid for an article, viz., the calling in of the foreman, and asking him his price for doing the work, has long ceased to be used in modern factory practice, and a system somewhat similar to those outlined in the foregoing pages, must be introduced if present-day manufacturers are satisfactorily to compete with their more up-to-date rivals.

The system of paying having been satisfactorily settled, it is essential that the wages receive very careful analysis, for, as previously stated, accurate analysis is the secret of Cost Accounts. Some system of allocating wages paid on account of each individual job must be arranged, and the system set out later will be found accurately to meet the case. The total wages for each week will be drawn from the bank in one cheque, and the amount duly posted by the accounts department to the debit of a wages account, the subsequent analysis being made and transferred from the wages account to the various accounts affected. By this means we make

the total wages figure, as appearing in the financial accounts, agree with the figures appearing in the Cost Accounts, and thus arrive at a means of agreement between the two sets of accounts.

In making up wages care should always be taken that under no circumstances should the person making up the wages have anything to do with the actual paying. Should this rule be disregarded a very grave opening for fraud is given.

The wages in most businesses being a large item of expense, the greatest care should be exercised in dealing with it, and as many safeguards as possible used. To this end it is wise to make as many people as possible involved, so that it becomes difficult for anything wrong to take place without collusion.

A stamp after the following pattern will be found very useful for fixing responsibility—

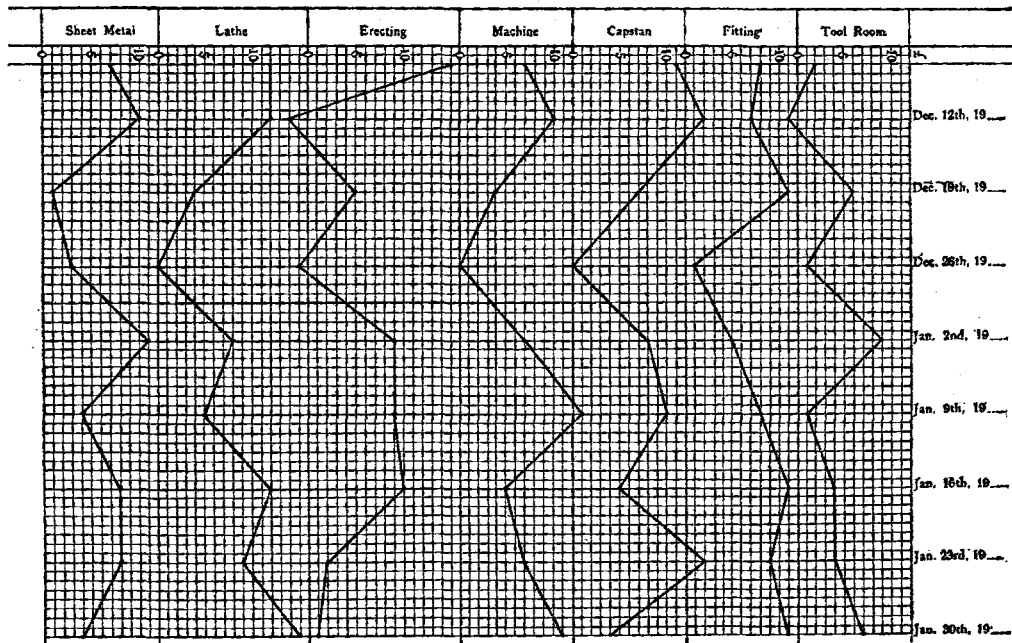
| |
|--|
| <p>WAGES MADE UP BY _____</p> <p>WAGES CHECKED BY _____</p> <p>PASSED FOR PAYMENT BY _____</p> <p style="text-align: right;"><i>Works Manager.</i></p> |
|--|

In order to keep a careful watch on the wages, balance earned, and debt contracted, diagrams are not without advantage. The following form showing the balance or debt in each shop per week will, we think, be self-explanatory.

The line marked 0 represents no balance and no debt: the distance the line goes above 0 represents in pounds the amount of balance earned in each shop, and the distance the line goes below represents the amount of debt contracted. For example, the Tool Room commences with a balance of £2, which is altered during the week ending December 12th to a debt of £1, the subsequent week seeing this again altered to a balance of £6, and so on.

This chart will show the works manager graphically the amount of balance or debt in each shop, and should he think it necessary to enquire into the matter further, owing to the excessive amount of balance or debt, the individual workmen's piecework accounts can be readily turned up.

No. 4—



Many technical men have the greatest possible objection to figures, but a chart something after the form given on the previous page will interest them immediately.

Where the wages paid are large and many men are engaged, the following hint for assisting in balancing may be of service. The sovereigns and half-sovereigns should be put in heaps of ten, and the wages sheets marked in pencil where the tens end. When the wages clerk comes to the pencil mark, he should, of course, just complete one heap; if not, he has made a mistake. Should a mistake occur, it will be necessary for him to go through only the last few tens to rectify the error.

CHAPTER IV

MATERIAL CONSUMED

THE second factor in the cost of a manufactured article is material. To keep an accurate account of stores received and issued, it is necessary to have a carefully arranged stores under the charge of an experienced storekeeper.

Records of all stores in hand will have to be kept on stock cards, on which will be stated the maximum and minimum quantities to be kept, and it is the duty of the storekeeper to see that these stores are always in thorough working order. The detail work entailed will be found in the second part of this book. Under the system there set out it will be observed that it is almost an impossibility for the storekeeper to accumulate a lot of useless or obsolete stock. A method by which waste may be effectively guarded against is also set forth.

All material is purchased on the proper authorised requisitions being forwarded to the buying department, which is alone responsible for the material being properly obtained as ordered. For this purpose it is advisable to have a viewer stationed in the stores to see that the goods received are up to the necessary standard and in accordance with the order. Should there be any discrepancy, either in quantity or quality, the purchasing department is immediately advised and the matter is taken up with the firm supplying the goods.

All goods as received are entered in the goods inwards book, which is a triplicate book of the following pattern.

The top copy is sent to the Accounts Department and the invoices checked therewith. This enables the invoices to be examined without the necessity of taking the book itself out of the stores. The second copy is forwarded to the finished stores, in order that the foreman may know what material is to hand, and enables him to make out the production or pink cards. As stated in the detail system set out later no pink cards are made out by the finished stores, until the foreman receives an advice that the material is to hand in the rough stores. The third copy is retained in the rough stores itself for reference. Unless this form of goods inwards book is

used, it will be necessary to have two books in the stores for recording goods received. These will be used on alternate days, so that the accounts department may have one book for marking off invoices, whilst the other is in use in the stores.

The sheets of the Goods Inwards Book are numbered consecutively and kept by the accounts department in a file reserved for the purpose, and the individual items are marked off with the invoices as received. The invoices are retained and entered in due course in the purchase analysis book at the end of the month, when they are posted in the usual way to the credit of their respective accounts in the Bought Ledger.

It is usually advantageous to enter the invoices only at the end of the month, as by this means all the invoices from one firm can be entered together, and the total only extended into the second column. As the total figure only requires to be posted, this will materially reduce the clerical labour involved in posting.

All requisitions received by the buying department for material required must clearly state the purpose for which the goods are required. If for a particular job, the job or repair number must be stated, if for a sanction or manufacturing order, the sanction or order number must be specified.

The functions of a purchasing department in a manufacturing establishment are—

- (1) To secure the most satisfactory material.
- (2) To secure the most satisfactory delivery.
- (3) To secure the best price and terms of payment.

To fulfil the first of these functions, it is necessary to have at the head of the purchasing department a man who has an intimate knowledge of the industry in which he is engaged. For the second, a man who has a good knowledge of business methods is required, and for the third, a man of shrewdness and tact is necessary.

It will be seen then that the position of manager of the purchasing department is no sinecure, and is a position calling for a man of undoubted ability.

A card index should be kept for records of all prices and quotations, as from this information the purchasing manager or buyer will be able to keep an accurate record of all purchases made, and check the invoice prices.

All material required must be requisitioned on recognized forms

giving full particulars of date ordered and date required. It is exceedingly wasteful to have the factory kept waiting for supplies, and the introduction of these dates on the requisitions will enable the responsibility for the delay to be placed on the proper shoulders.

The stores should be suitably fitted up for containing all the material stocked, and a stock card kept in the stores itself recording the additions to and deductions from each class of stores.

If the business is big enough to warrant it, it will be found advantageous to have three stores, namely, Rough Stores, Finished Stores and Dispatch Stores, all of which should be suitably situated. As a rule, it will be found convenient to have the rough and dispatch stores in the front of the building adjoining the street, in order that carriers and others can readily deliver and obtain delivery of goods required. A convenient situation for the finished stores is in the middle of the works, where it is readily accessible to the men requiring material for manufacturing.

The arrangement of a factory, it will be conceded, must have a very appreciable effect upon its efficiency, the saving of time attendant upon having the departments suitably placed being a big factor in making for the success or otherwise of its activities.

In most workshops there is a tendency to waste, and the advantage of requisitioning all material from stores on official forms, stating the purpose for which the goods are required, will be found of the utmost service in checking and reducing this waste to a minimum. It is frequently in small consumable stores that this leakage occurs, and an analysis of the stores requisitions will enable this excessive expense to be quickly located. For example, the machine shop may require a certain number of files, in order to carry out its work satisfactorily. Should, however, the number used in any month show a marked increase, the matter can be further looked into and the reason ascertained.

The cost of material is the invoice price plus the amount which has to be paid for delivery at the works, and on the cost thus arrived at the issue price of it by the storekeeper must be based. A little calculation will be necessary, and when made the result should be noted at the top of the card, so as to avoid doing it again for another issue. In practice it will sometimes be found difficult to obtain a workable fraction for this price, since goods purchased and delivered in tons are delivered to the workmen in pounds, and

so long as the coinage remains on its present basis, it seems undesirable to employ decimal points. The only practical way seems to be to adopt the nearest workable fraction, adjusting it as far as possible in fixing the next issue price. It should always be remembered that the storekeeper must not be afforded any opportunity of making a profit in his issues; and although it may be impossible to avoid a slight loss, this should be little more than the turn of the scale, and should not be added to by differences in divided prices.

There is another point to be remembered in connection with this price. Many markets are usually in a state, or approaching a state, of "unstable equilibrium," and this condition affects the purchases made by a firm as well as its sales. As to special purchases for a particular contract, such as steel plates and angles for a caisson, or railway bridge; or compressors for a steamer, there need be no difficulty: they can be charged at once to the contract or portion of contract for which they were purchased. But with general stores, such as screws, rivets, oil, paint, and the thousand and one articles which pass through the storekeeper's charge, the case is different. It is frequently difficult to ear-mark any particular issue, and say from what identical purchase it is made. As a rule, therefore, it must be assumed to be from the oldest purchase remaining in stock, and the issue price will be unaltered until the lot has been exhausted; and so on from purchase to purchase.

At the periodical stocktakings these issue prices should be adjusted to the then market price, if below the original purchase rate. Except under very special circumstances no increase on purchase prices should be made at stocktaking.

CHAPTER V

ESTABLISHMENT CHARGES

(THE third factor in the cost of the manufactured article is Establishment Charges or indirect expenses, and it is here that the majority of manufacturers lose touch with their costs, and where the biggest leakage of profits occurs. There is considerable difference of opinion amongst cost accountants as to the treatment of indirect expenses, and several books have been written on this subject alone.

There will always be a certain proportion of indirect expense for supervision, clerical work, repairing, etc., which cannot be allocated to individual jobs, and it is these unallocated expenses which must be added to our flat cost, *i.e.*, actual wages paid and material consumed in the manufacture of the finished article.

There is always a natural objection on the part of a manufacturer to increase what he calls unproductive labour in his factory, and the introduction of a clerk in his works is usually, to him, like a fly in the ointment. To deal adequately with establishment charges will require clerical assistance, and whereas it is a fairly simple matter to ascertain the flat cost, (to assess accurately the amount of indirect expenses is a matter requiring considerable experience and knowledge.)

It will be seen that the rough-and-ready method of fixing one percentage to cover all indirect expenses is manifestly inaccurate and unscientific, for the reason that work requiring the use of expensive machinery would, under this system, bear precisely the same proportion of establishment charges as work performed with a cheap tool. To overcome this difficulty an attempt is frequently made to introduce what is termed a machine rate, that is, a charge of so much per hour for each tool or machine used, in addition to the cost of wages and material consumed. To do this accurately, however, is a very difficult matter. Usually some arbitrary proportion is fixed which is supposed to cover the interest on the capital sunk, but this is generally very inaccurate owing to the difficulty of correctly arriving at the amount of depreciation, either owing to wear and tear or obsolescence. Apart from the question of cost of manufacturing, this question has also to be faced when

valuing the work in progress for stocktaking purposes. It is clearly just that some portion of the indirect expenses should be added to work in progress for stocktaking purposes, as the indirect expense consumed is as much an increase in value of the goods partly manufactured, as are the wages and material themselves. Great care, however, must be exercised that nothing in the nature of distribution expenses, selling expenses, or profit is included.

For this reason it is advisable to divide the indirect charges into two component parts, namely, works charges and selling or administrative charges. The flat cost, plus the works charges, give the works cost; the works cost plus the selling or administrative charges giving the gross cost, to which has to be added profit only, to give the selling price.

The works cost would probably be the correct figure for inclusion in the stocktaking, and it is with the method of arriving at this figure that we are immediately concerned.

The simplest method of doing this is by taking a percentage on wages, and if the article manufactured has to go through most of the shops it is substantially accurate, owing to the fact that errors in one department are adjusted in the others. But, in cases where several articles necessitating the use of different classes of plant are produced, it is most unjust, as will be readily appreciated. It is also alarmingly inaccurate in those cases where the indirect expenses represent the largest proportion of the cost, which is frequently the case where girl or boy labour is employed on expensive machinery.

Another method of arriving at works charges is by what is known as the hourly burden plan. By this method the total expenses are ascertained and divided over the number of hours worked. Here again, the great weakness of the system lies in the fact that no discrimination is made between expensive and cheap machines, and this method is therefore only substantially accurate where the class of machinery used is uniform.

Still a further method is the Machine Rate Method, which aims at disposing of the objection to the two previous methods, namely, the difference in the values of the machines used, but it is only accurate when the machine is in use the whole of the time. It follows, therefore, that the longer the machine is idle, the less accurate will be the result.

From the above methods of fixing indirect expenses, it will be seen that the question is one of great complexity, and one requiring very careful and individual treatment.

In the system set out in detail in the second part of this book, an attempt has been made to deal with the objections to all the foregoing methods of fixing indirect charges, namely, a division of the works establishment charges into three distinct parts, one rate for machine labour, which covers all the heavy and expensive machinery, another for fitting labour, which covers all the smaller machines and tools, and still a further rate for ordinary labour.

It is necessary to arrive at some method, and since no system can give absolute accuracy, we must therefore adopt the one most suitable to the peculiar circumstances of each individual case.

Having now arrived at the works expenses, we have the works cost, to which must be added the selling and administration expenses to give us the gross cost. These may justly be added as a percentage on works cost, the percentage for which can be readily ascertained from the Profit and Loss Account.

