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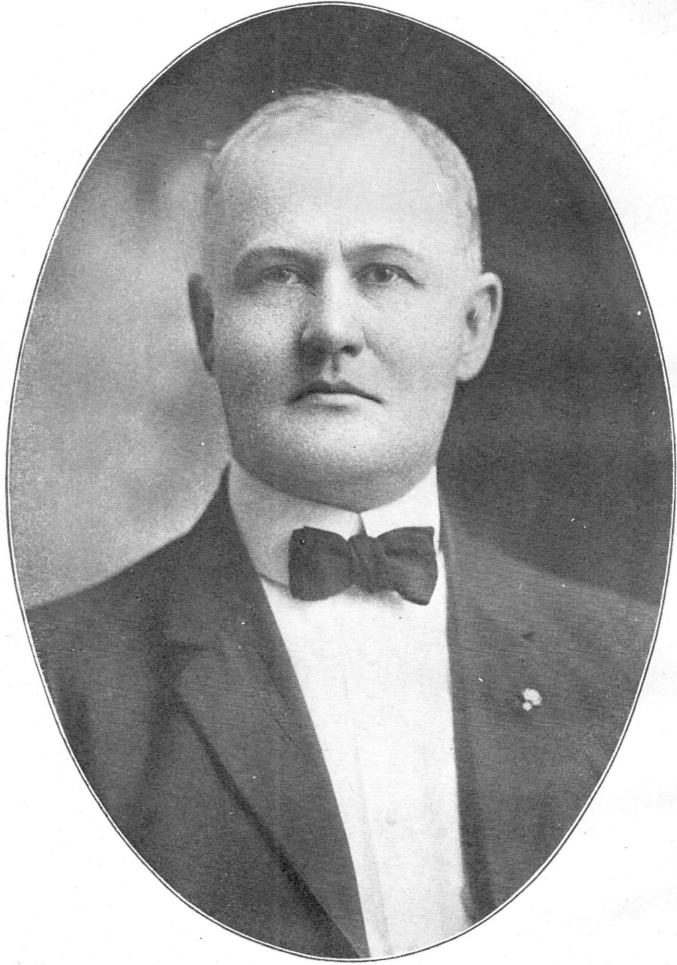
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Accounting in the Furniture
and Woodworking
Industries

BY

FRANK H. TIMKEN



J. H. Tinker

Accounting in the Furniture and Woodworking Industries

Designed in Combination with
General Factory Accounting

By the Same Author

To Afford a Definite Standard of Practice in the
Industries Referred to in the Title

BEING

A Minutely Detailed Exposition of the Application of the
Recognized Principles of Accounting in the Formulation
of those Especial Methods which Experience has Shown to
be Essential to the Acquirement of Maximum Profit in the
Minimization of Production Costs in Those Industries

By

Frank H. Timken
Efficiency Engineer

CHICAGO
TRADE PERIODICAL COMPANY

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CHICAGO**

FOREWORD.

This book is intended to supplement General Factory Accounting, in which, without reference to particular lines of industry, are set forth the author's general methods of book and record keeping. The purpose of the present book is to illustrate, in detail, the manner of employing those general methods in, as well as to describe and explain the results to be accomplished by the employment of such additional methods as are peculiar to, accounting practice in the furniture and woodworking industries. Originally it was proposed to cover the entire work in a single volume, but, upon mature deliberation, the impossibility of doing this, without running the risk of leaving the average reader more confused than enlightened, became apparent. Accounting in the industries here referred to entails the employment of every method described in the earlier work. In illustrating the employment of these general methods in those industries, and in describing and illustrating the use of the additional methods which the peculiarities of the industries referred to render desirable, the author has gone into more minute detail than he would have felt warranted, had he attempted simultaneously to explain general and special methods. The reader will be best served by taking up the subjects of principle and general practice in the perusal of General Factory Accounting before beginning the study of special methods and their application as these are treated in this book.

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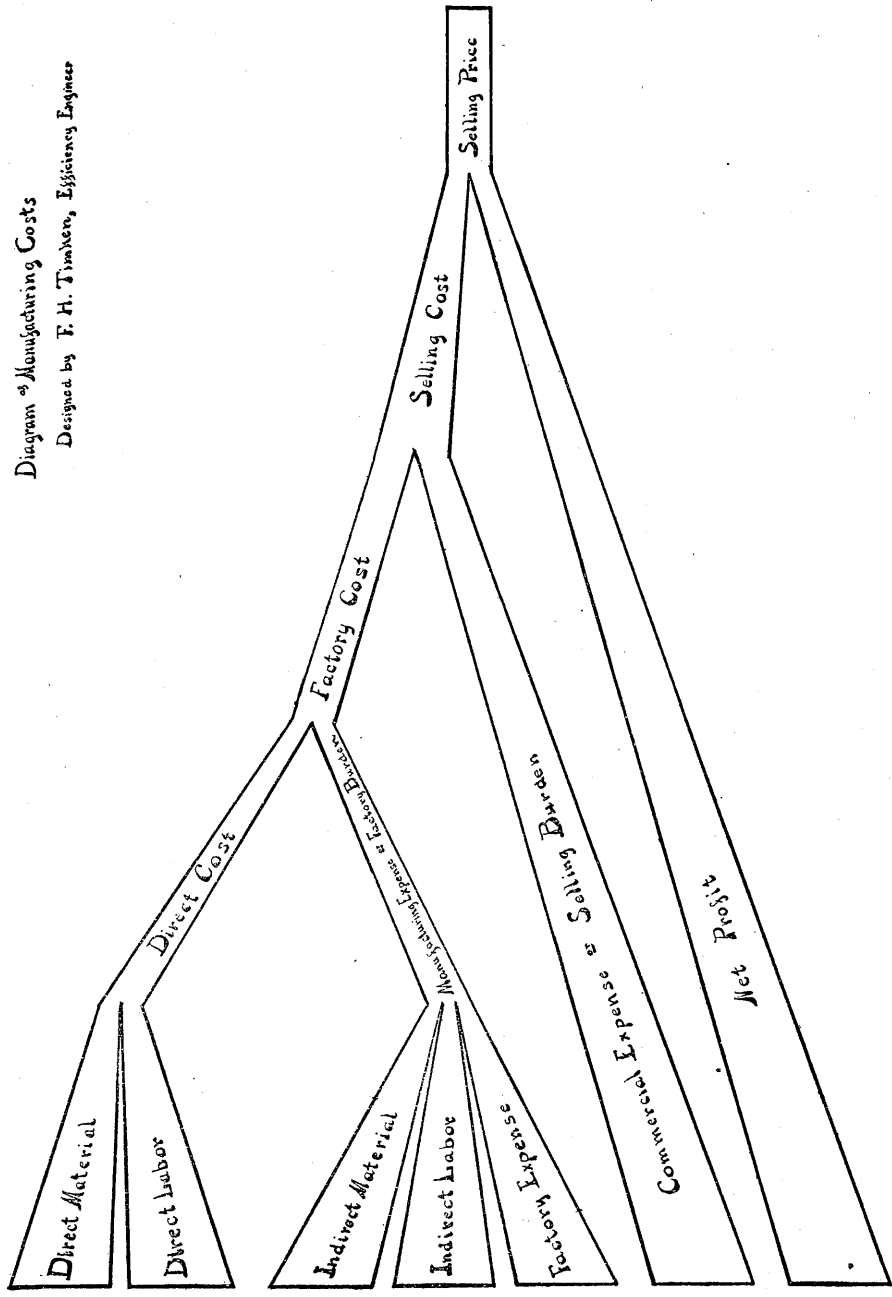
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Diagram of Manufacturing Costs

Designed by F. H. Timken, Efficiency Engineer



CHAPTER I

Overhead Expense

Manufacturing costs are composed of three elements, viz.:

Direct Material,
Direct Labor and
Overhead Expense.

According to the nature of the component expenditures, the latter element is divisible into three major groups, viz.:

Material Burdens,
Factory Burden and
Selling Burden.

Direct Material, i. e., that which *tangibly* enters and is converted into the finished product, and Direct Labor, i. e., that which is *productively* employed in effecting that conversion, are elements readily reducible to dollars and cents, as they apply to the cost of any single article of product. Absolutely reliable cost figures, however, cannot be obtained, nor can the expense of producing and of marketing be intelligently regulated and controlled, until modern accounting methods are employed at regular intervals to systematically analyze the third element and, reassembling its components in the three groups named, to equitably apply it to the cost of the separate parts of the product.

It is necessary to ascertain which of our overhead expenses apply to the direct material which enters into the finished product before we can accurately price the material which we know is required to manufacture a given article. Those expenditures which, in the aggregate, we call Factory Burden, i. e., the sum of all expenses of providing the space and equipment and of operating that equipment and the expense of indirect labor and of factory supplies, made necessary by the conversion of that accurately-priced material into the finished product, must be extracted from the mass of overhead expense in order that we may definitely understand the cost of that conversion. We cannot be exactly certain with reference to the cost of any single item of our product until we know which elements of our overhead expense apply to the cost of the raw material itself, which elements apply to the cost of converting that raw material into

finished wares, and which elements apply to the cost of marketing those wares. The knowledge that we have spent a certain gross sum of money for material, a second gross sum for labor and a third gross sum for "expense" is of no further value. Until we have analyzed it, we cannot know what portion of that expense applies to material, what portion to manufacturing and what portion to marketing. Nor can we know what portion of the labor we have paid for has actively contributed to the conversion of the raw material into the finished product, and what portion of that labor, being employed indirectly, that is, employed upon work other than that of actually converting raw material into finished product, must be added to the item of "expense," unless we painstakingly dissect the whole labor item.

We must know the relation between the elements of overhead that apply to material and the material itself; we must know the relation between the elements of overhead that apply to production and production itself as represented in the item of productive labor; we must know the relation between the elements of overhead that apply to sales and the volume of sales. Without exact knowledge upon these points we cannot accurately price our wares. Until overhead expense is systematically and continuously dissected and applied in conformity with the value or measure of material, in conformity with the value or measure of the labor which effects its conversion into saleable commodities, and in conformity with the value of the wares that are sold, we cannot really expect to control and regulate our industrial and commercial activities, nor, consequently, to gain the maximum return of profit upon those activities.

It is a comparatively simple matter to *approximate* direct cost. Every manufacturer can say offhand what he pays for his raw material and how much he must add for freight and handling, etc., in order to determine its cost, delivered upon his own premises. The percentages of waste featuring the consumption of differing raw materials are at the finger tips of the practical factory manager, and it is no trick at all to equitably advance the figures at which those materials are priced, in order to offset the loss sustained. Every employer can give an accurate estimate of the unit cost of his direct labor. But, in our cost calculations, over and above the price paid for raw material plus freight and handling charges and waste allowances, we must include those

expenditures which are incurred because of the purchase, storing and handling of that material before we can be said to have accurately priced it. The expense of storing and handling raw material certainly is no part of the cost of converting it into finished wares nor is it part of the cost of selling those finished wares.

Objection to this view has been raised upon the ground that this expense does not enhance the value of the material and that, therefore, it should not be included in the figure accepted in cost calculations as the price of the material. Obviously, the expense of handling and storing does not give the material a higher selling value but *it does apply to the cost of that material*. The act of receiving, unpacking and putting upon the shelves does not give the merchant's wares a higher selling value but the labor involved must be compensated and so the *cost* of the wares is advanced. Material can be purchased at a certain price at the point of its production and at a certain higher price at the point of its consumption, the difference between the two figures being, wholly or in part, occasioned by the expense of transportation. Therefore, if it is fair to assume that lumber is worth one price at a southern mill and another price f. o. b. cars at a northern manufacturing town, it certainly must be fair to say that that lumber in the stack is worth, over and above the f. o. b. price, the cost of hauling and stacking it; is worth that additional figure for the purpose for which it was purchased, viz.: for manufacturing furniture. Chiefly, objection is made to the practice of including insurance in the material burden, but the insurance carried upon lumber while it is in the stack is equivalent to the insurance carried upon the same lumber while in transit from mill to factory. The cost of the insurance in transit is included in the freight rate paid, ordinarily, and, if the value of lumber is raised by the cost of its transportation, an element of which transportation cost is its insurance in transit, it is certainly fair to assume that its value is equally raised by the cost of insuring it while carried in stock preliminary to its conversion into the saleable commodity. Questions of value aside, it certainly does COST a certain amount to store and handle stocks of raw materials and that cost is an element of the cost of the finished product but it does not apply to the cost of conversion. The process of conversion definitely begins at a certain point in the factory. Until the material

reaches that point, the expense of handling and preparing it for conversion must apply to the material itself, since the actual process of manufacture has not yet begun.

In the woodworking industries, the figure at which the chief item of raw material, that is: lumber, may accurately be taken into account is the price of the lumber delivered to that point in the factory where the definite process of converting it into a definite finished article actually does begin. Taken from the kiln, it may be sawed to stock lengths or to stock dimensions. Those stock pieces may subsequently be employed in the manufacture of any one of several articles. Therefore, *the process of manufacturing those articles has not begun*. The sawyer is directed to cut *stock sizes*. When it is determined to manufacture a given number of articles of a certain pattern, a stated number of those stock pieces or parts will be used. Intelligent cost-keeping, therefore, must establish the cost of those parts as they are cut and stocked, ready for subsequent conversion into finished articles.

Taking the gross sum of the money figures of our invoices for the entire quantity, purchased and received, of a given kind of lumber, we add to the same the gross amount of all charges for freight, switching or hauling, and, by dividing the resulting sum by the entire quantity, we establish the average cost, per M. ft., delivered to our yard, of that kind of lumber. We establish the expense of the yard, the expense of unloading, stacking and re-handling; we establish the expense of charging and heating the kiln, of trucking and sawing to stock sizes all of the lumber of every kind that has come into our yard and into our factory during a given period and we divide the sum of those expenses by the total number of feet of all kinds of lumber and thus establish the average Lumber Burden per M. ft. We add that average burden to the average cost of a given kind of lumber, delivered to our yard, and then we ascertain what percentage of the gross amount of a given kind of lumber is represented by the stock parts into which that gross amount has been cut up. If our record indicates that 10 M. ft. have been delivered to the saw and that 7,000 ft. of stock sizes resulted, we correspondingly increase the sum of the average cost of the lumber plus the average burden. If we paid \$70. per M. ft. for the lumber and the burden amounts to \$10. per M. ft., the 10 M. ft. delivered to the

saw cost us \$800. That 10 M. ft. has resulted in 7,000 ft. of net available lumber, in stock sizes, which, the expense of sawing being included in the burden, cost us \$800., or an average of \$114.29 per M. ft. When we come to figure the cost of the finished article to be manufactured out of those stock parts, therefore, we must take the net or finished size measurement of the parts necessary for the construction of that article into account at the rate of \$114.29 per M. ft.

In the metal furniture industry, we must take the raw material into account at the price it costs us delivered to that point in the factory where the process of converting it into a concrete finished part or finished article actually begins. Tubes, angles and bars cost certain figures, delivered to the plant; upon receipt, we incur the expense of a certain amount of labor necessary for storing and, subsequently, transporting the same to the point where conversion into the finished part or article actually begins. The prices at which these tubes, angles and bars are taken into account in cost computation must include the expense of this labor, *as it applies to the bulk of material*, if our cost figures are to be accurate. The cost of pig and scrap metal must include the expense of handling, storing and transporting it to the cupola. The weight of this metal, as it is thrown into the cupola, must be extended at prices which include the expense of this labor. To the sum so arrived at, we must add the cost of the coke, the expense for cupola labor, cupola depreciation, insurance and taxes on the investment in the cupola, etc. The gross sum thus arrived at gives us the cost of the mass of molten metal taken from the cupola. A certain percentage of that molten metal will be dropped upon the floor, recovered, weighed and charged back to scrap. A certain percentage of the castings poured will be found defective, rejected, weighed and charged back to scrap. The weight of the sound castings will now be used to divide the sum of the money cost of the molten metal plus moulding and chipping labor, less credit for scrap recovered from the floor and for scrap castings, to arrive at the per lb. cost of manufacturing those sound castings. In computing the cost of the finished article in which those castings are incorporated, we must take them into account at the total cost per lb. of their manufacture, which, of course, means extending the computation into small decimals.

The expense of receiving, storing and handling, wages of

store-keepers and their assistants and the expenses of the Stores Department, including that department's proportion of the Space Burden and Labor Burden as well as its proportion of the expense of superintendence, insurance, taxes and interest upon the investment in raw materials and the department's equipment—all these must be included in the figures at which those materials are taken into account in cost computations, if accurate cost figures are to be obtained. If, for instance, the total invoice cost of raw materials purchased and received during a given year aggregates \$40,000. and if, during that same year, the sum of the expenses enumerated above amounts to \$2,400., six percent must be added to the invoice price of the materials passed through the Stores Department. Say, for example, that:

Ten barrels of varnish are purchased, containing a total of 500 gallons, at a price of \$4.00 per gallon or.....	\$2,000.00
Freight on the same is paid, amounting to.....	25.10

The gross cost will be.....\$2,025.10

Six percent must be added to cover the material burden	121.51
--	--------

The Stock Room Cost will be.....\$2,146.61

The record kept shows that a total of 485 gallons of varnish is drawn from those ten barrels.

Those 485 gallons cost exactly.....\$2,146.61

or an average of \$4.42.6 per gallon. That is the figure at which that varnish must be included in computing the cost of the article to which that varnish is applied. Unless materials are priced in this manner, cost calculations will mislead the manufacturer into believing that he has profited upon his transactions at a certain ratio, whereas his annual balance sheet will prove that his profits are very much less if not absolutely nil.

Equally is it necessary, if our cost figures are to be trustworthy, to ascertain exactly which of our overhead expenses relate to the process of converting raw material into finished

wares and to apply these to the productive labor that effects that conversion, upon the most equitable bases. Technical requirements in some lines of manufacture render necessary methods of minute nicety to satisfactorily accomplish this application. Such requirements are not found in the furniture and woodworking industries, particularly in the latter. In General Factory Accounting the author has set forth his general methods of assembling, distributing and apply the expense that is incident to manufacturing in these lines, upon such bases that, without involving the employment of minutely nice methods, the desired result is accomplished with a degree of exactitude that has been found amply sufficient for all practical purposes.

If the manufacturer is not the owner of the premises occupied, he pays rent. If he is the owner, the interest on the investment in and taxes upon land and buildings, and insurance and depreciation of the buildings, constitute the equivalent of rent. In both cases the expenditure represents the cost of *space*. In addition, we find minor expenditures which apply according to space occupied, for instance: the wages of watchmen, supplies used by these and provision for relief and protection in case of their meeting with accidents. Watchmen travel the space occupied and the expense of their employment cannot be more equitably distributed than upon that same basis. All these expenditures are assembled in the Space Burden account and prorated between the accounts kept with departments according to the space occupied by each.

In the average woodworking plant, the expenditures applicable to yard space are so insignificant that it is not worth while to charge any proportion of the Space Burden to the Lumber Burden, thus throwing a part of the space expense into the cost of the lumber itself. But, inside the factory buildings, we find a very considerable area devoted to storage of raw and partly finished material. Now, if that space were not necessary for such storage, it might be used for purposes of production, or it might not be required at all, and its expense would, therefore, form no part of our overhead. Consequently, the expense of that space should be charged to the Material Burden and thus made a part of the cost of the material itself. Certain bulky materials which enter into the manufacture of one part of the

factory's product may not be required for the manufacture of another part. If the expense of storing that bulky material were not burdened upon and thus made a part of its cost, but were, instead, made a charge upon the process of converting it into the finished product, the result would be that the product manufactured out of the less bulky material would have to carry a part of the load which legitimately applies to the product that is manufactured out of the more bulky material and, thus, the cost figures of both products would be rendered inaccurate.

Also, in the factory buildings we will find a considerable area devoted to the storage of finished wares or of wares the process of manufacturing which has been suspended until the Sales Department shall indicate the style in which these wares are to be finished. The expense of that space should not be burdened upon the process of manufacturing; it legitimately forms a part of the expense of marketing the product. The factory must be regarded as an independent organization and it is not the fault of that organization that it is not finishing those wares with the utmost expedition, nor is it the fault of the factory that finished wares are not sold immediately upon finishing them, so that the expense of their storage might be rendered unnecessary. The more efficient the Sales Department, the less space will be required for storage; and the expense occasioned by that department's lack of efficiency, even though that lack is due to conditions which the department cannot control, can be most equitably applied by making it a charge upon the Selling Burden.

The expense of the space occupied by the Power Department should be charged to the account kept with that department and, added to the sum of its other expenses, prorated between the accounts kept with departments in which are located the machines in the operation of which the developed power is consumed. The expense of only that space occupied by departments in which the process of converting raw material into finished wares is actually carried on may be directly applied to the cost of production.

General expenditures which relate, directly or indirectly, to the volume of labor performed, such as the wages paid elevator men and similar *general* workers and the inherent expense occasioned by their employment; a proportion of the expenses of superintendence; the expense of *general* supplies; the expense

of repairing *general* equipment, such as elevators, trucks, etc.; the loss occasioned by faulty workmanship which, while distinctly attributable to the factory, cannot be definitely traced to any particular department; and a proportion of the expense of the general office, representing the clerical work there performed in the interest of the factory, such as time-keeping, payroll work, etc., cannot be more equitably apportioned than by prorating the sum of such items between accounts kept with departments, according to the volume of labor employed in each. Some minor items, such as the loss occasioned by faulty workmanship which cannot be definitely traced, may not justly be considered a part of the expense of a non-productive department, such as the Power Department, and their inclusion as part of the expense of these departments is, of course, inequitable. Nevertheless, the total expense of the non-productive departments is finally burdened upon production upon certain equitable bases, and the inclusion of such minor items in that total expense does not affect the ultimate result sufficiently to warrant the expense of the more detailed accounting necessary to segregate and apply them upon an exactly equitable basis.

Such general expenditures as relate to the value of equipment, however, are of sufficient magnitude to warrant a more detailed treatment. Interest upon the investment in, taxes upon and insurance and depreciation of machinery, heavy tools and fixtures are the major items of such expense. The method is to charge to the account kept with each of the non-productive departments in which such equipment is located, such a department's proportion of each of these items and, for convenience and the minimization of clerical work, to charge to an account entitled Equipment Burden that proportion of each of these items that applies according to the value of the equipment located in and employed by productive departments.

The expense of operating non-productive departments, including that proportion of the general expenses just enumerated and that proportion of the general expenses assembled in the Space Burden and Labor Burden accounts as well as that proportion of the expense of superintendence which is justly chargeable to one of these non-productive departments, having been assembled in the account kept with each, the method is to apportion the sum of such expense upon the most equitable basis available.

For instance: The expense of a Power Department is prorated between the departments in which power-consuming machinery is located, according to the rated power consumption of each. If light-current is generated by the same department, the expense of its generation may be established with reasonable exactness, as distinguished from the expense of power-generation, and that light-current generation expense is prorated between departments according to the number and candle-power of all lamps found in each. Ordinarily, heat is a by-product of such a department, and, rather than attempt separating the expense of its generation (which must always be an arbitrary division) it is entirely disregarded. If desired, however, the total expense of a Light, Heat and Power Department may be split up between the items of power, light and heat and the accepted cost of the latter item charged to departments according to floor area occupied or according to cubic measure of the space to be heated. Where the heat generated in and distributed by a Light, Heat and Power Department is conducted to a kiln or baking room, it may be fair to use an arbitrary figure as the basis of crediting the account kept with that L. H. & P. Dept. and charging the account kept of the burden of which the expense of such a kiln forms a part, or for charging the account kept with a department in connection with which such a baking room is operated, with the approximate cost of the heat there consumed.

The expense of the Maintenance Department, that is, the department whose operatives are charged with the duty of repairing equipment and buildings and who, sometimes, also construct new equipment, is charged to Building Repairs or to the accounts kept with departments in which is located the equipment actually repaired. In case of construction of new equipment, the cost of that work is assembled and capitalized by charging the total amount to the account in which is carried the replacement value of such equipment. The cost of material actually consumed and the cost of labor actually employed in making repairs is separately reported for each department, except in the matter of those minor repairs which require only a few minutes and, occasionally, material to the value of a cent or two. All the material and labor reported is charged to the departments for which such repair work was actually performed. At the end of a month, then, the Maintenance Department account will

exhibit a certain deficit (due to the small repair work which is not reported) and the method is to make that deficit a charge upon the Equipment Burden, thus apportioning it among the productive departments according to the value of the equipment located in each.

