SHOP MANAGEMENT

"The most successful managers are those who manage men, not things. By selecting the right heads of departments, encouraging them to do their best, by showing in a substantial manner their work is appreciated, the manager or superintendent can suggest improvements to the various departments that far out-weigh the whole cost of some of the details. It is well to know the details, so as to be able to examine them occasionally, but to attempt to follow them continually prevents attention to features of more importance."

"The shop manager must educate his foremen; must train them to his methods; must teach them concentration along the line of their particular work. Imbued with this spirit the shop foreman will train the gang boss, and he in turn the workmen under him. All must understand, that the greatest output of perfect, finished product, with the least delay and waste, is the sole object in view."

SHOP MANAGEMENT.

The advanced machinist, in common with other trades and professions, has, in very recent times, learned the value of co-operation between man and man, and between man and machines; at last he is working on the principles he has found to underlie good results in any trade—division of labor and organization.

When the modern machinist undertakes a problem of construction, or a special line of manufacture, he looks it squarely in the face, and if the equipment is not equal to the demands of the situation, supplies the need with the most approved machines or he invents new and improved devices and tools, and guarantees successful and definite results even before the work is begun. He does this by what is broadly named shop management.

The subject suggests two things—a shop and a manager; or, to enlarge a little, shops with machinery in operation and a foreman; again, to widen the view still further, shop management may properly include as its field of operations, a vast establishment with thousands of skilled and unskilled workmen, with their gang-bosses, foremen, and superintendents of departments, the whole animated and directed as a single whole by a general manager, who in turn is responsible to a board of directors, representing the capital employed.

For its most effective use, the shop may be considered a machine, sometimes large and sometimes small, of which the equipment and men are the moving parts. These are so placed as to work one with another, so that the product,

passing through the shop, reaches the finished condition with the least expense, in the desired state of finish and accuracy, thus effecting the combination of superiority and low price.

Be the "plant" large or small, the first thing that enters into its successful management is a "system" adapted to its size, condition and location. The word system explains the idea: A plan or scheme according to which ideas or things are connected together as a whole; a union of parts forming a whole; whatever savors of system, savors of accuracy, speed, ease and comfort.

Let it not be forgotten, that of thousands of machine-shops now in existence, the exceptions are few in number but what they had their beginnings in the days of small things, as to men and equipment; they have simply grown with passing years, but with all, the fact has been, that success and continuance has depended upon a proper system, which has been classified as

1. Organization;
2. Management;
3. Equipment.

NOTE.—"System is not work, but is simply a law of action for reducing work; it does not require special executors, but permits few to accomplish much. It loads no man with labor but lightens the labor of each by rigidly defining it. Hard work begins when system relaxes.

System never under any circumstances, interferes with variations in human action, but includes them; elasticity is not a quality of system, but comprehensiveness is. System is the result of two rigid laws: 1, a place for everything and everything in its place, and, 2, specific lines of duty for every man. The laws being written, understood and executed, lighten the responsibility of every man."—*Chordal's Letters.*

ORGANIZATION.

The term organization refers to the arrangement of departments and the positions they occupy, but in this book, the term does not include the commercial organization, of account keeping, financing or business management.

EQUIPMENT.

The term equipment may be said to include all machinery, tools, gauges, auxiliary plant, means of transportation and shop fittings; this is nearly a definition of a power-plant.

MANAGEMENT.

The above enter into the operation of every shop and "plant," and so the problems of to-day in shop and factory management, *are not so much problems of machinery as of men;* the question of men is, and always will be a difficult one; men are, as a rule, willing to do a good, fair day's work for a fair day's pay. They do not have to be driven to this. It is only necessary that the foreman let them know, in manly, inoffensive ways, what is expected of them.

Many schemes of co-operation have been attempted in the various trades and factories, with varying success. Many schemes have been too complicated, and many have a serious drawback in the length of time necessary before the workman knows to what extent he has participated in the profits. Many schemes are too visionary, and some good ones may have been failures on account of the methods taken to introduce them. Any plan, to succeed, must be practical and simple enough to introduce without

NOTE.—The Century Dictionary defines a "plant" as "the fixtures, machinery, tools, apparatus, etc., necessary to carry on any trade or mechanical business, or any mechanical process or operation."

displacing entirely the old. The most practical schemes seem to be those in which the workman is able to participate in the profit on a given piece. That is, he is given opportunity to reduce cost of production and is allowed an increase of wage for so doing.

PIECE-WORK PLAN.

The piece-work is the most widely introduced of any system in which the machinist shares in his increased productiveness. It consists in paying a fixed price for a certain piece of work. Although it was originally intended to benefit the manufacturer, in its first result it most directly benefited the workman, as he received an increase of wage, while the price per piece remained constant to the manufacturer, who, however, gains something by the greater output of his plant.