The selling price is therefore made up in the following manner—

| | | | | |
|---|----|----|----|---|
| Productive Wages paid.. | .. | .. | .. | £ |
| Material consumed | .. | .. | .. | £ |
| <hr/> | | | | |
| <i>Flat Cost</i> .. | .. | .. | .. | £ |
| <i>Add Works Establishment Charges</i> .. | .. | .. | .. | £ |
| <hr/> | | | | |
| <i>Works Cost</i> .. | .. | .. | .. | £ |
| <i>Add Administrative Charges</i> .. | .. | .. | .. | £ |
| <hr/> | | | | |
| <i>Gross Cost</i> .. | .. | .. | .. | £ |
| <i>Add Profit</i> .. | .. | .. | .. | £ |
| <hr/> | | | | |
| Retail Selling Price | .. | .. | .. | £ |
| <hr/> | | | | |

In many cases the division of the indirect expenses into the three classes mentioned will be found insufficient, and some further analysis will be required. For example, a varying rate may be necessary for each shop or department. In a factory where the work is uniform and the conditions practically constant, the percentage on wages will be found fairly accurate, as all charges press equally on all portions of the work. In a mixed shop, however, this is not the case—power, floor space, rent, rates, insurance, interest on capital outlay on machines—all vary in each shop, and there is

TRADING AND PROFIT AND LOSS ACCOUNT

| | | | | | |
|--|--|--|--|--|--|
| To Stock, Jan. 1st, 19.. | | | | | |
| „ Purchases | | | | | |
| „ Productive Wages .. | | | | | |
| „ Gross Profit carried down | | | | | |
| | | | | | |
| To <i>Salaries and Unproduc-</i> <i>tive Wages—</i> | | | | | |
| Management | | | | | |
| General unproductive | | | | | |
| Drawing Office .. | | | | | |
| General Office.. .. | | | | | |
| | | | | | |
| To <i>Sundry Varying Trade</i> <i>Charges—</i> | | | | | |
| Maintenance of Plant.. | | | | | |
| „ „ Tools | | | | | |
| Carriage and Packing.. | | | | | |
| Sundry Works Ex- | | | | | |
| penses | | | | | |
| Motive Power.. .. | | | | | |
| Fuel and Lighting .. | | | | | |
| | | | | | |
| To <i>Sundry Fixed Trade</i> <i>Charges—</i> | | | | | |
| Office Expenses and | | | | | |
| Stationery | | | | | |
| Rent, Rates, Taxes, etc. | | | | | |
| Professional Charges .. | | | | | |
| Travelling Expenses and | | | | | |
| Commission.. .. | | | | | |
| Maintenance of Build- | | | | | |
| ings | | | | | |
| Patent Expenses | | | | | |
| Advertising and Show | | | | | |
| Patterns | | | | | |
| Sundry Expenses .. | | | | | |
| | | | | | |
| To Interest on Debentures | | | | | |
| „ Bank Charges and | | | | | |
| Interest | | | | | |
| „ Depreciation | | | | | |
| „ Experimental | | | | | |
| „ Directors' Fees .. | | | | | |
| „ Balance carried down | | | | | |
| | | | | | |
| To Directors' Remunera- | | | | | |
| tion | | | | | |
| „ Managing Director's | | | | | |
| Commission | | | | | |
| „ Net Profit for the year | | | | | |

| | | | | | |
|---------------------------------------|--|--|--|--|--|
| By Sales—Cars | | | | | |
| Parts | | | | | |
| Repairs | | | | | |
| Petrol and Oil | | | | | |
| Sundries | | | | | |
| By Stock at December 31st, 19.. | | | | | |
| By Gross Profit brought down | | | | | |
| „ Balance of Discounts | | | | | |
| „ Transfer Fees.. .. | | | | | |
| By Balance brought down | | | | | |

no justification for treating such charges as an average if it can possibly be avoided. It becomes necessary to make some further division. If we take an ordinary factory we find it is composed of many little shops, each carrying on its own special industry, incurring charges for rent, interest on capital, depreciation, etc., and is quite independent of what may be the charges incurred in other departments. It may be considered a very difficult process to divide the total charges amongst the various shops with anything like accuracy, but if we keep in our minds the fact that the entire factory is composed of various little shops, and try and apportion the charge that would be made to various tenants by a landlord who owned the whole premises, we shall not be far out.

The first item to consider will probably be the building, including the capital invested in the land and the cost of the building itself. The capital expended can be divided amongst the various shops according to the floor space occupied. Having arrived at this figure the charges incident to this capital outlay can be ascertained. Rent, rates, depreciation, interest, etc., can all be reduced to figures, and a charge made of so much per square yard of floor space; the cost of lighting can also be reduced to the same basis. We have then the correct charge for our shop lighted up, in fact, ready for use.

The next item to consider will probably be power consumed, and in most cases a charge of so much per horse power will be found to meet the case. The charge due for interest and depreciation is the next item requiring consideration, a full explanation of which will be found in subsequent pages.

From the above it will be seen that the division of our total charges into varying rates for individual shops is not an insurmountable difficulty, and although it may require very careful consideration at the outset, once worked out, and the various factors determined, no special difficulty will present itself in the future.

In the first instance, the establishment charges will have to be an estimate, having no previous experience, except of other and perhaps similar businesses, on which to base our figures; but at the end of the first year's trading, the Profit and Loss Account, if accurately prepared, will afford considerable assistance. For example, let us take the Profit and Loss Account prepared at the end of the first year's trading as given on pages 34 and 35.

The items therein must be carefully scrutinized to see that every class of expense, either paid or incurred, is accurately included, and a detailed analysis of one or two of the items is not without advantage.

INTEREST usually raises a difficult problem, and illustrates forcibly the difference between estimates and cost accounts. In the former case the person wanting the goods cares nothing about the financial difficulties of the manufacturer, and will certainly not pay more for the goods because the maker has to apply to his bankers or others for assistance to produce them. In estimates, therefore, Interest is more correctly treated as a portion of the profit, than included under establishment charges which must be met before any gross profit is available. But in cost accounts this evasion is no longer permissible. In some form or other they must contain all the expenditure of the firm, and interest is part of such expenditure. The first step is to ascertain the total interest paid, or to be paid, for a limited period, say one month. This will include—

Interest on partners' capital in private firms.

Interest on debentures in limited companies.

Interest on preference stock or shares (though termed dividends) when this is cumulative and at a fixed rate, and not fluctuating with the profits of the company.

Interest on loans, on bills receivable or payable, and bank interest.

The fixing of this total amount requires considerable care and ability on the part of the accountant, particularly if the bill transactions are numerous or complicated. It is desired to debit to the cost accounts and usually under the heads of the several departments, the charge for interest incurred during the month; and though every care should be exercised in approximating this interest, it is pretty certain that an adjusting debit or credit will be required at the end of the half-year or year: the bank interest alone would compel this. The Interest Account, where departmental allocation is required, should be in the form shown on the next page.

The first five cash columns are for the capital employed under each head in the several departments, and are for the purpose of arriving at the due proportions each should bear. The first column, "Land," must be ascertained from the Balance Sheet of the firm or company. Where freehold or leasehold land is there entered as an asset, the

No. 7— SUMMARY OF INTEREST AND DEPRECIATION
JANUARY, 19..

| | Land. | Build-ings. | Plant. | Stock. | Total. | Interest. | Depre-ciation. |
|------------------------|-------|-------------|--------|--------|--------|-----------|----------------|
| Offices | | | | | | | |
| Stores | | | | | | | |
| Mould Loft | | | | | | | |
| Foundry | | | | | | | |
| Smithy | | | | | | | |
| Forge | | | | | | | |
| Steam power | | | | | | | |
| Machine Shop | | | | | | | |
| Joiners' Shop | | | | | | | |
| Fitters | | | | | | | |
| Work in progress, viz. | | | | | | | |
| ----- | | | | | | | |
| ----- | | | | | | | |
| ----- | | | | | | | |
| Balance of Interest.. | | | | | | | |

value so taken credit for must be divided between the several trades or departments in the yard, not merely in proportion to the extent of site occupied, but also as including the facilities afforded to them by roads and unapportioned pieces of land. When, however, unoccupied land has been purchased for future extensions, or to protect the property against encroachments, such unoccupied land should be given a separate line in the summary, and not apportioned to the departments.

WORK IN PROGRESS.—At the foot of the summary is a line "Work in progress." This will not be needed for an ordinary factory, where work under construction in each department may well be included under the head of stock. It will chiefly be necessary in Engineering and Shipbuilding establishments where the contract price is payable by instalments regulated by progress and the acquirement of certain material. In one instance the third and fourth instalments for a composite war vessel were earned and applied for in September, but in consequence of some trifling irregularity and dispute, less than half of each instalment was paid in October, and the balance not until the following March. By that time the fifth instalment was earned and also certified for by

the inspector, but, consequent on the previous delay, payment of this was also kept back until June. A somewhat similar case occurred in the construction of a foreign railway. The contractors for the excavation and levelling of a large section had completed the work to the satisfaction of the superintending engineer, and obtained his certificate for payment; but in consequence of a dispute with the superior authorities as to freight of materials for another section of the road, the money was withheld from them for some months. In both these cases the contractors suffered a loss of interest, either paid for money borrowed, or not received on investments they might have made, or on money deposited in the bank. But it is certain that no single department should bear the penalty. In the first case, the delay arose through yard, as distinct from departmental management; in the second, it was caused by a dispute which in no way affected the actual work. The loss in interest should, therefore, be borne by the entire establishment. Indeed, apart from these instances, it may be assumed that all firms engaged on complicated structures must make provision of this kind for work completed in sections, but not paid for, or only partly paid for, until the whole equipment is finished. The last item on the summary is "Balance of interest." This is to cover unemployed capital on which interest has to be paid to shareholders, debenture holders, or, in the case of private firms, to one or more of the partners. The charge incurred on such capital, being a charge to be provided for before any profits are estimated, increases the cost of work throughout the yard, just as an increased price for gas or water would, but no single department can be debited with it. The burden is a general one, which should be shared by all in the proportion of benefit received, and the amount must be transferred to the management account, thence to be apportioned over the departments with the rest of the management charges. The amount of unemployed capital must be inserted in the total column.

DEPRECIATION is a vexed question both with proprietors and auditors, and the anomalous position taken up by the Income Tax authorities has tended to overshadow it. That every machine wears out with use must be readily admitted. What is lost sight of is the fact that its economic life tends to an end when it lies fallow, that is to say, is unused, both by the inroads of rust and natural decay, and by the tendency of human minds to develop

or evolve something better: Thus there is a limited economic period for every machine (and also for every building) during which it must not only earn a profit for the owner, but must earn that profit after providing a reserve for its own replacement. Probably the most satisfactory method is to estimate the economic life of the buildings and plant at the time of purchase, or laying down, and to deduct, or lay aside, an equal annual sum, so as to reduce the cost to scrap value by the end of such period.

It must, however, be clearly understood that such estimate should be made by an engineer, a builder, or other technical expert, thoroughly acquainted with the trade, and its anticipated developments, and not by a mere financial expert or auditor.

The cost accountant should always remember that the technical staff can be of the greatest possible assistance to him in reference to the question of establishment charges, particularly with regard to matters concerning heating, horse-power, depreciation, etc., and he should do all in his power to interest them in his important duties, and help to create a feeling of co-operation, instead of one of antagonism, which only too frequently exists in many manufacturing businesses.

The depreciation should be either by individual machines and buildings or by numerous classes. The former appears the more convenient for cost account purposes, because the latter would involve a double classification, first for apportionment to the department using the plant, and secondly, to the particular group or class to which it belonged. Again, when a machine is removed from one department to another, a not infrequent occurrence in some works, the transfer involves a fresh calculation of the balance on both pages, and if two or three removals are made in one year the alterations may become perplexing. Further than this, all machines are not affected by improvements and invention to the same extent. Some contained under one class would for many years be left untouched by improvements, whilst others in the same class would, perhaps, only a year or two after erection become obsolete, and of little more than scrap value, and yet it is probable that all would continue in the list in which they first appeared.

The amount of depreciation will be based on the estimated life of the machine; ordinary repairs, cleaning, or upkeep, being charged direct to the Trading account of the concern. Thus for a machine

BUILDINGS AND PLANT—FITTING SHOP

| Depreciation. | Value. | January. | | February. | | March. | | April. | | May. | | June | |
|---|-----------------|--------------------------|--------------|---|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|
| | Jan. 1st, 1920. | Depreciation. | Value, 31st. | Depreciation. | Value, 28th. | Depreciation. | Value, 31st. | Depreciation. | Value, 30th. | Depreciation. | Value, 31st. | Depreciation. | Value, 30th. |
| Building of Fitting Shop | 162 10 0 | 1 2 11 | 161 7 1 | Life twenty years, from January, 1921. Cost £300, less old brick work, £25. | 160 4 2 | 1 2 11 | 159 1 3 | 1 2 11 | 157 18 4 | 1 2 11 | 156 15 5 | 1 2 11 | 155 12 6 |
| 10-in. centre gap lathe, No. 1 | 57 0 0 | 7 11 | 56 12 1 | Life twenty years from January, 1924. Purchased at £100 less scrap, £5. | 56 4 2 | 7 11 | 60 5 8 | 8 6 | 59 17 2 | 8 6 | 59 8 8 | 8 6 | 59 0 2 |
| | | From Fitter's Cost Sheet | | | 4 10 0 | 7 | | | | | | | |
| Bradbury Shearer and Puncher | 81 0 0 | 11 3 | 80 8 9 | Life twenty years from January, 1924. Purchased at £145, less scrap, £10. | 79 17 6 | 11 3 | 79 6 3 | 11 3 | 78 15 0 | 11 3 | 90 1 11 | 13 1 | 89 8 10 |
| | | From Fitters Cost Sheet | | | | | | | 12 0 0 | 1 10 | | | |
| 10-in. centre plain lathe, No. 2 | 84 0 0 | 8 9 | 83 11 3 | Life twenty years from January, 1928. Purchased at £115, less scrap, £10. | 83 2 6 | 8 9 | 82 13 9 | 8 9 | 82 5 0 | 8 9 | 81 16 3 | 8 9 | 81 7 6 |
| 5-in. centre Bradbury Capstan lathe, No. 3 .. | 44 0 0 | 4 7 | 43 15 5 | Life twenty years from January, 1928. Purchased at £60, less scrap, £5. | 43 10 10 | 4 7 | 43 6 3 | 4 7 | 43 1 8 | 4 7 | 42 17 1 | 4 7 | 42 12 6 |
| 7-in. centre Bradbury Capstan lathe, No. 4 .. | 60 0 0 | 6 3 | 59 13 9 | Life twenty years from January, 1925. Purchased at £80, less scrap, £5. | 59 7 6 | 6 3 | 59 1 3 | 6 3 | 58 15 0 | 6 3 | 58 8 9 | 6 3 | 58 2 6 |

which costs, fixed in place and ready for working, £120, and which it is assumed will last, with reasonable care, for twenty years and at the end of that time be worth £10 for scrap material, the annual amount to be written off will be £5 10s. When a machine undergoes extensive repairs which are in the nature of renewals of the worn-out portions, or improvement of some part, in either of which cases its working life receives a new lease, then the cost of such work must be added to the value standing in the schedule, and a new expected life and rate of depreciation calculated. The example on page 41 will explain the suggested method of keeping the account.

When, however, it is determined to adopt the percentage method, the buildings and plant should be divided into different classes, and this division should be made by a technical expert after taking into account the probability of improvements in any of the machines, as well as the anticipated use and extent of wear and tear. The example set out on page 43 will be found a suitable form for such schedules and accounts. It will be seen in this example that the purchase cost is inserted for each machine, and a total made at the foot of the class concerned. The depreciation and resultant balances are, however, only entered against the total, thus giving one calculation only for the class, whilst keeping a record and description of each machine. •

The other items on the Profit and Loss Account do not call for such detailed analysis as Interest and Depreciation, most of them, with the exception probably of Rent, dividing themselves naturally into either Works charges or Selling and Administrative charges. The Rent item should, therefore, be divided in the same manner as Interest and Depreciation. For example, the rent of the premises will be debited in the accounts in one figure, but it can readily be divided according to the floor space used for offices and works respectively.

There may possibly be some difference of opinion with regard to the division of some of the other items, for example, draughtsmen's wages; but if we consider the business as being divided into two distinct establishments, having its works say in the country, and its commercial department in town, most of the apparent difficulties will disappear.