The account with each Productive Department is charged with the labor employed there, Direct Labor as one and Indirect Labor as a second item; with material consumed there, Direct Material as one item and Indirect Material (including shop supplies and small tools) as another; with royalties upon patented machines located in and used by such departments; with repairs to departmental equipment (as reported by the Maintenance Department); with the loss occasioned by faulty workmanship traced to such a department which necessitates the return and repairs of wares, in process or finished; with proportions of the expense of superintendence, of the Space Burden, of the Labor Burden, of the Equipment Burden and of the expense of generating Light, Heat and Power. Each of the Productive Departments is credited with its actual production upon basis of the standard cost figures established for each item of regular product and upon basis of actual figures reported for each job of special product, with Direct Material as one item, with Direct Labor as a second item and with Departmental Burden as a third item of such credit. The account kept with a Productive Department being debited with the item of Direct Material as actually delivered to that department and credited with that item upon basis of established standard specification quantities, wastefulness in its use must inevitably be disclosed when an inventory of the Direct Material in that department is taken. Such an account being debited with the item of Direct Labor, as actually compensated upon the department's pay roll and credited with that item upon basis of established standard labor figures, a decline in the rate of efficiency in the department's production must inevitably be disclosed when the wares in process of manufacture in that department are inventoried.

Such an account being debited with the various items above enumerated, and the percentages of waste of different materials being established by inventorying, the percentage of the burden of the Productive Department in its relation to the total Direct Labor employed in that department is readily to be established.

Now, in figuring the cost of any single article of product, the method is, first, to establish the cost of the Direct Labor required, in each successive department, to produce that article and, next, to apply to the total sum of the Direct Labor in each department, that department's burden percentage, and to include the sum of the resulting amounts in our cost calculations as representing the total Factory Burden. In General Factory Accounting, Plate 35 will be found to illustrate a form of Standard Cost Sheet upon which this data is most conveniently compiled. Unless the burden of producing is established *by departments*, separately, instead of for the factory, as a single unit, we cannot hope to arrive at trustworthy cost figures. Our cost computations should reflect the process of manufacture and that process involves passing the articles in process of manufacture through successive departments, in each of which a specific amount of labor is employed. The specific expense of operating that department being established, the more work is required in a given department to manufacture a specific article, that much more of that department's burden must be attributed to the cost of that article. In a certain factory devoted to the manufacture of wooden furniture, the author found an average Factory Burden of 80 percent in its relation to the total Direct Labor employed in all the factory's departments, whereas, by separate departments, the burden percentages ranged from 21 to 140. A certain piece of furniture carried a total labor charge of \$45.00 and, applying the round Factory Burden percentage of 80, this article was loaded in the sum of \$36.00. Of the total of \$45.00 of labor, however, \$30.00 represented hand-carving labor and the burden of the Hand-Carving Department was found to be only 21 percent, so that the burden applying to this \$30.00 worth of labor amounted to only \$6.30. The sum of the burdens in other departments contributing to the manufacture of that article, brought the total load on the article up to only \$18.87. The difference between the latter sum and \$36.00 burden, established by the former method, certainly is sufficient to prove the correctness and expediency of practice of the latter method.

We must also learn to know the relation between the elements of overhead expense that apply to the sale of finished wares and the bulk or value of the separate lines of wares. If the plan of selling those wares differs for differing lines, or if separate selling

organizations are maintained in different sections of territory, we must learn to separate those items that apply to the sale of one line or to the sales in one section of territory but which do not apply to other lines or to other sections; we must keep separate accounts in which to assemble the items that are peculiar to different lines or sections, so that we may apply to the volume of sales in each line or in each section the sum of the expenses there assembled plus that proportion of the common or general selling expense which is legitimately chargeable according to volume of sale without reference to line or section. If we sell to both jobbers and retailers, we must, by means of separate accounts, establish what portion of our selling expense applies to all sales (to jobbers and retailers alike) and what portion applies to sales to retailers exclusively. We must learn to do all these things if we expect to arrive at trustworthy cost figures which will enable us to make selling prices intelligently.

For instance: Commissions paid upon a certain line of goods may differ, as to rate, from the commissions paid upon another line, or, we may pay commissions upon one line and not upon another. Where that is the case, instead of charging commissions to Selling Burden (as it is equitable to do where uniform commissions are paid upon all sales) we should charge them to a trading account kept of the line upon which commissions are actually paid. For example, we may pay a five percent commission upon sales of iron beds and a ten percent commission upon sales of brass beds. Keeping one account of Sales of Iron Beds, we would charge all the commissions upon sales of those goods to that account; and to an account entitled Sales of Brass Beds we would charge all the commissions upon sales of the latter description of goods. The commission is part of the direct expense of selling each separate line. If, in this case, we charged all commissions paid to one Selling Burden account and then prorated the latter according to the volume of sales, which, let us assume, would be identically the same for both iron and brass beds, Sales of Iron Beds would be burdened with part of the expense of selling brass beds while Sales of Brass Beds would not be sufficiently burdened and, therefore, both accounts would show false conclusions with reference to profit.

If we maintain a special selling organization in a stated section of territory, the salaries paid executives in charge of, and

the expenses of office and show-rooms furnished for, that organization should be charged to a separate Selling Burden account for that section. In addition, that account should be charged with its proportion of the general selling expenses which, while incurred at the home office, and legitimately applicable to all sales, regardless of section in which made. One such item, for example, would be the salary of the General Sales Manager who, it is to be assumed, is in authority over the entire selling force and a portion of whose time, therefore, must be given to directing the work of the separate organizations. Unless we keep accounts in this manner, we cannot hope definitely to know whether the special selling organization is paying its way or whether it would be best to discontinue it.

If we sell goods to jobbers as well as to retailers, certain items of selling expense will be found to apply to all sales (to both jobbers and retailers) while certain other expenses apply exclusively to the sales made to retailers. In that case, we should divide the Selling Burden into accounts No. 1 and No. 2, the former being charged with the items of expense that apply indiscriminately to all sales, while the latter account is charged with only those items that apply to sales to retailers exclusively. For example, salaries paid to salesmen who call upon the retailers would be chargeable to No. 2, whereas the salary of the General Sales Manager, who might personally effect all sales to jobbers, would be chargeable to No. 1. The percentage of the sum of all expenses assembled in Selling Burden No. 1, in its relation to the factory cost of all wares sold, must be added to the factory cost of a given article to establish the Selling Cost of that article, when sold to jobbers. The expense of selling goods to retailers must be established in this fashion: The separate totals of the factory cost of wares sold to jobbers and retailers must be found and the total expense assembled in Selling Burden No. 1 divided accordingly, that proportion which applies to the cost of the wares sold to retailers being added to the amount of Selling Burden No. 2. The percentage of the sum of these latter two items, representing the cost of selling wares to retailers, in its relation to the factory cost of wares sold to retailers, must be added to the factory cost of a given article to establish the Selling Cost of that article, when sold to retailers. For instance: Let us assume that the Factory Cost of wares sold to jobbers during

a given year amounts to \$100,000, while the Factory Cost of wares sold to retailers during the same year amounts to \$200,000, and that Selling Burden No. 1 for that year amounts to \$30,000, while Selling Burden No. 2, for the same year, amounts to \$20,000. One-third of Selling Burden No. 1, or \$10,000, applies to sales to jobbers, which, the Factory Cost of wares sold to jobbers being \$100,000, means that we must add 10 percent to the Factory Cost of an article to establish the cost of its sale to a jobber, and two-thirds of Selling Burden No. 1, or \$20,000, plus the \$20,000 found in Selling Burden No. 2, or \$40,000 in all, applies to sales to retailers, which, the Factory Cost of wares sold to retailers being \$200,000, means that we must add 20 percent to the Factory Cost of an article to establish the cost of its sale to a retailer.

Careful study of Chapter II of General Factory Accounting, entitled "Classification of Accounts and Their Arrangements," and of the Ledger Scheme therein presented, as well as of the conditions peculiar to the business of the individual manufacturer, will enable the accountant to arrange a set of accounts which will answer every desirable purpose referred to above, and intelligent scrutiny and study of the purposes of all items of overhead expense will show to which of the accounts set up each separate item is to be charged or between which accounts it is to be prorated. The object of every system of factory accounting should be, not merely to facilitate the compilation of true costs, but, to afford the means for intelligently regulating and controlling expenditures with a view to cost reduction, and, no less, to demonstrate the degrees of net profit earned in different sections, upon different lines of wares and upon sales to different classes of dealers.

CHAPTER II

Materials

A complete set of methods for the routine handling of material records, with illustration of every necessary form, will be found in Chapter VI of General Factory Accounting. In the furniture and woodworking industries, it is preferable to open a separate account for certain of the bulkier and heavier materials, such as different kinds of lumber, metal tubing, steel angles, steel rods, etc. Other items, especially the smaller materials and accessories, economy in the use of which can be practiced by shop foremen and operatives, such as trimmings, glass, paints and varnishes, nails, tacks, screws, bolts, etc., may be charged direct to the department where, in due course of manufacture, these smaller materials will be consumed. It is, however, for several reasons, much more desirable that a Stores Department or stock room be instituted and that all these smaller materials be delivered to that department and retained there until issued upon requisitions, in such limited quantities that a more conclusive check may be kept upon consumption. First of all, the effect of delivering limited quantities to departments will be to stimulate careful economy in their use. Where large quantities of these small materials are delivered to and carried in stock in a work shop and where these stocks may be drawn upon by operatives without anything in the nature of a systematic check being made and record kept, wastefulness is encouraged. But when these materials are delivered to a work shop in judicious quantities and stocks must be replenished by frequent requisitioning, both foremen and operatives come to understand that prodigal use of such materials is bound to be uncovered and brought home to the offenders. Not infrequently, also, petty theft of these small materials goes unnoticed because of large quantities being delivered to work shops. Secondly, if such materials are delivered and charged to a department as purchased and received, the departmental account must show a debit balance, representing the money value of these unconsumed materials. In consequence, the account kept with a department will be found less effective in regulating and reducing production

costs, because, until a physical inventory is taken, that account cannot be accurately made to reflect the cost of the department's production. Where a Stores Department is instituted, it is ordinarily satisfactory to open one ledger account under the title of "Stores," to which should be charged all direct and all indirect materials, shop supplies, tools and everything of that nature. At the end of each month, the requisitions evidencing issues of materials and supplies by the Store Keeper during that month, should be tabulated, priced, extended and charged to departments to which requisitions show that these materials and supplies have been delivered, Direct Material being charged as one item and Indirect Materials, supplies, tools, etc., as another item, credit, of course, being given the "Stores" account at prices which, in addition to the invoice figure and carriers' charges, are made to include the cost of receiving, storing and handling (as this expense is assembled in the "Stores Department" account). When an inventory is taken, discrepancies found in the "Stores" account, except those minor differences which are occasioned by receiving large and issuing small quantities, will indicate faulty pricing or carelessness in issuing upon the part of the Store Keeper, particulars concerning which may be gathered from the Stores Cards, which should be kept in the general office.

In the woodworking industries, the first item to be considered, naturally, is lumber. Whether one ledger account under the title of "Lumber" or a separate account for each kind of wood is kept, a Stores Card, of the general character shown by Plate 7 on page 80 of General Factory Accounting, should be kept for each thickness of each kind of wood, in factories where lumber is purchased in random lengths, or for each size of each kind of wood where dimension lumber is used. The sawyer who cuts stock sizes from boards should be required to keep a tally of the number of pieces of each size which he cuts and at the end of each month the footage of net sizes cut from each thickness of each kind of wood should be credited in the "Issue" column of the respective Stores Cards. When an inventory is taken, the total footage of each kind of lumber found in original lengths and widths should be subtracted from the total footage received (including the amount found in stock at the time of taking the last preceding inventory). The difference represents the gross footage in original lengths and widths of

the boards cut up to make the net footage credited. The difference between this gross footage consumed and the net footage reported cut, will establish the percentage of waste and permit the issue price at which the net footage is taken into cost computations to be raised to a figure which will cover that waste. For example: If the Stores Card for lumber of a certain size shows that 100,000 ft. were on hand when taking inventory at the beginning of a year and that 200,000 ft. more were received during that year and, finally, that 150,000 ft. remain on hand at the end of the year, the difference between the sum of the first two items and the third item represents 150,000 ft., in original measurements, consumed. Let it be assumed that the footage of the finished sizes to which that 150,000 ft. has been cut down is shown by the card to be 100,000. This exhibits a shrinkage of 50,000 ft. or $33\frac{1}{3}$ per cent. Let it be farther assumed that the lumber was inventoried at the beginning of the year at a price of \$75.00 per M. ft., and that subsequent purchases were made at a delivered price of \$70.00 per M. ft. and that the Lumber Burden averages \$5.00 per M. ft., so that all of the lumber, in the original measurement, costs \$75.00 per M. ft. One hundred and fifty thousand ft. consumed, at \$75.00 per M. ft., comes to \$11,250.00, which means that the 100,000 ft. of finished sizes cost us \$112.50 per M. ft. *The percentage of the waste, its relation to the net footage, must be applied to the per M. ft. cost in the original measurements, to establish the cost of the finished sizes, per M. ft.* In the above case, the waste is 50,000 ft. or 50 percent of the finished size footage. Therefore, 50 percent must be added to the cost in the original measurements, viz.: \$75.00 plus \$37.50, or \$112.50. The 150,000 ft. in original lengths and widths above referred to had been cut down to 125,000 ft. in finished sizes, the waste of 25,000 ft. would have been twenty per cent of the 125,000 footage of the finished sizes. In that case, we would add twenty percent to the cost of the lumber in its original measurements, viz.: \$75.00 plus \$15.00, or \$90.00. In the former case, we would have used the figure \$112.50 and in the latter case the figure \$90.00 as the issue price of the lumber in its net or finished sizes that is used in the manufacture of a given article.

The next item to be considered, in the wood furniture industry, is glue. Many manufacturers treat this item as indirect material; but, since direct material is that which tangibly enters,

and is converted, into the finished product, we must consider glue as a direct material. We know that the glue is a part of the finished article, just as we know that the wood, the glass, the trimmings and the nails are there. *The glue tangibly enters into the finished article.* If we take the finished article to pieces, we will certainly find some of the glue adhering to those pieces. Consequently, in our cost calculations we must take glue into account as direct material. It is, however, extremely difficult, and can never be worth while, to establish the exact quantity of glue used in the manufacture of a given article. We should, however, establish that quantity as nearly as we can and price it at figures which will cover the shrinkage. The most satisfactory method of accomplishing this is as follows:

The exact weight of the raw glue that is put into the kettle should be recorded, and a record made, also, of the exact measure of liquid glue taken from that kettle. The invoice price of the raw glue may be \$5.00 per 100 lbs. and the freight upon 100 lbs. may be 10 cents, bringing the gross cost up to \$5.10. The material burden may be six percent, bringing the actual cost of 100 lbs. of glue put into the kettle, including the expenditure for heat to boil it, up to \$5.41. Let us assume, for the purpose of this illustration (the author is not familiar with glue practice in detail and the figures used in this illustration may be ridiculously out of proportion, but they will serve their purpose) that this 100 lbs. of raw glue boils up into five gallons of liquid glue taken from the kettle. Let us further assume that tests demonstrate that because of adhesion to the pots in which it is carried from the kettle, only 75.14 percent of the glue taken from the kettle is available for application to the product. That would mean that 3.757 gallons of liquid glue applied to the product cost \$5.41, averaging \$1.44 per gallon, or 18 cents per pint. It cannot be worth while to establish either quantity or cost of the glue required to manufacture one single article, but it is quite possible to establish a sufficiently exact average by keeping track of the quantity of liquid glue applied in the manufacture of round lots of (25, 50 or 100) articles of a stated pattern. Thus, if we establish the fact that it takes five pints of glue to manufacture twenty-five articles of a single pattern, the total cost of the glue for those twenty-five articles will be ninety cents, or an average

of 3.60 cents per article, which is the figure which should be used in the Standard Cost Sheet for that particular article.

In the ordinary woodworking factory, the most satisfactory accounting method is to carry a "Glue" account upon the ledger, to which are charged all purchases of raw glue (including freight charges) and at the end of the year (or other closing date) this account is charged with its proportion of the Material Burden. As wares are manufactured, this account is credited with the average glue costs, established in the above manner. When an inventory is taken, this account is credited with the raw glue found in stock, and, the more nearly the account then balances, the more nearly correct these average glue costs are shown to be, in the aggregate. For example: Suppose that at the beginning of the year 1,000 lbs. of glue are found in stock and that this quantity is priced at \$5.30 per 100 lbs.

1,000 lbs. on hand @ \$5.30.....	\$ 53.00
12,000 lbs. purchased @ \$5.00.....	\$500.00
Freight on 12,000 lbs. @ 10 cents per cwt.....	12.00
	<hr/>
Total cost of purchases.....	\$612.00
Material Burden at 6% on purchases.....	36.72
	<hr/>
Stock Room cost of glue purchased is 5.406 per lb., or, in all.....	648.72
	<hr/>
Average Stock Room cost is 5.398, or.....	\$701.72
Let us assume that 2,000 lbs. of glue remain on hand at the end of the year which we inventory at an average Stock Room cost of 5.40 per lb., or, in all.....	108.00
	<hr/>
Thus the 11,000 lbs. of glue consumed has cost..	\$593.72

Now, let us assume that we have manufactured only the one pattern—the article upon which we arrived at an average glue cost of 3.60 cents each, and that of this article we have manufactured 15,000 pieces. Fifteen thousand pieces at 3.60 cents

each comes to \$540.00, whereas the glue consumed has cost us \$593.72, leaving a debit balance in our Glue account of \$53.72 to tell us that our average glue costs must be raised ten percent to come out even.

Next, we may consider the item of accessories, viz.: nails, tacks, screws, bolts etc. We may, with reasonable degree of certainty, establish the quantity and, consequently, the money value of these materials, provided that, in the figures at which we price them, we make a sufficient allowance to cover spoilage and waste. The approved method is to charge these materials from requisitions, as issued, to departments where they are consumed. Each Standard Cost Sheet shows one money figure for the lump item of these accessories for each department in which they are, in due course of manufacture, applied to the product. That figure is the one which the Superintendent assumes to be sufficient to cover the quantity of these accessories, required in each of the departments, for the manufacture of each separate article, including a reasonable margin for loss and spoilage. As production reports show completion by one department of, say, twenty-five articles of a given pattern, the account kept with that department is credited with twenty-five times the money figure taken from the Standard Cost Sheet for the item of accessories. When an inventory is taken and the departmental account is credited with the accessories found in stock there, abnormal discrepancies found in this item should be brought to the attention of the foreman in case of shortage, and, if that discrepancy is sufficiently large, either as a shortage or an excess, to warrant doing so, the money figures for accessories shown in Standard Cost Sheets should be carefully gone over to verify their correctness. If these are found to be correct, or reasonably so (in case of a shortage), the discrepancy must be occasioned by wastefulness or theft, and steps should then be taken to correct the abuse.

This item of accessories is made up of a great variety of small materials in different sizes and descriptions, and, to some, it may not seem worth while to endeavor to keep any systematic check upon their consumption. But these small items are those which most require watching. Of course, an equally close check should be kept upon the larger items, but, even without such a check, losses in these larger items are more easily run down. In the

aggregate, however, it is safe to say that the loss incurred by lack of thrift in the employment of these small materials amounts to more than the loss occasioned by the ordinary use of the larger materials. If we charge nails and tacks and screws to the account kept with the department to which they are issued, the foreman of that department, if he is the right man for the job, will want to know whether his account shows economy in the use of these materials. If the account shows a loss, he will know that there are operatives in his department who are careless in small things and, knowing that those who are careless in small things are not, really, efficient workers, he will look for those who are responsible for the rising percentage of the department's burden, due to wastefulness of small materials and, having located them, he will scrutinize their use of other materials and, observing their application to the work given them and more closely inspecting their production, he will either correct their faults or he will give the room they occupy to better workers.

In the items of paint, stains and varnish, we have the same difficulty encountered in the item of glue, viz.: that of establishing anything like the exact quantities necessary for the manufacture of an article. By making tests on round lots, we may determine true average quantities and price those quantities in the same manner as that suggested in the case of glue. First of all, we will keep a record of the varnish drawn from a barrel and establish the average cost of the quantity actually drawn, as explained in Chapter I of this book. Naturally, some of the varnish will adhere to brushes and to varnish pots, and the prices at which we take varnish into account in our cost computations must be raised sufficiently to cover that loss. In the same manner, we may establish the average cost per gallon of the paint drawn from a barrel and raise the prices at which we take it into account sufficiently to cover the loss of adhesion and evaporation. When finishing a round lot of a certain article, we may make tests of the quantities of varnish or paint applied, to arrive at an average cost per article for these items, in the same manner in which we may arrive at the average cost of glue, per article. Having, at first, used estimated figures in our Standard Cost Sheets, we may now substitute for these estimates the figures demonstrated by our tests. We charge all paints, varnish and stains to the Finishing Department as items of Direct Material,

and we credit the account kept with that department, upon basis of the department's production, with the Direct Material figures shown in our Standard Cost Sheets. When an inventory is taken, the Direct Material found in the department is credited to that department's account and if the discrepancy then found in the items of Direct Material is sufficient to warrant doing so, we immediately test all our paint and varnish costs to determine upon which articles our figures have been incorrect.

Trimnings are the items with which we will have the least trouble, because a check of the design will enable us to determine the exact quantities of locks, escutcheons, pulls, knobs, etc., required for the manufacture of an article. When an operative is given a stated number of the articles to trim, his foreman will know exactly what number of each of these articles he will require to complete the job. Necessarily, however, even in these items there is bound to be some waste and spoilage, and the prices at which we take them into account in our cost computations should be raised sufficiently to cover this loss. By charging the account kept with the Trimming Department with these materials and crediting that account with the exact quantities definitely known to be required in the manufacture of the different articles produced, the inventory taken at the end of the year will enable us to determine in what degree the prices at which we have been taking these materials into account have been incorrect and, therefore, the following year we may make our cost figures still more exact by raising or lowering the issue prices on these materials in accordance with the showing found in the Trimming Department account.

In the metal furniture business, the major items of Direct Material are Tubing, Angle Bars and Rods. Where these are purchased in random lengths and cut down to the specific sizes required for the various goods manufactured, we must, first of all, establish the burden that applies to these materials, just as, in the woodworking industries, the Lumber Burden is first established. We must add a proportionate amount of this burden to the invoice price, to cover the cost of the delivery of the material to that point in the factory where the specific sizes are stored, ready for assembling completed articles. The proceeds of sales of scrap metal, recovered after cutting, should be credited to the material burden, thus fractionally reducing the final price

of the material in the sizes to which it is cut down. When we come to compute the cost of an article in the manufacture of which these finished sizes are used, we will be able to price them accurately. A separate account should be kept of differing characters of this heavy material, such as Tubing, Angles and Rods, to which should be charged all purchases of these materials, together with the freight paid upon the same (except, of course, in case of f. o. b. purchases, the carriers' charges are deducted from the amount of invoices) and, at the end of the year, the material burden should be prorated between these accounts upon basis of the weight or footage of the materials received. These accounts should be credited, upon basis of production, with the figures at which these materials are included in our Standard Cost Sheets. When an inventory is taken, therefore, it will be possible to establish the correctness of these figures and to adjust them as the record found in the account may make expedient. In the larger factories, it is desirable to maintain a detailed record of receipt and consumption of these materials, a separate Stores Card for each size or diameter being kept, to which are posted all quantities purchased and to which are credited all quantities consumed, as indicated by production orders issued.

Another considerable item in the metal furniture industry is castings. Separate accounts should be kept of Pig and Scrap Metals and Coke, and, also, an account should be kept of the Cupola Burden. To this latter account should be charged every item of overhead expense that legitimately applies to the burden of the cupola, such as a proportion of the Space Burden (the Space Burden is mainly made up of interest on the investment in and taxes on land and buildings and insurance and depreciation of buildings), interest on the investment in and taxes on the cupola and all the equipment necessary for its operation, such as blowers, blower-motors, scales and trucks, as well as the immediate expense of the cupola, such as repairs to the same and its necessary equipment, cupola supplies, etc. As heats are run, we take records of the pig and scrap metal and of the coke that is thrown into the cupola and of the labor of cupola men and, knowing how frequently we run such heats, we know what proportion of the Cupola Burden we must charge to each heat. In this manner we arrive at the cost of the mass of molten metal

that is drawn off and, by crediting that mass-cost with the foundry scrap and defective castings returned to Scrap Metal, we arrive at that average cost per lb. of good castings at which we must include these in our cost computations.

Brass tubes, of course, are ordinarily purchased in the specific lengths required for the manufacture of different articles of product. When some of these standard lengths are cut down for use in the manufacture of a smaller article, say, we must take this short piece into account at the price of the longer length from which it was cut down, or, even, advance that price sufficiently to cover the cost of the labor of cutting, unless the scrap produced is sufficient to cover the cost of this labor. A separate account should be kept for Brass Tubes and to this account we should charge all purchases, together with carriers' charges and an equitable proportion of the material burden that legitimately applies to brass tubes; and this account should be credited with the figures used in Standard Cost Sheets for the various articles manufactured. Since the quantities of these materials are easily checked and there is comparatively little waste, if this account tells us, when an inventory is taken, that our Standard Cost Sheet figures for brass tubes are inaccurate, we must scrutinize the prices at which we have extended them.

