

amental principles of scientific management are applicable to all kinds of human activities, from our simplest individual acts to the work of our great corporations, which call for the most elaborate co-operation. And, briefly, through a series of illustrations, to convince the reader that whenever these principles are correctly applied, results must follow, which are truly astounding."

The labor problem of to-day is caused by the belief that the interests of employee's and employers are antagonistic, but the very basis of scientific management is the belief that the maximum prosperity of one must be coupled with that of the other to endure. This means higher wages for the workman and greater dividends for the employer, due to decreased cost of production. A great many men are deliberately limiting their daily production and others, with the best of intentions, are far from efficient.

Mr. Taylor gives three causes for this condition:

"First. The fallacy, which has from time immemorial been almost universal among workmen, that a material increase in the output of each man or each machine in the trade would result in the end in throwing a large number of men out of work.

"Second. The defective systems of management which are in common use and which make it necessary for each workman to soldier or work slowly, in order that he may protect his own best interests.

"Third. The inefficient rule-of-thumb methods, which are still almost universal in all trades, and in practising which our workmen waste a large part of their effort."

He does not claim that his system will be a panacea for all the troubles of working people or of employers, but that it will relieve the duration of the periods of depression and the suffering of both classes to a certain extent. In his own words, "Scientific management fundamentally consists of certain broad principles, a certain philosophy, which can be applied in many ways, and a description of what any one man or men may believe to be the best mechanism for applying these general principles, should in no way be confused with the principles themselves."

Mr. Taylor warns against making the error of mistaking the mechanism of the system for its essence, and gives as the elements of the mechanism:

"1. Time study, with the implements and methods for properly making it.

"2. Functional or divided foremanship and its superiority to the old-fashioned single foreman.

"3. The standardization of all tools and implements used in the trades, and also of the acts or movements of workmen for each class of work.

"4. The desirability of a planning room or department.

"5. The 'exception principle' in management.

"6. The use of slide rules and similar time-saving implements.

"7. Instruction cards for the workman.

"8. The task idea in management, accompanied by a large bonus for the successful performance of the task.

"9. The 'differential rate.'

"10. Mnemonic systems for classifying manufactured products as well as implements used in manufacturing.

"11. A routing system.

"12. Modern cost system, etc., etc."

The text is largely taken up with illustrative cases, varying from the simplest to the more intricate forms of labor. The famous pig-iron case illustrates its application to a class of labor of the lowest type. A gang of men who had been loading pig-iron on cars at the rate of 12½ long tons per day per man, were made to load 47 tons, by working them in the most efficient manner. It was found that for

the minimum tiring effect on a man handling pigs weighing 92 pounds, he should be under load 43 per cent. and free from load 57 per cent. of the time. He should even sit down and rest at regular intervals, a thing which under the old system would have been cause for immediate discharge.

At the Bethlehem Steel Co.'s plant, a large number of tests were made on the relation of the size and shape of shovel to the amount of material handled, and as a result eight to ten different kinds of shovels were provided. The men unloading iron ore under the new system adopted, were able to earn more at 3.2 cents than elsewhere at 4.9 cents per hour.

Mr. Frank B. Gilbreth applied the principles of scientific management to brick laying and made a very careful study of the motions required in the operation. By standardizing the tools and eliminating all unnecessary movements, a man was able to lay 350 bricks per hour, whereas the average speed with the old methods was 120 bricks per man per hour. Other cases cited are the inspection of the output of a factory manufacturing steel balls and the results attained in a factory making a standard machine, where the output had been within three years, more than doubled per man, and per machine, and the average increase in earnings of each man was about 35 per cent.

All this was accomplished by applying "the four elements which constitute the essence of scientific management."

"First. Developing a science for each element of a man's work to replace the old rule-of-thumb method.

"Second. Scientifically selecting and then training and developing the workman; whereas in the past he chose his own work and trained himself as best he could.

"Third. Heartily co-operating with the men so as to insure all of the work being done in accordance with the principles of the science which has been developed.

"Fourth. Dividing the work and the responsibility between the management and the workman. The management taking over all work for which they are better fitted than the workman.

He warns against attempting to adopt the system too rapidly, as the change from the old to the new system is too radical and involves not only physical changes in the plant, but a complete change in the mental attitude and habits of the management as well as of the workman. He gives a case where the sudden change brought on a strike and finally a complete failure.

The book deserves, and will, no doubt, be widely read. The principles set forth in it can be applied to a great many lines of work other than those in which they have been developed, and will unquestionably do a great deal toward improving our national efficiency.—H. J. C.

PUBLICATIONS RECEIVED.

The Monthly Peat Report.—Souvenir and presentation number to commemorate the organization of the Peat Association of Canada, Vol. 1, No. 1, September, 1911. Published monthly and distributed free by the Peat Association of Canada.

Descriptive Catalogue of the Road Model Exhibit.—The office of Public Roads, U. S. Department of Agriculture, have just issued their bulletin No. 36, illustrating the road model exhibited at the Alaska-Yukon-Pacific Exposition.

Monthly Reports of the Department of Trade and Commerce, published by the Department of Trade and Commerce of Canada.