Having carefully considered the foregoing question of interest and depreciation, etc., we are now in a position to arrive at the total

No. 9—

MACHINE SHOP

| Class. | Date of Purchase. | Description. | Cost. | Balance brought forward. | Year ending Dec. 31st, 19—. | | Dec. 31st, 19—. | | Dec. 31st, 19—. | |
|--------|-------------------|---------------------|---------|--------------------------|-----------------------------|--------------------------|-----------------|--------------------------|-----------------|--------------------------|
| | | | | | Depreciation. | Balance carried forward. | Depreciation. | Balance carried forward. | Depreciation. | Balance carried forward. |
| | | | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| A | | | 162 0 0 | | | | | | | |
| | | | 178 0 0 | | | | | | | |
| | | | 154 0 0 | | | | | | | |
| | | | 57 0 0 | | | | | | | |
| | | | 81 0 0 | | | | | | | |
| | | | 84 0 0 | | | | | | | |
| | | | 44 0 0 | | | | | | | |
| | | | 60 0 0 | | | | | | | |
| | | Total of class A .. | 820 0 0 | 710 0 0 | 35 10 0 | 674 10 0 | 33 14 6 | 640 15 6 | 32 0 9 | 608 14 9 |

establishment charges, a further analysis of which will give us the works establishment charges, and the selling and administrative charges. Percentages can then be worked out on the method previously explained.

From what has been said it will be clear that absolute accuracy in dealing with establishment charges is out of the question, but the system as outlined, namely, the fixing of different rates for the various classes of labour, if not absolutely accurate, is certainly more scientific than using one percentage for all classes of work.

Another difficulty that arises is, that whereas the establishment charges are a practically constant figure, the productive wages depend entirely upon the amount of work done; hence the establishment charges are a higher percentage in a bad year than in a good one, and therefore at those times when a manufacturer is most anxious to obtain business, his cost of manufacturing is actually more than when he is working at full pressure, and is not anxious about obtaining fresh work.

Again, ignorant competitors have to be considered, for it matters not at all how good the system may be, if we wish to compete in the open market, we must sell at the same prices as other people. The great advantage of knowing the cost, however, lies in the fact that we know what lines to push and what lines to leave alone. Many manufacturers at the present time who, according to their Profit and Loss Accounts, are doing a good and profitable business, would do considerably better if they were to close one department, which in reality is being run at a loss, a fact of which they are supremely unconscious, knowing only that the business as a whole is making profits.

It is perhaps unnecessary to point out that in adding percentages for profits the percentages should be based on returns. For instance, on an article costing £10 and sold at £13 6s. 8d., there is a profit on cost of $33\frac{1}{3}$ per cent., but on the return it is only 25 per cent. The following table may be of service for calculating profits.

Add to cost 50 per cent. to give $33\frac{1}{3}$ per cent. on return

| | | | | | | | | | |
|---|---|-----------------|---|---|---|-----------------|---|---|---|
| “ | “ | $33\frac{1}{3}$ | “ | “ | “ | 25 | “ | “ | “ |
| “ | “ | 25 | “ | “ | “ | 20 | “ | “ | “ |
| “ | “ | 20 | “ | “ | “ | $16\frac{2}{3}$ | “ | “ | “ |
| “ | “ | $12\frac{1}{2}$ | “ | “ | “ | $11\frac{1}{4}$ | “ | “ | “ |
| “ | “ | 10 | “ | “ | “ | $9\frac{1}{11}$ | “ | “ | “ |

CHAPTER VI

TERMINAL COST ACCOUNTS

BEFORE coming to an examination of the detail system of costing set out in the second part of this book, which would fall under the heading of Multiple Costs, we will consider the special features of the other classes of cost accounts mentioned earlier, viz.—

Terminal Costs,
Single Costs,
Process Costs.

TERMINAL COSTS. (This class is applicable to undertakings where definite contracts are entered into, in which the costing is terminating and definite)

Accurate records of all time worked by each man will have to be kept by a timekeeper, and in addition each workman will have to note on a time sheet the time spent on each contract or job, the total time recorded on the time sheets being agreed with that recorded in the timekeeper's book. These time sheets must be given up every night, and sent to the office, in order that the various amounts can be posted in the Cost Ledger.

A simple form of time sheet is as follows—

No. 10—

TIME SHEET

Workman's Name Johnson Date Sept. 28

Workman's No. 4 Occupation Filter

| Job No. | Name of Customer. | Particulars of Work done. | Hours. | | Rate. | Amount. | | |
|---------|-------------------|---------------------------|--------|---------|-------|---------|----|----|
| | | | Time. | O'time. | | £ | s. | d. |
| 950 | A. Cooke | Repairs to cylinder. | 6 | | 1/4 | | 8 | |

(Signed), _____ Foreman.

There are many forms for recording time, the above is only given as a suggestion (any form is sufficient which enables the actual cost price of the direct labour to be charged to its proper job.)

All time spent on repairs, cleaning shop, etc., and other unchargeable time, is recorded in precisely the same way, only instead of Customer's Name on the time sheet, some initial or symbol should be used to designate the class of work being performed.

In businesses where the men may change their jobs several times a day, and several men may be working on the same job, it will be found advantageous to summarize the wages once a week, and to transfer only the totals to the cost ledger.

The summary on the next page will be found suitable for most cases. This summary is written up daily from the men's time sheets, the final summary being made up at the end of the week. The total of this summary must, of course, agree with the gross earnings as shown by the wages book.

The wages book, or sheets, will be written up from the time sheets and should show the gross earnings of each man less deductions for fines, hospital, etc., the total of the gross earnings column agreeing with the total of the summary given in the illustration opposite.

The wages cheque will be drawn in one amount, and posted in the financial books to the debit of the wages account. The total of the direct wages, as per the summary, will then be transferred to productive wages, and the other amounts to their respective accounts, the total productive wages representing the wages charged to customers, or jobs on hand that will eventually be charged to customers.

In order to ensure all material consumed being charged to its contract or job, it will be necessary for all goods purchased and used to be accurately recorded. For this purpose the storekeeper will have to keep books or cards similar to illustrations given on pages 10 and 11. All goods drawn from stores must also be requisitioned on the authorized forms; see page 100.

These requisitions will in due course find their way to the office, where they will be debited to their respective jobs, either direct to the cost ledger account, or by way of a summary. Where the requisitions are numerous, it will save clerical work if they are summarized weekly, like the wages, in something like the form on page 49.

WAGES BOOK.

| No. | Man's Name. | Repairs to Plant. | Repairs to Tools. | Shop Supervision. | Sundry Works Expenses. | Productive Wages. | Gross Earnings. | Deductions. | Amount to Pay. |
|-----|-----------------------|-------------------|-------------------|-------------------|------------------------|-------------------|-----------------|-------------|----------------|
| | | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| 1 | W. Smith | | | | | | | | |
| 2 | A. Jones | | | | | | | | |
| 3 | N. Robinson | | | | | | | | |
| 4 | P. Johnson | | | | | | | | |
| 5 | H. French | | | | | | | | |
| 6 | N. Hobson | | | | | | | | |
| 7 | B. Ault | | | | | | | | |
| 8 | T. Wigley | | | | | | | | |
| 9 | T. Scaley | | | | | | | | |
| 10 | A. Evans | | | | | | | | |
| 11 | B. Lane | | | | | | | | |
| 12 | C. Andrews | | | | | | | | |
| 13 | E. Thornley | | | | | | | | |
| 14 | H. Barnsley | | | | | | | | |
| 15 | A. H. Gibson | | | | | | | | |
| 16 | S. Whitfield | | | | | | | | |
| 17 | M. Mitchell | | | | | | | | |
| 18 | E. Matthews | | | | | | | | |
| 19 | N. Gould | | | | | | | | |
| 20 | W. Powell | | | | | | | | |
| 21 | C. Southwick | | | | | | | | |
| 22 | D. Adams | | | | | | | | |
| 23 | S. Corbett | | | | | | | | |
| 24 | A. Wainwright | | | | | | | | |
| 25 | C. Lee | | | | | | | | |
| 26 | F. Stratford | | | | | | | | |
| 27 | W. Pitt | | | | | | | | |
| 28 | D. Wagstaff | | | | | | | | |
| 29 | F. Smallwood | | | | | | | | |
| 30 | H. Allen | | | | | | | | |
| 31 | L. Gosling | | | | | | | | |
| | | 3 12 2 | 1 18 3 | 2 6 11 | 5 0 0 | 24 10 8 | 37 8 0 | 3 8 | 37 4 4 |

The returns to stock, representing amounts overdrawn, will in all cases be entered in red ink, and deducted from the total.

Material purchased for a particular job can be charged direct to the cost ledger from the invoice, all other purchases will be debited to stores, and charged to their respective jobs through the medium of the requisitions. A suitable form of purchase analysis book is given on the next page.

The totals of the various columns of the purchase analysis will be posted in the ordinary way to the debit of the respective nominal accounts, the account recording "Materials purchased direct" agreeing with the amount charged in the cost accounts to customers, or to jobs on hand that will eventually be charged to customers.

All expenses chargeable direct to jobs will also be debited in the cost ledger to the proper accounts, and the total direct expenses debited to a direct expenses account in the financial books from the Cash Book, Petty Cash Book, etc.

We have then charged to various jobs in the cost ledger, direct wages, direct purchases and direct expenses. We have also debited in the financial accounts corresponding amounts under similar headings. To this extent then the costing system must be in actual agreement with the financial accounts.

The total of the account headed Goods and Materials purchased for stock will not, however, agree with the amounts debited in the Cost Ledger, owing to the fact that in all probability there will be some goods remaining over in stock. In the financial accounts we have a record of the goods put into stock, whilst in the cost accounts we have a record of goods taken out of stock; if therefore we deduct from the stores account in the financial accounts the value of goods in stock, the balance should represent the value of stores debited in the cost accounts. If this figure agreed exactly we should have perfect correspondence between the financial and cost systems. In practice, however, this is impossible, owing to the difficulty of accounting for sundry consumable stores. The amount of the discrepancy is, however, a known quantity, and can be kept within reasonable limits.

A suitable form for the cost ledger is given on page 52. A separate account should be opened in the cost ledger for each job, and in the case of repairs and other unchargeable time, no indirect expenses need be added, or at any rate, only a proportion of the usual percentage.

With the exception of the column headed "Indirect Expenses," the cost ledger can be written up from the information obtained from the time sheets and material requisitions, etc.

We have now to consider the method of arriving at the amount to be charged for Indirect Expenses.

This is a very difficult matter, and for a full consideration of this important subject, the reader is referred to the chapters dealing with establishment charges.

| Dr. | Cr. |
|--|--|
| TRADING AND PROFIT AND LOSS ACCOUNT | |
| YEAR ENDED SEPT. 30TH, 19.. | |
| To Stock on hand, Sept. 30th, 19.. .. 5000 .. Material purchased .. 8500 .. Productive Wages .. 4000 .. Gross Profit c/d .. 7000 <hr style="width: 100%;"/> £24500 | By Sales 20000 .. Stock at Sept. 30th, 19.. 4500 <hr style="width: 100%;"/> £24500 |
| To Rent, Rates, and Taxes . 600 .. Gas and Water 140 .. Insurance 110 .. Discount 150 .. Management Salaries .. 500 .. Drawing Office Wages .. 350 .. Office Expenses 400 .. Travelling Expenses .. 500 .. Repairs to Plant 250 .. Repairs to Tools 200 .. Repairs to Fixtures .. 100 .. Professional Charges .. 30 .. Bank Charges and Interest 15 .. Depreciation 155 .. Directors' Fees 500 <hr style="width: 100%;"/> 4000 .. Net Profit on Trading . 3000 <hr style="width: 100%;"/> £7000 | By Gross Profit b/d 7000 <hr style="width: 100%;"/> £7000 |

The only method of obtaining this figure is either by means of a percentage on prime cost (*i.e.*, labour and material), or on materials only, or on labour only. The author prefers the percentage on wages method, as wages are more constant than prime cost, as this includes material, which is a constantly fluctuating figure. The percentage to be charged will be largely dependent on past experience and, as will be evident, a certain turnover must be assumed. A further reason why establishment charges should be added as a percentage

on wages will be found in the fact that the amount of these charges is largely dependent upon the amount of wages or labour. Labour requires machinery to work with, supervision, heat and power, and the work that has been turned out has helped to depreciate the machinery with which the work was executed; further, if these charges are added as a percentage on any other basis than productive wages, the costs when worked out will be found to give some quite misleading results, owing to the disproportionate amounts of labour and material included in the manufacture of different articles. For example, one article may represent £4 15s. labour, and only 5s. material, whilst another may be made up of only 5s. labour and £4 15s. material, and under the system which adds establishment charges as a percentage on prime cost, both these articles would bear precisely the same charge, which is

Dr. TRADING AND PROFIT AND LOSS ACCOUNT Cr.
YEAR ENDED SEPT. 30TH, 19..

| To Stock on hand, Sept. 30th, 19.... | 5000 | By Sales .. | 20000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------|---|---------------------|--------------------|-----------------------------|----|-----------------------|----|-------------------|----|------------------|-----|--------------------------|-----|---------------------------|-----|-------------------------|-----|--------------------------|--|--------------------------|-----|--------------------------|-----|--------------------------|-----|---------------------------|----|----------------------------|----|----------------------|---|-------------------------|-----|--|-------|--|-------|----------------------------|------|--|------|--|-------|--|--|
| „ Materials purchased | 8500 | „ Stock at Sept. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Productive Wages | 4000 | 30th, 19.. .. | 4500 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Gross Profit c/d | 7000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | £24500 | | £24500 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Shop Charges.</th> <th style="width: 50%; text-align: center;">Office Charges.</th> </tr> </thead> <tbody> <tr> <td>To Rent, Rates and Taxes ..</td> <td style="text-align: right;">50</td> </tr> <tr> <td>„ Gas and Water</td> <td style="text-align: right;">40</td> </tr> <tr> <td>„ Insurance</td> <td style="text-align: right;">10</td> </tr> <tr> <td>„ Discount</td> <td style="text-align: right;">150</td> </tr> <tr> <td>„ Management Salaries ..</td> <td style="text-align: right;">300</td> </tr> <tr> <td>„ Drawing Office Wages ..</td> <td style="text-align: right;">400</td> </tr> <tr> <td>„ Office Expenses</td> <td style="text-align: right;">500</td> </tr> <tr> <td>„ Travelling Expenses ..</td> <td></td> </tr> <tr> <td>„ Repairs to Plant</td> <td style="text-align: right;">250</td> </tr> <tr> <td>„ Repairs to Tools</td> <td style="text-align: right;">200</td> </tr> <tr> <td>„ Repairs to Fixtures ..</td> <td style="text-align: right;">100</td> </tr> <tr> <td>„ Professional Charges ..</td> <td style="text-align: right;">30</td> </tr> <tr> <td>„ Bank Charges, Interest..</td> <td style="text-align: right;">15</td> </tr> <tr> <td>„ Depreciation</td> <td style="text-align: right;">5</td> </tr> <tr> <td>„ Directors' Fees</td> <td style="text-align: right;">500</td> </tr> <tr> <td></td> <td style="text-align: right; border-top: 1px solid black;">£2000</td> </tr> <tr> <td></td> <td style="text-align: right; border-top: 1px solid black;">£2000</td> </tr> <tr> <td>„ Net Profit on Trading ..</td> <td style="text-align: right;">4000</td> </tr> <tr> <td></td> <td style="text-align: right;">3000</td> </tr> <tr> <td></td> <td style="text-align: right; border-top: 1px solid black;">£7000</td> </tr> </tbody> </table> | Shop Charges. | Office Charges. | To Rent, Rates and Taxes .. | 50 | „ Gas and Water | 40 | „ Insurance | 10 | „ Discount | 150 | „ Management Salaries .. | 300 | „ Drawing Office Wages .. | 400 | „ Office Expenses | 500 | „ Travelling Expenses .. | | „ Repairs to Plant | 250 | „ Repairs to Tools | 200 | „ Repairs to Fixtures .. | 100 | „ Professional Charges .. | 30 | „ Bank Charges, Interest.. | 15 | „ Depreciation | 5 | „ Directors' Fees | 500 | | £2000 | | £2000 | „ Net Profit on Trading .. | 4000 | | 3000 | | £7000 | | |
| Shop Charges. | Office Charges. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| To Rent, Rates and Taxes .. | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Gas and Water | 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Insurance | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Discount | 150 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Management Salaries .. | 300 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Drawing Office Wages .. | 400 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Office Expenses | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Travelling Expenses .. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Repairs to Plant | 250 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Repairs to Tools | 200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Repairs to Fixtures .. | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Professional Charges .. | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Bank Charges, Interest.. | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Depreciation | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Directors' Fees | 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | £2000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | £2000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| „ Net Profit on Trading .. | 4000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | £7000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | By Gross Profit b/d | 7000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | £7000 | | £7000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

manifestly inequitable. To assist us to obtain an accurate percentage, a carefully prepared Trading Account will be of the greatest assistance. Suppose, for example, we are desirous of fixing our percentage for establishment charges or indirect expenses, and we find upon reference to our last year's Trading Account, the figures are as shown on page 53.