The supplies used in the Polishing Room are, distinctly, Indirect Materials and, as such, should be treated as elements of burden. It must be apparent that any tests we may make of the cost of that quantity of these supplies that is required for the manufacture of a stated number of articles of a given pattern cannot afford us a definite figure for use in computing the cost of future production. Buffing-wheels, for example, will last longer if used by one man than if used by another and, indeed, even if used by the same man, one wheel will last longer than another. The length of service of different wheels subjected to identically the same usage, is bound to vary quite materially. Equally, in the use of rouge, tripoli, emery flour, alcohol and similar materials, one man will be economical and another will be wasteful. Cost accounting can effectively provide for the inclusion of the cost of these materials by ascertaining the percentage of that cost for a given period, in its relation to the cost of the productive labor employed during that same period, and by applying that percentage to the productive labor required to

manufacture the separate articles produced. For items like these we must accept *averages*, because we cannot establish actual quantities. Trustworthy averages are certainly preferable to figures which, while they are assumed to represent actual quantities, cannot be proven. If we will charge all the polishing room supplies to an account kept with that department and include their cost in the departmental burden, finally establishing the percentage of the total sum of that burden in its relation to the total cost of productive labor employed in that department, we will know that, in applying that percentage to the productive labor required to polish a given article, we are including the cost of these supplies in the cost of that article upon a far more reliable basis than the thing might be done by any other method.

Lacquer is, distinctly, an item of Direct Material, but, in spite of that fact, we cannot satisfactorily attribute any definite quantity to the cost of a single article or of any other number of articles of a stated pattern, where it is sprayed. In the spraying process, a very large percentage of this material is wasted, even with the most careful handling of the sprayer. Few workers will be found, under observation, to hold the sprayer rigidly enough to prevent all waste during the first hour of the day's work, and as the hours lengthen the best of them cannot help but "shoot it in the air." The larger the part that is being lacquered, the less of the material will be found to be wasted, of course. Now, if we will charge that material to an account kept with the Lacquering Department, as an item of Direct Material, and apply it to the cost of production on basis of the productive labor, we may not get exactly accurate figures for each separate article but we will get figures which are as nearly accurate as any that can be obtained for this item. Objection has been raised to this practice because of the fact that small parts, such as tubes of small diameter and small trimmings require more productive labor in lacquering than do larger parts. But, prolonged observation of the spraying process conclusively warrants the statement that, if the practice of applying the cost of the lacquer according to the productive labor employed works an injustice at all, it is the larger parts that suffer, for, undoubtedly, a greater amount of the material used in spraying the smaller parts goes into the air than is lost in spraying the larger parts. Because of its intrinsic value, however, it is preferable to treat

the item of lacquer, as Direct Material, as a separate item, rather than to follow the line of least resistance by including it in the departmental burden. Sometimes, when a very large number of parts of identically the same description are being sprayed, it is possible to make a test of some value with reference to the quantity of this material consumed. If this material appears in our Standard Cost Sheets as a separate item, when it becomes possible to make such a test, we will have that item to check the results of our test against, and, if they are found to appear out of line, we may correct them, whereas, if included in the burden, we would have nothing against which to check our test.

Tests of the correctness of our cost figures, with reference to Direct Material and Direct Labor should be made as frequently as the pressure of production will permit. Instead of being done spasmodically, we should continuously and successively test each and every article in the line. As soon as the entire line has been tested, we should begin again at the beginning and test all the articles in that line over again. This should not be interpreted to mean that every job put in work, should be tested. On the contrary, the care and attention required for making these tests makes it imperative that not more than one or two articles be tried out at the same time. It is a good rule, however, first of all, to test the costs of those articles of which we are selling the greatest quantities and of those which we are selling only in a limited way. The fact that we are selling a large number or only a few should be ground for suspicion that our cost figures on those articles are incorrect.

In concluding this chapter, the author wishes again to emphasize the necessity, in cost computation, of carrying all quantity and money figures to at least the second decimal before taking the benefit of the fraction. It is all very well to "play safe" in figuring costs, but, if we take the benefit of all fractions in the use of whole numbers in extending every one of a large number of items in the computation of the cost of a single article, and, further, if we are too ready to assume that the amounts of certain items should be more than our figures make them appear, the result will be selling prices which competition will render prohibitive. The ambitious cost clerk must be ready to carry his calculations to those small fractions which will reflect the condition that, while he is figuring the cost of a single article,

it will be manufactured in round numbers. Carrying cost figures to the second decimal is equivalent to figuring the cost of an article if made up in lots of one hundred.

CHAPTER III

Labor

Of all the elements of cost, none deserves more careful and earnest consideration than does the item of labor, because it is the most elastic. We may economically cut up a board and thus gain a comparatively insignificant advantage. If the sawyer stops to scheme out how that board may be made to yield the largest footage of net sizes, he makes a certain gain in the lumber saved but, in the meantime, his time goes on, so that the value of the lumber saved is not a net gain. If the sawyer had not stopped to map out how he would cut up that board, he would have cut a larger number of pieces, thus wasting some of the lumber, perhaps, but economizing in his own time. But, in the item of labor, careful management may effect tremendous savings. Left to his own devices, the ordinary mechanic will probably putter away his time and produce a comparatively small volume, whereas, if his work is carefully laid out for him and he is made to execute it with a minimum of lost motion, his production will increase tremendously.

Nor is it the compensation, alone, that makes labor the most important factor of production. In addition to the wages paid, we must provide labor with the space in which it is to effect the conversion of raw material into a saleable commodity; we must furnish labor with the tools and machinery necessary to effect that conversion in the most expeditious manner; we must keep those tools and that machinery in repair; we must pay taxes, insurance and interest upon the money invested in that equipment and in the land and buildings wherein we house our labor; we must take into consideration the fact that those buildings and that equipment depreciates day after day. Above all, we must bear in mind the fact that, in order that some of our workers may actually effect the conversion of the raw materials which we purchase into the finished wares which we sell, we must employ other workers to aid them without, however, directly contributing to that conversion; that we must employ others to supervise that conversion and to inspect the product, to keep the accounts and records and to sell that product, so that

the toil of the worker who does, actually, produce our wares, may be worth full compensation. Obviously, these other expenditures, in the aggregate, amount to very considerably more than the amount we pay productive laborers. The employer cannot afford to rest content with the answer to the question: "What shall I pay John Smith?" He must also ask himself: "What will it cost me to employ John?" and: "How much return will John Smith render as compared with Tom Jones?" It is safe to say that in the average manufacturing institution the cost of providing productive labor with the facilities for economically performing its function is in excess of the actual compensation paid that productive labor.

Chapter VII of General Factory Accounting is devoted to the exposition of methods of accounting for labor, with accompanying illustrations of all the necessary forms, which will demonstrate the cost of providing John Smith with the space, tools, machinery and power necessary for the work he is to perform, and of furnishing him the cooperation of non-productive labor, and which will also demonstrate how much will be the return of his labor in the shape of production as compared with that of the labor of any other employee engaged upon similar work. The worker having been hired and assigned to the department in which his previous training and experience will make him most useful, the first problem should be to develop his maximum productive efficiency. This should not be interpreted as the thought of a "slave-driver." The employer is entitled to the worker's maximum productive efficiency in return for the compensation paid and, more especially, in consideration of the fact that the employer has provided the worker with the place in which to earn a livelihood. That is an essentially equitable proposition, to which the worker tentatively assents in applying for employment. In asking to be employed, the worker tenders his maximum efficiency, and, in giving him employment, the employer accepts that tender, wherefore, the contract is signed, sealed and delivered, that:

IN CONSIDERATION of the sum of dollars per, to be paid by the employer to the worker upon the day of each, the said worker agrees to render unto the said employer that maximum amount of labor of which he

is capable, so long as this contract shall remain in force and effect.

Notoriously, with trifling exceptions, the party of the second part does not conscientiously fulfill his part of the contract, but, if the party of the first part, in these days, ventures to point out that failure, the worker feels himself aggrieved, and often terminates his contract rather than to submit to the indignity of being expected to really live up to its terms. That is one of the monumental evidences of an industrial system gone wrong. But the blame for the fact that that system has gone wrong cannot, in all justice, be laid entirely, or even mainly, at labor's door. Employers, in the main, have done so little, we may say almost nothing, to make the contract a desirable one. Far more ready, as a rule, to take the line of least resistance, employers offer labor scant inducement to carry out that contract, and, indeed, but little to assure themselves that it is carried out, to the letter, by rendering the maximum service of which it is capable. We agree to pay the worker a certain sum of money each payday, provided he has worked a certain number of hours and, thereafter, we assume that, being in the factory at his machine or bench during that number of hours, he will earn the wages we have agreed to pay him. Our foremen may, in desultory fashion, keep something of a check upon the volume of work produced, but few of us make any systematic effort to ascertain whether the operator of a certain machine works sixty minutes to the hour or whether he averages forty-five minutes—few of us see the point that we can well afford to hire one or two extra clerks to keep comparative production records for each productive worker because, by so doing, we will be able to increase production without, relatively, increasing expense. We simply take for granted that our workers are doing as well as can be expected and, rather than disrupt things in general by being businesslike about our compensation plans, we allow them to palm off a half day's work for a whole day's pay. Rather than make a businesslike move toward inducing our best workers to do a good, honest day's work by offering them a premium for production beyond what might be considered an average day's work, we allow our factories to be cluttered up with a lot of inferior workers—and the overhead expense accumulates at

exactly the same rates as if we had none but really productive workers in the place.

That having been the attitude of employers, for generations, it is not surprising that labor which is compensated upon a day-wage basis, is not conscientious; nor is it to be wondered at that labor organizations, in certain lines of trade, have been able to limit the individual earnings of piece-workers. That employers, as a class, have multitudes of good reasons for antagonizing organized labor, cannot be gainsaid, but, after all, it is also true that having, as a class, been guilty of the things which drove labor to organize, employers, again as a class, have done little to placate labor and much to irritate it. In consequence, these two classes, whose interests, being identical, would be best served by harmonious cooperation, have, at times, almost reached that parting of the ways beyond which lies industrial revolution.

Happily, there is a growing sentiment among modern employers that a challenging attitude toward labor is not the one best calculated to serve their own immediate interests, and, also, labor is coming to assume a less hostile and more businesslike position toward its *associates in industry*. Some modern employers take the position that, after entering into the contract referred to above, it is not alone their duty to carry out their own side of the agreement but that it is their duty to help the party of the second part to carry out his side to the letter. If, as a class, they have helped to create a condition in which the worker has come to feel that it is no longer obligatory upon him to render the maximum service of which he is capable in exchange for the stipulated compensation per hour, these gentlemen think it good business to offer him a modified form of contract, under the terms of which he has every inducement to fulfill his part. They think it good business because they have come to realize that, if the worker increases his per hour production, they can well afford to pay him a per hour compensation that is increased at the same ratio, because, the greater his per hour production the less a percentage of the expense of providing him with the means of earning that compensation must be charged to the separate articles which he produces. Chapter XII of General Factory Accounting, entitled "Compensation Plans," is devoted to the exposition of the several methods of accomplishing this result.

It is, essentially, the manufacturer's moral duty to afford the worker every facility for turning out the largest possible volume of product, and to teach the worker to avail himself of those facilities, in order that the latter may earn something more than a mere living wage, no less than it is the employee's duty to avail himself of these opportunities and by that maximum volume of production to win for himself the largest possible compensation for his hours of labor. It is the right of the individual to earn for himself the largest possible return upon his investment or upon his industry, provided that, in gaining that return, the right of the other is not impaired. The solution of the one vital problem of industrial science is respect for the right of the individual. The capitalist who is the employer is one individual and the worker who is the employee is another. Both have certain distinct rights and those rights cannot be forced, if social order is to endure. Every man who thinks far enough must see that the rights of both—the natural and inherent rights—cannot conflict.

The manufacturer of today must ever be keenly alert to reduce costs, without, however, reducing the compensation of labor. The laborer in the furniture factory is a consumer of a part of the product of furniture factories and of the product of many other factories. If the manufacturer would prosper, the consumer who is the employee must also prosper. Therefore, it is to the manufacturer's interest that the maximum efficiency of his labor be developed. He must secure the largest volume of production of which his workers are capable. And he can best accomplish his purpose of cost reduction and his purpose of efficiency development, first, by carefully selecting his workers with reference to their fitness for the work to which they are to be assigned and, subsequently, by offering them a differential compensation rate for the product of their industry. Having secured the services of a skilled worker, the manufacturer should offer him such inducements as will not only permit him to earn ample wages, thus insuring the worker's continuance in the manufacturer's employ, but such inducements as will either spur the less skillful to perfect their own dexterity so that they, too, may earn ample wages or, being hopelessly unfit for the competition, drop out entirely.

With reference to labor as an element of cost, two things are

vitaly important to do, viz: Decrease the amount of non-productive labor to the minimum and increase the volume of productive labor's results to the maximum. The salaries of superintendents, wages of foremen, watchmen and general helpers, the time consumed in cleaning and setting machines, in sharpening tools and in cleaning shop—all these are non-productive expense. Above all, however, there is the item of lost time—the time lost by productive workers between jobs, lost because their foreman is not laying out work intelligently. Comparative memorandums of pay-rolls, made out for each department and showing, item by item, the various charges upon the department because of non-productive labor, may be depended upon to minimize this loss if the foreman is worthy of his job. In the factory of one of the author's clients, the first week's comparisons showed that in one department, in which the direct labor normally amounted to about \$400 per week, the item of indirect labor amounted to about \$80, or twenty percent of the productive labor. This particular concern had never attempted anything in the nature of analytic accounting and, at first glance, the figures did not greatly impress the manager. However, when they were explained to the foreman, the latter promptly grasped their significance. The following week's comparison showed that his non-productive labor percentage had dropped to twelve percent and after several weeks the average percentage for the department fell to ten percent, effecting a saving of \$40 as compared with the first week. That foreman had gradually drifted into the habit of allowing his men to come to him for work and, in the absence of a factory system, the expense of that habit had not been understood. *With the figures showing the weekly cost of that habit before him*, that foreman made it his business to keep the work behind the men. Later on, as this same concern became familiar with the possibilities of internal accounting, similar comparisons were instituted with reference to the consumption of material, which presently brought about considerable savings in this respect also, and, finally, they learned that it was possible to hold foremen closely accountable for the volume of work turned out in exchange for the wages paid out for productive labor. The most satisfactory feature of the newer conditions is that, while the company's profits have been substantially augmented, they are now able to compensate their foremen for

services rendered and, since bonus and differential plans of compensation have been introduced, employment in that factory is sought by the class of mechanics *who work with head and hand*.

Costs may be materially reduced by systematic economy in the use of raw materials, may be more substantially reduced by the minimization of the expense for non-productive labor, but, above all, and in a far greater degree, they may be reduced by increasing the efficiency of labor—of productive labor, especially. Increased efficiency may be best defined as: Increased volume of production without corresponding increase in inherent cost. Inherent factory cost is the compensation paid productive labor plus the sum of the expense of providing that labor with the means of performing its function. We may pay a worker \$2.00 per day and the expense of providing him with the space, equipment, power and cooperative non-productive labor which is necessary for the proper execution of his work may be \$2.00 per day. If the average production of that worker is 100 pieces per day, the inherent factory cost of those pieces will average \$4.00 per 100. Now, if we can induce the worker to increase his output to 150 pieces by paying him \$3.00 per day and if the sum of the expenses of providing him with space, equipment, power and cooperative non-productive labor increases to, say, \$2.25 per day, the average inherent factory cost of those pieces will be reduced to \$3.50 per 100. He will have been induced to increase his production by increasing the amount of his compensation upon exactly the same ratio as his production has increased, and still we are the gainers by reason of the fact that the inherent factory cost of the articles he has produced has been lowered.

The expense of providing the productive worker with the space, equipment, power and cooperative non-productive labor which is necessary for the proper execution of his work (the sum of which expenses we call Factory Burden) is largely of a *fixed* character; for instance, interest upon the investment in and taxes upon premises, insurance and depreciation of buildings and equipment—all these are expenses which accrue, day by day, whether our factory works full time, or half time, or not at all. The greater the volume of the result of productive labor, therefore, the less of this burden will apply to each separate article manufactured. The percentage of the sum of these expenses that apply to a given department, in its relation to the productive

labor employed in that department, is easily to be established and, in figuring costs, if we will establish the exact amount of productive labor required in a certain department to manufacture a given article and then apply that percentage to that labor, we will definitely establish the cost of manufacturing that article, so far as that department is concerned.

Cost finding, however, is the least important of the two objects to be gained by properly accounting for labor. The infinitely more important object is to reduce cost. Many furniture and woodworking plants have been persuaded to install systems of accounting which, while they would be eminently satisfactory in an automobile factory or in a locomotive works, are not at all adapted to the first-named lines. These systems render necessary the continuous compilation of job costs, that is: the cost of each and every job that is put in work must be compiled. The reader will readily understand the necessity for keeping costs in this manner where an expensive machine is being constructed and where, because of changes in types, an operation may take the greater part of a day or several days, so that it is vital to economical operation to keep a detailed check upon the cost of each piece of work performed. But why, in the name of common sense, should the productive workers in a factory which manufactures small staples, such as furniture, in large quantities, be required, day after day, to suspend the work with which they are thoroughly familiar, to take up pencil and time card and laboriously record figures which purport to show that it has taken a certain number of fractions of an hour to perform one operation ten times and another number of fractions of an hour to perform another operation fifteen times (and such figures nine times out of ten, aren't anywhere near the facts), if the only purpose, when the time-card reaches the office, is to set down the fact that so much time having been consumed, therefore the labor cost of one lot, say, twenty-five parts was \$12.29 while the labor cost of another lot of the same number of identically the same parts was \$12.32? Is it not conceivable that the time spent by the worker in the unaccustomed and awkward use of pencil, in making figures which are seldom reliable, might be far more profitably employed in *producing* additional parts?

Numerous systems, embodying this feature, have come under the author's eye in furniture and woodworking plants and, when

the question was asked: "Now that you know that one lot cost you \$12.29 and the other \$12.32, what benefit have you gained by the knowledge?" no answer was forthcoming. The purpose of cost compilation can only be the establishment of profitable selling prices. And, in the furniture and woodworking factory that manufactures staple articles in round lots, *the average cost being established*, we have no occasion to bother about minor variations in the cost of successive jobs. If we charge to an account kept with a department all the productive labor employed in that department, as one item, and all the overhead expenses that apply to that department as, in the aggregate, another item and, if we have established the average cost for each operation performed in that department, we are best served by permitting the productive workers in that department to stick to the work with which they are most familiar, thus increasing the volume of their production. If then, we will, from time to time, verify the correctness of the labor figures which we have established as the average cost of the various operations, by testing the time consumed in performing those operations when round lots of wares are being processed, and if, further, we will credit the account kept with a department with that department's production on basis of the average labor figures referred to, an inventory will tell us whether, in the aggregate, our figures are incorrect and in what degree and, therefore, we will have accomplished everything that is desirable for the purpose of fixing selling prices.

It is quite another matter, however, if, in the campaign to reduce costs, we require our workers to show the time consumed in performing certain operations a stated number of times, by reporting the same upon a daily time card, so that, when that time-card reaches the office, we may be able to determine whether the time consumed in performing that operation the stated number of times is within our standard of efficiency. For instance: If our Efficiency Card for an operation (see Plate 44 in General Factory Accounting) shows that our Standard Mark for performing that operation 100 times is nine and one-half hours, if the time-card shows that the operative took five and one-half hours to perform that operation fifty times, we have established a fact that is worth knowing, because, then, we can *immediately* take that operative to task and either induce him to speed up his

production or we can make room for a better worker. In any case, however, where the daily time-card is used, accuracy in reporting time employed in performing different operations must be insured. Otherwise, all the work involved is worse than wasted, for we will only be misled. Therefore, it is vital that these time-cards should be promptly posted to the Efficiency Cards on the day after the work is performed and any variations from the accepted standard immediately investigated.

The product of manufacturers in the industries referred to in the title of this book is, as a rule, either entirely composed of staples, i. e., goods which are regularly manufactured in round quantities, or the proportion of specialties is so negligible a quantity that, in the formulation of a system of factory accounting, we cannot afford to consider it a really important factor. Such a manufacturer, who has not yet made a beginning in analytical accounting, will make more satisfactory progress in the regulation of his production costs, if, at beginning at least, he does not attempt to keep a consecutive detailed record of the manner in which his productive workers have employed their time, except as they may be engaged in non-productive work—that is, if he does not require these productive workers to record, upon a daily time card or upon coupons or job cards, the work upon which they have been engaged and the length of time consumed in the execution of each successive job or operation. As stated above, if we will charge all the productive labor employed in a department to the account kept with that department, and then credit that account with the labor required in that department for the manufacture of the wares which are actually produced, at the average labor cost figures established, first, by estimates or the best available data and, ultimately, by making tests, in the manner presently to be explained, of the cost of each operation, our departmental accounts will tell us whether our labor cost figures are correct in the aggregate and our specific tests will show us when our labor cost figures are wrong with reference to any single operation.

It is extremely conservative to say that the workers in these industries who are required to keep a consecutive detailed record of their daily employment spend not less than five percent of the total time for which they are compensated in making such records and, counting the expense for the extra printing neces-

sary and the additional work made for foremen and the additional clerical help required to work up the data from these records, the total cost of time of consecutive time records must be not less than from eight to ten percent of the total amount of the wages paid for productive labor. Consequently, in a factory with an annual productive labor item of \$50,000, four or five thousand dollars will be spent each year for the compilation of figures which, except in very highly organized institutions, can never be even approximately correct. The human factor enters into the problem here. Everywhere, where the daily time card or its equivalent is in use, if the workers are not very closely watched, they will either deliberately make false reports or, even the best of them, unintentionally but frequently, erroneous ones. And in many factories the author has found that workers were allowed to wait until the end of the day before recording details of the complete day's work. Obviously, reports made under these conditions, and the statistics worked up from such reports, cannot be worth very much. In most instances, comparisons of the figures arrived at in this manner, purporting to show the cost of performing a certain operation a certain number of times, will just as frequently demonstrate that the *average* time required to perform an operation one hundred times, consecutively, was greater than the *average* time required to perform that same operation five times, as they will demonstrate the reverse.

If he were to engage in manufacturing, in the furniture or woodworking industries, operating under the conditions that obtain, and employing the character of help that is employed, in the typical factory in those industries, the author would, in the light of his experience, very much prefer, at beginning, to have his superintendent and foremen give him estimates of the average cost of performing each different operation and, subsequently, to test those estimates when round lots of wares in process of being manufactured would require the performance of these operations a sufficient number of times to make such a test conclusive. While knowing that his average labor costs upon different articles of product might not be exactly accurate, he would feel quite sure that, after making a test of an operation two or three times, those average costs were within eight or ten percent of the actual figures. He would have the satisfaction of knowing that his productive workers were putting in all their

time in executing the work with which they were most familiar, and *producing a merchantable commodity*, instead of spending half an hour or more each day with pencil and card, writing down figures which really meant nothing to him. He would feel quite confident that, without this distraction, his foremen would be able to force production to within five percent of their previously given estimates (and, by way of satisfying himself upon this point, he would cause continuous tests to be made to verify the correctness of estimates, first, and, subsequently, of the figures arrived at in previous tests), so that, instead of spending from eight to ten percent of the total outlay for productive labor in compiling inaccurate figures from which he would gain no benefit, he would be gradually narrowing that percentage until, finally, his tests would prove his averages correct.

In these industries it is far more important to establish the cost of non-productive or indirect labor and, having established it, to include it in the burden that applies to the productive or direct labor, than it is to establish the specific cost of each operation. We pay a certain amount of money for labor in a given department and, if we can establish the proportion of that amount that is spent for labor which does not *produce* anything in the nature of a saleable commodity and which, therefore, is not included in the labor figures (whether these be estimated or the results of conclusive tests) which we carry in our Standard Cost Sheets, we will have made a long stride toward correct cost finding and, no less, toward cost reduction. The outlay for indirect labor is as much an element of burden as are insurance, taxes and depreciation. In the factories of those of the author's clients who are just beginning to practice analytical accounting, the Daily Work Card, illustrated in Plates 11A and 11B in General Factory Accounting, is successfully used for the purpose of establishing the cost of indirect labor, except the item of lost time, which, where foremen systematically lay out the work for their operatives, is never a considerable item and which, therefore, may safely be included in average operation cost figures.

Where these cards are used, productive workers are assumed to be productively employed except during the time reported on the back of the card (see Plate 11B). All indirect labor jobs, such as cleaning machines, setting machines, sharpening tools, cleaning shop, etc., are given a blanket number. When a pro-

ductive worker is given a job which is not part of the regular process of manufacturing, the number of that job is written in the column under "Job No.," the time of beginning work upon that job is written under "From" and the time of completing under "To." When the card is returned to the office at the end of the day, this indirect labor time is extended into the "Hours" and "Tenths" columns (working hours being split up into fractions of six minutes, or one-tenth of an hour, each). When the pay-roll is made up, the productive worker is credited with having worked productively all of the time except during those intervals reported on the back of the card. The direct labor is entered on the pay-roll as one item and the indirect labor as another item. When the pay-roll is analyzed, the account kept with the department is charged with the sum of all direct labor as one item and the sum of all indirect labor is charged to that account as a burden item. And the foreman who regularly receives his monthly departmental statement (see illustration in Plate 42 of General Factory Accounting) soon learns to understand that this item of indirect labor in his burden is one which he may very materially reduce and thus effectively contribute toward the reduction of Factory Cost, with corresponding benefit to himself.