THE DIFFERENTIAL PLAN.

The differential plan consists of paying a man a high price per piece in consideration of his reaching a certain high-water mark of production per day, and a lower price per piece provided he falls below this rate of production. This plan congregates the ablest of workmen, but leaves the medium men considerably in the shade. It necessi-

NOTE.—"A tour of the machine shops of the United States and the newer works of Europe gives few impressions more striking than the one created by the widespread evidence of growing thought for the comfort of the workman. Humanitarian considerations aside, *it pays*—pays in quality and lower cost of output—when the worker is kept well nourished and in good hygienic surroundings. It is not, of course, possible for all works to go so far as some others, but the general principles are everywhere applicable."—*The Editors of the Engineering Magazine.*

tates a radical change from the method of paying by the hour, but perhaps conforms more closely than any other plan to the true theory of having the wage proportionate to the production.

THE PREMIUM PLAN.

The premium plan consists of setting a "time limit" upon the piece, within which limit the piece is expected to be completed. The man is paid his hourly wage for every hour he works upon the piece, and a specified premium for every hour he saves or does not work upon the piece inside the "time limit" set. The "time limits" and premium rates are not changed or cut. The advantages of this plan are: First, adaptability to ordinary work fitting in alongside of regular day work; second, its self-regulating feature, whereby the cost per piece is reduced to the employer and the wage per hour increased to the workman every time any improvement is made in production; third, its flexibility, due to the opportunity at the start of fixing a premium rate adapted to the conditions or business in hand, and the opportunity thereafter of setting either a liberal or close "time limit" to regulate cost per piece. It does not crowd out the medium machinist, but gives him encouragement to become better.

It also serves the foreman as the best indicator possible for setting the rates of men per hour, by affording him an opportunity to note the amount of product turned out in a given time.

Of these three plans of co-operation, the piece work plan requires the least knowledge in fixing prices; the differential plan requires a most extensive, minute and

complete knowledge of the exact maximum rate of production. The premium plan requires a fair knowledge and judgment of machine-shop operations, in order to set a reasonable "time limit," but with proper premium rates the "time limits" may vary considerably, without varying the actual cost to a dangerous extent.

AN EQUITABLE METHOD.

An equitable method of scaling the rates for machine labor would tend to clear the atmosphere for those who are in doubt. An even rate for all machinists greatly handicaps the most skilled labor and benefits most the incompetent.

PLANNING A SHOP.

In planning a shop, however small, the possibility of its steady growth for many years to come, should be kept constantly in mind. No building should be erected that does not conform with part of the whole scheme of what the plant might be in the remote future. Another consideration is to provide for the unity of the plant, even though it trebles or quadruples in size.

NOTE.—A notable example of forethought in guarding against this possibility is the new Allis-Chalmers shop at Milwaukee. Provision has been made not only for its doubling, but for its expansion indefinitely, without loss of its integrity. The foundry and pattern shop run parallel to each other. At right angles and abutting the foundry are three machine shop bays, and at the other end of these bays, running out at right angles to them, is the erecting shop, so that the castings from the foundry go through the varions machine shop bays and into the erecting shop by the most direct routes. But the finest feature of this whole plant is that more bays may be added and the foundry, pattern shop and erecting shop lengthened without damaging the correct proportions of these departments relatively to each other, and without their growing apart.

DEPARTMENTS.

As an army is divided into divisions, brigades and companies, so are the large shops of the present day divided into departments, each of which has its official head.

A description of one will be sufficient to indicate the management of many. It is that of a well ordered pattern shop, which constituted a department in an extensive establishment.

The closing paragraphs of the article are especially worthy of attention :

"The shop was on the second floor of a separate building, having windows on all sides. Benches were around the outer walls, each having a window over it. Windows had shades to roll from both top and bottom, thus getting all possible light without the glare of the sun. Each bench had a tool rack at back of same for tools most commonly used, and drawers built in the bench for workmen's supplies and such tools as were only occasionally used. A small clothes closet with towel, rack and mirror over each bench completed the individual equipment. Each workman was required to leave his bench clean and in order at night.

"The shop floor was swept every night, and the refuse taken out, thereby lessening fire dangers. The lumber was kept in racks on edge, one size above another, the heavier pieces near the floor. In this way any piece could be taken out without moving any other. There was but one scrap pile in the shop. Instead of being thrown on the floor in a heap, pieces of lumber were properly sorted in a rack next the band-saw, shelves being provided for the smaller pieces and cross-bars for longer ones. But little time was lost getting nearly the right piece. No scrap was allowed under the benches. All pieces left had to be put in the rack or thrown in the waste. The floor under the benches was kept as clean as the rest of the shop.