The above illustration has been made in round figures in order to make the example easier to follow. If the manufacturer is of opinion that the year's trading here set out represents an average year, and that there is nothing extraordinary either in expenses or turnover, and that the account is accurately prepared, he has all the necessary information for deciding upon the establishment charges.

The indirect expenses will be found to total £4,000, and the productive wages £4,000; clearly then our establishment charges are 100 per cent. on the productive wages, and this naturally would be the figure used for future transactions.

If it is considered advisable to divide the establishment charges into Shop charges and Office charges, some further division of the Profit and Loss Account becomes necessary. All the items of expense will have to be divided into Shop charges and Office charges. Many of these expenses fall naturally into one or other of these classes; some again are partly Shop and partly Office charges, in which case they will have to be apportioned to their proper class. For example, the Rent, Rates and Taxes item stands at £600. A very ready method of dividing this figure is according to the floor space used by the office and works respectively; and all the other expenses can also be allocated to their proper class by this or some similar method.

We will suppose that the necessary division has been made, and the Profit and Loss Account will now read as on the previous page.

Now we find the total shop charges amount to £2,000, and the productive wages, £4,000, the percentage necessary to cover shop charges is therefore 50 per cent. on wages.

When this division of expenses into shop and office charges is made, it is usually better to add the office charges as a percentage on shop cost. To do this we must ascertain the shop cost, which in the example given will be as shown at top of page 56.

The total office charges amount to £2,000, or a percentage of 13½ per cent. on shop cost.

| | |
|--|---------------|
| Prime Cost— | |
| Wages | 4000 |
| Material consumed | 9000 |
| | <u>13000</u> |
| Add Shop on-cost 50 % on Wages | 2000 |
| | <u>£15000</u> |

¹The "Material consumed" figure is obtained as follows—

| | |
|---|--------------|
| Stock on hand, Sept. 30th, 19.. .. . | 5000 |
| Material purchased | 8500 |
| | <u>13500</u> |
| Less Stock on hand, Sept. 30th, 19.. .. . | 4500 |
| Material consumed | <u>£9000</u> |

The percentages for future transactions will therefore be based as follows—

| | |
|---|-------------------|
| Material | |
| Productive Wages | |
| Add Shop on-cost 50 % on Wages.. .. . | <u> </u> |
| Shop Cost | |
| Add Office on-cost 13½ % on Shop Cost | <u> </u> |
| Total Cost | <u> </u> |

To this total cost figure the only percentage to be added before arriving at Selling Price is profit.

To take a concrete example, assuming that we require a profit of 15 per cent., and the prime cost of the article is £13 made up of £4 wages and £9 material.

The figures will then appear—

| | |
|--|----------------|
| Prime Cost— | |
| Wages | 4 0 0 |
| Material | 9 0 0 |
| | <u>13 0 0</u> |
| Shop on-cost 50 % on Wages | 2 0 0 |
| | <u>15 0 0</u> |
| Office on-cost 13½ % on Shop Cost | 2 0 0 |
| | <u>17 0 0</u> |
| Profit— | |
| 17½ % on cost to give 15 % on return | 3 0 0 |
| Selling price | <u>£20 0 0</u> |

It must always be remembered in adding the percentage for profit, that the figure required is based on turnover or sales price and not on cost. A short table showing some of the more usual percentages has already been given on page 44.

Having decided upon the percentage necessary to cover the establishment charges, and the method of adding same, we enter the figure under the column headed "Indirect Expenses" in the Cost Ledger, which amount, added to the total prime cost, gives us the total cost price. To this must be added profit, to give the selling price.

As pointed out earlier, the productive wages, material consumed, etc., as shown in the financial accounts agree substantially with the amounts debited to the individual job accounts. The total amount debited to jobs, therefore, should agree with the "Materials consumed" and "Productive wages" paid as per the Trading and Profit and Loss Account. The other items appearing in this account could not be debited direct, and we therefore estimated to the best of our ability the percentage necessary to cover these indirect expenses. If we therefore summarize the whole of the indirect expenses added to the various jobs in the Cost Ledger, and compare them with the actual total indirect charges as ascertained from the Profit and Loss Account, we should be able to agree approximately the estimated profit with the actual results shown. Absolute agreement is not possible owing to the reasons previously given, and also to the additional difficulty of actually assessing indirect expenses. By attempting the agreement, however, we shall learn

TRADING AND PROFIT AND LOSS ACCOUNT

| | | | | | | | |
|---------------------------------|-----|----|----|--------------------------------|-----|---|---|
| To Stock at Sept. 23rd, 19.. .. | 20 | 0 | 0 | By Sales | 74 | 6 | 0 |
| „ Purchases | 22 | 13 | 11 | „ Stock at Sept. 30th, 19.. .. | 25 | 0 | 0 |
| „ Productive Wages .. | 24 | 10 | 8 | | | | |
| „ Gross Profit c/d. | 32 | 1 | 5 | | | | |
| | £99 | 6 | 0 | | £99 | 6 | 0 |
| To Repairs to Plant .. | -5 | 12 | 0 | By Gross Profit b/d | 32 | 1 | 5 |
| „ Repairs to Tools .. | 3 | 11 | 3 | | | | |
| „ Shop Supervision .. | 2 | 6 | 11 | | | | |
| „ Sundry Works .. | | | | | | | |
| Expenses | 7 | 4 | 3 | | | | |
| „ Other Expenses .. | 3 | 19 | 6 | | | | |
| „ Net Profit | 9 | 7 | 6 | | | | |
| | £32 | 1 | 5 | | £32 | 1 | 5 |

the amount of the deficiency, and should the estimated percentage for indirect expenses have proved insufficient, the rate for subsequent years can be corrected.

To make this agreement clearer, we will take as an example the accounts for wages and materials already given on a previous page, and for the sake of simplicity, we will consider the week as covering the period under review. The Trading and Profit and Loss Account prepared in the usual way from the financial books, will appear as shown on page 57.

Comparing the above figures with the wages summary and material summary given on pages 47 and 49, we find the amount shown as purchases in the Trading and Profit and Loss Account represents the total of the amounts drawn for jobs 950-5

| | | | | | | | |
|-----|----|----|----|----|-----------|---|---|
| 950 | .. | .. | .. | .. | 7 | 3 | 6 |
| 951 | .. | .. | .. | .. | 1 | 3 | 8 |
| 952 | .. | .. | .. | .. | 3 | 9 | 9 |
| 953 | .. | .. | .. | .. | 2 | 9 | 3 |
| 954 | .. | .. | .. | .. | 2 | 1 | 4 |
| 955 | .. | .. | .. | .. | 1 | 6 | 5 |
| | | | | | <hr/> | | |
| | | | | | £17 13 11 | | |

with the addition of £5 representing an addition to Stock, as shown on the credit side of the Trading Account.

The productive wages can be made up in the same manner—

| | | | | | | | |
|-----|----|----|----|----|----------|----|---|
| 950 | .. | .. | .. | .. | 1 | 9 | 0 |
| 951 | .. | .. | .. | .. | 8 | 7 | 4 |
| 952 | .. | .. | .. | .. | 3 | 7 | 8 |
| 953 | .. | .. | .. | .. | 4 | 6 | 8 |
| 954 | .. | .. | .. | .. | 2 | 11 | 8 |
| 955 | .. | .. | .. | .. | 4 | 8 | 4 |
| | | | | | <hr/> | | |
| | | | | | £24 10 8 | | |

In the same way the amounts appearing as "Repairs to Plant," etc., can be made up. The total of these remaining items will be found to amount to £22 13s. 11d. In fixing the selling prices during the period under review, we had always added 100 per cent. on productive wages to cover establishment charges, that is, a total of £24 10s. 8d., which should have given a net profit of £7 10s. 9d. (£32 1s. 5d.—£24 10s. 8d.).

The actual profit is, however, £9 7s. 6d., or a difference of £1 16s. 9d., this we find represents the difference between the estimated establishment charges, £24 10s. 8d., and the actual £22 13s. 11d.

CHAPTER VII

SINGLE AND PROCESS COST ACCOUNTS

SINGLE COSTS.—This class is suitable for breweries, collieries, etc., where there is a natural unit of cost, as the barrel, the ton raised, etc.

In order to compile a system suitable for the above, it is necessary to have a definite standard of production, and to do this a plan of the working of the business will have to be drawn. This will be prepared from the actual experience of previous years.) In the example given the thirty-six gallon barrel has been used as the standard. It is possible to convert every quantity to a unit of one barrel, and the barrel therefore becomes a very ready standard by which to measure the output of the brewery, the trade done, etc.

In the subsequent illustrations the figures are purely imaginary, and are not intended to be used as a basis of organization. For each brewing a separate cost should be prepared, the material consumed being credited to the individual stock accounts, so that the balance on the stock account always represents the stock on hand. The cost of each brew is ascertained from the Cost Account ; in the example given the cost per barrel was 16s. 0·8d. (See p. 60.)

In addition to the Cost Account, we have given the Brewing Account for the year and the Trading Account, both of which are prepared from the financial books in the ordinary way, the only difference being the addition of the number of barrels. (See pp. 61 and 62.)

As previously stated, this method of costing is equally suitable for a colliery, the unit or standard being in that case the ton raised. It is also usual in the case of collieries to divide the Working Account into two classes, viz., Underground and Surface.

PROCESS COSTS.—In this class of accounts, the remarks made in the second chapter, in reference to the necessity of the costs accounts being prepared by a man having an inside knowledge of the particular trade, are emphasized more than in the classes previously dealt with, (the many technicalities of the subject making it quite impossible for the costs to serve any useful purpose, unless the practical side of the business is thoroughly understood by the would-be cost accountant.)

As mentioned, (process costs are applicable to the chemical and

allied trades, these again dividing themselves into one of three groups—

- (1) Processes resulting in solids.
- (2) " " liquids.
- (3) " " gases.

In order to deal with this part of the subject thoroughly, it would be necessary to give almost a lecture on chemistry, dealing with, amongst other things, the measurements of solids, liquids and gases, and processes of concentration, crystallization and purification.

It is possible, nevertheless, to apply in most cases a standard of output, as in the case of brewery and colliery accounts, the standard varying, of course, in different trades. In order to do this considerable analyses will have to be made, and it will probably be found wise to work backwards from the Sales Day Book, taking each of the products separately, and ascertaining as nearly as possible the cost of each class, by first of all deducting carriage, then raw material, process material and wages, and eventually arriving at the various proportions applicable to each product manufactured.

No. 16— BREWERY COSTING No. 48. (See p. 59.)
QUALITY XX. DECEMBER 18TH, 19..

| Quantity. | Material Consumed. | Price. | Details. | | | Amount. | | | Stock Book. |
|-----------|---------------------|--------|----------|----|---|---------|----|---|-------------|
| | | | | | | | | | |
| 5 qrs. | Malt— | | | | | | | | |
| | English | 36/6 | 9 | 2 | 6 | | | | |
| 5 qrs. | Foreign | 35/- | 8 | 15 | 0 | 17 | 17 | 6 | |
| 100 lbs. | Hops | 1/6 | | | | 7 | 10 | 0 | |
| 3 cwts. | Sugar | 14/- | | | | 2 | 2 | 0 | |
| 25 lbs. | Salt | /1 | | | | | 2 | 1 | |
| 30 lbs. | Preservatives | /4 | | | | | 10 | 0 | |
| | Duty | | | | | 20 | 2 | 5 | |
| | | | | | | £48 | 4 | 0 | |

Brewer's Remarks—

Barrels—

| | |
|--------------|----|
| Brewed | 62 |
| Racked | 60 |
| Loss | 2 |

Production—

60 barrels at a cost per barrel of 16/0·8.. £48 4 0

No. 17—

BREWING ACCOUNT FOR THE YEAR ENDED DECEMBER 31st, 19..

| | Barrels. | Per Barrel. | £ | s. | d. | | Barrels. | Per Barrel. | £ | s. | d. |
|-------------------------|----------|----------------|-------|----|----|-----------------------|----------|----------------|-------|----|----|
| To Material consumed— | | | | | | By Production carried | | | | | |
| English Malt .. | | 4 0 | 5000 | 0 | 0 | down | 25000 | 19 0 | 23750 | 0 | 0 |
| Foreign Malt .. | | 3 0 | 3750 | 0 | 0 | „ Residuals | | 6 | 625 | 0 | 0 |
| | | 7 0 | | | | | | | | | |
| „ Hops | | 2 0 | 2500 | 0 | 0 | | | | | | |
| „ Sugar | | 3 0 | 3750 | 0 | 0 | | | | | | |
| „ Other materials .. | | 6 | 625 | 0 | 0 | | | | | | |
| „ Beer Duty | | 7 0 | 8750 | 0 | 0 | | | | | | |
| | | 19 6 | 24375 | 0 | 0 | | | | | | |
| To Production brought | | | | | | By Trading Account | 25000 | 19 6 | 24375 | 0 | 0 |
| down | 25000 | 19 0 | 23750 | 0 | 0 | | | | | | |
| „ Wages | | 1 0 | 1250 | 0 | 0 | | | | | | |
| „ Water | | 1 | 104 | 3 | 4 | | | | | | |
| „ Coal | | 5 | 520 | 16 | 8 | | | | | | |
| „ Rent, Rates and Taxes | | 6 | 625 | 0 | 0 | | | | | | |
| „ Gas and Insurance .. | | 1½ | 156 | 5 | 0 | | | | | | |
| „ Cooperage and Stores | | 2 | 208 | 6 | 8 | | | | | | |
| „ Repairs | | 1 | 104 | 3 | 4 | | | | | | |
| „ Depreciation | | 1½ | 156 | 5 | 0 | | | | | | |
| | 25000 | 1 1 6 | 26875 | 0 | 0 | | 25000 | 1 1 6 | 26875 | 0 | 0 |

No. 18—

TRADING ACCOUNT FOR THE YEAR ENDED DECEMBER 31st, 19..

| | Barrels. | Per Barrel. | £ | s. | d. | | Barrels. | Per Barrel. | £ | s. | d. |
|---|--------------|--------------|--------------|-----------|-----------|--|--------------|-------------|--------------|-----------|----------|
| To Stock, Jan. 1st, 19.. | 200 | 1 2 0 | 220 | 0 | 0 | By Sales | 24000 | 2 0 8 | 48795 | 0 | 0 |
| „ Production at Brewing Cost | 25000 | 1 1 6 | 26875 | 0 | 0 | „ Bottling Department.. | 700 | 1 15 0 | 1225 | 0 | 0 |
| „ Selling and Distribution Expenses | | 5 0 | 8175 | 0 | 0 | „ Allowances | 400 | 1 1 6 | 430 | 0 | 0 |
| „ Balance to Profit and Loss Account | | 14 0 | 17287 | 10 | 0 | „ Stock at December 31st, 19.. | 100 | 1 1 6 | 107 | 10 | 0 |
| | | <u>2 0 6</u> | | | | | | | | | |
| | <u>25200</u> | | <u>50557</u> | <u>10</u> | <u>10</u> | | <u>25200</u> | | <u>50557</u> | <u>10</u> | <u>0</u> |

The following *pro forma* accounts are given by way of illustration only, and show the method of cost grouping which enables the manufacturer to have the cost of each process put before him in a convenient form.