When it is desired to test the cost of a particular operation, the Cost Clerk issues a Job Time Card (such as is illustrated in Plate 13 of General Factory Accounting) when a production order is issued for wares, in the manufacture of which that operation will have to be performed. He inserts the Date, Job No. (Number of the production order), Part or Stock No. (of the article to be manufactured), the Operation No. and No. of Pcs. to be processed, then sends the card to the foreman of the department in which that operation is performed. When the foreman gives out the work, he either himself records the details upon the card or he turns over the card to the worker with instructions to record thereon the date and hour and fraction of time of beginning to work on the job and the date and hour and fraction of time of completing it. When the card is returned to the office, the Cost Clerk extends the total tenths of hours consumed in the performance of the job the indicated number of times at the rate of compensation paid the operative into the "Money" space, compares that money figure with the labor cost

of that operation as it appears upon Standard Cost Sheets and, if any appreciable difference is found, calls the attention of the Superintendent and foreman to that difference, whereupon the operation is tested a second time under the supervision of the foreman. If the second test proves the correctness of the figures obtained in the first test, these are now substituted for those previously shown in the Standard Cost Sheets. If the second test proves inconclusive, a third and further tests are made *until the average cost of performing that operation that number of times which is fairly representative under governing conditions is satisfactorily established.*

The wages paid non-productive workers, such as engineers, firemen, watchmen, elevator men, truckers, etc., of course, appear on the pay-roll as indirect and, ultimately, are charged to accounts kept for non-productive departments or, as an item of indirect labor (wages of truckers, shop-cleaners, etc., for instance) to accounts kept with the productive departments in which these workers are employed. There is one kind of indirect labor, however, concerning which we should have a complete detailed record, at least of the time consumed in the execution of jobs requiring more than a quarter or half hour, viz., the labor of workers in the Maintenance Department, such as machinists, millwrights, carpenters, etc., whose work is devoted to the upkeep of machinery and equipment, repairing buildings and similar jobs. Naturally, much of the time of these workers is spent on small jobs requiring so little time for execution as to render accounting for them a difficult and, no less, fruitless task and, further, some of their time is employed in the construction of new equipment which is not in the nature of expense at all. Full details concerning the methods of accounting for this kind of labor will be found on pages 92 to 95 of General Factory Accounting, with accompanying illustrations in Plates 14A and 14B. A complete exposition of methods of accounting for piece-work and of making payrolls will be found on pages 95 to 99 of the same book, with illustrations in Plates 15, 16 and 17.

After some practical knowledge of factory accounting has been gained by actual experience in the use of such methods, a manufacturer in these industries may come to see that, in his own plant, conditions governing operation are such that, in spite of the expense involved, a consecutive detailed report of time

consumed by each worker in productive operations will be of substantial benefit. It is to be understood that, where the process of manufacture, with reference to volume of production of individual articles, justifies, the compilation of statistics based upon such reports may very well be worth the expense, just as it is to be understood that, unless such detailed reports are carefully made and carefully checked, they might as well not be made at all. The principal objection to the employment of this feature in the furniture and woodworking industries, as business is conducted in these industries today, is that the product of most manufacturers is so diversified that an operative cannot be employed upon a single operation for more than a fraction of an hour at a time. In the exceptional case, where operatives are customarily given one or several hundreds of pieces upon which to perform a given operation, the consecutive detailed time report can be made most effective in the campaign for cost reduction.

By way of making such reports absolutely accurate, the use of mechanical time-recorders is sometimes found of advantage. There are a number of successful devices of this character on the market, most of which punch or stamp the time of beginning and of completing a job on a card which is made to represent the performance of a given operation a certain number of times. One of the things to be considered before incurring the expense of the installation of such a device, however, is brought out by quoting the remark of an old street railway manager (who had himself been a conductor) with reference to a very complicated fare-register which was submitted for his criticism. "The thing works beautifully," he said, "but the machine that one man has made other men can beat, no matter how well it works." The point is this: Unless a man operates a machine which is supposed to be a check upon the work of another, there is no certainty that the purpose of the machine is accomplished. The mechanical time-recorder can be made effective for its purpose if men will make it their duty to make it so effective. It is not to be supposed that the mere installation of a piece of mechanism will insure that labor costs will be correctly reported. Unless the foreman of a department or his assistant makes it his constant duty to see that a job card is stamped or punched by the time-recorder at the time work upon a job is begun and that, immediately upon completion of that job, the card is returned to the

recorder to be punched again, the expense of installing the device might just as well have been saved. Where the mechanical time-recorder is not used, a Daily Time Card, such as illustrated in Plates 12A and 12B of General Factory Accounting may be made a reasonably effective instrument for accurate cost finding and cost reduction, *always provided that the foreman or an assistant will make it his business to see that entries upon these cards report facts.* Where foremen or assistants see to it that the time-recorder is properly used, or that the time consumed in the execution of certain operations is accurately reported on daily time cards of the type referred to, the Efficiency Card which is illustrated in Plate 44 and the use of which is explained in Chapter XI of General Factory Accounting, may be made to contribute most effectively toward the reduction of direct labor costs.

CHAPTER IV

General Factory Burden

The Indirect is the cost accountant's real problem. It is comparatively easy to establish Direct cost, at least to a satisfactorily approximate degree, and were there no other factor to be considered, the term "cost accounting" would be unknown. But, beyond the cost of the material which tangibly enters into the finished product, beyond the cost of the labor which converts that material into that product, beyond the cost of the miscellaneous elements which are termed Direct Incidentals, such as depreciation of machines used exclusively in the manufacture of one specific article, the royalty on such a machine which may be leased and royalties on devices which may be incorporated in the product—beyond all these lies the wide expanse of the Indirect, those expenditures which cannot be directly charged to the cost of any single article or group of articles but which are incurred and which, therefore, must be taken into consideration, as necessary accompaniments of production and sale.

The cost accountant's duty is to devise methods which, in their amplification, will, with increasing refinement of method, more and more thoroughly dissect indirect expense, separate it into logical groups and exhibit the relation of different groups to the manufacture and marketing of the various goods which are comprised in a factory's output. A system that is correctly designed will, with almost automatic precision, demonstrate what portion of the indirect expense might be dispensed with if the manufacture of certain articles of the product were discontinued and the capacity of the factory devoted entirely to the manufacture of the remaining items.

In designing such a system, the accountant does not concern himself with the invoice price of material or with the wage paid for labor. Those quantities are the manufacturer's first consideration. His information with reference to these elements of cost is seldom to be questioned or improved. The factors that are to be considered in the formulation of a system of factory accounting are: Economical use of material and efficient utilization of labor, as well as outlays for all materials and service,

other than Direct Material and Direct Labor, which, in the lump, are commonly referred to as overhead expense, divisible into "Burdens," each such burden applying in its own peculiar way, or upon differing bases, to the raw material which is converted into the finished product, to the cost of the conversion (or cost of production) and to the cost of marketing that product. The present chapter is devoted to the consideration of the elements of overhead which become a burden upon production, variously referred to as Manufacturing Expense, Production Expense, Factory Overhead or, properly, Factory Burden, and to the methods of correctly assembling and arranging those elements so that they may be correctly included in cost computation and that their significance with reference to profitable operation may be better and more thoroughly understood.

Whether actually disbursed or its outlay merely prospectively incurred, every dollar of the cost of operating a factory should be incorporated somewhere in our accounts in such a manner that it may be insured of inclusion in our cost computations. To the extent that these expenses, actual or prospective, are omitted from those computations, to that same extent will our Profit & Loss statement tell us that we have been in error. The purpose of a real factory system should be to make such errors impossible. A system that is a "cost system" (as the term is used, though it is utterly devoid of real meaning) and nothing more is not worth a very great deal. Any set of methods that pretends to show costs but does not interlock with the general accounting scheme and so cannot be made to prove the correctness of those costs is really an insidious foe of profit. Certainly, it cannot be very satisfactory to have a system demonstrate that wares are sold at a loss and then discover in the annual P&L statement that a profit has been made, and very much more unsatisfactory to have the system apparently demonstrate profitable operation, only to find, at the end of the year, that money has been lost. Of what value can such a "system" be and what return is shown for the expense of operating it? Obviously, if a system can be made to prove, during the course of the year, exactly what profit is being made upon each and every article produced and sold, something well worth while has been accomplished.

To accomplish such results, it is necessary to design a system of accounting that will, without fail, *force* the inclusion of every

item of expenditure. To be eminently satisfactory, factory accounting must afford the means of proving its own conclusions. Costs that cannot be proved, and a system that does not, periodically, *compel* the proof of costs, must always be untrustworthy. Why should cost figures be untrustworthy? When an inventory has been taken and the books have been closed, the final trial balance should just as conclusively prove the correctness of costs as it indicates the correctness of bank balances. Let this not be accepted, however, as conveying the idea that a factory accounting system, to be eminently satisfactory, must be elaborately intricate. Satisfaction in accounting does not, necessarily, mean refinement in detail of method. Nor should demonstration of costs be the primary purpose of the practice of such a system. An analytical system of factory accounting should mean: Keeping books with ourselves—keeping account of our raw materials, keeping account with our departments, keeping account of our goods in process of manufacture and of completed wares, in stock and delivery of the same.

It has been said that the time is not far distant when every American manufacturer must look to internal economy for his profit, rather than to expanding the volume of his sales. But the time has never been when internal economy could not have been made to pay large dividends. Because of an abnormal—almost prodigal prosperity, American manufacturers, with some few exceptions, have deliberately ignored the expediency of real economy in management. A properly designed system of factory accounting is the first step, and the longest, we may take toward effecting those economies. Such a system can be made to bring to attention abuses in the use of raw materials, -abuses in the item of Indirect Labor and, especially, abuses in burdening a factory with wholly unnecessary expense. Comparisons which such a system makes possible, between different departments and, particularly, between differing periods for the same department, will enable the management to trace those abuses to the careless employees.

We must not, however, attempt too much at first. Beginning in the simplest way, no considerable change in bookkeeping methods is necessary. Separate accounts are opened for the bulky raw Direct Materials and with all Departments, Productive and Non-Productive. To the accounts kept with non-productive

departments are charged all labor and all supplies employed and consumed therein as well as each department's due proportion of the general expense of operating the factory. Ultimately, the expense assembled in the accounts kept with non-productive departments, is made an element of the expense of operating the productive departments, for the benefit of which the non-productive departments operate. To the accounts kept with the productive departments are charged, all Direct Labor, as one item, and all Indirect Labor as another; all the smaller items of Direct Material which are consumed in these departments and in the use of which foremen and employees may exercise economy, as one item and all Indirect Material and supplies as other items and, also, these productive departments are charged, in one form or another, with all the general expenses of operation. Then, as goods are manufactured, the bulkier direct materials reported as consumed are credited to the Direct Material accounts and the Productive Departments are credited with the smaller Direct Materials applied in the department, with the Direct Labor required to manufacture those goods and with a due proportion of the Departmental Burdens. The percentage of the sum of all Indirect Materials, all Indirect Labor and a proportion of the general expenses which have been charged to these productive departments, which sum we call Departmental Burden, in its relation to the Direct Labor charged to the same accounts, will tell us what amount of that Departmental Burden must be added to the productive labor involved to cover the cost of running a given lot of goods through each of these departments. In this way the total Factory Cost is established, department by department.

Among the considerable items of general burden that apply to the cost of production are: Rent of premises occupied or depreciation of buildings; depreciation of equipment, horses, harness and wagons, automobile trucks, etc., and interest upon the investment in and taxes upon and insurance of these assets and interest, taxes and insurance upon other assets which are not subject to definite depreciation, such as raw materials and finished wares and wares in process of manufacture. Other considerable items of general burden are: The expense of administration and of the office; the expense of generating or the outlay for light, heat and power; the expense of maintenance

of equipment; salaries and wages of superintendents, foremen, watchmen, general helpers, etc.; the outlay occasioned by and provision for accident relief and expense.

After having separated and grouped expenditures of a general nature, the accountant must satisfy himself as to the reasons which occasion each separate outlay and add its amount to the burden of which it logically forms a part. If a given item is shown to be legitimately a part of several different burdens, he must determine the basis upon which that item may fairly be apportioned between the accounts kept of those different burdens. For instance, of the expense of administration which, as a rule, includes the salaries and expenses of general executives whose jurisdiction extends over purchasing, manufacturing and marketing, ordinarily only a proportion may be charged to the cost of production. Similarly, only a proportion of the expense of the office may equitably be charged to production. The office force is employed in keeping records and accounts and with work the purpose of which is regulation and control of purchases and stocks of raw material, manufacturing and marketing. The proportion of the expense of administration and of the office which may fairly be charged to production by being made an element of Factory Burden, therefore, varies with different plants. In the small factory, the time of a single general executive may be given exclusively to supervision of manufacturing operations, in which case his entire salary and expenses should be charged to the Factory Burden; if his time is devoted wholly to supervision of the selling campaign, that expense should be entirely charged to the Selling Burden. If a part of his time is devoted to purchasing material, a part of that expense should be included in the Material Burdens. Where elaborate systems of factory accounting are features, the salaries of clerks employed in the work of those systems and the expense occasioned by their employment must, of course, raise the percentage of the office expense that is chargeable to the Factory Burden to a higher figure than that percentage would be if only the simplest factory methods were practiced.

Interest upon the investment in and taxes upon land and buildings and insurance and depreciation of buildings represent the cost of the space within the buildings. As that space is occupied, so should that expense be apportioned. In most factories,

finished and partly finished wares are stored under the same roof that shelters the departments where those wares were manufactured, and the Shipping Department also occupies space there. We must, therefore, determine the aggregate of these expenses and apportion that aggregate between the various departments, according to the space occupied by each. That aggregate expense is called Space Burden, a part of which may be charged to Material Burdens, according to the space occupied for the storage of raw materials, to Selling Burden, according to the space occupied for the storage of finished and partly finished wares and to the various departments, productive and non-productive, including the office, according to the space occupied by each. If the Sales Department occupies a separate office and if a show-room occupies some of our space, the account kept with the Sales Department should be charged with that proportion of the Space Burden that the actual space occupied by that department's office and show-room bears to the total space in our buildings.

Interest on the investment in and taxes upon and insurance and depreciation of factory equipment must be charged to the accounts kept with departments in which that equipment is located. The same charges, as they apply to the value of horses, harness and wagons, should be debited to Stable or Teaming Expense; those that apply to the value of automobile trucks should be charged to Garage or Auto Trucks Expense; those that apply to the value of office furniture and fixtures should be charged to the Office. Such interest, taxes, insurance and depreciation should be charged, item by item, to the accounts kept with each separate non-productive department in a factory, as, for instance, the Light, Heat & Power Department and the Maintenance Department, but that portion which applies to the value of the equipment located in the productive departments may be charged to one account entitled Equipment Burden, the total expenditure charged to which, ultimately, is charged, as one item, to the accounts kept with those productive departments, between which it is prorated on basis of the value of the equipment located in each.

The expense of the Light, Heat & Power Department should be charged, as a separate item, to the accounts kept with the departments in which power machinery is located, each being

charged with its proportion on basis of rated power consumption. The expense of the Maintenance Department should be charged, as a separate item, to the accounts kept with the departments for which the Maintenance Department performs service, each department being charged with the labor and material employed and consumed in the service actually rendered (as reported upon Maintenance Department Work Reports—see Plates 14A and 14B of General Factory Accounting). It is, however, always the case that small repairs, requiring only a few minutes of time and material valued at a nominal amount, form a large proportion of the work of the Maintenance Department. Rather than attempt to trace and record the expense of these small jobs, it has been found satisfactory in the furniture and wood-working industries to add the expense of these small repairs (as indicated by the deficit appearing in the Maintenance Department account at the end of the month) to the Equipment Burden and so, ultimately, include it as an element of productive department burdens according to the value of the equipment situated in each of these. Some small injustice is done here, of course, because no charge is made to non-productive department accounts for the minor repairs made for these and because a larger amount of these small repairs is made for one department than for another. The dollars and cents figure involved, however, is not, ordinarily, of sufficient significance to warrant the expense of actually tracing the expense of these small repairs.

Certain expeditures, also, may be most equitably proportioned according to the labor employed in each department, especially, the expense of and provision for accidents, such as premiums upon liability insurance policies, interest, taxes, insurance and depreciation as these apply to the mechanism installed to keep records of labor, such as time-recorders, etc. The expense of superintendence that applies to the Space Burden because of the time of watchmen and to Material Burdens because of the labor of handling materials, may be charged direct to these burden accounts and the balance to the Labor Burden, which is subsequently prorated between the accounts kept with all departments in which labor is employed.

The equitable reason for charging proportions or all of the expenses enumerated above to the Factory Burden and thus burdening them upon production, will be apparent with the

single exception, perhaps, of interest on net investment. The proposition that interest upon a manufacturer's net investment should be considered an element of overhead expense has frequently been debated in meetings of manufacturers in the furniture and woodworking industries. Accounting practice, of course, prescribes that procedure as technically correct. Accountants maintain that capital is entitled to a definite return, regardless of any activity upon the part of the manufacturer, and that the manufacturer cannot truthfully be said to have earned a return upon his activities until his profits equal that return which his capital would earn, without any activity upon his part, if invested in a less hazardous security than is presented by the ordinary manufacturing plant.

Technicalities aside, it must be obvious that the prosperity of the furniture and woodworking industries, as a whole, depends upon equalizing conditions, as nearly as that may be done, between different factories, in order that comparisons of cost figures may be made intelligently. For example: One manufacturer may have \$300,000 invested and, as a non-borrower, no interest charge will appear in his burdens. A second manufacturer may require \$300,000 for the operation of his plant, of which he borrows \$100,000, and he must show the interest paid upon that sum in his burdens. Let it be assumed that he has borrowed at an interest rate of six percent. Therefore, his burdens will include an interest item of \$6,000. A third manufacturer may also require \$300,000, of which he borrows \$200,000 at six percent and he must show in his burdens an interest item of \$12,000.

For purposes of effective comparison, let us assume that each of the three does an annual business of \$400,000 and that, exclusive of interest charges, the Selling Cost of the wares sold amounts to \$350,000. The net profit of that one of the three who does not borrow will be \$50,000; the net profit of the one who borrows \$100,000 will be \$44,000 and the net profit of the one who borrows \$200,000 will be \$38,000. So far, so good. Let us further assume, however, that this Selling Cost of \$350,000 is split up in this way:

Direct Material	\$100,000
Direct Labor	100,000

Factory Burden (exclusive of interest charges)	100,000	
		<hr/>
The sum of these three items constitute Factory Cost		\$300,000
Selling Burden (exclusive of interest charges)		50,000
		<hr/>
The total sum constitutes Selling Cost...		\$350,000

In figuring costs, that one of the manufacturers who is not a borrower will add 100 percent to the Direct Labor figures and 16 2/3 percent to the Factory Cost figures, in order to establish the Selling Cost of any article in his line. Let us now assume that in the case of the two borrowers, one half the interest is charged to the Factory Burden and the other half to the Selling Burden. In the case of the manufacturer who borrowed \$100,000, Selling Cost would be split up in this way:

Direct Material	\$100,000	
Direct Labor	100,000	
Factory Burden	103,000	
		<hr/>
Factory Cost		\$303,000
Selling Burden		53,000
		<hr/>
Selling Cost		\$356,000

In figuring his costs, this second manufacturer will add 103 percent to the Direct Labor figures and 17 1/2 percent to the Factory Cost figures, in establishing the Selling Cost of separate articles of his product. In the case of the manufacturer who borrowed \$200,000, Selling Cost would be split up in this way:

Direct Material	\$100,000	
Direct Labor	100,000	
Factory Burden	106,000	
		<hr/>
Factory Cost		\$306,000
Selling Burden		56,000
		<hr/>
Selling Cost		\$362,000

In figuring his costs, this third manufacturer will add 106 per-

cent to the Direct Labor figures and 18 3/10 percent to the Factory Cost figures, in establishing the Selling Cost of different articles of his product. Because of the unequal conditions of capitalization, cost comparisons between these three manufacturers would lead to nothing, since elements included in the figures of the second and third would find no equivalent in the figures of the first and, as between the second and third, these elements would vary so greatly that comparisons would be ineffective.

The purpose of such comparisons, between manufacturers engaged in the same industry, must be to educate those manufacturers. In computing the cost of a certain article which two manufacturers produce, one of them may have overlooked a certain item or have included it at erroneous figures. Comparisons of the figures shown in the computations of both, therefore, will point out such errors and, ultimately, the general good of the industry is advanced because the one in error will correct his error. Now, if by way of equalizing conditions,

The manufacturer who borrows nothing,
will include in his burdens an interest
charge upon his net investment of \$300,-
000 at the rate of six percent, his oper-
ating expense will show this item as.. \$18,000

The manufacturer who borrows \$100,-
000 already includes in his burdens an
interest charge of.....\$ 6,000
and if he will, in addition, include an
interest charge of six percent upon his
net investment of \$200,000 or..... 12,000
his operating expense will show an in-
terest item of..... \$18,000

The manufacturer who borrows \$200,000
already includes in his burden an in-
terest charge of.....\$12,000
and if he will include an additional

charge of six percent upon his net investment of \$100,000, or.....	6,000
his operating expense will show an interest item of.....	\$18,000

In this manner, these conditions will be equalized between the three, so that, to that extent, cost comparisons between them will be of educational value.

Six percent is used as the interest rate in the foregoing illustrations because it is readily understood. It is not to be inferred, however, that the author approves of this rate for the purpose of figuring interest upon net investment. That sum of money which may represent the average net investment in the furniture and woodworking industries cannot, ordinarily, be loaned at anything like bank counter rates and, also, it is true that the borrower does not, as a rule, remain a borrower throughout the twelve months of the year. Obviously, therefore, one purpose of charging interest upon net investment, i. e., equalizing conditions between different manufacturers in an industry, would be best served by fixing the rate at a lower figure than bank counter rates. Associations of manufacturers should adopt such a rate as the standard of practice, and each member of that association should, thereafter, include interest upon his net investment at that standard rate as an element of his operating expense. It is to be believed that such an association, representative of the intelligence in an industry, cannot do one single thing that will more effectively contribute toward the general prosperity of that industry than to ceaselessly and strenuously advocate the inclusion of interest upon net investment in burden charges. The more all the manufacturers in an industry can be made to realize that the capital they have invested is entitled to a fair return in the shape of interest, before they themselves can be said to have earned a profit, the more they will be likely to include the equivalent of that interest in their operating expenses and, thus, automatically advance their Selling Price figures.

Obviously, the practice of charging such interest to burden accounts, in the manner indicated, does not affect the final result of a year's business. The interest that is charged to the monthly burden account must, necessarily, be credited elsewhere. Ord-

narily, the credit is given an account entitled Interest on Net Investment. The amounts credited to this account are in the nature of a monthly income, as might be income from rentals. At the end of the year, this income from net investment is transferred to Profit & Loss account, as one item, while, as other items, the income from operations is transferred to the same account. If the income from net investment did not appear in the Profit & Loss account, by reason of the fact that it had not been included in operating expenses, it must be clear that the income from operations would be that much greater and, finally, the Profit & Loss account would show identically the same net profit.

It is to be admitted, of course, that it might work a hardship upon some members of an association to insist upon the entire membership figuring costs invariably and without exception upon basis of the inclusion of such an interest charge in burdens. In sections where competition might lie between members of such an association, no such hardship would be occasioned and, if such a condition does, actually, exist anywhere, the members of such an association, in their own interests, as well as for the purpose of setting a commendable example to the rest of the trade, should conscientiously adhere to this practice. But many are in immediate and keen competition with numbers of manufacturers who, not being members of such an association, would not include such a charge in their burdens. In such cases, the author recommends that upon their books, by way of educating themselves to the importance of including this item in their cost ideas, they should actually charge interest upon their own investment but that, in figuring costs, they use burden percentages which do not include this interest charge until conditions of competition warrant the other method. The more manufacturers who are members of an association in a given industry will educate themselves with reference to the correctness of the proposition of charging interest upon net investment, the more effective will be the missionary work they may be able to do with unattached competitors.

The question may be asked, how the percentages of the burden that does not include this interest charge, may be established. A part of that interest will be charged to the Space Burden first, and, ultimately, to the account of a department,

according to the space occupied by each department, because of the investment in land and buildings. Another part of that interest will be charged to the account of a department because of the investment in equipment used by that department. A part will be charged to Material Burdens and another part to the Selling Burden, according to the investment in raw materials and finished and partly finished wares. To establish the percentages of the various burdens, exclusive of these interest charges, a detailed statement of each of these Departmental and Burden accounts should be taken off and from the sum of the burden items in each should be subtracted the sum of the several items of interest on net investment that appear in such an account. The difference then remaining in a Material Burden account will show, of course, a lower percentage, in the relation of the amount of that difference to the invoice cost of materials; the difference remaining in the account kept with a department will show a new percentage in its relation to the productive labor employed in (and charged to) that department's account and the difference remaining in the Selling Burden will show a new percentage of the Factory Cost of wares.

