

a minute investigation unnecessary; no matter how obscure, however, it may be located with certainty by checking up the operation, element by element, with a stop watch, and comparing the time taken with the time shown on the instruction card. Standard methods are of equal importance in the instruction of new operators whose troubles are often confined to one or two elements of an operation, or due to false moves not easy to detect in the absence of a standard.

Few people realize that the setting of a definite task, or standard of accomplishment based upon a standard method, and the payment of a high reward for its accomplishment, serve a more important end than a mere incentive for the operator. Were we to depend upon incentive alone, the results accomplished under scientific management would never be approached. Straight piece work of the ordinary type would seem to offer all that could be desired in the way of incentive, but repeatedly the production secured under the old style management with ordinary piece work has been doubled and trebled. The development of standards such as I have described and their maintenance does not lie within the power or control of the worker, nor even to any great extent within that of the foreman. The definite task and the high reward for its accomplishment are a power holding the management up to its job—obliging it to maintain standards. In February, 1915, Mr. C. B. Thompson published in the *Quarterly Journal of Economics* the results of an investigation of "Scientific Management in Practice." From this I quote as follows:

If one may judge from rapid personal inspection of employees at work under the system, there can be no question of their closer application and deeper interest in the work they are doing. This interest extends beyond their own work to that of the management. Inasmuch as the success of the worker in earning the bonus depends partly on the smoothness with which the administrative department is conducted, the foremen and other executives receive numerous and forceful suggestions on this score if anything goes wrong. I have often seen workmen reminding their "bosses," in no uncertain terms, of their failure to live up to their managerial responsibilities. In fact, the authority of the operators within their own sphere is one of the outstanding peculiarities of a scientific management plant.

Standard Products

The full benefits of scientific management are never realized until real co-operation between the Planning Department, the Sales Department, the Designing De-

partment and the Accounting and Cost Departments has been established.

In machine work standardization may permit the use of commercial articles in place of special parts that otherwise would have to be manufactured in small quantities with universal equipment rather than special equipment. Draughtsmen if left to themselves will often in different parts of a machine use similar parts differing slightly in dimensions where the same size might have been made to serve—or even parts identical with those used in other machines might be used—with the result that such parts could be manufactured for stock in economical quantities and the expense for properly tooling up be justified. Parts may be so designed as to facilitate their manufacture with the equipment available and unnecessary work eliminated. In matters such as these co-operation between the route man and the time study or methods man and the draughtsman is invaluable. It is, however, in products sold chiefly through the retailers that we find the greatest need for standardization of product and particularly with respect to those of a more or less seasonal nature. In business of this class, encouraged by the buyers of the large distributors—both retailers and jobbers—or by competition, rival manufacturers vie with each other in presenting a wide and novel assortment of styles. In many cases a complete new line is presented each year or season, in others the line consists partly of new styles and partly of the old, and in the worst cases, of all former styles plus a generous assortment of new ones. Some of the styles may meet with large sales, some with less and some may not sell at all. The results of such practice are between the time of closing out the old line and receipt of orders for the new, work in the factory is slack, much of the plant lies idle and labor turnover is high. Owing to the uncertainty as to which styles will take with the buyers, there is considerable hesitation about manufacturing for stock, not only from fear of being caught with unpopular styles but because by so doing a shortage of raw materials required to fill orders for popular styles might be created. The situation is further complicated by the fact that many large customers demand "special put-ups," special labels, and special boxes which preclude manufacturing for stock.

Conditions such as I have briefly touched upon greatly complicate the problem of manufacture,

multiply the work incident to planning and control, and make it almost impossible to keep the employees and the machinery uniformly busy. Fluctuations in the volume of work do not seem to worry the management very much under the old style of management, especially where piece work is in vogue—particularly slack periods. Under scientific management it is quite a different story; workers must be kept supplied with work, and the cost of idle plant capacity is promptly and forcibly brought to the attention of the management as is the inefficiency and high costs of handling small orders and excessive variety.

The manufacturer, or at least the salesman and the designer, may deplore such conditions and regard them as being economically unsound, but he insists that the consumer—usually personified in the distributor's buyer—is responsible: to what extent this may be true is difficult to determine, but if the consumer knew what it costs him I'll wager that he would put up a howl for standardization that could not be mistaken or ignored.

In this direction schools of business administration such as the Harvard Graduate School of Business Administration, the Tuck School of Dartmouth, the School of Commerce and Accounts of the New York University, and no doubt many others with whose work I do not happen to be familiar, have helped, but the most significant thing I have seen is the work of Street and Finney, who call themselves advertisers, but who might better be called "Engineers of Distribution." They have established a department for the scientific investigation of problems of distribution such as I have touched upon, involving standardization of products, predetermination of the consumers' demand, etc. This work, which was started as an adjunct to their advertising work, ought to and will, I am confident, become of major importance. To the scientific management engineer such a service is an invaluable aid, to say nothing of its value to the manufacturer and the consumer.

Standards and Increased Production Essential to Betterment of Industrial Relations

In conclusion let me say that in presenting this paper I do not feel that I am adding anything to the art of management as it was developed by Taylor. My own experience has taught me that the work

of Taylor and of those who had the great good fortune to be associated with him through the period of his active and constructive work, as did Mr. Barth, Mr. Gantt and Mr. Merrick, was so fundamental in character and so thoroughly done as to leave little room for improvement; but much is to be done in its extension, in making it understood and in its application to new conditions and in new fields. The country has been flooded with weak imitations of the Taylor System masquerading as improvements under other names. This represents progress—backwards.

It is but natural that the members of the Taylor Society should be for progress, that they should desire to live up to its object as stated in its constitution—"to promote the science of management." There are two ways of doing this: by original contribution or improvement on that which exists, and by bringing about a better and more extensive understanding of that which exists and guarding against the loss of that which has been achieved. The former course is perhaps more alluring, but is it not apt to lead us into chasing rainbows or to reinventing, especially if undertaken before the second course has been pursued to a logical conclusion?

In our discussion of the broad questions of economics and of industrial relations, almost to the exclusion during the past few years of the practical problems of production and the technique of management, may we not have been indulging in intellectual joy riding and side stepping our real task?

I do not wish to detract from the importance of the sciences of economics and sociology, but I do want to point out that "industrial relations" is, like "standards of accomplishment," but a single element in the science of management and largely dependent upon other factors of a more material and unromantic nature.

The happiest of "industrial relations" would be of no avail in the case of a Pennsylvania Railroad without a signal system, without running schedules for its trains, without the track-walkers' daily inspection. The tools ground by the workmen shown in Figure 7 (p. 500, October number) might reflect fine industrial relations but they will not turn out as much product as the standard tool.

Satisfactory "industrial relations," if they are to endure, must have something more solid as a found-