CONCENTRATION PROCESS

| | | | |
|-------------------------|--------------|-------------------------------|--------------|
| To Reduction Process .. | 1543 | By Crystallization Account .. | 3170 |
| .. Coal and Power | 631 | | |
| .. Repairs | 615 | | |
| .. Depreciation | 310 | | |
| .. Labour | 71 | | |
| | <u>£3170</u> | | <u>£3170</u> |

CRYSTALLIZATION ACCOUNT

| | | | |
|-----------------------------|--------------|----------------------------|--------------|
| To Concentration Account .. | 3170 | By Purification Account .. | 3345 |
| .. Coal and Power | 21 | | |
| .. Repairs | 65 | | |
| .. Depreciation | 35 | | |
| .. Labour | 54 | | |
| | <u>£3345</u> | | <u>£3345</u> |

PURIFICATION ACCOUNT

| | | | |
|-------------------------------|--------------|------------------------------|--------------|
| To Crystallization Account .. | 3345 | By Recrystallization Account | 3470 |
| .. Coal and Power | 6 | | |
| .. Repairs | 71 | | |
| .. Depreciation | 14 | | |
| .. Labour | 34 | | |
| | <u>£3470</u> | | <u>£3470</u> |

COAL AND POWER

| | | | |
|------------------------|-------------|----------------------------|-------------|
| To Stock on hand | 150 | By Transfer— | |
| .. Purchases | 500 | Concentration Account .. | 631 |
| .. Wages | 65 | Crystallization Account .. | 21 |
| .. Water | 65 | Purification Account .. | 6 |
| | | .. Stock on hand | 122 |
| | <u>£780</u> | | <u>£780</u> |

REPAIRS AND MAINTENANCE

| | | | |
|------------------------|--------------|----------------------------|--------------|
| To Stock on hand | 325 | By Transfer— | |
| .. Purchases | 735 | Concentration Account .. | 615 |
| .. Wages | 40 | Crystallization Account .. | 65 |
| | | Purification Account .. | 71 |
| | | .. Stock on hand | 349 |
| | <u>£1100</u> | | <u>£1100</u> |

DEPRECIATION

| | | | |
|---------------------|-------------|---------------------------|-------------|
| To Sundries | 359 | By Transfer-- | |
| | | Concentration Account.. | 310 |
| | | Crystallization Account.. | 35 |
| | | Purification Account .. | 14 |
| | <u>£359</u> | | <u>£359</u> |

In many processes there is considerable waste due to drying, and again in others there is an actual gain due to absorption. In both cases there may be a substantial difference in cost. In many instances, raw material is purchased upon a definite understanding as to the various components parts, amount of moisture, etc., and when there are facilities for examination by analysis, this variation can be duly allowed for.

In each of the three classes of process costs, some special difficulties will occur as to the method of measurement. In the case of solids, measurement may be either by weight or count, and the method to be adopted for charging between the various departments is a matter which will require considerable experience.

The measurement of liquids is probably not so difficult as that of solids, as liquids always require a receptacle to contain them, and it is usually an easy matter to obtain the contents of any such vessel. In addition to quantity, it will, generally, be necessary to examine, or test samples for quality. There are special instruments for this purpose, the usual method being to compare the specific gravity of the liquid with water at 60 degrees Fahrenheit.

There are also special instruments for measuring gases, the quality being ascertained by sampling and analysis.

Having mentioned some of the technical difficulties, we will now turn our attention to the method of cost recording. Wherever possible a break should be made in the accounts, corresponding with each individual process, the particular account for each process being debited with its proper share of labour, material, power, coal, depreciation, etc., the cost under each process thereby being obtained.

In some businesses by-products have a considerable influence on the cost of the article manufactured. This is especially true of several trades whose costs would fall under the head of process costs. Where these by-products do exist, the best method of

dealing with them is to credit their value to the process account in which they arise, thereby reducing the cost of that particular process.

In practice, among other advantages, this method of keeping process costs will encourage efforts to decrease costs, lead to improvements in the method of manufacturing, and also localize errors. Percentages can be worked out showing the expense of building up the product through its various stages, from raw material to the finished article. These percentages should be worked out weekly and compared with the figures of previous weeks and also with corresponding periods.

All that is required of a system is that it will reveal errors and extravagances. When the accounts do this, the thinking power can, with the aid of the actual costs, easily grapple with the problem.

One of the most important items in the cost of a process is the cost of power. To apportion this accurately between the various processes is a matter for a technical expert, as also is the cost of heating; the cost of lighting by gas or electric light is probably best ascertained by installing a separate meter for each department. Depreciation can also be charged to the individual accounts by the method set out on page 43.

In addition to the various charges that can be apportioned to the individual manufacturing processes, there will be others of a general nature; these will be charged against the Profit and Loss Account in the usual way, and do not call for any special comment.

CHAPTER VIII

SOME SPECIAL FEATURES

THE accurate accounting for all material is of the greatest importance in any costing system, and therefore the storekeeper usually keeps a special set of books, which are not in reality essential to the costing, but used only to explain the differences between the financial and costing systems. For this purpose, the three books previously mentioned (see pages 10 and 11) are usually kept, viz., Stores Received Book, Stores Issued Book, and Stores Ledger. The Stores Received Book is written up from the delivery notes, and in cases where the delivery note does not agree with the actual goods received, the delivery note must be altered to the correct amount, and the firm supplying the goods notified immediately. The storekeeper will, of course, only sign the carman's note for the goods actually received, and if not examined at the time of delivery, he should sign "Not examined." It frequently will be found that the storekeeper will not have sufficient time to write up the Stores Received Book at the time the goods are received, in which case the delivery notes may very well be kept on a file until he has the necessary time.

The Stores Issued Book will be written up from the requisitions, and here again it will be found convenient, as a rule, to file requisitions until the storekeeper has sufficient time to enter them in his book.

The Stores Ledger will be written up from the Stores Received Book, and the Stores Issued Book, and since every item received will be debited and every item issued credited, it follows that the balance on the Stores Ledger must record the quantity of stores in stock. By this means the work of stocktaking is substantially reduced, and any discrepancy readily localized.

FOUNDRY ON-COST.—In foundry on-cost it will be found sufficiently accurate to charge on-cost solely on weight. The rate can be arrived at by dividing the total foundry expenses for a given period, by the weight of the castings produced. In an engineering works running its own foundry, it is better, as a rule, to treat the foundry as a separate concern for the purpose of costing. When this is

done the total weight of castings produced will be ascertained by weighing the castings as they leave the foundry for the stores. At the end of the day a daily total of castings produced will be obtained, and the amount compared with the daily melting report.

A form for a melting report for an iron foundry is given below, and a similar report, with slight modifications, would be suitable for a foundry making brass or other castings.

| | Monday | Tuesday | Wed'sday | Thursday | Friday | Saturday | TOTALS |
|-----------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Cupola in Work No. _____ | | | | | | | |
| Blast on at _____ | | | | | | | |
| First Metal at _____ | | | | | | | |
| Blast off at _____ | | | | | | | |
| No. of Hours Melting _____ | | | | | | | |
| MATERIALS USED | Tons Cwts. Qrs. Lbs. | Tons Cwts. Qrs. Lbs. | Tons Cwts. Qrs. Lbs. | Tons Cwts. Qrs. Lbs. | Tons Cwts. Qrs. Lbs. | Tons Cwts. Qrs. Lbs. | Tons Cwts. Qrs. Lbs. |
| Iron | | | | | | | |
| Ferro Manganese | | | | | | | |
| Remelt, Scrap | | | | | | | |
| Foundry, Scrap | | | | | | | |
| Dressing, Scrap | | | | | | | |
| Passing, Scrap | | | | | | | |
| Erecting Shop, Scrap | | | | | | | |
| Machine Shop, Scrap | | | | | | | |
| Drilling Shop, Scrap | | | | | | | |
| Fitting Shop, Scrap | | | | | | | |
| Polishing Shop, Scrap | | | | | | | |
| Warehouse, Scrap | | | | | | | |
| Moulding Boxes, Scrap | | | | | | | |
| TOTAL DAY'S MELT | | | | | | | |
| TOTAL LIMESTONE | | | | | | | |
| TOTAL COKE | | | | | | | |
| Coke per 1 ton Iron | | | | | | | |
| Limestone per 1 ton Iron | | | | | | | |
| Weight of Iron melted per hour | | | | | | | |
| | | | | | Week ending | | 19 .. |

ADDITIONS AND REPAIRS TO FIRM'S OWN PROPERTY.—As previously pointed out all additions or repairs should go through precisely the same costing system, but instead of using job numbers, some symbol or initial should be used to designate this special

class of work. As to whether any indirect expenses should be added or not is a very debatable point, our view is that some charges should be added, but what percentage must be left to each manufacturer to decide for himself. It is, however, perfectly fair that some proportion should be added, as, of course, work of this description cannot be carried out without charges; for example, rent, rates, taxes, gas, water, insurance and supervision all have to be paid, and presumably the repairs or additions executed could not be carried out without these expenses. However, the greatest care must be taken to see that the percentage added is not too high, and it is far better in cases of doubt to include too little than too much.

The following symbols are some of the more usual—

| | | | |
|-----------------------|------|-------------------------|------|
| Plant Additions | P.A. | Building Maintenance .. | B.M. |
| Tool „ | T.A. | Shop Supervision | S.S. |
| Building „ | B.A. | Works Staff | W.S. |
| Plant Maintenance .. | P.M. | Sundry Labour | S.L. |
| Tool „ | T.M. | Motive Power | M.P. |

COMPLETED CONTRACTS NOT PASSED.—As a general rule, it is unwise to take credit for completed contracts until they are passed by the purchaser, as frequently something may turn up that may very materially reduce the profit; for example, some of the work may not be considered satisfactory and have to be done over again.

PROFIT ON WORK IN PROGRESS.—Here again it is unwise to take credit for any profit in the accounts until the work is completed. It may sometimes be justifiable, in cases where the amount is large, but the figure taken credit for must always be less than the ultimate result, for, as in the case of completed contracts not passed, something may turn up that may materially reduce the profit, and for this reason it is better to let the period in which the work is completed, take credit for the profit made.

SALES TO BRANCHES.—In cases where a business has several branches, some method of charging from one branch to another must be considered. This may be necessary in order to fix the manager's remuneration, which might be dependent upon the profits of his particular department, and in such a case the cost price would be the correct figure to use. In some instances, however, it is not desirable that the branch managers should know the actual cost price of each article manufactured, and in such cases

it will be best to charge at retail selling prices, less a special discount. This will enable the works to take some credit for the work executed, and enable the various departments to charge the same prices. When this is done, care must be taken that the sales to branches are not included as actual sales in the financial accounts, as, of course, all that the transaction amounts to, is the transfer of a portion of stock from one warehouse to another, the goods being invoiced only for the sake of convenience.

Again, at the annual stocktaking, care must be taken that actual cost prices are used in valuing the stock at the respective branches, and not the prices charged to the branches. This is an important point and apt to be lost sight of unless definite instructions are given to the contrary.

SPECIAL PLANT USED.—In cases where special plant is bought for a particular contract, the best method is to debit the contract with the cost of the plant and credit it with the sale price of remaining plant at the completion of the contract.

ADVANCES TO WORKMEN.—The practice of making subs to workmen is one that should be discouraged as much as possible; it complicates the payment of wages, and may be the cause of loss to the firm, when a man has drawn money on account which he may never earn. Where it is unavoidable, it should not affect the making up of the wages, the subs made being paid by the cashier out of petty cash, and repaid to him out of the wages money by the pay clerk, who will, of course, stop the various amounts from the workmen's wages.

The system of costing outlined in the previous chapters will be found suitable for a concern paying its workmen by day work; where piecework is used, some further elaboration will be found necessary, and for a further consideration of this subject the reader is referred to subsequent chapters. In practice the system there set out will not be found so complicated as it may appear in theory. The various forms are only given by way of illustration, different forms will, of course, be designed to meet individual requirements, and modifications made to meet the exigencies of each undertaking. It is admitted that the cost accounts of one business are never the cost accounts of another business. Each must be judged on its own merits and peculiar treatment presented for each.

PART II

A SYSTEM OF COSTING FOR MOTOR-CAR MANUFACTURERS, ETC.

CHAPTER IX

WORKS ORGANIZATION

THE system set out in detail in the following pages is one that is in use at one of the leading motor-car manufactories in the kingdom, with very satisfactory results.

The works are divided into departments, each department being in charge of a competent foreman, who is responsible to the Works Manager for the work of his department.

In addition to the manufacturing departments, there are several selling depôts in other towns, all of which are controlled from head office, and all financial transactions dealt with from there.

The system cannot be said to have been originated by any one man, rather is it a system that has evolved from small beginnings to its present highly organized efficiency. Neither can it be said to be cheap. As a matter of fact it is expensive, but that the expense is exceptionally productive is clearly proved from the firm's successive Profit and Loss Accounts, which testify to an increasingly profitable business.

The cars are manufactured under separate orders or sanctions, as will be explained later, and any alterations in design are carefully noted. Should a customer at any time require a special part for his car, upon receipt of the number of his car, the sanction under which it was made can be readily traced, and the part suitable for his particular car can always be sent him. By this means the firm has built up a very big reputation for promptness and accuracy of dispatch of goods, which undoubtedly has been a big factor in its success.

In addition to the works departments there are, of course, the usual office and administrative departments, each in charge of a head who is responsible for his department to the management—

1. Drawing Office.
2. Accountants' Department.
3. Secretarial Department.
4. Sales Department.

The stores are divided into three parts, namely, Rough Stores, Dispatch Stores and Finished Stores, the first two having entrances on to the road and the last named being conveniently situated in the middle of the works.

In addition to these three stores, there is a tool stores in which are kept all tools, jigs, etc., tools being given out to men only upon a special requisition—form of which is given below. The requisition is handed back to the man to be destroyed when the tool is returned to the storekeeper.

No. 19—

DEPARTMENT _____

Supply Workman No. _____ with

| KIND OF GAUGE or JIG. | SIZE AND DESCRIPTION. | PROCESS REQUIRED FOR. | PART TO BE USED ON. | | | |
|--------------------------|-----------------------|--------------------------|---------------------|------|-----|-------|
| | | | SEC. | DIV. | NO. | MARK. |
| | | | | | | |

ONE GAUGE ONLY TO BE REQUISITIONED ON EACH SLIP

Date _____ Foreman _____

Each part manufactured has a shop sheet or working drawing, prepared by the drawing office, all drawings being numbered and properly filed ready for reference or use in the shops.

These shop sheets are given out only upon the proper requisition, the form of which is given below—

No. 20—

DEPARTMENT _____

Supply Workman No. _____ with

SHOP SHEET NO. _____

| SEC. | DIV. | NO. | MARK. |
|------|------|-----|-------|
| | | | |

ONE SHOP SHEET ONLY TO BE REQUISITIONED ON EACH SLIP

Date _____ Foreman _____

To each part is assigned a distinctive section (the letters of the alphabet being used for this purpose), a division, and a number, the mark denoting the first type made. For example, the requisition given on the previous page could be filled in as follows—

M III 6. 2

which might be : Piston Ring, section three, number six, mark two.

The organization of the works and the responsibilities of the various departments are graphically shown on the chart facing this page.