"The machines were in groups in the center of the shop at one end, leaving a large floor space at the other end. This made the machines accessible from all sides. All machines were belted from below, thus avoiding belts across the shops. All face-plates, centers, wrenches, calipers, etc , were kept on shelves under the lathe, and back of same to be easily accessible. Each workman was required to leave machines clean and in order.

SHOP MANAGEMENT.

"A great deal of work was only sandpapered after sawing. Some was only sawed. Saws were kept in order by the foreman and hung alongside the machine. The buzz planer was kept in the best possible condition. The 30-inch grindstone ran 450 revolutions per minute, taking water on its side, centrifugal force carrying it out. The stone was properly hooded, had tight and loose pulleys and iron frame. This machine had the fast cutting qualities of an emery grinder without its heating disadvantages. There was a small bench drill taking small twist drills and the ordinary wood bits up to one inch. There was one large trimmer and two smaller ones conveniently arranged about the shop. Round, concave and convex sandpapering blocks of standard sizes and curves were kept in a rack for that purpose.

"Time slips and approximate amount of material used were turned in to the foreman every night. The aim in this shop seemed to be to waste nothing; to do work at as low cost as possible; to do good work; to be considerate of the comforts and conveniences of the men, and to have good order and cleanliness everywhere."

Mr. Sibley, in the same journal, tells of a new foreman who reformed a shop noted for its untidiness:

"Shortly after his appearance on the scene, he started a crusade against dirt and rubbish; he had the carpenter build a bin in one corner of the yard, which was roofed over and fitted with a door, made in sections which could be successively inserted as the bin filled, after which he sawed in two a half dozen empty oil barrels, which were painted a bright red and on which were inscribed in large white letters the legend "Refuse;" these were located in convenient places. A laborer was selected and given an outfit consisting of broom, rake, shovel and wheelbarrow, and to him was assigned the task of raking up and wheeling away all litter from the yard; also once a day cleaning out the chips and scraps from the various boxes around the machine tools and depositing them in the bin.

"It is an axiom that 'Like begets like,' and the result of such surroundings was to make the men more careful and painstaking in their work, reducing the loss from waste and spoiled jobs, and also having the effect of drawing and holding a much better and more intelligent class of workmen than could otherwise be obtained for the same wages."

THE FOREMAN.

The man upon whom the success, comfort, character, and continuance of a "works" depends in the ultimate is the model foreman; he has been described as follows:

THE FOREMAN.

"A foreman is a chief or leading man, with those whom he is appointed to manage and direct; a successful foreman must be two-sided. He must not only keep the machinery under his charge in proper order, but he must discipline, direct and control the animated human machine that operates the inanimate tools. He should be a good mechanic as well as a good leader of men.

"To be a leader of men, he should cultivate perfect patience, forbearance and self-control, remembering that no man has controlled others who did not start by controlling himself. He should be even-tempered, or, if not born so, should not let anyone discover it. He should be strictly just, granting cheerfully everything due his employees, while jealously guarding his employer's interests, curbing his generosity in spending funds intrusted to him. A man so qualified should make a successful master mechanic, but will not long remain one in the present day of keen competition in all branches, calling for competent men for advancement."

The shop manager should be keen to remove and keep removed from the foreman such tasks as do not bear directly upon the production. The foreman must turn out the maximum of good products. To do this he must have his materials supplied to him without effort on his part. He must be left time to pick and choose the men best suited to the various classes of work. He must train them into rapid and skillful workmen. He must keep the machine tools in good order and see that they are worked to their full capacity, and the organization of which he is a

part must make it possible for him to do all this, and must not distract his attention with anything else.

GANG BOSSES.

Gang bosses are now common on the erecting floors of even small shops, and there is no reason why gang bosses should not be appointed to oversee work on tools also. For example, the best lathe hand in a group of three or four is paid a trifle more and put in authority over them. The foreman instructs this man in regard to the work laid out ahead for these lathes, while the man in turn sees that it is carried out in detail. He is still a producer, but at the same time he is relieving the foreman of a considerable burden. In this way the foreman is left freer to plan out the more important details of his work.

A quotation expresses a strongly-felt need for information: "There are a great many problems for the small shop to solve, and the methods of the big shops furnish no solution. I mean the small shop that is just big enough to have troubles, but not big enough to have a fine organization—where one man has to do many things—where the question of *commercial* expediency turns up daily. I mean the shop employing from twenty-five to fifty hands and doing a variety of small work—sometimes a quantity of pieces, sometimes a limited number of special machines. Something a little beyond the jobbing machinists, but away behind the great sewing machine companies and small arms companies and typewriter concerns. *I sometimes think the manager of such a shop has a tougher job than a man with one ten times as large.*"