CHAPTER V

Departmental Burdens

Factory Burden, defined as an integral quantity, is the aggregate expense of factory operation—the sum of all expenditures of a general nature, such as those referred to in the last chapter, or of portions of these, plus the sum of expenditures whose nature is specific. In formulating an effective system of factory accounting, however, we may not consider Factory Burden as an integral quantity. We must consider it as the sum of certain groups of expenditures or “burdens” upon production—that is, the sum of the burdens of the several productive departments. We may not say: “Our Factory Burden is eighty percent of our Direct Labor; therefore, we will apply eighty percent to all the Direct Labor consumed in manufacturing a given article, the resulting amount of which, added to the sum of Direct Labor and Direct Material, will give us our Factory Cost.” The Factory Burden that legitimately applies to the manufacture of a certain article is the sum of the proportions of the burdens of the several departments which contribute to the manufacture of that article. For instance: For the manufacture of a certain article we may require Direct Material costing \$1.00. In the process of converting that material into a saleable commodity, it may pass through several departments, in each of which a certain amount of Direct Labor is applied and, therefore, the proportion of the burden of each of these departments, based upon that amount of Direct Labor which is applied to each, must be added together in order to arrive at the total Factory Burden as it applies to the manufacture of that article. Let us assume that Department “A” performs twenty cents worth of labor and that the burden of that department is 60 percent; that Department “B” performs forty cents worth of labor and that the burden for Department “B” is 80 percent; that Department “C” performs fifteen cents worth of labor and that the burden of “C” is 100 percent; that Department “D” performs twenty cents worth of labor and that “D’s” burden percentage is 40. The sum of the cost of Direct Material, plus Direct Labor, plus

the burden for each department gives Factory Cost. The problem is stated below:

Direct Material			\$1.00
	Direct Labor	Burden	
	Amount	Percent	Amount
Dept. "A" .....	.20	60	.12
Dept. "B" .....	.40	80	.32
Dept. "C" .....	.15	100	.15
Dept. "D" .....	.20	40	.08
	<hr/>		
Total Direct Labor.	.95		.95
	<hr/>		
Total Burden .....		.67	.67
		<hr/>	
Total Factory Cost			<hr/> \$2.62

The *average* burden of a factory may be eighty percent. Now, if we were to apply that eighty percent to the total Direct Labor cost of 95 cents, we would obtain a burden item of 76 cents instead of 67 cents, raising Factory Cost to \$2.71. Selling Cost is the sum of Factory Cost plus Selling Burden. If our Selling Burden should happen to be 20 percent of Factory Cost, in the one case our Selling Cost would be \$3.12.40 while in the other case it would be \$3.25.20. Using the average Factory Burden rate, therefore, does not alone affect Factory Cost but, when the percentage of Selling Burden is applied to the variant in the Burden item, Selling Cost is still more affected. In the above illustration, Selling Cost would be 128/10 cents higher, when using the average Factory Burden rate than it would be had we figured Factory Burden correctly, that is, on basis of departmental percentages.

All overhead expense is incurred for the purpose of promoting production and sale. A part of that proportion that is incurred for the purpose of promoting production is to be attributed to the cost of the Direct Material, that is, included in the price at which we take that Direct Material into account in our cost computations. But the major part is to be attributed to the cost of converting that Direct Material into the finished product. Every penny of that major part must ultimately be

made an element of the burden of our productive departments. Unless every penny of that major part is so made an element of our productive departments, our cost figures cannot be *complete*, and, unless that major part is correctly apportioned between the burdens of our productive departments, our costs can never be *correct*.

In formulating a factory accounting system, therefore, we must trace and attribute overhead to the accounts kept with the departments in which is employed the Direct Labor which converts our Direct Material into finished product. We apply our burdens according to the Direct Labor necessary to convert a certain quantity of Direct Material into a certain finished article. It behooves us, therefore, to know what is the percentage of the burden that applies to the Direct Labor that, in certain operations, is required, fractionally, to contribute to the act of conversion. In General Factory Accounting is cited the case of a factory in which the *average* Factory Burden was 80 percent, whereas, by departments the burden percentage ranged from 21 to 140. Analysis of the cost of a certain article manufactured in that factory showed a total labor item of \$45.00. Applying the average rate of 80 percent, the burden on this article was made to appear as \$36.00. Of that total labor, however, \$30.00 represented the cost of hand-carving and in the Hand-Carving Department the burden rate was only 21 percent, so that the amount of burden applying to the labor performed upon that article in that department was only \$6.30 and the burden items in other departments brought the amount of the total burden up to only \$18.87, or practically one-half of the burden figure arrived at by applying the average factory rate of 80 percent.

In order to arrive at the correct percentages of burden for the several productive departments in a factory, we must first provide the means of correctly assembling the items of overhead expense which are of a general nature in groups which will facilitate the distribution of those items between the accounts kept with the productive departments upon equitable bases. As has been said, certain of these general items apply according to space occupied, certain others apply according to the volume of labor employed, still others according to the value of equipment, and all these are assembled in separate accounts, entitled,

Space Burden, Labor Burden and Equipment Burden, respectively. The Equipment Burden applies only to productive departments, according to the value of equipment installed and used in those departments. Certain portions of some of the expenditures which go to make up this Equipment Burden are to be charged to accounts kept with non-productive departments and to Material and Selling Burdens. The expense here represented, that is charged to the Material Burden, is included in the cost at which Direct Material is taken into account in our cost computations. That part of this expense which is charged to the Selling Burden is included in the Selling Burden percentage. That part of this expense which is charged to non-productive departments, is so charged instead of being included in the Equipment Burden because the expenses of those non-productive departments themselves ultimately become elements of the burden of the productive departments. Having assembled the cost of space in the Space Burden account, we apportion that cost between the accounts of the various departments and burdens in the ratio that space is occupied by and for each of these. Having assembled those items of a general nature which apply according to the volume of labor employed, we apportion the sum of those items between the accounts of the various departments and burdens, in the ratio that labor is employed in such departments or performed as part of the cost of such burdens. We assemble the cost of generating power, light and heat in a separate account and apportion that cost between the accounts kept with the various departments in which is located the machinery for the operation of which the power is generated; between the accounts kept with the various departments according to the number and candlepower of the lamps in each department; and between the accounts kept with the various departments according to the area to be heated. Having assembled the cost of the Maintenance Department in a separate account, we apportion that cost between the accounts kept with the various departments by charging to each the important repair work performed for it and the balance of the cost of the Maintenance Department we make an element of the Equipment Burden. Finally, the Equipment Burden is apportioned between the accounts kept with the various productive departments, accord-

ing to the value of the equipment located and used in each of these departments.

So, now, each productive department will have been charged with its proportion of the cost of the space, according to the amount of space each such department occupies. Each productive department will have been charged with its proportion of the expense of a general nature that applies according to the volume of labor employed, on basis of the labor employed in each such department and each of these departments will have been charged with its proportion of the cost of generating power, light and heat, according to its rated power consumption; each department will have been charged with its proportion of the expense of maintaining equipment, as assembled in the Maintenance Department account and with its proportion of the expense that applies according to the value of equipment, on basis of the value of the equipment located and used in each such department. Thus the items of general expense will have been distributed upon equitable bases and ultimately made elements of the burden of the productive departments in which is employed the Direct Labor which converts Direct Material into the finished product. In addition, each department is charged with the Indirect Labor that is actually employed in that department, with the Indirect Materials and shop supplies that are consumed in that department and with the expense of returning and cost of repairing wares rejected by customers because of faulty workmanship in that department. Also each productive department is charged with the smaller Direct Materials which are applied to product in that department and each of these departments is given credit for these smaller Direct Materials at the figures which experience teaches should be ample with economical management, on basis of the reported production. When an inventory is taken, this item of small Direct Materials may show a certain shortage or waste and the amount of that waste must be considered an element of the burden of the department, although, being brought to the attention of the management, its ratio may be reduced. Each department is charged, as a separate item, with the Direct Labor compensated on the department's payroll and each of these departments is given credit for this item of Direct Labor at the figures which have been accepted and set up in Standard Cost Sheets as ample,

with economical management, on basis of the reported production. When an inventory is taken, this item of Direct Labor may show a deficit, and that deficit must also be considered an element of the burden of the department, although, being brought to the attention of the management, its ratio may be reduced. Any deficit found in this item of Direct Labor must, however, always be taken into consideration as an element of departmental burden, since it amounts to nothing more than Indirect Labor.

The actual cost of the Direct Labor required to perform certain operations having been established by means of tests, as explained in Chapter III, the Direct Labor figures set up in Standard Cost Sheets are, therefore, to be considered reliable. Credit on basis of actual production having been given the various productive departments at these figures, the total amount of Direct Labor actually performed in a department is definitely established. It is never safe to base percentages upon the figures found in an account covering only one single month. Fairly accurate percentages may be gleaned from departmental accounts covering periods of three or six months but really reliable percentages can be gained only from accounts covering a full year. The sum of all the burden items that have been charged to the account kept with one of the productive departments, in its relation to the sum of all Direct Labor actually performed in that same department in the same period, throws off the percentage which is to be added to the cost of the Direct Labor performed in that department in the manufacture of a given article, when computing the cost of that article.

Some of the author's clients, whose experience in analytical accounting warranted the installation, have stipulated that their systems shall demonstrate what portion of their burdens are in the nature of fixed charges, that is, expenses which accrue regardless of whether the plant is being operated at full or half capacity or not at all and what portion of these burdens are contingent upon volume of production and sale. The purpose of these clients is, during dull times to be able to determine whether they may accept business at reduced selling prices without adding to the amount of their overhead expense. Naturally, systems incorporating this feature are bound to be considerably more intricate than where this feature is omitted, but, at the same

time, it cannot fail to be obvious that this is a highly desirable feature. Few manufacturers in the furniture and woodworking industries are qualified to successfully practice such a system of accounting and none should attempt it until they have had an experience of two or three years in analytical accounting. The method is to divide general burden accounts into two sections, to one of which is charged every item of expense of a fixed nature and, to the other, every item of expense of a contingent nature. For instance, to the Fixed Equipment Burden would be charged interest on the net investment in, taxes upon and insurance and depreciation of equipment, while to the Contingent Equipment Burden would be charged the deficit in the Maintenance Department account, on the proposition that if the factory were not being operated this deficit would not be incurred. All the burden items charged to a departmental account are "keyed" to distinguish fixed charges from those of a contingent character. Thus, when burden percentages are established, it will be under these two heads for each burden item. For example:

Direct Material						\$1.00
		Burden.				
	Direct	Contingent		Fixed		
	Labor	Pct.	Amount	Pct.	Amount	
Department "A".	.20	20	.04	40	.08	
Department "B".	.40	20	.08	60	.24	
Department "C".	.15	40	.06	60	.09	
Department "D".	.20	20	.04	20	.04	
	—		—		—	
Total Direct						
Labor....	.95					.95
	—					
Total Contingent Factory						
Burden .....			.22			.22
			—			
Total Fixed Factory Burden.....					.45	—
Total Contingent Factory Cost.....					2.17	\$2.17
					—	
Total Fixed Factory Cost.....					2.62	
Contingent Selling Burden at 5% on Fixed Factory Cost .....					.13.1	.13.1

Fixed Selling Burden at 15% on Fixed Factory

Cost .....	.39.3
Total Fixed Selling Cost.....	3.14.4
	<hr/>
Total Contingent Selling Cost.....	\$2.30.1

Thus the manufacturer understands that, during dull times, he may really reduce his operating expenses if, instead of allowing his factory to stand idle, he will sell for \$2.50 an article which, during good times, he would not think of selling for less than \$3.50.

Indirect Materials and shop supplies are some of the elements of burden chargeable to the account kept with a department, in the use of which the foreman and his subordinates may exercise economy, thus effectively contributing toward cost reduction, and these elements enter into the contingent burden. Among these is the item of sandpaper which some manufacturers in the woodworking industries include in their cost computations as items of Direct Material. However, sandpaper does not *tangibly* enter into the finished product and, therefore, should not be considered an item of Direct Cost. Some men are more economical in their use of sandpaper than are others and, also, some pieces in the process of manufacture—pieces of wood, for instance, require the use of more sandpaper than do other pieces which are used for exactly the same purpose. We can, with reasonable exactness, say in advance how much lumber will be required to manufacture a certain number of articles of a given pattern, but we cannot say in advance how much sandpaper will be used in the manufacture of those articles. The lumber is going to be converted into the finished product, the sandpaper is not. It is consumed in the manufacture of that product but it forms no part of the completed articles, any more than does the saw which cuts the lumber or the brush which lays on the paint. It would be equally as logical to classify as an element of Direct Cost the freight car in which was shipped the lumber that is converted into the finished article. Both the sandpaper and the freight car are necessary to the manufacture of the finished article but they form no part of the completed article itself.

There is every reason why we should keep accurate detailed accounts with all departments in a factory, especially with reference to burden items. Not only is such accounting essential to

the demonstration of true costs but, still more, it is vitally necessary for the regulation and reduction of the cost of manufacturing and of marketing. To the account kept with a department should be charged all such expenses as can be specifically traced to that department. Expenses, such as the cost of non-productive labor and of Indirect Material, are part of the burden of that department and no part of the burden of any other department. Manifestly, therefore, it would be inequitable to assemble such expenses in a lump sum for the factory and prorate them between all departments. The good foreman would thus be made to suffer for the shortcomings of the bad foreman. Factory accounting that does not, so far as it is possible to do so, charge burden expenses directly to the department which occasions those expenses is, to that extent, bound to prove imperfect and misleading. As above explained, many elements of overhead expense cannot be traced directly to any one department, but always equitable bases for the distribution of these expenses can be reasoned out. Whether by direct charge or by means of such equitable proration, each and every item of overhead expense should, ultimately, be made to appear in the account kept with the several productive departments and thus made a constituent of the burden of those departments.

With such accounting, the intelligent manufacturer may effectively augment his own personal efficiency in administration. By means of comparative analyses of these departmental accounts, for different periods, he will keep check upon the efficiency in shop management of his foreman. He will educate those foremen to the realization that the departments in their charge are, in fact, independent commercial units and that each of them can conduct the affairs of the unit of which he is the responsible head in precisely the same businesslike fashion in which he might conduct the work of a shop which was his own personal property and business. He can educate them up to the realization that the ledger account kept with their departments is the barometer by which their compensation must be regulated. Ultimately, he puts the foreman upon a bonus or profit-sharing basis, so that the foreman will have a businesslike incentive for economical and efficient management. And then the foreman, in his turn, educates his subordinates up to the idea that they are his working partners in the operation of that

unit and, according to the intelligence displayed by those subordinates, in the end they, too, come to share in the added profits of the department, not because of any altruistic consideration but upon the solid business proposition that, because of their intelligent performance of the work entrusted to them and because of their economical administration of the business of the department, they have helped to earn those profits. A properly designed system of factory accounting naturally and inevitably develops toward this end, and one way in which foremen and workers can most effectively co-operate in the gaining of additional profits is by minimizing departmental burdens.

CHAPTER VI

Production and Factory Management

The form in which authority for manufacturing goods is to be transmitted to the factory must, necessarily, vary in accordance with the conditions that are peculiar to the factory for which a system of accounting may be designed. Always, however, such authority should be given in writing. In some factories the nature of productive operations is such that a separate production order with supplementing bill of material and shop orders (as described in detail in Chapter VIII of General Factory Accounting) may be issued for each lot of goods it is desired to have manufactured. In other factories the volume and diversified nature of the product is such that to require the issuance of a separate order, authorizing the manufacture of a stated number of articles of each separate pattern and size would intolerably hamper operations.

In the factory of one of the author's clients, a manufacturer of wooden furniture in exceptionally large quantities and of staple patterns, the practice is pursued of issuing a general cutting order upon the first day of each month. This general cutting order specifies the number of articles of each pattern, in each different size, in the line that is to be manufactured. During the course of the month, as it becomes necessary to do so, special cutting orders are issued, authorizing the manufacture of additional quantities of different patterns and sizes.

A copy of each of these cutting orders, general and special, is sent to the foreman of each department in the factory. Work in Department "A" is limited to sawing pieces of stock sizes, as they may economically be gotten out of the boards that are being delivered to the department. With the copies of all uncompleted cutting orders before them, sawyers can now cut stock size pieces, according to specifications covering each of the articles specified in these orders. These specifications are in typewritten form and each sawyer has a complete set. Within a few days after a specification is issued, however, the sawyers learn what is required and, thereafter, seldom consult these specifications, especially those that cover articles which are manufactured

in the largest quantities. As stock is cut up into these different sizes, a tally is kept of the number of pieces of each size sawn, until the number which will be required to manufacture all the articles specified on all cutting orders has been gotten out.

These pieces are then stacked, each size in a separate rack or pile and as the wood-machine departments require supplies, they are loaded on trucks and transported to the machine where the first operation in the actual conversion is to be performed. One by one, the worker operating that machine picks up the pieces, runs them through and deposits them on another truck. As soon as he has machined the number of pieces delivered to him on the first truck, or, in case a piece is found that will not do for the purpose intended, as soon as he has machined the full number required for the manufacture of a specific number of the articles specified on the cutting orders, the second truck is wheeled to the next machine where the next operation is performed and the truck load is transferred to the third machine, and so on, until the finished pieces reach the cabinet department. Here they are assembled and the different articles specified on cutting orders are set up, tallied against the cutting order and, when completed in the white, these articles are stored in the "White Stock" store-room. Up to this point, production is strictly according to these general and special cutting orders.

As orders are received from customers for articles in different finishes, a Finishing Order is issued for each separate article in each separate size. Not more than one pattern nor more than one size of that pattern in more than one finish is specified upon one of these Finishing Orders. Upon receiving such a Finishing Order, the Superintendent of the Finishing Division draws from the "White Stock" store room the required number of specified articles. These are now successively painted and varnished, trimmed or upholstered, glazed, packed and delivered to the Wares Department. Throughout the process, the foreman of each department in the factory renders a daily report of the work that his department has completed.

In the Superintendent's office, an elaborate Stock Record Sheet is kept for each pattern in each different size but with a separate set of columns for each different regular finish and a set of special columns for special finishes on each of these sheets. When a cutting order, general or special, is issued, the quantity

of each pattern and size specified thereon is posted to the corresponding stock sheet and completion of work, in the white, of quantities named by foremen in their daily reports is recorded upon these sheets. When Finishing Orders are issued, details of these are entered in the columns for the several finishes and when the number of pieces specified on each such Finishing Order has been delivered to the Wares Department, that fact is recorded by posting to the stock sheet. Sales and shipments, in different finishes are also recorded upon these stock sheets which are thus made to serve as perpetual inventories of wares finished and in the Wares Department and wares in process of manufacture. Furthermore, these sheets are consulted by the Superintendent when making out general cutting orders, with reference, not merely to stocks on hand but with reference to the movement of each article in the line. With these sheets upon which to base his judgment with regard to warranted volume of production, the necessity for issuing special cutting orders has been greatly minimized and, in spite of the fact that the factory's line includes upward of five hundred patterns, some of them in three or four sizes and ten to twelve finishes, the Superintendent never devotes more than three or four hours to getting out his regular monthly general cutting order.

The business of certain other clients of the author is to manufacture goods to order exclusively. There are no regular stock patterns, everything being manufactured according to the individual ideas and specifications of customers. In these factories, of course, it is necessary to use forms of Special Production Orders, Special Bills of Material and Special Shop Orders, similar to those illustrated in Plates 18, 19 and 21A, used in illustrating General Factory Accounting. Where a factory's business is entirely or mainly of this character, it is never possible to accomplish satisfactory accounting results without the feature of a continuous record of the work performed by each productive worker, whether that record be made upon one daily time card or upon a number of coupons, either pencilled or punched by a mechanical recorder to indicate the time consumed in the execution of successive jobs. Of course, it is not to be expected that the foreman of a large department shall keep a record of the material and labor consumed and employed in the execution of the department's share of the work of manufacturing each successive

lot of goods, in the manner described in General Factory Accounting (Chapter VIII) upon a form such as that illustrated in Plate 21B.

In these factories, all materials and supplies, as received, are delivered to the Stores Department or stock room, whence they are issued only upon written requisition. The Bill of Material is sometimes accepted as such requisition for the Direct Materials specified thereon and these are delivered, without further written request, to the department where they will be consumed in due course of manufacture of the order of which the Bill of Material is a supplementary part. The preferred practice, however, is to consider this Bill of Material as the Store Keeper's *authority for issuing these Direct Materials upon receipt of written requisitions of foremen of departments in which they will be used.* The Bill of Material, as made out by the Superintendent or his assistant, specifies the exact quantities of each kind of Direct Material to be issued on account of that order, and the Storekeeper issues these materials up to those specified quantities. When a quantity in excess of that authorized by the Bill of Material is requisitioned, the Superintendent's authority to issue the additional quantity must be first obtained. Practice of this method insures the uncovering of wastefulness in the use of Direct Materials. The Superintendent himself having specified the quantities shown in the Bill of Material, the request to authorize the issuance of an additional quantity serves to direct the Superintendent's attention to the fact that more material is being consumed than is warranted according to his original idea. Upon investigation he may find that his first estimate was below the real requirement while, in the contrary event, he is sure to locate careless use of these materials.

In the office a separate cost sheet is made out for each successive special order put in work. Upon this cost sheet are recorded quantities of material issued by the Storekeeper under authority of the Bill of Material and these are priced by the Cost Clerk. If the issuance of material in excess quantities originally specified is shown to be warranted by the manufacture of a job, that additional material is charged to the cost of that job. On the other hand, if the issuance of that additional material is shown to be due to wastefulness on the part of a worker, its cost is charged to the department in which that worker is employed

and, being made an item of the department's burden, the foreman is prompted to more closely scrutinize the work of that worker, by way of preventing the burden of the department being unduly increased. As reports of the work performed by operatives are received in the office, the time and money compensation of the labor employed in the execution of a job is posted to the cost sheet of that job, so that, upon completion, this sheet will show the total Direct Cost of the job. The percentages of burdens of each department contributing to the production of the job are now applied to the productive labor reported from each of these departments that has been charged to the cost sheet and so the total Factory Cost of each successive order is established. Finally, each job's proportion of the Selling Burden is added to the Factory Cost upon basis of the established Selling Burden percentage, the sum representing the Selling Cost of the job.

As yet, the plan of manufacturing stock parts which are later assembled in making up finished articles, has not been generally introduced in the furniture and woodworking industries. Of course, the business of some manufacturers in these industries is such that this plan would not be feasible, but in the majority of cases it is not alone feasible, but its adoption can hardly fail of the result of reducing production costs. This plan involves standardizing the parts which, being manufactured and stocked, may be used in assembling a number of different finished articles. For instance, the same top is used for a variety of extension dining tables, the difference between certain stock numbers being entirely in the base. In the manufacture of beds, the difference in head and foot is the difference between certain stock numbers, the side rails being interchangeable for all. In a certain metal furniture factory, which catalogs a line of upward of 250 different stock numbers, less than fifty stock parts are manufactured. The great variety of finished articles is made possible by the fact that this small number of parts is interchangeable in all the finished goods. A casual inspection of this factory's line, as it is exhibited in its show rooms, would naturally lead the visitor to believe that this company *manufactured* a huge variety of patterns. As stated, the company does *manufacture* less than fifty stock parts but it *assembles* more than two hundred and fifty patterns by arranging different combinations of these parts.

This particular factory is one of the largest producers of fur-

niture in the West and one of the biggest money-makers, and the reason for its success is easily to be comprehended. When a carload of angles, for instance, is received, instead of being stored, to be later withdrawn in small quantities as certain articles of furniture are to be made up, a production order may be said to meet that carload at the door of the factory. That production order directs that the angles in that car are to be used in making so many hundreds or thousands of end rails or side rails, as the case may be. Instead of being handled and re-handled before cutting, the angles are cut up and punched immediately upon receipt and stored in bins provided for each of these interchangeable parts. When it is desired to assemble a certain quantity of beds of a particular pattern, the bill of material authorizes the issuance of the parts already manufactured which may be necessary for the construction of that bed. Thus, instead of it being frequently necessary to cut up a few of these angles and perform different operations upon a small number of pieces, each operation is performed a great number of times successively. As everyone knows, the greater the number of times an operation is performed without a break, the lower will be the average cost per time of performing that operation. There is no time lost in frequent re-setting of the machine and the operative acquires that mechanical precision of hand and eye which enables him to speed up the rate of his production tremendously. Where goods are manufactured under this plan, the introduction of the differential or bonus plans of compensation, described in General Factory Accounting, Chapter XII, is certain to accomplish the most wonderful results in the matter of cost reduction. Nor is it necessary that the entire line shall be composed of articles made by the use of interchangeable parts exclusively, in order that this plan of manufacturing may be successfully practiced. In almost every factory in the furniture and woodworking industries, it is quite feasible to standardize and manufacture a large number of parts in considerable stock quantities, which may be made interchangeable with a great variety of other parts. These latter parts need not be manufactured in stock quantities. Whenever it is desired to manufacture an article in the construction of which certain standard parts which are carried in stock and certain other parts which are not carried in stock will be required, the production order issued is authority for manufacturing the

special parts needed simultaneously with assembling the standard parts to be taken from stock.