The starting-point for reading the chart is the managing director, who gives a sanction to the works manager to manufacture. Following the line we come to the drawing office for specification, which when complete, is returned through the works manager to the rate-fixer (works manager's office). The order for material is then forwarded to the order office, the material when received being retained in the rough stores. At this point it will be noticed there is a break. The material lies in the rough stores until sufficient is to hand to complete a pink or manufacturing card. When sufficient is to hand, the finished stores issue the manufacturing cards, which are forwarded to the rate-fixer for the purpose of fixing prices and sanctioning material. From here, still following the line, the cards are forwarded to the various departments for manufacture, the necessary material being drawn from the stores and the requisitions finding their way in due course to the cost office. The work when completed is passed to the view room for inspection, after which the labour receipts are made out, these latter also being forwarded to the cost office. From the view room the finished articles are sent to the finished stores along with the pink card, which at the end of the week reaches the cost office. This completes the progress of the pink card, which is used for machine operations only. The fitting or assembling is recorded on blue cards, the same routine being carried out. An examination of the chart will show clearly the process, the fitting labour commencing, of course, after the parts have been manufactured.

The same procedure is followed in the case of capital account expenditure on additions to the company's premises or plant, and also maintenance of same.

All these details, when completed and passed, find their way to the accountant for incorporation in the financial records of the company.

CHAPTER X

DETAILED CONSIDERATION OF WAGES

WHERE possible all wages are paid on a piecework basis, the workman being guaranteed a minimum wage for a full week's work. For a full explanation of this system the reader is referred to page 12.

Every workman uses a card for recording his total time, this being done automatically by a clock recorder, placed in a convenient position near the entrance to the factory. These cards are of a distinctive colour (yellow) and record total time only. They are ruled as given on next page.

The capital letters indicate the days of the week, and the columns "In" and "Out" refer to the times of entering and leaving the factory morning and afternoon.

If the man is not on piecework, he will also use another card, of a different colour, ruled in the same manner on the front, but with rulings on the back for recording the work performed. The ruling for the back of this card is as shown on page 75.

These job cards are made out by the works office clerks, the details of the work to be performed being filled in by them, the view room receipt at the foot of the card being filled in by the viewers when the work is passed.

If thought desirable, differently coloured cards may be used for the various departmental charges—for example, red for experimental, green for maintenance, etc. This, although facilitating the work of sorting the cards in the cost office, is found somewhat difficult to carry out in practice, owing to the fact that when work is put in hand, it is not always known to what department it will eventually be charged.

Every man when engaged has a number given him by the gatekeeper. This is done by means of a metal check upon which the number is stamped. The metal check is retained by the workman, and is, at the end of the week, handed in at the pay office window in exchange for his wages. These are put up in tins, on each of which is painted a number corresponding with the men's check numbers.

An engagement card is also made out (see page 76),

No. 22—

No. _____

Name _____

Week Ending _____ 19____

| DAY | | IN | OUT | IN | OUT | Total |
|-----------------|-------|----|-----|----|-----|-------|
| T | A. M. | | | | | |
| | P. M. | | | | | |
| F | A. M. | | | | | |
| | P. M. | | | | | |
| S | A. M. | | | | | |
| | P. M. | | | | | |
| S _{UN} | A. M. | | | | | |
| | P. M. | | | | | |
| M | A. M. | | | | | |
| | P. M. | | | | | |
| T | A. M. | | | | | |
| | P. M. | | | | | |
| W | A. M. | | | | | |
| | P. M. | | | | | |

TOTAL TIME _____ HRS.

RATE _____

TOTAL WAGES FOR WEEK \$ _____

No. 23—

| Sec. | Div. | No. | Mark. | Blue Card No. |
|------|------|-----|-------|------------------|
|------|------|-----|-------|------------------|

Name of Part and Process.

QUANTITY to be made.....

| Good | Usable | Maker's Scrap | Man's Scrap |
|------|--------|------------------|----------------|
|------|--------|------------------|----------------|

Signed

Foreman.

which the man himself signs, agreeing to the recognized rules of the works.

No. 24—

ENGAGEMENT CARD.

| NAME AND ADDRESS. | | NO. | WAGES. | DATE. | PASSED BY. |
|-------------------|--|-----|--------|-------|------------|
| ENGAGED | | | | | |
| LEFT | | | | | |
| RE-ENGAGED | | | | | |
| LEFT | | | | | |
| RE-ENGAGED | | | | | |
| LEFT | | | | | |

REVERSE SIDE OF ENGAGEMENT CARD

MAN ENGAGED AS _____ AGE _____

LAST EMPLOYERS _____

CHARACTER _____

WORKING FOR _____

I agree to conform with the recognized Rules of these Works

WORKMAN'S SIGNATURE _____

This card is kept in a file in the wages office, and it will be noted gives all the necessary particulars of the workman, including character, etc. By this means any inquiries that may subsequently be received concerning any workman can be readily answered.

A further card is also used by which the wages office is notified

when a man leaves, and from which the engagement card can be filled in. The form of this card is as follows—

No. 25—

Please Pay off No. _____

_____ up to _____ o'clock _____ 19 _____

Name _____

Reason _____

Why Discharged _____

Ability as a Workman _____

General Character _____

Foreman _____

In addition to the metal check every man also receives a domino with his number painted thereon, which he hands to the boy stationed at the entrance to the factory, every time he enters. This additional precaution was found necessary owing to the fact that on one or two occasions men had "clocked in" for their fellows, in order that they should not be fined for bad time-keeping.

Should a man desire to go out of the works before the recognized time, he must obtain from his foreman a pass-out check, which he must show to the gatekeeper before leaving.

As previously mentioned, every workman must register on his yellow card every time he enters or leaves the factory; he must also, if on day work, register on his job card every time he commences and finishes a specific job. The total time recorded on the various job cards must equal the time recorded on the man's yellow card. This is a very valuable check and proves that all time paid for is duly charged to some department, customer, or job.

No work is allowed to be put in hand without a written order, the piecework price for which (if piecework) being written on the order itself by the rate-fixer. After each process, the work is taken to the view room, where it is examined, carefully checked and gauged, and a receipt made out in duplicate, one copy being handed to the workman, and the other retained and forwarded at the end of the week to the wages department,

The view room receipt is as follows—

No. 26—

Man's Name and No. _____ No. 92300

Name of Part _____

Reference _____ S.S. No. _____ Card No. _____ Order No. _____

Process _____

Quantity Rec'd. _____ Date _____ Rec'd by _____

| Price. | QUANTITY. | REASON. | VIEWER'S SIGNATURE. | £ | s. | d. |
|--------|---------------|---------|---------------------|---|----|----|
| | Good. | | | | | |
| | Usable. | | | | | |
| | Maker's Scr'p | | | | | |
| | Man's Scr'p | | | | | |

On the view room receipt are separate columns for good, usable, maker's scrap and man's scrap. If the parts are good, the workman gets the full piecework price credited to him; if usable only, he receives a portion of the piecework price, usually about one-half; if the parts are scrap the fault is either that of the suppliers of the material or of the man. In the former case, a waster note in the following form is made by the viewer and forwarded to the works manager for signature, who in turn forwards it to the accounts department, where the value of the material wasted is debited against the firm supplying the material.

No. 27—

PINK
OR
BLUE

CARD No. _____ REJECT NOTE _____
WASTER _____

Section _____

Cause and Description _____

Date _____

Signed

Viewer

Signed

Manager

MAKER'S SCRAP _____ Debit Note _____ Value _____

To _____ Signed _____

Co. Scrap _____ Charge to _____ Department _____

to stock _____ to cost _____ Labour £ _____ material £ _____

If the scrap is due to the fault of the workman, he does not get paid for the work, and the amount of scrap made, or loss entailed, is either debited against his balance or debited against the shop, as may be decided, according to the circumstances of the case.

If the whole lot is scrap a fresh pink card and corresponding material requisition would have to be issued; if, however, only a portion of the goods were scrapped a supplementary sheet (yellow) is issued for the balance that has to be done again.

The form of yellow sheet is as follows—

No. 28—

CAR NO. _____ TEST DEPARTMENT. INSTRUCTIONS TO _____
R/NO. _____ ISSUED BY _____ DATE _____ REPORT NO. _____

| ITEM NO. | DESCRIPTION OF WORK TO BE DONE. | MAN'S SIGN' RE. O.K. | CHARGE TO. | IS WORK TO BE PAID FOR | RECEIPT NOTE NO. |
|----------|---------------------------------|----------------------|------------|------------------------|------------------|
| | | | | | |

MATERIAL AND PARTS USED

| SEC. | DIV. | NO. | NAME OF PART. |
|------|------|-----|---------------|
| | | | |

REVERSE SIDE OF YELLOW SHEET

At the end of the week, as mentioned, all receipts are forwarded to the wages office where the amounts are duly credited to the various workmen, and the balance due to, or from, each is ascertained.

From this information the wages sheets are prepared and submitted to the works manager for approval. They are then forwarded to the cashier's department, where the cheque is drawn and the cash obtained. The wages are then put in the workmen's tins and handed to the men in exchange for their metal checks.

CHAPTER XI

REPAIRS

THE system for costing a repair job is very similar to that in use for new work, though somewhat easier to follow, so we will deal with this first.

Upon receipt of an order from a customer, a master card is made out, giving a précis of the work to be done, together with a repair number, by which the work is known all through the works. Other details are given, such as date of commencement, client's name, particulars as to whether the work is chargeable or not, and any other necessary information.

The master card—the ruling of each side of which is given below—is then passed to the works staff, who, if the work is to be done in

No. 29—

| REPAIR. | Date. | Signed. | Passed. | | | |
|-------------------|-------|---------|---------|--|--|-------------------------------|
| Issued | | | | ORDER No.----- For----- To be finished by----- | | |
| Completed | | | | | | |
| Passed to Cost | | | | | | |
| Passed to Invoice | | | | | | |
| Invoice No. | | | | | | |
| Work Done. | | | | REPAIR. | Repairs done by Company to bring Car up to present type. | Repairs done under Guarantee. |
| | | | | | | |

THE MASTER CARD

Top portion, to show ruling. Reduced from 8 in. wide by 10 in. deep.

| Repair Sheet No. | PRÉCIS OF WORK TO BE DONE. | R. | T. | G. |
|------------------|----------------------------|----|----|----|
| | | | | |

REVERSE SIDE OF MASTER CARD

Top portion, to show ruling

the factory, make out the instruction sheets for the various departments.

On the master card, a note is made of the numbers of the instruction sheets referring to each job, all of which instruction sheets must be returned and attached to the master card when the work is completed.

The letters on the reverse side of the master card signify as follows—

- R. Repair.
- T. Type.
- G. Guarantee.

The form of the instruction sheets is as follows. They are torn out of a duplicate book and given to the rate-fixer, who fills in the processes that are to be carried out, and if the work is piecework, the prices to be paid for each process. If the work is day work, the rate-fixer fills in the processes and opposite writes the letters D.W., signifying day work. These instruction sheets are then handed to the foreman of the shop who gives them out to his men.

No. 30—

Issued to

REPAIR DEPARTMENT

Date _____ 19__

Please attend to the following, charge time to R/_____

| NAME. | PARTICULARS. |
|-------|--------------|
| | |

(Signed) _____

Works Manager.

MATERIALS USED

| Div. | Sect. | No. | NAME. | £ | s. | d. |
|-------------------|-------|-----|-------|---|----|----|
| | | | | | | |
| Material Total .. | | | | | | |

If the job necessitates the sending of a fitter out of the works, an outwork time sheet is handed to the fitter, and a note to this effect made at the back of the master card.

From the outwork time sheet given on inset facing this page it will be noticed that a space is left for the customer's signature, which testifies that the times recorded are in order.

Time spent on outwork jobs is charged at a special price of so much per hour, different rates being charged for travelling time, working time, overtime, and Sunday time. All these rates are duly notified to the customer before the man is sent.

It will be seen that it is possible to trace what repair jobs are in course of completion in the shops, by examining the master cards that are still in the works office.

When the work specified on an instruction sheet is finished, it is taken to the view room and a receipt given to the man in the ordinary way. The sheet itself is forwarded to the works office in due course and attached to its corresponding master card.

When the whole of the instruction sheets or outwork time sheets are to hand and attached to the master card, they are forwarded to the cost office for costing, the cost clerks being in possession of the whole information necessary for this purpose. Thus, if piecework, they will have the piecework receipts from the view room; if day work the job cards will have been passed in; and if outwork, the outwork time sheets will be to hand.

This procedure gives the cost clerks particulars of the entire wages paid for the repairs, which together with the details of material consumed, enables them to arrive at the flat cost of the job.

All material used on a repair job is drawn from the stores by means of a signed requisition, which must bear the repair number, in exactly the same way as material requisitioned for new work. Further details of this are given in the subsequent chapters dealing with new work. These requisitions are forwarded to the cost office regularly, and the details charged to the various jobs specified on the back of the instruction sheets, in the space reserved for that purpose.

The total wages paid and the total material consumed on each job is now to hand in the cost office, where the total flat cost of the work is ascertained, the necessary establishment charges added, and

OUTWORK TIME SHEET.

Workman's No. -----

For -----

Name -----

R/ -----

| DESCRIPTION OF WORK. | Thur. | Fri. | Sat. | Sun. | Mon. | Tues. | Wed. | SUMMARY. | £ | s. | d. |
|----------------------|-------|------|------|------|------|-------|------|------------------------------|---|----|----|
| | | | | | | | | | | | |
| | | | | | | | | Working Hours (53 a week) .. | | | |
| | | | | | | | | Overtime | | | |
| | | | | | | | | Sundays | | | |
| | | | | | | | | Travelling Time | | | |

| | DATE. | TIME. |
|----------------------|-------|-------|
| Left Works | | |
| Arrived | | |
| Departed | | |
| Returned to Works .. | | |

RULES FOR OUTWORKERS

TIME—Outworkers must book time IN INK, and must obtain Customer's Signature in space below for such times being correct.

Outworkers must not work Overtime on Sundays unless specially instructed by Customer.

No extra time allowed for Overtime spent in travelling to or from destination.

Customer's Signature -----

the whole is ready for invoicing. The dates on which the papers are passed to the various departments are filled in, and initialed in the spaces reserved on the master card, so that should there be any unnecessary delay responsibility can be fixed in the proper quarter.

It frequently happens that disbursements are made for a particular job. These are entered through the petty cash book and analysed in a special column, with the repair number noted against the payment. In due course these items are charged to their respective jobs.

A repair record book, containing particulars of all master cards issued, is kept in the cost office. When a job is completed, the card is marked off and the date noted when the papers were forwarded to the invoice department.

By this means it is impossible for any work to be performed without being charged to its proper account.

The above explanation covers the treatment of repair work executed either in the factory or outside. The only remaining system to be explained is that for new work (which is treated in the next chapter) and stock orders, *i.e.*, orders for spare parts, oils, tyres, etc., etc. If these are in stock it is, of course, unnecessary to issue either master cards or instruction sheets.

Upon receipt of a customer's order for spare parts, etc., the dispatch clerk first ascertains if the goods required are in stock or not. If not, he issues a master card and instruction sheets as explained previously. When the goods are in stock, he issues a sheet of the pattern given on the next page. These sheets are bound in triplicate in book form. The top copy, when filled in by the dispatch clerk with the customer's name, the order number, and the section number of the part or parts required, is given to his assistant, who requisitions the goods from the stores on the authorized forms. The goods are duly received, packed and dispatched, the mode of delivery being stated in the space reserved for that purpose.

Where the goods required are not stock lines, and also have not to be made in the factory, they are ordered from another supplier finished complete. In such cases the sheet is sent to the order department and the necessary outward order made out, a note of the order number being made on the sheet itself.

86

COST ACCOUNTS

No. 32—

DISPATCH DEPARTMENT

Order No. _____

For _____

Per _____ Date _____ 19 _____

| Div. | Sec. | No. | Mark. | PARTICULARS. |
|------|------|-----|-------|--------------|
| | | | | |

Signed _____

Discharged _____

Invoice No. _____

CHAPTER XII

NEW WORK—WAGES

IN the previous chapter the procedure necessary for costing a repair job having been set out, it is now our intention to deal in detail with the system necessary for costing new work.

