

ordered, an operation which required them to go all over the stock room and up and down stairs with small wicker baskets which they filled and returned for verification and packing on the first floor. The goods were then sent down a chute to the shipping department. The orders were sent to the billing department, where copies were made with corrected prices and quantities, managers' commissions figured, and one copy mailed to the manager. The personnel necessary for these operations (not including the billing) was at that time fifty-two.

The organization at this stage was confined to the preparation and packing of orders, and to a systematic repairing of packing cases. These were usually the cases in which the merchandise had been delivered to the depot. Without going into the detail of this stage of the organization, suffice it to say that the personnel was rapidly reduced to forty-six. I will call attention only to one detail, which became very important in the second stage of the organization which followed. This detail consisted in clearing out a space on the first floor over the shipping department, and using it for storing a completely representative stock drawn from the entire stores room. This central stores room, which we called the "preparation," contained from three to six days' supply of each article, of which the main stock was kept in the "reserve." The obvious and immediate advantage of this was to concentrate the movements of the preparation clerks in a very small area. This necessitated, of course, a continual restocking of the preparation from the reserve. The consequence was to reduce the number of preparing clerks from six to three, while one man assured the restocking. At the same time the delay in filling orders was reduced from an average of three days to an average of one.

The rapid growth of the business soon made it evident that larger and more convenient quarters must be secured for the stores rooms. It was decided to install them in a rectangular building in another part of the town with a ground floor 300 meters by 120 meters, half covered by a first floor. This gave me the occasion for a radical reorganization, whose general principles I had been maturing during the organization of the old stores rooms.

Before describing this in detail it is worth noting that, when the new organization was finished, the number of lines prepared had increased from 1650

to 3500 per day, the tonnage from 60 per month to about 130. The entire work was also being done by thirty-five employes instead of the one hundred that would have been necessary if the personnel had been increased in the same proportion as the increase in the business. As a result of this success, the opposition of the other directors to these methods was overcome, and they were applied to the much more important grocery department with even more striking results; for example: reduction of the personnel from 105 to 30 coincident with an increase of tonnage of more than 100 per cent. In the case of the grocery department, however, this result was attained chiefly by a very special mechanical equipment, which falls outside the scope of this article in which I propose to describe chiefly such modifications of stores handling as involve no new or very special mechanical changes.

The first step in the new organization was obviously to analyze the problem and divide it into workable units. This analysis immediately showed the following as the most important groups:

1. Purchasing and Maintenance of Stock
2. Receiving and Inspection
3. Tagging
4. Moving to Reserves
5. Moving from Reserves to Preparation
6. Preparation
7. Verification of Preparation
8. Packing
9. Weighing and Shipping
10. Billing and Bookkeeping Control

Each element was studied in detail, stop watch in hand; many alternative solutions were investigated and rejected. The solutions finally accepted were rigorously time studied and put on task and bonus. Detailed instructions and instruction cards are in force for each operation. Bonuses for employes and also for bosses go as high as 55 per cent of the wage. In view of the great variety of articles, these time studies are sometimes extremely complicated, but in every case the results have been reduced to simple and easily verifiable form. Bonuses are calculated daily, and in the case of the tagging clerks, who are fourteen- and fifteen-year old girls, they are paid daily.

We will consider here only the solutions adopted, with special emphasis on those elements in which new methods were applied.

1. *Purchasing and Maintenance of Stock.* Here

I applied the classic Taylor methods: balance sheets, symbolization of merchandise, maximum and minimum limits, purchase requisitions and purchase orders, together with stores issues of a special form necessitated by the division of the stock rooms into reserves and preparation. This division allowed me to apply to the preparation the principle of the fixed inventory such as Taylor applied to tool rooms. We determined the amount of each merchandise which in principle should be maintained in the preparation. At the time of the annual inventory this amount was stocked complete for all lines. This obviated the necessity of accounting for each daily delivery from the preparation and permitted us to carry on the balance sheets only the stock of the reserves, thus greatly simplifying the stores accounting.

2. *Receiving and Inspection.* This also followed the classic lines, with one important modification made necessary by the fact, first, that each article before going to the reserves had to be tagged (catalogue number and price) and second, that all merchandise was to be placed, immediately after tagging, in standard bins where it remained, through all operations, until taken out for shipment. This required, first, that the receiving clerk be advised, on the back of his copy of the purchase order, of exactly the type of tag and the quantities of tags to be used together with the price, as it was his business to deliver the tags (after having them printed on our special machines, if necessary), to the tagging clerks; second, that he indicate to the "encaisseuse" (the clerk who puts the merchandise into the standard bins for delivery to the reserves) the type of bin to be used and the quantity to be put in each bin, and third, that he prepare the bin tags. This information also was given to the receiving clerk on the back of his copy of the purchase order.

One mechanical trick must here be mentioned. Merchandise taken from the supply cases, verified and accepted, was stacked on simple platforms about 30 by 40 inches, mounted on four large steel balls on which they were pushed the length of a number of tables perpendicular to the table from which the distributor took them for delivery to the tagging clerks. As each board or tray was emptied it was passed through a slot under the same table to an inclined plane which brought it back by gravity to the point of departure. The

sketch in Figure 1 will give an idea of the arrangement of these tables together with the tagging and the filling of bins for delivery to the reserve. (It will be noticed that there is a gravity conveyor running beside the tables. This conveyor is for certain merchandise, which is delivered already tagged by the manufacturer and placed at once by the receiving department into standard bins which go directly to their reserve.)

3. *Tagging.* This operation is done at a series of tables whose general form and disposition is indicated in Figure 1. Each tagging clerk has a part of the table separated from the others by a board separation just high enough to prevent distraction and conversation. The clerk sits at the center of the table to which she gains access by lifting a part which is mounted on hinges, and which she closes when inside, so as to have the whole table at her disposition. On the table are marked the places for each sort of tag, for needle and thread when necessary, for the specially designed glue pot and for her job card which indicates the work to be done, the time allowed for it, and the premium earned when the task is accomplished. The head tag clerk distributes the work to each tag clerk, together with the tags and the job cards, from the table on which she has received them from the receiving department. In order to avoid the necessity of taking articles off the boards on which they arrive, the head clerk has, in the passage between her receiving table and the tagging tables, a small sliding table over which she pushes the merchandise to the tag clerks.

It is not surprising that in view of the variety of articles (about five thousand different kinds) and of tags (which after standardization were reduced to five varieties), the job of establishing tasks for tagging occupied one time-study man the greater part of a year. The result, however, justified the expense, as finally seven tag clerks did the work which formerly would have required at least eighteen, and each of the clerks was getting a premium of 55 per cent of his wage, thus assuring a permanent and highly skilled staff for this work. In view of the limited space at our disposal, the saving of space which resulted from this reduction in personnel was also of inestimable value.

4. *Moving to Reserves.* An important innovation in this kind of stores room came into play here; namely, a radical application of the Taylor standard