Systematic control of production is vital to the success of any manufacturing enterprise. Haphazard methods cannot fail to be ruinous since the result must be that stocks of wares for which there is no real demand are accumulated and these must, therefore, be sacrificed. It should be the rule that the production of every lot of goods be authorized in writing. That written authority should be based upon the selling qualities of the wares, as indicated by a perpetual inventory record, kept on a Finished Stock Card, such as that illustrated in Plate 30 of General Factory Accounting. Such a record, properly kept, must come to be a safeguard against over-production of unsaleable wares. When written authority for the manufacture of a stated quantity of a certain stock pattern is issued, the fact that it has been issued is posted to this record. The fact that that quantity has been manufactured and stocked is posted to the card, upon return to the office of the Shop Orders or, where a general production order is issued, in the nature of the general cutting orders referred to above, when the Foreman's Daily Production Report (made upon a form similar to that illustrated in Plate 28 in General Factory Accounting) is received.

Such systematic control of production makes possible a closer supervision of and check upon the work of the factory. There can be no question that, in the average furniture and woodworking factory, greater profit is to be gained by pertinacious scrutiny of production costs and processes and by perseverance in a campaign for cost reduction than by a high order of salesmanship. There are many brilliant salesmen in these industries, men of untiring energy and shrewdness who wage unrelenting warfare in the market. But there are comparatively few factory managers who can be made to realize that if they would devote one-half the time they ordinarily give to supervision of the selling campaign to the supervision of their production methods and processes, they would be tremendous gainers in the end. The losses annually sustained in the factories in these industries, by reason of the use of defective material and faulty workmanship are at least double the net profits earned. And yet the very simple and inexpensive method of tracing those losses by the employment of the Manifest of Wares Returned, the Damage in

Process Tracer and Repair Tags (illustrated in Plates 25, 26A, 26B and 27) as explained in Chapter VIII of General Factory Accounting, is certain to minimize them.

Furthermore, production costs are to be materially reduced by keeping a careful check upon the consumption of materials and supplies. Superfluous indirect labor is another big leak in every factory, the wages of employees whose work is not *productive* but who are retained on the payroll simply because employers have grown accustomed to seeing them about the premises. Of course, each of these employees has certain duties to perform but it is the author's observation in almost every factory into which he goes that these non-productive workers, as a rule, are the ones who do the "visiting" with productive workers, thus, in addition to being, to a great degree, themselves a superfluous expense, contributing needlessly toward rendering the work of productive laborers less efficient. If factory managers, superintendents and cost clerks will devote some time and study to the problem of the work actually performed by non-productive workers on their pay-rolls, they will often find that the duties assigned to two men can be just as efficiently performed by one man.

The biggest problem of all, and the one the study of which will repay the factory manager most abundantly, is that of raising the standard of efficiency of productive workers. The saving to be made here is not alone in keeping those workers constantly moving, but in seeing that they are provided with every facility for doing their work in the most expeditious manner. "Lost motion" is one of the most pernicious leaks in factory practice. It is all very well to keep a manual worker moving but unless his every movement is utilized and made to count for something in the result of production, he cannot be said to be one hundred per cent efficient. At almost every machine in the furniture and woodworking industries are to be seen men one-third to one-half of whose energy is fruitlessly expended. They stoop to pick up a piece before processing it and again to lay it down afterward, instead of having convenient receptacles on a level with the heads of their machines. In many cases a worker's productive efficiency might be trebled by giving him the aid of a cheap boy helper.

The problems of space utilization and of operating equipment

at maximum speed are others, the study of which by factory managers and superintendents who desire to increase their profits cannot help but prove immensely effective. In a certain factory, two rather expensive machines were being operated at slow speed. The work of these machines was so satisfactory that the immediate purchase of two more was in contemplation. Instead however, upon the author's recommendation, a larger pulley was mounted on the line shaft for each of these machines, and the employment of a cheap helper for each enabled the operatives running the machines to treble their production. In another factory, the machines upon which successive operations were performed were placed so far apart that trucking material from one to another was an obviously expensive feature. The management of this factory contemplated the erection of an addition to its wood machine shop, but after the machinery had been concentrated and ranged in the consecutive order of the process, it was found that ample space had been gained in which to install considerably more than the machinery needed to take care of the factory's expanded business, and thus the expense of erecting a new building was rendered unnecessary.

Necessarily, a factory manager cannot be supposed to spend all of his time in the factory but he should be in close touch with all the fixed conditions that obtain there and his accounting system should automatically and constantly keep him informed concerning the things which it is vitally necessary for him to know. It is not enough to effect savings in the cost of production. The moment the possibility of effecting such a saving is made a certainty, that saving should be reflected in the cost figures. In other words, so soon as the cost of manufacturing can be reduced, the sales department should be immediately notified and given the opportunity of benefitting by the reduction by booking business at the lower selling prices which may be made in consequence of that saving. The correctly designed factory accounting system will periodically bring to the attention of the management the fact that productive workers are not being constantly and effectively employed, that the materials in which the owner's money is invested are not being used economically and that the expense of operating the factory and of selling the product is being kept within reasonable bounds. But the really good system goes farther. It will promptly report

improvement in manufacturing processes, it will promptly reflect, in its cost figures, fluctuations in the prices of raw material, it will enable the selling organization to "beat" competitors by getting into the market first with reduced prices. A system that is not so designed that it cannot help but be thorough and prompt in bringing changes in production costs to attention of the sales organization, cannot be a thoroughly good system.

Shop efficiency means shop economy. That has always been and always will be a cardinal truth and the study of shop efficiency will always be a profitable subject for study. It has always been possible to increase productive efficiency by increasingly rigid supervision—by keeping a closer check upon expenditures, by keeping a closer check upon consumption of materials and by bringing about conditions most favorable to a maximum per man and per machine production. These results cannot be accomplished in the absence of a system of factory accounting and it is with these results that a factory system should concern itself. Nor can the moral effect upon the working force of a thoroughly effective factory system be over-estimated. Workers are always influenced by their environment. Placed in a dirty workshop, in the corners of which rubbish is allowed to accumulate for days and with piles of scrap and miscellaneous odds and ends to be seen everywhere, the best of workers cannot help but grow indifferent in their workmanship with the inevitable effect of deterioration in quality of product. Placed in a factory devoid of anything like system in method, such a worker may safely be counted upon to either himself become unmethodical in his work or to take his services into an atmosphere where efficient workmanship is recognized and given the opportunity to earn equitable compensation. Placed in a factory that is well appointed and in which the work is pushed with systematic and businesslike energy, he will probably grumble good-naturedly at first, but, presently he will fall under the influence that dominates the place and, unconsciously, he will speed up his production.

The essentials of factory accounting are not peculiarly the property of the accountant. Every business man should be qualified to speak of them authoritatively and with familiarity. The science of accounting presents a field that only needs to be intensively cultivated to yield most abundantly and the manufac-

turer who will be content to approach the subject with an open mind cannot help but profit by his studies. A clear and comprehensive understanding of the fundamental principles of commerce is the prerequisite, equipped with which, a thorough knowledge of modern accounting methods cannot fail to broaden his business perspective. The first and most obvious lesson of scientific management is *concentration*. The greater the diversification, the greater the "lost motion," and, consequently, the greater the cost and the smaller the profit. That is purely elementary. If a shop operative is kept constantly employed in performing one single operation, he is bound to develop a degree of dexterity which, as compared with what he was able to do when he performed that operation only occasionally, will seem marvelous. But an operative may be employed in this manner only as a result of concentration—by limiting the range of goods manufactured. If a great variety of articles or parts are manufactured in small quantities, that dexterity cannot be capitalized and, consequently, both the employer and the worker are the losers.

Scientific factory accounting is the mechanism of scientific management. Without the one, the other becomes an impossibility. Scientific management must depend upon intelligent accounting for its momentum. No man can be expected long to persevere in any course of action or in any undertaking if he cannot, at least, see that he is not standing still. He may discover that he is going backward and that realization may spur him on to renewed endeavor in the determination to go forward. No one is likely to exert himself steadfastly without, first, knowing just what it is that he is trying to accomplish and, second, without having some definite understanding that he is making progress or the reverse. No factory manager can long persevere in any set plan of management without wanting to be apprised of what is the result of his perseverance, and a scientific system of factory accounting that is made to properly control production and reflect the cost of production is the sole means of determining that result.

CHAPTER VII

Factory Cost

The manufacturer really is a manufacturer only up to a certain point of his commercial practice. Beyond that point, he is a merchant, even though he produces absolutely every one of the articles of commerce in which he deals. In effect, he purchases the wares he sells from his factory, no less than the jobber, who is his competitor, purchases the wares he jobs from other factories. If he does not take this view, if he does not look at his Factory Costs in the same light that the jobber looks at the invoice prices plus carriers' charges which he pays, the manufacturer cannot intelligently compete with the jobber, nor can he be definitely certain that it pays to operate the factory in the manufacture of the wares he sells. It might pay better to invest his capital elsewhere, or to devote the capacity of his factory to the manufacture of commodities which he cannot buy for less than it costs to manufacture them. Why should the manufacturer worry himself with manufacturing operations if wares of the kind he manufactures can be purchased elsewhere at prices below the figures at which he can manufacture those wares? And how can that question be answered until the exact Factory Cost of each article he manufactures is known?

Knowledge of net profit is predicated upon knowledge of net cost. Essentially, Factory Cost must always be gross, and this cost may be arithmetically defined as buying price plus the expense of manufacturing. To the aggregate invoice price paid for his wares, the merchant must add the expense of selling to arrive at the true net cost of those wares, sold and delivered to the customer. Manufacturers employ labor to convert raw material into finished product. The price paid for that labor and the expense of operating the factory, or the department, in which that labor is performed, must be added to the price paid for that raw material to arrive at the gross or Factory Cost of the finished product. That Factory Cost is equivalent to the merchant's invoice price and to that sum the manufacturer must add the expense of selling to arrive at the true net cost of his product, delivered to the customer.

The Factory Cost of a given article, therefore, comprises the entire expenditure incurred in connection with its manufacture. Any really good system of factory accounting must be so designed that expenditures may be searchingly analyzed and distributed, so that the entire expenditure that is incurred in manufacturing the constituent articles of product may be established separately from the expenditures incurred in connection with the sale of the product. Each class of material, each department and each line of wares must be made to bear its just proportion of the expense that is incurred, either directly, because of the purchase of materials or because of the operation of the departments or because of the sale of the wares, or, indirectly, as an element of burden. It is necessary to accurately analyze expenditure, to charge to material accounts the money paid for material including the cost of its transportation and to charge to accounts kept with departments the labor employed and the supplies consumed in and the expense of operation of those departments. It is necessary to intelligently superimpose upon the price paid for material and upon the labor employed that proportion of the overhead expense which may be legitimately attributed to that material and that labor, in order that the true Factory Cost of the articles manufactured out of that material by that labor may be established.

The Factory Cost of a given article is the cost of the raw Direct Material which is used in manufacturing that article (and that cost must be fixed at prices which, in addition to the first cost of the material and of its transportation, include the burden that applies to the material, and which must be sufficient to cover the normal shrinkages and wastes) plus the cost of the Direct Labor that effects its conversion plus the expense of providing that labor, the space in which, and the equipment with which, to effect that conversion.

Cost of Direct Material is easily to be established, as is the cost of Direct Labor, wherefore, Direct Cost, which is the sum of the cost of these two elements, is also easily to be established. Beyond Direct Cost, however, we find those expenditures which, while absolutely necessary to the process of manufacturing, cannot be charged directly to the cost of any specific article or group of articles but which must still be taken into consideration in the endeavor to reach a clear understanding of the cost of the fin-

ished product, as a whole or with reference to any constituent part of that product, viz: the expense of operating the factory, or the department, in which the labor is performed, those expenses which, in the aggregate, are commonly referred to as Factory Burden.

Where the entire product of a factory is of uniform character, that is, of such character that, in the process of manufacture, each article follows exactly the same "route" through the factory that is taken by every other article in the product, the elements of Indirect expense which constitute Factory Burden need not be farther subdivided in the analysis, since all of the articles in the product will benefit equally by reason of the expense of operating the factory, or, to put it into other words, each article is individually chargeable with its share of the total expense.

Very few factories in the furniture and woodworking industries, however, restrict their production to one line of goods so uniform in character as to make unnecessary further analysis of the Factory Burden. Where one article or part differs radically from other items of the product, it is vitally necessary to correct understanding of costs that the expense of operating each productive department of the factory be established, in order that, as the product passes through those departments it may be equitably burdened with the expense of their operation. For instance: In the wood furniture industry, a handcarving department is a feature of many factories, but not all product embodies handcarved ornamentation and the amount of that ornamentation varies with different articles that do embody it. Consequently, it would be unjust to burden that part of the product which embodies no such ornamentation with any share of the expense of operating the department where handcarving is performed.

The expense of operating a factory accrues by the clock. The expense of operating any department, per day, per hour or per minute, may be established to the last decimal. The more labor is performed in manufacturing a given article, the more of the burden of operating the departments in which that labor is performed is chargeable to that article. The greater the number of hours consumed in performing a certain operation in the manufacture of that article, the larger the proportion of Factory Burden that must be added to its cost. We may employ Direct

Labor in one department to the amount of \$525 per week and the expense of operating that department may be shown to be \$700 per week. In another department we may employ Direct Labor to the amount of \$300 per week and the expense of operating the second department may be shown to be \$150 per week. In both departments, we employ Direct Labor to the total amount of \$825 per week and the expense of operating both departments is \$850 per week. In the first department the burden will be 133 1-3 per cent of Direct Labor, in the second department 50 per cent and for both departments together the burden will average 103 per cent. Now, if of the total time required to manufacture each and every article produced an equal proportion is consumed in each of the two departments, the use of the last named percentage might be thought to answer the purpose for equitably burdening that article. Look at the figures printed below, which illustrate how greatly erroneous would be the burden arrived at in this manner.

	Direct Labor	Burden
Two hours in first dept., @ 25c.....	\$0.50	\$0.66.67
Two hours in second dept., @ 30c....	.60	.30
	<hr/>	<hr/>
Total Departmental Burden.....		\$0.96.67
Applying the mean percentage of 103 to \$1.10 of Direct Labor, we would arrive at a burden charge of.....		\$1.13.30

Let us assume that the cost of Direct Material is \$1.00, and that the Selling Burden averages 20 per cent of Factory Cost. Figuring the Selling Cost of the article in question, we would arrive at these figures:

	Factory Burden figured upon basis of each de- partment's percentage.	Factory Burden figured upon basis of a mean percentage.
Direct Material.....	\$1.00	\$1.00
Direct Labor.....	1.10	1.10
Factory Burden.....	.96.67	1.13.30
	<hr/>	<hr/>
Factory Cost.....	\$3.06.67	\$3.23.30
Selling Burden 20 per cent.....	.61.33	.64.66
	<hr/>	<hr/>
Selling Cost.....	\$3.68	\$3.88

Thus, it will be seen, the Selling Cost figure arrived at upon basis of a mean percentage varies about five and one-half per cent from the figures arrived at by means of each department's percentage (and which, it must be admitted, more truly reflect the cost of operating expense as it applies to that article).

The expense of operating a factory that applies and is to be attributed to the separate articles manufactured can only be measured by the length of time required for the manufacture of each. The longer an article remains in process of manufacture, the more of the expense of factory operation must be attributed to its ultimate Factory Cost. And the greater the variation in time consumed in its manufacture in different departments, the more will the application of a mean percentage of Factory Burden erroneously affect the cost of an article, as illustrated in the figures which follow:

	<u>Direct Labor</u>	<u>Burden</u>
Four hours in first dept., @ 25c....	\$1.00	\$1.33-33
One hour in second dept., @ 30c..	.30	.15
	<hr/>	<hr/>
Total Departmental Burden....		\$1.48-33
Applying the mean percentage of 103 to \$1.30 of Direct Labor, we would arrive at a burden charge of.....		\$1.33-90
as against		
One hour in first dept., @ 25c....	\$0.25	\$0.33-33
Four hours in second dept., @ 30c.	1.20	.60
	<hr/>	<hr/>
Total Departmental Burden....		\$0.93-33
Applying the mean percentage of 103 to \$1.45 of Direct Labor, we would arrive at a burden charge of.....		\$1.49-35

Again assuming that the cost of Direct Material is \$1.00 and that the Selling Burden averages 20 per cent of Factory Cost, in figuring Selling Cost we would arrive at the following figures for the two examples cited, viz:

ACCOUNTING IN THE FURNITURE

	Factory Burden figured upon basis of each de- partment's percentage.	Factory Burden figured upon basis of a mean percentage.
Direct Material.....	\$1.00	\$1.00
Direct Labor.....	1.30	1.30
Factory Burden.....	1.48.33	1.33.90
	<hr/>	<hr/>
Factory Cost.....	\$3.78.33	\$3.63.90
Selling Burden 20 per cent.....	.75.67	.72.78
	<hr/>	<hr/>
Selling Cost.....	\$4.54	\$4.37
	<hr/>	<hr/>
as against		
Direct Material.....	\$1.00	\$1.00
Direct Labor.....	1.45	1.45
Factory Burden.....	.93.33	1.49.35
	<hr/>	<hr/>
Factory Cost.....	\$3.38.33	\$3.94.35
Selling Burden 20 per cent.....	.67.67	.78.87
	<hr/>	<hr/>
Selling Cost.....	\$4.06	\$4.74

It will be seen that, in the one case, Selling Cost, arrived at by the use of a mean percentage falls seventeen cents or about three and three-quarters per cent *below* the figures arrived at by means of departmental percentages while, in the other case, the Selling Cost, arrived at by the use of that mean percentage mounts sixty-eight cents or sixteen and three-quarters per cent *above* the figures arrived at by means of departmental percentages, and yet the only difference between the two calculations lies in the fact that it is assumed that the articles remain in process of manufacture a different length of time in each of the two departments.

Necessarily, in order to arrive at the cost of manufacture of different parts of our product, as nearly as it may be done, we must *localize* the expense of production. While the Factory Burden, through departmental accounts, should be distributed according to the labor required for the actual conversion of raw Direct Material to finished product, in our cost calculations no item should be considered an element of that burden unless it positively cannot be attributed to some specific article or to some

specific group of articles, as distinguished from the remainder of the factory's product. Wear and tear of a machine which is used exclusively in the manufacture of one such specific article or group of articles, for instance, should not be made a burden upon the factory's entire product by attributing it to *all* the labor employed in the department where that machine may be located. If that specific article or group of articles were not being manufactured, that machine would not be needed. There would be no investment and, consequently, no charge for interest and taxes upon, insurance and depreciation of that machine. In that event, the remainder of the factory's output, of course, would not be burdened because of these charges and it is, therefore, inequitable to include those charges as elements of the inherent cost of that remainder. These charges are to be considered as Direct Incidentals and are to be included as elements of the inherent cost of the specific article or articles for the manufacture of which that machine is needed, and for exactly the same reason that raw Direct Material which tangibly enters into those articles is to be included in that cost. For instance: In the case of a plant manufacturing tables and chairs, say, the charges named above, as they apply to a machine used exclusively in the manufacture of tables, must be considered as elements of the burden that applies to the table product. To include those charges in the percentage used to burden all the product that passes through a given department would result in charging part of the expense of manufacturing tables to the chair product, which would manifestly be inequitable. In a factory where such a condition is found, the system of accounting should be so designed that, while all the elements of the departmental burden are assembled in the account kept with the department in which that machine may be located, these Direct Incidental charges may be picked out and that, in figuring costs, the elements of the burden that apply to the entire product may be included in the computation upon basis of one percentage and these Direct Incidentals upon basis of another.

A system of accounting, to be of any real value in the understanding of Factory Costs, must be adapted to the understanding, not merely of the management but to that of the class of help which is available for its practice. Successful system is a plant of slow but continuous growth. It is practically impossible

to design a system so elaborate that it will, from the start, accomplish every desirable purpose. Of course, it is always possible to devise a system which, if properly practiced, will from the first, positively demonstrate the exact cost of every, even the most insignificant, operation. But it is not possible to secure that class of clerical help which can, from the beginning, properly carry on such a system, at wages which will not make its expense prohibitive.

We must, at first, content ourselves with the rudiments and, as we become accustomed to the practice of the system and gradually familiarize ourselves with its possibilities, we may expand and amplify its scope until, by its ultimate operation, we may achieve almost perfect efficiency into the supervision of our affairs and operations. The system should not, at beginning, be burdened with so much of detail as to render it incomprehensible to the average mind. There is always temptation to draw a system fine. In addition to the accountant's appreciation of the niceties of method, the client, enthused with the idea of immediately becoming thoroughly conversant with all his affairs, may urge the introduction of methods for the practice of which he is absolutely unprepared. If such niceties of method are allowed to creep into the prescribed system, it is certain that its practice will seem cumbersome and, consequently, sooner or later it will either be discarded entirely or it must be amended and, as a rule, clients are not sufficiently familiar with the subject to form an opinion as to whether the fault lies with themselves or the accountant.

A factory accounting system should be so designed that, as its practice becomes a matter of every-day routine, it will, almost automatically, suggest how its expansion will be of increasing benefit. All accounting, in the final analysis, is purely the practical application of simple arithmetic. Correct method centers about the division of the elements of cost and the arrangement of successive calculations in their logical order. Accurately analyzed expense, intelligently superimposed upon Direct Cost, governs true Selling Cost and true Selling Cost alone may be depended upon in determining whether certain competition may safely be met.

It does not always follow that net profit will result from meeting competition, even with a correct understanding of costs.

During certain periods it may be a question whether, in meeting competition, we are not increasing our overhead expense. Certain elements of this expense, of course, are contingent upon volume of production and sale, while other elements are of a fixed nature which accrue steadily, day by day, regardless of that volume. And, ordinarily, the aggregate of the fixed charges is considerably in excess of the aggregate of the contingent charges. For instance, depreciation of buildings and equipment, interest on the investment in land, buildings and equipment, and taxes and insurance upon these assets, accrue day after day, regardless of volume of production. It may be argued that depreciation, in the case of a factory temporarily shut down, does not accrue at a ratio equal to that of such depreciation while the factory is in operation. But anyone who has given the subject any thought must coincide with the dictum of a celebrated industrial engineer that, "Idle equipment is the greatest expense a business man may have." In other words, a manufacturer can better afford to operate his plant and earn a part of his fixed charges than to shut down and allow all of his fixed charges to accumulate as a dead loss, provided that, in doing this, he does not increase his contingent charges sufficiently to more than offset that portion of his fixed charges which he may earn. With experience in the practice of a correctly designed system of factory accounting, we come to learn to divide our burdens into fixed and contingent burdens and, thus, are able to say whether, during dull times, we may meet prices which, during ordinary times, we would consider utterly out of the question.

Repeating what was said at the beginning of this chapter, the manufacturer is a manufacturer only up to a certain point, beyond which he becomes a merchant. Intelligent study of the subject of factory accounting must separate the business of the manufacturer into two distinct divisions, that is to say, producing and marketing. We cannot consider the manufacturer as a composite producer and merchant. For the purposes of this study, we must think of him, first, as a producer and, finally, as a seller, but never as both simultaneously. He ceases to be a producer so soon as his factory has turned out the finished wares wherein he deals. He is a manufacturer only up to the point where product is placed at the disposal of his sales organization.

These two phases of the business of the manufacturer have

nothing in common. To all intents and purposes, the factory is one organization and the sales department quite another. At first reading, this may seem a somewhat forced statement but it is absolutely true. The salesman on the street or on the road has no real interest in the factory and no sympathy for the process of production. The details of constructing the product have no interest for him. He knows the product as a completed quantity, not as the thing that must pass through certain processes and undergo certain operations before it becomes that completed quantity. On the other hand, the superintendent of a factory seldom has any real interest in the selling end. The worries of the sales organization concern him not at all. The salesman may criticise quality and price and the superintendent may criticise because of lack of volume of sales of the wares he produces. The two have no common ground, otherwise, and no common view point.

The sales organization is the customer of the factory and buys (at absolute cost of production or Factory Cost) the goods turned out by the factory. The factory is not a profit and loss account. It is simply one huge machine which the manufacturer, in his capacity of merchant, operates for the purpose of promoting his commercial enterprise. That machine receives its impetus from the sales organization. And it may not be amiss to say, here, that in the furniture and woodworking industries, at least, this is quite as it should be. The character of product should be controlled by the sales organization. The salesman comes into contact with the buying trade; it is his eye and his judgment which interprets the trend of popular demand and it is by his intelligent observation that the manufacturer must prosper in his selling campaign. The salesman can "make the line" which will meet the tastes of discriminating buyers. The mere factory executive cannot hope, successfully, to *originate*. He may only hope to successfully interpret the salesman's conceptions in the product he turns out.