The number and type of cars to be manufactured having been decided upon by the directors, a sanction is given by the general manager to the works manager to commence, which sanction has a number assigned to it in exactly the same way as a repair job.

Before commencing to manufacture, detail drawings are prepared by the drawing office, a separate drawing or shop sheet being got out for every part, and a name and section number assigned to it. When all these necessary details are completed, they are passed by the chief draughtsman and bound in book form. They are then forwarded to the works manager's department, where the orders are given out for the work to be put in hand, and prices fixed for the work, a record of such prices being kept.

Material is then ordered by the works manager, upon a requisition to the outward order department. As soon as sufficient material is to hand a pink card is made out, a pink card being necessary for the manufacture of each part. These cards are made out by the finished stores clerks from the details supplied by the drawing office. They are made out in triplicate, one copy being retained in the stores, another being sent to the cost office, and the third copy to the rate-fixer.

Pink cards are used for machine operations only, and blue cards for fitting and assembling labour.

The rate-fixer fills in on the card the various operations and departments through which the work must pass, the piecework price of each operation, and on the corresponding material requisition, the quantity and quality of the material to be used.

These particulars all being filled in, the card is passed to the works manager for approval, and, if satisfactory, the card is signed by him. No work is allowed to be commenced without this signature.

The cards are then sent to the view room, where a note is made of each card issued, the purpose of which is explained later. The

| Sanction. | Date. | Quantity. | Capstan. | Milling. | Drilling. | Lathe. | Fitting. | Sheet Metal. | Grinding. | Carbon. | Harden. | Finished. |
|-----------|-------|-----------|----------|----------|-----------|--------|----------|--------------|-----------|---------|---------|-----------|
| | | | | | | | | | | | | |

(1378)

| QTY. | | MATERIAL | | | | | ORDER | | | |
|--|----------|----------|---------|----------------|--------------|------------------|-------------|------------|---------------|--|
| SECTION | | S S NO. | | | | | | | | |
| DATE | | DATE | | | | | | | | |
| Department. | Process. | Good. | Usable. | Maker's Scrap. | Man's Scrap. | Receipt Note No. | P.W. Price. | Viewed by. | No. Received. | |
| | | | | | | | | | | |
| ----- RECEIVED INTO FINISHED STORES ----- | | | | | | 19__ | BY ----- | | | |
| ----- " " " " " ----- | | | | | | 19__ | BY ----- | | | |
| ----- " " " " " ----- | | | | | | 19__ | BY ----- | | | |

THIS SIGNATURE DENOTES THAT WORK MAY PROCEED -----

THE CARD (PINK) TO WHICH IS ATTACHED MATERIAL
REQUISITION AS SHOWN ON PREVIOUS PAGE

These receipts are made out in duplicate (see page 78), the second copy being forwarded to the wages office, where the amounts are credited to the man's account, the balance being paid him at the end of the week as explained in previous chapters.

As each process is completed and forwarded to the view room, a note is made of the date received by the view room clerk on the following card. It will be remembered that the pink card, before being given to the foreman of the department where the first operation had to be performed, was sent to the view room and a note made of its issue, and as it passes through the view room from department to department, the card given (Inset No. 34) is filled in with the date the goods were sent out to each department, and also the date received from such department. By this means, it is possible to tell the progress of each piece through the factory, and to know exactly where a given article is at any moment. These progress cards are kept in a sectional cabinet in the view room, and are of the greatest possible service in keeping an accurate track of all work in progress.

When any scrap is made, a note containing particulars of section number, and quantity scrapped is forwarded to the works manager, by means of a Waster Note (see page 78).

No further material can be obtained from the stores for parts scrapped without the issue of a new card, as the storekeeper has already issued the goods on a previous requisition.

By this means an accurate record of all scrap is kept, and correctly charged against the suppliers of the raw material, or the shop in which the scrap occurred.

When all the operations on a pink card are completed, checked, viewed, etc., the card, together with the work, is passed to the finished stores and signed for by the storekeeper, the goods put in their proper bin and a record made on the stock card. The pink card is stamped "finished," and the date entered in the record book. At the end of the week all "finished" cards are sent to the cost office.

As each requisition is presented to the stores for material, the rate and total weight are filled in, and signed for by the storekeeper, and the amount credited to the stock card.

The form of stock card is as shown on Inset No. 35.

The requisitions are also forwarded to the cost office every week, where the prices are filled in and the extensions made; they are then filed along with their corresponding pink cards. The cost office has then particulars of wages paid on each card from two sources, namely, the pink card itself and the view room receipts, and these can be checked one against the other if necessary in order to see that no mistakes have been made.

These pink cards are filed numerically, a record of the cost being made in the sectional cost cabinet. When all these cards are to hand, and this information is obtained from the record book, all the data for ascertaining the flat cost of the entire sanction is available with the exception of the fitting and assembling labour. These particulars are obtained from the blue cards which are ruled in exactly the same manner as the pink cards (see page 89) and passed through the finished stores and registered in precisely the same way. In fact, the treatment of pink and blue cards is identically the same, the two different coloured cards being used for distinguishing machine operations from fitting or assembling labour.

| Required for 1 Car. | | Name of Part. | | | Sec. | Div. | No. | Mark. | Material. | Weight of Finished Part. | Shop Sheet. | | |
|---------------------|------|---------------------|------------------|-----------------------|------|-------------------------|------|---------------------|------------------|--------------------------|-------------|-------------------------|------|
| On Order. | | Received IN Stores. | STOCK in Stores. | OUT. | | | | Received IN Stores. | STOCK in Stores. | OUT. | | | |
| Pink Blue Card No. | Qty. | | | Authorised Order Nos. | Qty. | Replacements Order Nos. | Qty. | | | Authorised Order Nos. | Qty. | Replacements Order Nos. | Qty. |
| | | | | | | | | | | | | | |

No. 37—

WAGES SUMMARY.

WEEK ENDING.....

| No. | NAME. | No. of Men. | RATE. | Hours. | Day Work, | Piece Work Balances, | TOTAL. | Debts and Work in Hand. | | Deductions. | TOTAL TO PAY. |
|-----|-----------------------------|-------------------|---------|--------|--------------|----------------------------|---------|-------------------------|--------------|-------------|---------------------|
| | | | | | | | | Brought fwd. | Carried fwd. | | |
| | | | £ s. d. | | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| 1 | Shop Staff | | | | | | | | | | |
| 2 | View Room | | | | | | | | | | |
| 3 | Tool Room | | | | | | | | | | |
| 4 | Small Fittings | | | | | | | | | | |
| 5 | Machine Dept. | | | | | | | | | | |
| 6 | Car Erecting | | | | | | | | | | |
| 7 | Engine Erecting | | | | | | | | | | |
| 8 | Lathe | | | | | | | | | | |
| 9 | Stores and Warehouse.. .. . | | | | | | | | | | |
| 10 | Aluminium | | | | | | | | | | |
| 11 | General Test | | | | | | | | | | |
| 12 | Sales Driving | | | | | | | | | | |
| 13 | W/M Driving | | | | | | | | | | |
| 14 | Miscellaneous | | | | | | | | | | |
| | Total to Balance | | | | | | | | | | |

FRONT OF WAGES ANALYSIS

The ruling of the wages analysis is as follows—

| Classification. | PRODUCTIVE. | | | | | | | CAPITAL ACCOUNT. | | | | | |
|-------------------------|------------------------|------------------|----------|---------|----------|--------------------|---------|------------------|---------|---------|-----------------|---------|--|
| | Sanction Car Parts. | Addi- tional. | Repairs. | Sundry | Viewing. | Experi- mental. | Total. | Pat- terns. | Plant. | Tools. | Build- ings. | Totals. | |
| | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | |
| M/L Department | | | | | | | | | | | | | |
| Lathe | | | | | | | | | | | | | |
| Tool Room M/L | | | | | | | | | | | | | |
| General M/L.. .. | | | | | | | | | | | | | |
| Total M/L | | | | | | | | | | | | | |
| Tool Room Fitting | | | | | | | | | | | | | |
| Small Fittings | | | | | | | | | | | | | |
| Erecting | | | | | | | | | | | | | |
| Aluminium | | | | | | | | | | | | | |
| Painting | | | | | | | | | | | | | |
| Hardening | | | | | | | | | | | | | |
| Smithy | | | | | | | | | | | | | |
| General Fitting | | | | | | | | | | | | | |
| Total Fitting | | | | | | | | | | | | | |
| View Room | | | | | | | | | | | | | |
| Test Department | | | | | | | | | | | | | |
| Tool Stores | | | | | | | | | | | | | |
| Rough Stores | | | | | | | | | | | | | |
| Finished Stores | | | | | | | | | | | | | |
| Sales Department | | | | | | | | | | | | | |
| General | | | | | | | | | | | | | |
| Total General | | | | | | | | | | | | | |
| Grand Totals | | | | | | | | | | | | | |

REVERSE SIDE OF WAGES ANALYSIS (see also next page)

| Classification. | MAINTENANCE. | | | | | | UNPRODUCTIVE. | | | | | | |
|----------------------------|--------------|---------|---------|---------|------------------|---------|---------------|---------|---------|---------|---------------|---------|---------------|
| | Pat-terns. | Plant. | Tool. | Wrks. | Depart. Charges. | Totals. | S/S | W/S. | S/L. | M/P. | Adver-tising. | Total. | Grand totals. |
| | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| M/L Department | | | | | | | | | | | | | |
| Lathe | | | | | | | | | | | | | |
| Tool Room M/L | | | | | | | | | | | | | |
| General M/L | | | | | | | | | | | | | |
| Total M/L | | | | | | | | | | | | | |
| Tool Room Fittings | | | | | | | | | | | | | |
| Small Fittings | | | | | | | | | | | | | |
| Erecting | | | | | | | | | | | | | |
| Aluminium | | | | | | | | | | | | | |
| Painting | | | | | | | | | | | | | |
| Hardening | | | | | | | | | | | | | |
| Smithy | | | | | | | | | | | | | |
| General Fitting | | | | | | | | | | | | | |
| Total Fitting | | | | | | | | | | | | | |
| View Room | | | | | | | | | | | | | |
| Test Department | | | | | | | | | | | | | |
| Tool Stores | | | | | | | | | | | | | |
| Rough Stores | | | | | | | | | | | | | |
| Finished Stores | | | | | | | | | | | | | |
| Sales Department | | | | | | | | | | | | | |
| General | | | | | | | | | | | | | |
| Total General | | | | | | | | | | | | | |
| Grand Totals | | | | | | | | | | | | | |

REVERSE SIDE OF WAGES ANALYSIS (contd.)

The amount of wages paid is duly analysed under its proper heading in the weekly analysis. Also all material used is correctly charged and allocated to the particular machine, tool or premises, additions or repairs, as the case may be.

The foregoing analysis is self-explanatory, the letters used being abbreviations as follows—

M/L. Machine Labour.
 S/L. Sundry Labour.
 S/S. Shop Supervision.
 M/P. Motive Power.
 W/S. Works Staff.

Upon receipt of an order for a new car, a specification is submitted to the customer in duplicate. If satisfactory he signs and returns one copy to the office. Upon receipt of signed specification a number, out of a given sanction, is allotted to the order, and the work put in hand.

From the specification itself all the necessary instruction sheets can be issued, and the work carried out under the usual routine.

The specification has printed thereon all the usual extras required, plenty of space being left, however, for any special fittings desired.

When the car is completed, it is carefully tested, and checked off with the specification, and the customer advised that same is ready for delivery.

Upon receipt of delivery instructions the car is duly dispatched and the transaction completed.

No. 38—

SPECIFICATION AND SALE NOTE

To the Order of

Date _____

CAR ORDER SPECIFICATION

Registered Car No. _____

_____ H.P. _____ cylinder Motor-car, to general specification in Catalogue and Price List current, including complete Outfit of Tools to schedule. Identification Number Plates.

Type of

Body.

Painting.

Trimming.

Fittings. Nickel or Brass.

Gear. According to type of Car.

Wheels.

Tyres. Front.
Rear.

EXTRAS

Bodywork. Chauffeur's Seat.
Auxiliary Folding Seat.
Canopy Extension.
Glass Screen in front of driver.
Glass Screen in front of tonneau.
Tonneau Hood.
Cape Cart Hood.
Crest or Monogram.
Luggage Grille.
Wheel or Tyre Carrier.

Chassis. Wheels.

Tyres.

" Spare

Lamps, Head.
Side.
" Fitting.
Tail.
Horn or Alarm.

For the sum of—£ _____

Carried forward £ _____

To _____

Date _____

EXTRAS.—Continued

Brought forward £

Special Electric Light complete.
 Extras. Electric Indicator.
 Speedometer.
 Milometer.
 Fitting.
 Speaking Tube.
 Clock.
 Companion.
 Waterproof Covers.

£ _____

Registration Fee.
 Car to be registered in
 Full Christian Name

Delivery.

£ _____

SALE NOTE

In confirmation of Order for _____ Car to above
 specification, I herewith enclose cheque value £ _____
 as deposit, and agree to pay the balance on delivery of the Car
 at the Works or Depot, in accordance with your usual terms of
 business.

Signed _____

Date _____

CHAPTER XIII

NEW WORK—MATERIALS

In the preceding chapter we have dealt in detail with the treatment of wages in the cost system, we now come to the consideration of the other part of the flat cost, namely, material.

All material is purchased by the buying department on a signed requisition from the works manager. From this requisition—the form of which is shown below—the buying department makes out the necessary order form in triplicate, one copy being sent to the firm supplying the goods, another retained in the office and marked off when the goods are delivered, the third forwarded to the cost office, in order that prices can be noted. The order form gives particulars as to delivery, quantity, quality, prices and terms of payment.

No. 39—

| | | |
|--|-----------|---------------|
| From..... | Date..... | 19..... |
| to | | |
| OUTWARD ORDER DEPT. | | |
| Please order :— | | |
| (Give full particulars here of Goods required.) | | |
| | | Order No. |
| For purpose as follows :— | | |
| (State here exactly what for, with either Works Order No. or Instruction Sheet No.) | | |
| | | Initial here. |
| Passed by | | |
| (Where Instruction Sheet is cited, this must be initialed by person who signed Instruction Sheet, as well as by Head of his Department.) | | |

FORM OF REQUISITION

The goods when received are entered in the goods received book, and a record made on the stock cards (see Inset No. 35).

The invoices for goods purchased are sent to the accountants' department, where they are stamped with an india-rubber stamp of the following pattern—

No. 40—

| | |
|------------------------------|-------|
| FOLIO IN GOODS RECEIVED BOOK | _____ |
| PRICE. O.K. | _____ |
| EXTENSION. O.K. | _____ |
| CHARGED TO | _____ |
| NUMBER OF INVOICE | _____ |
| PASSED FOR PAYMENT | _____ |

These particulars are checked and initialed by the checking clerk; the entry in the goods received book is marked off, and the date invoiced noted therein. This prevents the possibility of an invoice being passed twice for the same lot of goods. The invoices, when passed, are entered in the purchase analysis book, and posted in the usual way to their respective ledger accounts.

The form of analysis book is as follows, which it will be noted is very comprehensive and gives detail analysis of all purchases made,

All goods purchased for manufacturing purposes are analysed to stores disposal. It frequently happens, however, that some of such material is used for other purposes than manufacturing, for example, timber may be bought for body-building, but a portion may be used for pattern-making or building maintenance; or again paint may be bought for the painting of bodies, and some may be used for painting the shops, etc. In such cases the invoice cannot be divided between the two departments affected when it is received, as, in all probability, it is not known in what proportions it will be divided. The invoice, therefore, in the first instance, is allocated to stores disposal, and a note forwarded to the accountants' department at the end of each month of the division of these items by the cost office. This they can readily ascertain, of course, from the requisitions, as it will be remembered that nothing is allowed to be

given out of the stores without a signed requisition, and such requisition states the purpose for which the goods are required. This notification being duly received, the necessary transfer can be made in the books, from stores disposal to pattern or building maintenance or whatever account is affected.