It is inevitable, therefore, that a system of factory accounting, to be most serviceable, must sharply dissociate the expenses which are chargeable to production from the expenses which are chargeable to marketing. To consider overhead expense as an indissoluble quantity, so far as manufacturing and marketing are concerned, must inevitably lead to misconception and errone-

ous analysis. Necessarily, all direct expenses are chargeable to the factory accounts. Those indirect expenses which, in the aggregate, we call overhead, are chargeable, partly to factory accounts and partly to sales organization accounts. Many elements of overhead expense are divisible between the factory and sales organization accounts and the system must be so designed that, in making that division, no part of the expense of manufacturing will be included in the Selling Burden and no part of the expense of marketing will be included in Factory Cost.

CHAPTER VIII

Selling Burden and Selling Cost

From the moment finished wares are delivered to the warehouse or shipping department, ready to be delivered to dealers, the manufacturer is a merchant, and from that point on his commercial practice, in its essentials, differs in no wise from the dealer's practice. Consequently, those of his expenditures which are incurred with the purpose of or incident to promotion of sale and for delivery of those wares must be attributed to the Selling Burden. The line of demarcation between Selling and other burdens may be determined by the answer to the question whether an expenditure would be incurred if the manufacture of wares were discontinued and the purchase of wares substituted. Necessarily, the item which would disappear from an expense account if the practice of jobbing were substituted, cannot be regarded as an element of Selling Burden, whereas the item which would still have to be paid must, perforce, be considered as applicable to marketing. Housing wares, for instance, would still remain an item of the expense account and, consequently, as a manufacturer, the manufacturer must incorporate in his Selling Burden all expenses of handling and storing wares from the moment they are delivered (packed and crated or, for local delivery, without being packed and crated) by the factory to the wares and shipping rooms. If those rooms happen to be located in the factory buildings, a due proportion of the Space Burden, i. e., the aggregate expenditure that applies according to the value of land and buildings, must be made a part of the expense of storage.

In the furniture and woodworking industries, the items which ordinarily constitute the Selling Burden may be enumerated as follows, viz:

1. Part of the cost of administration and of the office—salaries and expenses.
2. Salaries and expenses of executives and subordinate employees of the sales department.
3. Salaries, commissions and expenses of salesmen.
4. Agency Expenses.

5. Salaries, wages and expenses of the warehouse, show-room and shipping room, including insurance, taxes, interest on the investment in and depreciation of the assets involved, viz: the premises and the equipment and wares employed and stored therein.

6. Advertising, salaries and expenses of manager and subordinate employees of an advertising department, cards in periodicals, catalogs, price-list and special printing, photos, blue-prints, electros and the plates from which these are made.

7. Samples, sample cases and trunks and their depreciation.

8. Entertaining and expenditures of policy.

9. Cartage or the expense of stable and garage (or such portions of these as are not legitimately chargeable to Material Burdens because of hauling raw stores).

10. Allowances and uncollectible accounts.

11. Interest upon commercial paper and open accounts and on the net investment represented by finished and partly finished wares, book accounts and cash, less interest earned upon accounts and notes receivable.

12. Discounts allowed less discounts taken on accounts payable.

Whether one account is kept under the title of Selling Burden for the purpose of charging all these expenditures in a lump sum or whether, for a better understanding of the details of the business, several accounts are kept which, in their aggregate, will represent that selling burden, the vital thing is to charge to such accounts each and every item that legitimately forms a part of the expense of marketing the product. Of course, few will be content with one single account, for, the more thoroughly we analyze our expenses, the more certain we are to arrive at that definite and all-comprehending knowledge of the details of our business which is the keynote of commercial success. Given a free hand, even in the case of a client whose previous methods had been of the most primitive kind and bearing in mind that in such cases the utmost simplicity is essential to the success of a system of accounting, the author should still prescribe that instead of one single Selling Burden account at least the six accounts named below should be kept and that to those accounts should be charged the expenditures named in connection with each, viz:

Office

Administrative and office salaries, telephone and telegraph, donations, assessments, general postage, office supplies and general stationery and printing.

Sales Department

Salaries of sales executives and their immediate assistants (or equitable proportions of the salaries of assistants giving only a part of their time to this department); the printing, stationery, postage, etc., required by this department; salaries, commissions and expenses of salesmen; expenses of agencies and show-rooms; samples and depreciation of these and of trunks and cases; entertaining and expenditures of policy; commercial ratings, collection expenses and allowances.

Shipping Department

Warehouse and shipping room expenses and depreciation of buildings (or a proportion of the Space Burden); wages of shipping clerks and porters and that portion of the expense of cartage or of stable and garage occasioned by the necessity of moving finished wares.

Advertising

Items enumerated under classification No. 6, above.

Uncollectible Accounts

All customers' accounts that are declared uncollectible.

Sundry Selling Expenses

Discounts allowed on accounts, receivable and interest on commercial paper, open accounts and on the investment represented by finished and partly finished wares, accounts receivable and cash assets; miscellaneous items not otherwise provided for and, to this account should be credited all interest earned on notes and accounts receivable and discounts taken on accounts payable.

At the risk of incurring the disapproval of the client whose previous methods and habits might cause him to feel that he was being burdened with an undue amount of detail work, the author should insist upon nothing less than these six divisions of the client's selling expense, because he is thoroughly convinced that

in American commercial practice generally and in the furniture and woodworking industries at large, and, most especially, with reference to the practice of the small manufacturer in every line, the weak spot is a lack of exact and analytic knowledge as to what it costs to sell goods. While one single Selling Burden account, properly kept, will afford this knowledge, the author would feel that he had not done his whole duty toward the client if he had not, in providing him with the means of acquiring that exact knowledge, also facilitated his clearer understanding of the major elements that constitute the cost of selling his goods, so that he might, from the beginning, regulate that cost intelligently and effectively. Accounts which might tell the client that he was heading for the bankruptcy court and nothing else would not be worth while; he must be provided with accounts which will enable him to steer clear of that port.

In the average furniture and woodworking factory we find the administrative head of the organization devoting a part of his time to supervision of the factory; another part to the supervision of, or directly to, the purchase of raw materials; and a third part to the supervision of, or directly to, the sale of the finished product. It is seldom difficult to determine upon what percentages the salary and expenses of that administrative head should be charged to the Factory Burden, to the Material Burdens and to the Selling Burden. Bookkeepers and general clerks work part of the time on accounts and records which are vitally necessary for intelligent factory management and, in performing that work, they consume a proportion of the supplies and expense of maintaining the office. Equitable proportions of the salaries of these clerks and of the expense of the office having been charged to the Factory Burden, the remainder may be considered as directly applicable to the Selling Burden. In the furniture and woodworking industries, so small a part of the time of bookkeepers and general clerks is given to the keeping of material accounts and records that it is seldom worth while to apportion any of this expense to Material Burdens. However, where one or several clerks are employed, whose sole or chief duty it may be to keep such accounts and records, their salaries and the supplies consumed incident to their work, should be charged to Material Burdens. Similarly, the salary and expense of the timekeeper should be charged to the Factory

Burden. Salaries and expenses of cost clerks should be apportioned equitably between Factory Burden and Selling Burden, for, while the data compiled by these clerks is, primarily, for the use and benefit of the Sales Department, nevertheless, the factory management may benefit by the study of and by the knowledge gained from intelligently kept cost records.

One of the most frequently encountered errors of practice in the furniture and woodworking industries is that of charging freight allowances on shipments of wares to the Selling Burden. That is: All freights on wares paid by the manufacturer are charged to the Selling Burden, regardless of whether the goods are shipped to a point ten or two thousand miles away. Just a moment's thought must serve to show that freight allowances can not be considered elements of burden. If a carload of furniture is sold for \$1,000 f. o. b. at factory, that amount is credited to the trading account. If the same carload is sold for a round price of \$1,200 f. o. b. at the customer's town, that \$1,200 is credited to the trading account. If the freight on that carload comes to \$200, it is a matter of common sense to charge that \$200 (which the customer deducts or the manufacturer prepays) to the trading account. Absolutely, only \$1,000 (the difference between the face of the invoice and the freight paid) is realized, but, by charging the freight paid to the Selling Burden, false percentages are obtained for inclusion in cost calculations.

The purpose of all analytical accounting is to learn how to regulate affairs intelligently. The manufacturer is supposed to learn from the figures developed in his accounts in which section of the country he can most profitably market his wares. If, however, freight allowances are charged to Selling Burden and the percentage developed for that burden is used in working out this problem, it will appear that the long-distance shipments yield the largest profits, and if, then, the manufacturer regulated his business accordingly, he would ship his entire output to the remotest markets, with the inevitable ultimate result that he would lose money on each and every shipment. Selling prices must be figured f. o. b. cars at the factory, and if wares are sold f. o. b. at the customer's town, the cost of transportation must be added to the f. o. b. factory selling prices, in figuring the selling price to be named the customer. A factory located in Grand Rapids, for example, cannot sell wares

delivered f. o. b. cars at San Francisco at the same prices at which it can sell those wares delivered f. o. b. cars at Chicago. That fact is platitudinous and no manufacturer can be guilty of making such a mistake. But, if, after paying the freight on a shipment, he charges that freight to his Selling Burden, he will include in his Selling Burden percentage all the freights paid and, consequently, in calculating the cost of an article, delivered f. o. b. Chicago he will include part of the expense of shipping it to San Francisco.

In the furniture and woodworking industries, the cost of packing, crating, etc., is being properly made an element of Direct Cost, in most cases which have come under the author's notice. In some factories, however, he has found that this expense, or a large share of it, is considered as part of the cost of shipping, and, consequently, is made an element of Selling Burden. Obviously, goods sold for export must be packed much more carefully and at greater expense than shipments for domestic points. Also, some factories located in the larger cities have a considerable local trade, for which no packing and crating is required. By making this expense an element of Selling Burden, and, in cost calculations, covering it by a percentage factor, the wares which are not packed at all, or which are packed for domestic shipment, are made to stand a part of the expense of packing for export, and, thus, export shipments are made to show fictitious profits.

It has come to be pretty definitely understood that the Selling Burden is to be attributed to the cost of specific articles on basis of the percentage which that burden bears to the factory cost of the products. Sometimes it is contended that the Selling Burden should be included in cost calculations upon basis of the labor required to produce the article. Manifestly, the labor required to produce has nothing to do with the sale of the article. The Factory Burden, whether that be taken for the factory as a unit or by departments, is strictly a time proposition and must be based upon the Direct Labor which, also, is a strictly time proposition. It takes approximately the same labor and time to convert high-priced raw material into a finished article that it takes to convert low-priced raw material into the article which, in every other respect, save the quality of the material which enters into it, is identically the same, and so the percentage of

the Factory Burden is the same for both. But it is a sound business maxim that to sell high-priced wares costs more than to sell low-priced wares. Reverting then to the proposition that a manufacturer becomes a merchant the moment his finished wares are delivered by factory to warehouse or shipping room, it is logical to say that he must apportion his Selling Burden in the same manner that the merchant apportions his expense of selling, viz: on basis of the invoice cost of the goods. As before stated, Factory Cost is synonymous with invoice cost. Consequently, having established the Factory Cost of an article, by setting down, first, the net quantity of raw Direct Material required for its production, priced at figures which, in addition to the price paid for the material and cost of transportation, cover the cost of all handling, shrinkages, etc., and, second, the Direct Labor required to convert that net quantity of material into the finished article, and, third, the Factory Burden or the Departmental Burdens on basis of the percentages established by our factory accounts in the relation of those burdens to the corresponding Direct Labor and, having, finally, summed up the money equivalents of these three items, we must add the expense of selling that article by adding to that sum the percentage which our Selling Burden bears in the relation of its total to the Factory Cost of the wares sold, for a definite period.

The sum of Factory Cost and Selling Burden constitutes Selling Cost. For convenience and expedition in assembling the figures constituting Selling Cost, a printed form should be provided. Naturally, it would be a matter of some difficulty to provide a form which might be uniformly satisfactory in all factories in the furniture and woodworking industries, because governing conditions render necessary widely differing methods. The Standard Cost Sheet should be adapted to the conditions peculiar to the factory for which a form is used. The form illustrated in Plate 35 of General Factory Accounting is one which, in a general way, has met the requirements of a number of the author's clients in a variety of industries, and which is, perhaps, as well adapted for general use in the furniture and woodworking industries as any that might be drawn. Careful study of this form may suggest changes which will render such a sheet still more serviceable in the business of the individual

reader. Complete instructions for the use of this form will be found in Chapter X of General Factory Accounting.

In computing the cost of staple products—that is, those articles which are manufactured regularly and in round quantities, the figures representing weight, measure, etc., as well as all money figures, should be carried to at least the second decimal. It is sound practice to use only whole numbers in figuring the cost of special products, which are not manufactured regularly (except when these specials also are manufactured in round quantities on “repeat” orders), but the staples are manufactured in round lots, and, unless cost figures for that regular product reflect that condition by carrying all figures representing quantity of material and money to a corresponding decimal, before taking the benefit of the fraction, the result will be a Selling Cost which is sure to be from three to ten percent (according to the number of items entering into the computation) above what it actually should be. There is always a considerable number of items in such a computation, several of them burdened with separate departmental percentages and the sum of all items constituting Factory Cost is again burdened with the Selling Percentage. Consequently, if whole numbers are used for each item, the ultimate figure is raised, not only in that particular item, but, still further, by the subsequent application of burden percentages. Of course, it takes a little more work to compute costs if these figures are carried to the second decimal, but if cost figures are to be really helpful, they must be computed in this manner. Reliable cost figures cannot be obtained unless we are willing to set about computing our costs in an intelligent way and until we learn to base our calculations upon the round quantities in which they are manufactured.

With the Direct Material required to manufacture an article carefully dissected and its various elements carefully analyzed to establish correctness of quantities and issue prices; with Direct Labor carefully traced and its immediate cost definitely ascertained; with proper accounting methods to insure inclusion of absolutely every penny of overhead expense in the various burden accounts from which the percentages to be used in cost calculations are taken—with all these factors definitely understood and intelligently taken into consideration in computing the cost of a specific article, the figure added to Selling Cost in fixing

Selling Price may be considered absolutely *net* profit. Manufacturers who have been using arbitrary percentages (knowing quite well that these percentages did not begin to cover their total overhead or operating expenses), after dissecting and analyzing and burdening the production of separate articles of their product, may feel that this margin of profit is discouragingly narrow, but it should be borne in mind that in their former calculations a varying, but always large, proportion of their overhead expense was not taken into account, whereas, calculations made in accordance with the methods herein prescribed and including percentages taken from burden accounts kept as directed in General Factory Accounting, must include absolutely all of the overhead expense before arriving at the point where the margin of profit is fixed.

Reference to the Standard Cost Sheet, referred to above, will show that the last figure for which provision has been made under "Resume" is Selling Cost. Lines might have been provided for Net Profit and for Selling Price. That this was not done is due to the fact that the author, in his practice, discourages clients from adding a definite percentage of profit in order to fix Selling Price. For example: 11.12 percent might be added to Selling Cost to provide a net profit of 10 percent on Selling Price; 17.65 percent might be added to provide a net profit of 15 percent; 25 percent might be added to provide a net profit of 20 percent and so on. But the author recommends that after establishing the Selling Cost of an article, the manufacturer should compare that figure with the Selling Price which competition fixes and that, as the margin between those two factors widens, he shall devote more of his productive capacity to the manufacture of such articles and that, as that margin shrinks, he shall devote less of his productive capacity to the manufacture of such other articles. Having ascertained the Selling Cost of all his products, it should be the manufacturer's policy to manufacture the largest possible volume of wares upon which he makes the largest profits, leaving the competitor who does not know how or does not care to take the pains to ascertain his own Selling Costs to take the business which the manufacturer's figures tell him he cannot handle with profit to himself.

CHAPTER IX

Expediency

In its simplest and most elementary form, there is little room for discussion of the question: "Why know cost before selling?" The essentials of commerce present no such problem. The answer is obvious. The essential purpose of all commerce is profit, be that commerce trade, industry or speculation. In speculation the essential of profit always is problematic, obviously. In speculation, if we know selling price we cannot know cost, or, if we know cost we cannot know selling price. The moment both cost and selling price are known, the element of speculation has been eliminated. In trade and industry, the essential of profit may always be assured. Manufacturing and merchandising are the legitimate phases of commerce. Speculation, intrinsically, is not legitimate. It is not productive, whereas, manufacturing and merchandising are productive, in the sense that labor is required to bring the merchandise to market and to convert material from the form known as "raw" to the finished state—the saleable commodity.

Legitimate commerce differs from speculation in this one respect: The profit which is the purpose of commerce can be made certain. Whenever profit becomes problematic the element of speculation has crept into the proposition. If the manufacturer does not know the cost of his wares before he sells them, he is a gambler, just as is the speculator who contracts to deliver wheat without knowing exactly what he will have to pay for that wheat when the time of delivery comes.

The manufacturer engages in business—invests his capital and devotes his time and thought and energy for the one and only purpose of making a profit. If, at the beginning of the venture, he knew the selling price of the things he proposed to manufacture but did not know how much they would cost him to produce, what legitimate inducement would there be for him to engage in the venture—wherein would that venture differ from the wildest kind of speculation? If he were to engage in manufacturing with a knowledge of selling prices as his only preparation, wouldn't he be a gambler? Having begun manu-

facturing, if he sells a thing without knowing that it costs less to manufacture it than the price he obtains for that thing, isn't he a gambler?

That is about all that ought to be said in discussing this topic in its elementary aspect. It is manifest that legitimate commerce, elementarily, is no less dependent upon the knowledge of exact cost than it is upon knowledge of selling price. The gambler who contracts to deliver wheat which he does not own is a gambler for the one and only reason that he does not know *exactly* what price he will have to pay for it. And those phases of commerce which we call trade, merchandising, industry and manufacturing, cannot be *legitimate* unless knowledge of *exact* cost precedes knowledge of selling price. To the extent that the quantity he calls cost is not *exact*, to that extent the manufacturer is a gambler.

Absolute knowledge is *certainty*. The essential of profit in merchandising and manufacturing may be made *certain*. *Certainty of profit inevitably depends upon absolute knowledge of exact cost*. Profit is the difference between the figure at which a thing is sold and the, necessarily, lower figure at which that thing is bought or produced. Gaining that difference is the prime purpose of the manufacturer's venture. If the figure at which he sells is lower than the figure at which the thing sold can be produced, the difference represents loss. How can a manufacturer know that the difference between the two is that for which he is striving, if he is not certain which is the higher? Did he engage in business, and is he continuing in business, for the purpose of avoiding loss? Does he define success in the words: "I did not lose!"? When an inventory has been taken and his books closed, is he satisfied to know that he has lost nothing?

He *did* engage in business and he is *continuing* in business for the purpose of gaining profit. Instead of fleeing from loss, he is hotly intent upon the pursuit of profit. Instead of being the hare, he is the hound. He defines success by saying: "I made money!" He confidently waits for his bookkeeper to tell him *exactly* how much money he has made.

Now, the more certainly he knows the *exact* cost of his product, the *more legitimate* is his business. And the *exact* cost of his product is the price he has paid for raw material, plus the expense of converting that raw material into a saleable commodity, plus

the expense of marketing that commodity. The sum of those three elements constitute the manufacturer's *exact* cost. That is the truth, wholly and solely. We may blind ourselves to that truth but, none the less, it is the truth.

It is the absolute and exact truth, whether in speaking of cost, we refer to a year's product in the lump, to a single transaction or to a single article. The *exact* price paid for the *exact* amount of raw material that tangibly enters into the finished article, plus the money paid for the *exact* amount of labor required to convert that raw material into the finished article, plus the *exact* proportion of the expense of operating the factory which can be equitably attributed to that article, plus the *exact* expense of marketing it, *is the exact cost of that article.*

Defining profit still more precisely. The manufacturer's purpose is to make the largest possible profit and *that also* applies equally to his annual business, to any single transaction or to any single article. If we look at the aggregate of a year's business, we are simply looking at the composite of a year's separate transactions. If we look at the profit gained on the entire year's product, we cannot ignore the fact that the constituent articles of that product carried separate profits or losses. Now, the manufacturer's purpose being to make the largest possible profit on his year's business, is it not literally his purpose to know *exactly* what profit he makes on each separate article? How is he to accomplish his purpose of making the largest possible volume of profit on the aggregate volume of his business if he does not know the *exact* cost of each and every article he produces?

Obviously, to achieve the maximum of the only purpose for which he is in business, and, moreover, to minimize in his venture that element called speculation, which is no part of legitimate commerce and which makes for financial insecurity, he must know *exactly* what each and every one of the articles he produces costs him, before he sells it. If he sells without knowing that *exact* cost, to whatever extent he is *uncertain*, to that same extent he is *jeopardizing his financial security and impairing his own financial efficiency.* He is not then in the safe pursuit of profit—he is fleeing from possible loss.

His factory has a definite maximum capacity. In order to make the largest possible profit on his product, he must devote that capacity to the manufacture of those wares which yield

him the largest percentage of profit, in such quantities as the demand for those articles justifies. To do that he must determine: First, the quantity to be made up of that one article upon which he makes his very largest percentage of profit; next, the quantity to be made up of that second article upon which he makes the second largest percentage of profit; third, the quantity to be made up of that third article upon which he makes his third largest percentage of profit, and so on, until he has loaded his factory to as nearly its maximum capacity as trade conditions will justify. How is he going to do that unless he knows *exactly* what each and every article produced costs him? To insure the largest possible profit on his factory's capacity, he must know *exactly* what all his products cost him before he accepts the orders with which to load that factory.

More! He must devote the full efficiency of his selling campaign to the sale of the goods on which he makes his largest profits. He must push hardest the sale of the article upon which he makes his largest profit, and, next, the sale of the article upon which he makes his second largest margin of profit, and so on. He must not sell a bill of goods of the kind on which he makes none or merely a nominal profit unless, in so doing, he can effect the sale of a sufficient quantity of the goods on which he makes more than average profits. How is he going to manage his selling campaign intelligently, if he does not know his *exact* costs?

Commercial theory prescribes that we shall fix selling prices at figures higher than the combined cost of raw material, of labor, of the expense of manufacturing and of the expense of marketing. Modern commerce, however, is not a theory. That is another truth that is unescapable. Competition fixes selling prices and thus upsets theory. The one and only element in his commercial transactions that the manufacturer may positively control is cost. How is the manufacturer going to meet competition which fixes selling prices, unless he knows all there is to know about the one element which *he* can fix? How is he going to conduct his business with intelligence, how is he going to achieve his purpose in the maximum degree, how is he going to maintain his self-respect as a business man, how is he going to get any real satisfaction out of his life work, out of his business, unless he knows *exactly* all there is to know about this one and only element which it is in his power to control? How is he going to

be sure that competitors and customers are not deluding him, how is he going to be the peer, the master, of his competitors, unless, in addition to the exact price paid for the material and labor required to manufacture his product, he knows, article by article, and transaction by transaction, *exactly* what is the expense of operating the factory in the manufacture of, and *exactly* what is the expense of selling each separate article in his line?

If the manufacturer finds that one competitor is selling one article at a certain price, and a second competitor is selling a second article at another price, and a third competitor is selling a third article at a third price, how is he going to know whether any or all of this competition is legitimate if he does not, *separately* and *exactly*, know the cost of producing and selling each of those three articles? How is he going to know that if he sells those three articles at the prices which competitors fix for him, he will still be making a profit, unless he knows his *exact* costs? How is he going to know that, in letting them have the business, he is not losing sales on which he might earn his legitimate profits, unless he knows his *exact* costs? How is he going to know, on the other hand, that if he allows those competitors to have that business they will, that much sooner, land in the bankruptcy court and cease from troubling him, if he does not positively and conclusively know that it costs more to produce those articles than the figures at which they are selling them? How is he going to be able, instead, by devoting his factory's capacity to the manufacture of other articles on which competition allows him to make a legitimate profit, to make his capital outlast the capital of the foolish competitors, unless he **knows** *exactly* what it costs to produce and market each and **every** article which is sold in competition? How, otherwise, is he going to keep out of the class of the foolish competitors?

To gain the utmost possible return in the shape of profits upon his investment and because of his activity, the manufacturer must expect to bring to the management of his business the greatest intelligence at his command. Can it be considered even remotely intelligent to sell things without knowing *exactly* what they cost? Now and then it may be thought expedient to sell a certain article for less than its actual cost, in promoting the sale of another article on which the profit is abnormally large. But, is it not quite as essential to intelligent management to know

what the article sold at a loss costs, as it is to know the cost of the article sold at a profit? As a matter of common sense, is it not even more vitally necessary to know how much is lost in selling the one below cost, in order that it may be known whether the profit on the other is sufficiently great to leave a legitimate margin of profit on both?