Should it be impossible to tell exactly the quantity of material required when drawing from the stores, the balance overdrawn must be returned and a credit note made out, similar to the original requisition, but printed on a differently coloured paper.

The form of requisition used is as follows, the requisition being printed on white paper, the credit on red paper—

No. 42—

| ORDER No. | REQUIRED FOR |
|---|--------------|
| ----- | |
| <i>Materials Required</i> ----- | |
| ----- | |
| <i>Demanded by</i> ----- | |
| ----- | |
| <i>Labour</i> @ ----- <i>£</i> : : : : : <i>Material</i> @ ----- <i>£</i> : : : : : | |
| CWTS. QRS. LBS. | |
| <i>Analysed to</i> ----- <i>Weight</i> : : : : : <i>Supplied by</i> ----- | |
| POSTED <i>to Stock</i> ----- <i>To Output</i> ----- <i>To Cost</i> ----- | |

Under no circumstances must material drawn for a particular job be used on another without first of all being passed through the stores. The necessity of requisitioning all goods required from the Stores cannot be too strongly emphasized, and in some cases, where goods are required for replacing old and worn out parts, it will also be found a wise precaution to insist on the return of the old part. This will effectually stop pilfering of small tools, and in many cases, lead to economies in use. For example, files in many businesses are a heavy expense, and although the files may be too much worn for certain work, they may be quite suitable for other classes of work, and in any case, they can be re-ground and made almost as good as new for half the price of new files.

In dealing with the question of material it will not be out of

place to say a few words upon the question of the annual stocktaking. As pointed out previously, if the stock cards are accurately written up, it is possible to take a paper stock without the necessity of an actual count. It is always best, however, to make an actual count at least once a year, in order that obsolete and out-of-date stock can be written down for the purpose of valuing for the annual Balance Sheet. To do this properly generally necessitates the closing down of the works for a day or two, during which time no goods are received or dispatched. The railway companies should be advised to this effect, and the goods inwards book ruled off. All goods received previous to stocktaking should be invoiced, and included in the accounts. Should it be impossible to obtain all the invoices, the value of goods not invoiced must be ascertained, and the amount either reserved or deducted from the stock figure. Great care must be taken to see that the stocktaking and book-keeping records are in agreement, and should it be found necessary to receive or dispatch any goods urgently required during stocktaking, special precautions should be adopted to see that they are properly treated.

All stock is taken on vouchers which are kept in pads of 100 vouchers to each pad. All vouchers are numbered consecutively from 1 to whatever number may be required, and in addition adhesive labels with corresponding numbers are also procured. One voucher is used for each kind of stock and the corresponding label is put on the stock itself. All parts are entered on the vouchers, together with full description of section number, number in stock, name of article, condition, material, weight and any other information likely to be of assistance in pricing.

The following instructions are given to the stocktakers—

Counters and Labourers to count, weigh or measure stock, according to requirements for pricing, and a record made of same on scrap paper, which is to be left with the stock.

Recorders to have charge of one or two counters. They must check the scrap paper records made by the counters, and fill in the voucher with the checked quantity, initialing the voucher and also filling in the name of the counter. The adhesive label with the number corresponding to the voucher is stuck to the stock, and the scrap paper record made by the counter in the first instance destroyed.

When recording bar stock give quantity of material, length and section of bar and weight.

When recording sheet stock give quantity of material, size of sheet, thickness and weight.

When recording tube stock give quantity of material, diameter of tube, gauge or bore and length.

When recording castings and stampings give section number, name of part, material, weight and quantity.

When recording ordered out finished parts give full particulars and buying price.

When recording finished parts give section number, name of part, condition and quantity.

When recording assembled parts give section numbers, name of parts, and full description of condition.

It is of the utmost importance that the fullest possible details should be given, in order that prices can be accurately fixed.

It will be noted from the foregoing instructions, that every care is exercised in the annual stocktaking, and that two distinct counts are made of each part.

The actual counting and recording of the stock being completed, the vouchers are all ready for extending. Upon the completion of this work the pads are all entered up on sheets, the total of each pad being entered against its number on the sheets; no pads are destroyed. If one happens to be spoiled, it must not be destroyed: it must be cancelled. We therefore have entered against every number on the stock sheets either the total of the pad, or the words cancelled or not required; by this method it is impossible for any stock to be included twice or omitted altogether. The sheets when duly entered up are totalled and the total of stock for balance sheet purposes correctly ascertained.

The correct method of pricing stock is, of course, cost or market price, whichever may be lower, and only under special circumstances should credit be taken in the stocktaking for an increased market price of raw material. Should an advance take place, it is much the better course to disregard it for stocktaking purposes, and allow the profit to fall in the period where it is actually earned.

This rule may not be applicable under special circumstances, but in the general way it will be found to be a sound financial ruling.

CHAPTER XIV

DETAILED CONSIDERATION OF ESTABLISHMENT CHARGES

FROM the information given in the preceding chapters, we have seen how the flat cost of a given article or number of articles or processes is ascertained. We now come to a consideration of the amount of indirect expenses that are to be added in order to arrive at gross cost. This, as previously pointed out, is a most difficult matter, and one upon which considerable difference of opinion exists. It is practically impossible to state a method that will work satisfactorily under all conditions, and each individual manufacturer will have to fight the matter out for himself; the most that can be done is to give some guide to the general principles underlying this subject. An attempt has been made to do this in the chapter dealing with establishment charges, to which the reader is referred. A very full and detailed treatment of the subject has also been written by Mr. Hamilton Church in his book, *The Proper Distribution of Expense Burden*. The system there set out may be considered ideal, but whether many manufacturers would be prepared to go to the necessary expense of carrying out the method is an open question.

Many manufacturers fix an arbitrary percentage without any regard to the facts, such percentage becoming stereotyped in their minds. Particularly is this the case if the rate used is one generally approved in the trade.

As mentioned previously, there are several methods of arriving at a more or less accurate percentage to cover these charges. In the case under review the system adopted was as follows—

The total productive wages were a known quantity, as also the total establishment charges, the proportion that these two figures bore to each other was therefore readily ascertained. It was felt, however, owing to the reasons previously given, that this was not sufficiently accurate, and the expenses were therefore divided into Works and Commercial. This gave a separate percentage which was valuable, but it was still thought that some further division was desirable, owing to the fact that there was heavy and expensive

machinery involved in some cases, and only hand-presses and cheap tools in others. To meet this further complication, it was decided to divide the Works Expenses into three further classes, viz., Machine, Fitting and Ordinary. To do this required considerable analysis, and not a little patience, due regard being paid to the various classes of machinery, etc., the floor space occupied, and the power consumed.

Of course, by far the largest proportion was chargeable against the machine labour, a smaller proportion against the fitting labour, and a still smaller proportion against the ordinary labour, care being taken that the various percentages fixed gave in the aggregate sufficient to cover the total percentage of works expenses for productive labour. This being settled the commercial or administrative expenses required adding. These may perfectly justly be added as a percentage on flat cost, for in all probability the office and selling expenses entailed in dealing with one article are as great as another, irrespective of cost. The commercial charges were therefore added as a percentage on works cost, this figure also being ascertained from an analysis of the profit and loss account. Having added this latter figure, we arrived at the gross cost, to which only has to be added profit in order to give the selling price. The above method is not, of course, absolutely accurate, but as previously pointed out, absolute accuracy is impossible in dealing with the question of establishment charges, but the system outlined is found to work out in practice with very satisfactory results, and after all, the actual final result is the thing to be aimed at, and in these matters, as in most others, a little actual fact is worth a good deal of theory.

Before concluding the subject of cost accounts, we might with advantage point out that, with improved methods of costing, have also come into use improved methods of counting-house practice, the introduction of many labour-saving devices, such as loose-leaf and card ledgers, the extension of the duplicating system, etc., all of which tend to a higher and better state of efficiency in the commercial world, and any manufacturer having the advantages of the many mechanical labour devices now on the market, must eventually outstrip his more conservative and old-fashioned competitors.

The introduction of these various labour-saving devices should

have very careful consideration at the hands of the management, and in this, as in costing, it will be found advantageous to proceed with caution.

The principal advantages claimed for the loose-leaf and card ledgers may be summarized as follows—

- (1) Posting is facilitated.
- (2) Only live matter is dealt with, all dead accounts being transferred.
- (3) The laborious process of opening a new ledger is dispensed with, each sheet or card being made out as required.
- (4) Division of work between a staff of clerks, which of course, is impossible with a bound book, when it is of necessity, one man one book.

Against these advantages there is the possibility of an account becoming mislaid, either accidentally or intentionally.

CHAPTER XV

CONCLUSION

WITH increasing competition and improved methods of manufacturing, a more accurate record of detail cost accounts becomes increasingly necessary, and it is hoped that manufacturers will in time learn that the men who can show them how profits are made, or how savings may be effected, are equally valuable with their better-paid colleagues in the sales department. When this fact becomes more generally appreciated, we may hope to see a more intelligent class of man engaged on cost accounts, with a consequent improvement in the progress of our commerce.

It is undoubtedly a fact that big profits can permanently be obtained only by efficient operation, and no man can hope to exact, for a protracted period, a compensation out of proportion to the services rendered.

Under the old dispensation each master man had his own little shop, which he ran either single-handed, or with the assistance of two or three journeymen, who eventually hoped to become master men themselves. With the coming of the factory system, the little master man has almost ceased to exist, and we now have our giant manufacturing companies under the control of managers, who, in many cases, have very little, if any, knowledge of the actual work performed, and no personal interest in the workman; whether this is good or bad is a matter with which we are not at the moment concerned; the conditions are as they are, and it is our duty to deal with the various problems of manufacturing as they arise. Under the changed conditions of manufacturing with its consequent scientific difficulties, there is undoubtedly a large field opened out for educated and scientific men.

Up to the present time, manufacturers have been much too apt to regard the services of cost accountants, and others engaged in saving expenses, as being entirely unproductive, and for that reason to keep salaries for these positions as low as possible, with the result that the best class of man will not devote his time and attention to this branch of manufacturing, but that this is a

short-sighted policy on the part of our manufacturers can be shown from the examination of the following.

It is a well-known fact that establishment charges are a practically constant figure whatever the output, that is, if the output is doubled, the indirect expense per unit is almost halved; if at the same time we can reduce the wages cost and still double production, the profits made begin to increase at a very rapid rate.

•For example, suppose for the sake of illustration, we assume a profit of 10 per cent. on the cost of our manufactures, and our expenses for the year as follows—

| | |
|-------------------------|------------------------------|
| Material | 30,000 |
| Wages | 20,000 |
| Indirect Expenses | 20,000 |
| | <u>70,000</u> |
| Selling price.. .. | 77,000 |
| Profit | <u>£7,000 = 10 % on cost</u> |

Suppose now we double our products without increasing our indirect expenses (this, however, will nearly always be impossible, indirect expenses always increasing somewhat with increased turnover, but not of course in anything like the same percentage). For the purpose of our illustration, however, we will assume that we have doubled our output without any increase in our indirect expenses, our figures will then read as follows—

| | |
|-------------------------|---|
| Material | 60,000 |
| Wages | 40,000 |
| Indirect Expenses | 20,000 |
| | <u>120,000</u> |
| Selling price.. .. | 154,000 |
| Profit | <u>£34,000 = 29 % on cost approximate</u> |

Suppose, again, we double our product, by increasing efficiency in our works, without increasing the wages cost or indirect expenses, our figures will then read—

| | |
|-------------------------|-------------------------------|
| Material | 60,000 |
| Wages | 20,000 |
| Indirect Expenses | 20,000 |
| | <u>100,000</u> |
| Selling price.. .. | 154,000 |
| Profit | <u>£54,000 = 54 % on cost</u> |

The profit is, therefore, nearly eight times as great as in the first case, and more than one-and-a-half times as great as in the second case.

From the above figures, although of course somewhat extreme, it will be seen that the gain to our manufacturers, by the introduction of up-to-date methods, and the employment of skilled men in their factories, is at least of equal importance with the more apparent advantage accruing from salesmanship.

INDEX

- ACCOUNTS**, necessity for two sets of, 6
Accuracy of cost accounts, 2
Additions to plant, etc., 67
Administrative charges, 104
Advances to workmen, 68
Agreement between financial and cost accounts, 57
Arrangement of factory, 29
- BANK** interest, 37
Bonus system of paying wages, 21
Branch accounts, 68
Brewery accounts, 59
Buying department, 28
By-products, 64
- CAPITAL** account, 91
Card ledgers, 104
Carriage, 29
Clock recorders, 73
Coinage, 30
Colliery accounts, 59
Commercial charges, 104
Contracts uncompleted, 67
Cost grouping, 63
Cost Ledger, 52
- DAY** work system of paying wages, 17
Delivery notes, 66
Departmental charges, 73
Depreciation, 39
Diagrams, the use of, 23
Differential piece rate system of paying wages, 21
Direct expenses, 50
— purchases, 50
Division into trades, 7
Draughtsmen's wages, 42
- ELEMENTS** of cost, 2
Engagement card, 76
Establishment charges, general consideration of, 31
—, division of, 32
Estimates, 4
Expense burden, 103
- FINISHED** stores, 71
Flat cost, 33
Foundry costs, 66
- GOODS received, 27
Graphic charts, 23
Gross cost, 33
- HEATING**, cost of, 65
Hourly burden, 32
- INDIRECT** expenses, 31
Instruction sheets, 83
Interest, 37
Invoices, 28
- JOB** cards, 73
— numbers, 81
- LABOUR**, 12
Lighting, cost of, 65
Loose leaf ledgers, 104
- MACHINE** rate, 32
Maintenance of plant, etc., 67
Manufacturing order, 87
Master card, 81
Material requisition, 88
— summary, 49
—, treatment of, 26
Measurement of solids, liquids and gases, 64
Mining costs, 59
Multiple costs, 6
- NATURE** of cost accounts, 1
New plant, 67
- OBSOLESCENCE**, 40
Operating costs, 7
Organization chart, facing 72
Outworkers, 84
- PATTERNS**, 71
Percentages on cost and turnover, 44
Piecework receipts, 78
— system of paying wages, 17
Power consumed, 65
Premium system of paying wages, 14
Prime cost, 2
Process costs, 59

- Production cards, 87
 Productive wages, 12
 Profit-sharing, 17
 Profit on work in progress, 67
 Progress cards, 89
 Purchases, 29
 Purchase analysis book, 99
 — department, 28
 Purpose of cost accounts, 4

 RENT, rates and taxes, 36
 Repair numbers, 81
 — register, 85
 Repairs for customers, 81
 — to plant, etc., 67
 Requisitions, 100
 Returns to stores, 100
 Rough stores, 71

 SALES stores, 71
 — to branches, 68
 Scrap, 90
 Section numbers, 72
 Shop sheets, 71
 Single costs, 59
 Special features, 66
 — plant, 68
 Specification, 95
 Standardization, 59
 Stock card, Inset No. 35
 — prices, 102
 Stocktaking, 100

 Stores, division of, 29
 —, fitting up of, 29
 —, received and issued, 9
 Stores books, 9
 Symbols, 67

 TERMINAL costs, 45
 Time clocks, 73
 — sheets, 45
 — work, 17
 Tools, jigs, etc., 71
 Trading and profit and loss
 account, 34

 UPKEEP of plant, etc., 67
 Uses of cost accounts, 2

 VIEW ROOM, 13
 — receipts, 78

 WAGES, general consideration of,
 12
 —, subs. on account of, 68
 —, analysis of, 92
 —, payment of, 23
 —, chart, 24
 —, summary, 47
 Waster notes, 78
 Works cost, 33
 — expenses, 104
 — organization, 70
 Work in progress, profit on, 67

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