Suppose one of our employees were to announce his intention of leaving our service to start a factory of his own. Suppose he was asked why he had decided to set up for himself and his sole answer would be: "Because this article sells for four dollars and that second article sells for five dollars and that third article sells for six dollars." Would we have any respect for the business judgment and intelligence conveyed in that answer? If he did not have sense enough to carefully figure out in advance what his buildings and machinery would cost and how much they would depreciate and how much he would have to pay for raw material and how much for labor and how much it would cost him to sell those articles—if he didn't have that much sense, wouldn't we know that he was not going to last very long?

How are we wiser than he if, already owning a factory, we ignore depreciation of buildings and machinery and the correct apportionment of the overhead expenses of manufacturing and selling? How are we wiser, if we do not carefully compute the money equivalents of these things, as they enter into the costs of our products? Does the fact that we already own a factory magically transform folly into wisdom? How can we have any respect for ourselves, as business men, if we allow our salesmen and customers to persuade us to sell an article at the price which they tell us competition has fixed, without knowing exactly what it costs us to manufacture and market that article?

If the new competitor referred to above does carefully figure his exact costs and then devotes the capacity of his new factory to the manufacture of articles on which he makes abnormal profits to the exclusion of those on which he cannot make a profit because our selling prices are too low, how are we going to keep up with him in the long run? He will be making money on all of his products, in the full knowledge of what he is doing while we, blundering ignorantly about, may make a small margin on some of our goods and lose money on the rest. Aren't we going to feel very foolish, to say the least, at seeing him prosper

while we stand still or go backward? How are we going to prosper unless we will ascertain our own *exact* costs and sell our goods according to those costs and not according to the prices which competition may fix for us, or which salesmen and dealers may merely tell us competition has fixed?

The only true satisfaction in life is: Doing things—accomplishing results. Whether it is work or play—the feeling that we have done well makes life worth while. The more we accomplish, especially if there is corresponding increase in advantage to ourselves, the more enthusiasm we bring to the accomplishment of other things. The real satisfaction in business and in work is the feeling that we have not wasted our energy—that we have made our every effort count. The smaller the number of unprofitable transactions, the more satisfaction we take in our business. The more certainly we know that on each and every article we manufactured and sold during the course of a year we made as large a profit as did our competitor, the more zest we will put into our work during the succeeding year. The more certainly we know that we have made no mistake in loading our factory's capacity, the more vigorously we are going to attack that problem in the future. How are we going to know that we are not wasting a part of our energy, how are we going to know that we are keeping down the number of our unprofitable transactions to the minimum, how are we going to know that we are making a legitimate profit on each and every article in our line, how are we going to know that we have so loaded our factory that its operation will bring us in the largest possible profit, unless, before selling, we know exactly what it costs us to produce and to market each separate article?

Our prime and only purpose is to make the largest possible profit. Our object should be to make each and every effort count, to waste none of our energy, none of our activity. We need to get the largest possible return for each and every endeavor, for every bit of energy and thought we give to our business, for all our activities. How can we expect to accomplish all that unless, before selling, we know exactly what the thing to be sold will cost us?

Manufacturers who do not trouble to go into details in their cost computations always whine whenever they lose a sale. To hear them tell it, it is to be supposed that they do not want to miss a

sale, even though they know they will absolutely lose money in making it. Each and every one of them is eager to increase the volume of his sales, regardless of the fact that he doesn't know whether such an increase will result profitably or otherwise. Is it not utterly foolish to increase the volume of sales without, at the same time, increasing the volume of net profits—without being certain that the increased volume of sales will not positively decrease the volume of net profit? How are we going to be certain that we are not doing this in our own business, if we do not know the *exact* cost of the goods involved in such an increased volume of sales? We don't want to weaken our business organization. We want to *strengthen* it. How is expansion going to do that for us if we do not know *exactly* what it will cost us to produce and sell the goods with which we propose to expand—the goods required for the increased volume of sales?

It is no longer safe to expand volume of sales without regard to costs, if it ever was. Producing facilities—factory capacities—are rapidly reaching a parity with the volume of consuming demand. The prodigal standard of living that is a feature of our national life cannot long be continued. Dire necessity must inevitably make close economy in household finance the feature of our standard of living. And as that condition develops, the woodworking industries and the furniture industry, especially, will face a new problem. The business of the second-hand dealer and the repair man will pick up. Less extravagance in discarding furniture must accompany that development. The need for thrift is going to be more pronounced than is the foolish pride which, today, restrains the poor couple, setting up housekeeping, from going to the second-hand dealer. The signs of this condition are all about. Public prints are conducting economy departments and pointing out the folly of extravagance. We will presently find our commerce governed by conditions which have long obtained in European countries, where hard necessity teaches the poor man not to ape wealth.

How are we going to meet this condition of narrowing margins of profit on a decreasing volume of business? For if producing facilities and consuming demand are nearing a par, in the face of current margins of profit, does not that mean that the available average volume of business is decreasing? Our only hope lies in economical management. Our future profits must

come from within. We must look to internal economy, rather than to external expansion, for those profits. We must reduce costs, and, to do that effectively, we must analyze those costs and gain a thorough understanding of the separate elements of cost, in order that we may regulate our expenditures wisely.

Instead of devoting the bulk of our time to selling—instead of giving our best thought to the marketing of our wares, we must learn to devote at least an equal share of time and thought to the producing end of our business. How can we expect to effect internal economies—how can we hope to reduce costs to a minimum, unless we are willing to give time and thought to mastering the *exact* knowledge of the different elements that go to make up the costs of the goods we produce? We cannot hope to reduce costs by paying less for raw material. We cannot expect to economize by paying less for our labor. Our cost reduction and economy must come as the result of increased productive efficiency and the elimination of all that is superfluous from our overhead expense.

Of what value is the knowledge that it costs us *about* one figure to manufacture and *about* some other figure to sell? Modern competition creates the condition in which the difference between *about* and *exactly* is likely to represent something more than a normal profit. The great majority of manufacturers in the furniture and woodworking industries are strangely apathetic when it comes to computing *exact* costs. The few who are giving real thought to cost computation are the ones who are prospering in the greatest degree and the others are being, slowly but surely, eliminated.

Often, in one form or another, the author has heard this remark made: "I would rather not know my exact costs, because that might prevent my accepting business which I need to keep my factory busy." Can knowledge ever interfere with judgment? Why will a manufacturer be less competent to manage his business and to keep his factory busy if he knows *exactly* what a thing cost before he sells it? Real, analytical understanding of his costs is the one safeguard which he can throw about his business. Why is it that the men in the furniture and woodworking industries who have spent money in the installation of a scientific system of factory accounting—the men who do know, really *know*, all about their costs—why is it that their factories are kept

running at full capacity, why is it that those men complain the least about dull times?

There are no Carnegies and no Rockefellers in the furniture and woodworking industries and the reason for that is patently evident. Those men succeeded because of their recognition of the value of the knowledge of detail. In the industries named there is no such appreciation of the value of statistics. The great majority of manufacturers of furniture and kindred products are inclined to regard analytical accounting as something which may be useful in other industries but which cannot be of advantage to themselves.

That may be due to the experience of a few. Some marvelously intricate and wholly worthless systems of accounting have been palmed off on manufacturers in these industries by accountants who allowed their enthusiasm for niceties of method to run away with their judgment. And some other "systematizers" have sought to adapt to the furniture and woodworking industries methods which had been found effective in plants in other industries, in the electrical supply business, for instance. If one mistake greater than any other can be made in designing a system of factory accounting, it is to attempt to *force* the introduction of a method in one plant for the one and only reason that it has been found to work satisfactorily in another. A system of factory accounting, to be superlatively good, must be fitted to the processes of manufacturing followed in the factory for which it is designed. In other words, accounting must adapt itself to the work of the factory. We must not expect to adapt the work of the factory to our accounting methods. That is a false premise and the system that is designed with the idea that manufacturing processes are to be made to conform to its requirements is sure to be a failure. The system must be designed to fit the conditions that are peculiar to the factory—it must conform to the processes employed in that factory and it must reflect those conditions and delineate the cost of those processes, so that the manufacturer may gain an accurate understanding of his *exact* costs and of what is necessary to be done in order to reduce those costs to the minimum. The only excuse for the installation of a system of factory accounting must be that it shall become an effective aid in profit-earning.

CHAPTER X

Book and Record Keeping

It is, of course, to be understood that accounting, whether of costs or general bookkeeping, cannot be made to insure profit. Cost accounting, proper, can be made to demonstrate what it costs to manufacture a thing and what it costs to sell that thing. That is the limit. Factory accounting can be made to demonstrate where lies the fault for excessive costs and, to the intelligent mind, will point out the means of remedying the fault, but accounting cannot be made to correct that fault. The figures which are produced by accounting methods are merely sign-posts along the way. If the manufacturer does not heed those signs, he should not blame his accounting department if, in consequence, he finds himself upon the road he does not wish to travel. He may only blame his accountants and clerks for not erecting truthful signs, and, even then, it must be his own fault that he finds himself upon the wrong road. It is quite as much the manufacturer's personal business to know that his accounting methods are correct and complete, as it is his business to know that the machinery in his plant is adapted to the purposes for which it is used.

The furniture and woodworking industries seem to have experienced more than their fair share of accounting troubles. In most cases, that has been due to the fact that the systems installed, while, so far as principles and methods are concerned, no doubt highly satisfactory in connection with the work of other industries, such as the manufacture of machinery, for instance, were not at all suited to the requirements in the industries first named. Because of the attempt to fit a set of methods which had been proven efficient in other lines to the furniture and woodworking industries, it has frequently been found, these systems were not complete. They did not take *all* the elements of cost that are peculiar to these industries into consideration. Now, any system which does not, as a matter of routine bookkeeping, include every element in our cost computations, cannot be worth a great deal.

Analytical factory accounting prescribes the distribution of

expenditure accounting to the causes that render expenditure necessary. The main purpose cannot be said to be the establishment of the cost of different articles of product. The far more important purpose is to minimize expenditure and thus *augment* and *conserve* net profit. Business practice in separate establishments presents problems of accounting peculiar to each. No two plants, however close together they may be, geographically or technically, can ever be operated upon precisely identical lines. Local physical conditions combine to render impossible the formulation of one system of accounting which shall *exactly* meet *all* the requirements of more than one factory. The solution of all such problems, in common with all other accounting problems, is, however, a matter of simple arithmetic. *Intelligence solves arithmetical problems by the simplest and most direct processes.* And all such processes embody certain common principles, ramifications of which, by equally simple methods, can be made to afford the solution of specific problems. Modern business is more than ever dependent upon the "General Bookkeeper." Perpetual motion will have been discovered before "system" can be made self-operative. The General Bookkeeper of today is the master mechanic of system. The ledger clerk, the cost clerk and the efficiency clerk are mere cogs of the mechanism of which he should be the master and controlling head.

The real significance of the things with which we are most familiar most often escapes us. Factory managers and superintendents, day after day, unheeding pass over insidious leaks which minimize or entirely destroy profit—unheeding, because long familiarity with those leaks has blinded them to their vital significance. A well-designed system of factory accounting, intelligently practiced under the supervision of its master, will automatically uncover many of these leaks and bring their significance to the attention of the management. In almost every factory in the furniture and woodworking industries are to be encountered losses by reason of damage in process which, taken separately, amount to but little but which, in the aggregate presented by the intelligent accountant, often are found to exceed a normal profit. Ordinarily, it is only when wares are rejected and returned by customers that such losses are brought to attention, and even then the causes are seldom systematically traced with the purpose of putting a stop to those losses.

Chapter VIII of General Factory Accounting describes methods for tracing the causes of these losses, with illustrations of the necessary forms in Plate 25, Damage In Process Tracer; Plates 26A and 26B, Repair Tag; and Plate 27, Manifest of Wares Returned. In most of the factories in the furniture and woodworking industries in which the author has served, the loss discovered through the return of wares rejected by customers because of faulty workmanship or the use of defective material was as nothing compared to the loss uncovered by the Damage In Process Tracer. Such loss is due to the same causes but, in the absence of systematic methods for its discovery, its amount seldom becomes known. For instance: A piece of lumber may be used which is not suited for its purpose. The article of which it forms a part is manufactured and delivered to the Finishing Department where it may be given one or two coats of varnish before the defect becomes apparent. When the defect is discovered, the article is sent back to have the defective piece replaced. After that is done, perhaps several operations must be repeated before the article is accepted by the Finishing Department. A worker may imperfectly execute his work upon a certain part and the foreman or inspector of the department may be careless in his examination of that part before it is sent on to be used in manufacturing the product. That faulty workmanship may not be discovered until the article has been completed. Then it must be returned to the department where that faulty workmanship was performed. Often the correction of that fault entails the expense of repeating the performance of several other operations. Obviously, there is a loss involved but, in the absence of systematic methods, the aggregate amount of such loss is not brought to light as a separate figure. When, however, a factory accounting system is so designed as to bring this loss to attention, its aggregate amount is always such as to insure arousing the management to the necessity for curtailment. The practice of charging the loss that is occasioned by the employment of defective material to the burden upon that material may teach the lesson that that material is not sufficiently good for the purpose for which it was purchased and the expediency of using better grades will suggest itself. If the loss that is due to faulty workmanship is charged to the account kept with, and thus made an element of the burden of, the department in which that faulty

workmanship occurs, the foreman will be taught the lesson that his workers are not conscientiously performing their work and he will be made to see the reason for a more rigid inspection of the work they turn out.

The most satisfactory method of accounting for materials is to open a separate account for each of the bulkier items, to which all purchases are charged when materials are delivered and which are credited with consumption according to production, while the smaller materials are charged direct to the departments in which they are consumed. In the woodworking industries, it is the author's practice to prescribe keeping either one Lumber account or several accounts for different kinds of wood, and, in the metal furniture industry, a separate account for such items as Angles, Tubes and Rods (round iron or steel), while glass, paint, etc., small trimmings and accessories (nails, tacks, screws, bolts, hooks, etc.) as well as all shop supplies are charged to the department to which these materials are delivered. As production orders are issued, or, where a general cutting bill such as described earlier in this book is authority for production, as foremen report completion, the accounts to which has been charged the Direct Material which will be or has been consumed in the execution of those orders are credited with the quantities established by standard specifications or bills of material. If we charge all the glass and mirrors received to the department in which the glass is applied to product, and credit that department's account with the value of the glass which our standard specifications tell us should be consumed in the manufacture of different parts of our product, when an inventory is taken the account kept with that department will tell us what has been the loss by breakage and we will derive a percentage to be used in raising the invoice price of glass to a figure sufficient to absorb the loss by breakage. If we charge all the paint received to the Paint Department's account and credit that account with the value of the paint which our standard specifications tell us should be sufficient to cover the manufacture of our product, when an inventory is taken that account will tell us whether the amount of loss shown by this material item is more than might be occasioned by evaporation. In case of both departments, the account will give us a clue to the economic use of materials and management of departments by foremen.

As pay-rolls are liquidated, the total sum of money required for that purpose should be charged to a Pay Roll account. At the end of each month, that account should be analyzed and a closing entry made, charging to each department's account the amount of wages paid to workers in such a department. By employing the form of pay roll sheet illustrated in Plate 17 of General Factory Accounting and following the instructions for its use, the work of this analysis will be simplified. To the accounts kept with productive departments should be charged all Direct Labor as one item and all Indirect Labor as another item. As the work of manufacturing wares is completed by the several contributing productive departments, we credit the accounts of those departments with the Direct Labor figures shown by our Standard Cost sheets and when an inventory of work in process of manufacture has been taken, those accounts will tell us whether the Direct Labor compensated in a department has been fully utilized and, if not, in what degree it has not been so utilized.

Most factories in the metal furniture business number a foundry among their productive departments. The establishment of the cost of the product of the foundry requires a method somewhat different from the methods employed for other productive departments. The purpose must be to establish the cost of castings, either including or not including molder's labor. One or several accounts should be kept of pig and scrap metals and one or several accounts with coke and cupola supplies. The expense of receiving and storing these metals, coke and supplies should be assembled in one burden account and the expense of the cupola in another burden account. The first of these two burden accounts will tell us upon what percentage we must increase our prices of metals, coke and supplies to determine their cost delivered to the cupola while the second burden account will tell us how much must be added to the combined cost of metal, coke, supplies and the first burden, to establish the cost of the molten metal that is poured. The foundry foreman or clerk should be required to keep a detailed record of and report the weights of metal and coke and the cupola supplies consumed in, as well as the weights of foundry scrap and defective castings returned from, each separate heat. Upon receipt of these reports, the accounts named should be credited with the amounts

of metal, coke and supplies consumed and the scrap metal account should be debited with the amount of foundry scrap and defective castings returned, opposing debit and credit being made to the foundry account. As wares are manufactured in the construction of which the castings made are used, the foundry account is given credit for the same at the figures at which they are taken into account in our Standard Cost Sheets or specifications. If the labor of molders is charged to the manufacture of castings, necessarily the figure at which we take castings into account must include that labor, for which reason the sole credit to the foundry account will be for the *material* (castings) manufactured there. On the other hand, if the labor of molders is shown separately on each Standard Cost Sheet, the figure at which castings are taken into account will represent only the metal cost, plus, of course, the burden charges above referred to, and, consequently, on basis of demonstrated production, the foundry account will be credited for material at that metal plus cost, as one item, and for the Direct Labor of molders as another item.

To insure inclusion in cost computations of such items as interest on the investment in, taxes upon and insurance and depreciation of a machine which is used in the manufacture of only a portion of the factory's product, it is the author's practice to prescribe charging those expenditures to the account kept with the department in which such a machine is located, as separate and distinct from similar items which apply to the equipment used in the manufacture of the factory's entire product. If the machine happens to be a patented device upon which a royalty is paid, that royalty is charged to the departmental account as a separate item, of course. At the beginning of a year, we must then approximate the probable volume of production of the articles in the manufacture of which such a machine is used. Upon basis of that volume, we must include the aggregate of these expenditures in our cost computations, and, upon basis of that apportionment we must credit the departmental account with the aggregate of these expenditures, according to the actual volume produced. Naturally, the approximation of this probable volume renders impossible the *exact* distribution of this charge, but experience will teach us to make that approximation with reasonable precision.

In the furniture and woodworking industries little or nothing worth while is to be gained in keeping job costs, i. e., the cost of manufacturing each separate job, except, of course, specials. Necessarily, in the plant devoted to the manufacture of special work exclusively, it is imperative that job costs be compiled. Complete instructions for keeping job costs, with illustrations of the forms necessary to do so, will be found in Chapter VIII of General Factory Accounting. In the plant devoted to the manufacture of staple wares, minor variations in the cost of producing different lots of the same articles do not affect selling prices, and the one and only purpose of *cost accounting* is to show the relation between cost and selling price.

The compilation of job costs cannot be made to contribute effectively toward increasing efficiency and the minimization of expenditure. However, if a factory system includes the feature of a continuous record and report of the work in the execution of which each worker has employed his time, by means of a daily time card or coupon labor cards, instead of keeping costs on successive jobs, we should introduce the check upon operating efficiency, as described in Chapter XI of General Factory Accounting. It profits us but little to know merely that the cost of labor required to manufacture one lot of twenty-five articles was \$11.20, for instance, while the labor required to manufacture another lot of twenty-five of identically the same articles cost \$11.40 or \$11.00. But the knowledge that the labor cost of performing a certain operation, which is being performed day after day, fluctuates from \$2.00 to \$2.10 or to \$2.15, can be made most highly profitable by instituting the necessary corrective measures which will keep the cost of performing that operation steadily at the minimum figure of \$1.90.

There is no line of work, in connection with factory operation, that is of more importance and the conscientious performance of which can be made to more effectively contribute toward profitable results than the work of the Cost and Efficiency Clerks. In many small factories the work of both is performed by one man, and, for a young man possessing a capacity for detail and who is patiently persevering, no more promising field of endeavor can be desired. The training gained in such work cannot fail to qualify him for far better things than he might hope to achieve in following any other vocation. The successful Efficiency Clerk

differs from the poet in the respect that he is both born *and* made. He must possess, inherently, a keenly analytical mind and an alert temperament. He must find pleasure in mentally reconstructing conditions and in tentative inquiry as to whether and how that reconstruction will improve results. Without such mentality, all the schooling and experience he may acquire will make him only a straggler. There is no line of endeavor in industry where native qualifications, training and intelligent application will sooner bring deserved recognition and reward than the work of the efficiency man—none in which the man who is not qualified for his work can make a more dismal failure.

Experience must be gained at the price of overalls and soiled hands, sometimes bruises and always long hours. At this price, with eyes and ears always open, always weighing and dissecting, mentally tearing things to pieces to put them together again better than they were before, the Efficiency Clerk may gain that knowledge of practical factory operation that will, in time, warrant him in also opening his mouth. Efficiency men never “graduate”—they are always students. The efficiency student’s course of study in the University of Hard Experience includes mechanics, mechanisms, construction of machinery, laying out working space—more especially *process*—above all MEN. These he studies unceasingly. He studies men and conditions from the standpoint of the sociologist and of the humanitarian as well as that of the capitalist or employer. He must be tactful, persistent, but never peremptory. He must gain his ends by finesse if he cannot gain them by direct means. Men—employees and employers alike—are wedded to methods to which they have been accustomed. They do not take kindly to the oft-repeated announcement that they have been wrong. Even clients who realize their own short-comings frequently become impatient and resentful, come, with their workers, to feel that the Efficiency Clerk is an interloper who is uselessly burdening them with detail. These must be tricked into adopting new methods, at times, so that results may take the place of arguments. A few accomplished results will give them confidence in the judgment of the Efficiency Clerk. Without that confidence he cannot achieve a maximum of results.

A good man is sometimes called “the boss’s right hand.” With a correctly designed system of factory accounting the qualified

Cost Clerk may make himself the brains of any manufacturing business, so far as profit-making is concerned. He *knows* and *can prove* the cost of manufacturing different articles and of selling them. And if, with his cost work, he combines the duties of the Efficiency Clerk, he also *knows* and *can prove* how that cost may be reduced. Whenever he can steal a few moments from his clerical duties, he goes into the factory and into the department which he knows to be lacking in efficiency. He takes under surveillance the men whose work his records have told him is not up to a normal standard. He studies their movements and the manner in which they operate their machines or use their tools. He studies the routing of the work through the factory, with reference to economy in handling and expedition in execution. And, when he has gained the respect of superintendent and foreman, he points out the weak spots and suggests the remedy.

We should not content ourselves with cost finding and with minimizing cost of production and sale. We should analyze our burdens with reference to the fixed charges, viz., those charges which continue to accrue, whether we are operating at full capacity or shut down, and with reference to contingent charges, viz., those expenses which increase or diminish with volume of production and sale, in order that we may be in position to know whether, during dull periods, we can accept business at reduced prices and thus earn a part of our fixed charges, rather than shut down entirely and have the fixed charges pile up as a total loss. More than that, we should analyze our Selling Burden with reference to the elements that apply to sales to jobbers and retailers alike and the elements which apply solely to sales to retailers, so that we may be in position to know whether we can afford to sell our wares to jobbers. If we maintain separate selling organizations, as in different sections of territory or for the sale of different parts of our product, we should analyze our General Selling Burden (composed of the expenditures incurred in promotion of the sale of all wares and in all sections) and apportion it upon equitable bases between the selling burden accounts kept for each selling organization, and to these latter selling burden accounts we should charge the expenditures which are incurred directly for the maintenance of such an organization, in order that we may know whether the continuance of that organization is justified by the results obtained.

Above all, we should keep a detailed record of the work of different salesmen in order that we may be able to intelligently direct their efforts. A certain manufacturer of furniture classifies his product according to its physical characteristics and maintains a daily record of the sales of each man in each classification. If a man is not selling a normal amount of goods in a certain classification, he is written, to ask why he is not pushing those goods and offered such assistance as his reply may indicate he needs to augment the volume of his sales. In the wholesale dry goods trade the importance of definite knowledge concerning the profit-earning qualities of salesmen is so well understood that many houses keep an auxiliary ledger account with each salesman. To this account are charged all the goods shipped to his customers and collection of their accounts is credited to that account. To the same account are charged the salesman's salary, commission and expenses and, at the end of the year, the entire selling expense of the house is apportioned between the accounts kept with salesmen. The expense of collecting delinquent customers' accounts is charged to the salesman's auxiliary account, and if an account is found uncollectible, the loss stands charged to that account. When the books are closed for the year, therefore, the actual net profits gained during the year are found distributed between the accounts of the salesmen who earned them. The former method is, of course, valuable in promoting sales of all lines of goods, and the latter method is equally valuable in determining the sales efficiency of the men who are charged with the duty of marketing our product. Where it is not desired to go into details, such as explained in connection with the latter method, we should, at least as often as once each month, ascertain which are the men who are earning our maximum profits. And for the determination of that question no better method may be devised than that explained in Chapter IX of General Factory Accounting in connection with the Sales Record illustrated in Plate 33.