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with the author's general method; he has tried to be scientific, and in most cases gives the views on both sides concerning any matter in hand. But he does not stop there; he generally indicates in what direction his own feelings tend. So it is interesting to find that he ranges himself on the side of Free Trade, which he regards as the ultimate goal of civilisation.

As an introduction to the study of economics, the work of M. Blanchard may be recommended for its clear information on so many topics. It is certainly a moot point whether the intensive or the extensive method of study is best for the beginner in economics; whether, that is, he should strive to obtain a more or less thorough mastery of each important division of the subject in turn, or cover the whole of the ground in order to know his bearings. In the second case we can conceive of no better textbook than M. Blanchard's. It lacks only one thing—a bibliography, which is as essential to the student as a sign-post is to the traveller. Moreover, English readers will find it useful for reference on many aspects of French social legislation and social tendencies. On English conditions the author, though brief, is quite sound; but he invariably speaks of *shellings*.

There is a long appendix wherein many points in the text are illustrated by instances from the economic system of Egypt.

M. EPSTEIN

The Principles of Scientific Management. By FREDERICK WINSLOW TAYLOR. (New York: Harper. 1911.)

Scientific Management: Tuck School Conference, Dartmouth College. (Hanover, V.H., U.S.A.: Amos Tuck School. 1912. Pp. xi + 388. \$2.50 net.)

Increasing Human Efficiency in Business. By PROFESSOR WALTER DILL SCOTT. (New York: Macmillan. 1911. Pp. 339. 5s. 6d.)

Fatigue and Efficiency. By JOSEPHINE GOLDMARK. (New York: Charities Publication Committee. 1912. Pp. xvii + 302 + 591. \$3.50.)

THESE four books all deal with what claims to be a new science, and all come from America, where that science was born. It is the science of Efficiency in business, particularly the efficiency of production. Its founder, Mr. Taylor, the writer of the first book, calls it the science of management, and he claims that it is a true science because it rests "upon clearly defined laws, rules,

and principles as a foundation"; and further that "the fundamental principles of scientific management are applicable to all kinds of human activities." The second book is a very interesting report of papers, speeches and discussions on scientific management at a conference held in 1911 at the Amos Tuck School of Administration and Finance. The other two books are concerned with what is really only a branch of this science, namely, the psychology of labour. Professor Scott has made a careful if rather diffuse analysis of the psychological causes of efficiency or inefficiency of workers. Miss Goldmark has made an exhaustive study of the relationship of fatigue and efficiency, especially in women workers.

Mr. Taylor's is a remarkable book. It is written by a man who began life as a common labourer, who worked as pattern-maker and machinist, and eventually became chief engineer in a great steel works. It shows a power of imagination, a concentration of thought and language, which not only make it fascinating for anyone to read, but also, in a way, which is rare in this kind, or perhaps any kind of book, leave in the mind of the reader an indelible impression of what the writer thought important in his views. And there can be no doubt in the reader's mind after he has read the book that those views are of the utmost importance to the employer, the manager, the worker, and the economist.

Mr. Taylor sets out to prove three points : first, that almost every daily act is performed inefficiently by us, and that great loss results from such inefficiency ; second, that the remedy for the inefficiency is to be found in systematic management ; third, that the best management is a science. Not the least interesting part of his proof consists in the psychology of labour which he presents to us. He shows, first, that the ordinary systems of production and management, and especially piecework, universally result in underworking, or "soldiering," *i.e.*, deliberately working slowly so as to avoid doing a full day's work. This, of course, is deliberate inefficiency. But there is another cause of inefficiency over which the workman has no control. Under the best system of unscientific management the final responsibility for the way in which he is to do his job is left to the workman, and the workman uses rule-of-thumb methods which he has imitated from other workmen. Now, the American business man has discovered a great truth : that no man understands his own business. "To the man who says to me, 'I know my own business,' I say in my own mind, 'God help you !'" were the words of a large manufacturer at the conference at Dartmouth College. Mr. Taylor

applied this truth to the simplest work of the unskilled workman : he found that the most efficient way of doing even the simplest act can only be discovered by scientific study, often of a most elaborate nature : the man who is doing the act almost invariably has neither the time to investigate nor the intelligence to understand it.

The ordinary system of good management Mr. Taylor calls the "incentive and initiative" system. The manager attempts, by giving some special incentive, *e.g.*, pay, hope of promotion, &c., to induce the workman to use his traditional knowledge, skill, goodwill, &c., *i.e.*, his initiative. Scientific management, on the other hand, proceeds on four principles :—First, the development of a science for each element of a man's work ; the object of this science is to arrive at standards of productivity of machinery, material, and men. Second, the scientific selection of machinery, material and men, and the training, teaching, and development of the men. Third, co-operation with the men, so that all work is done in accordance with the principles of the science which has been developed. Fourth, redistribution of responsibility between the management and the worker.

The difference between the two methods and the results obtained by the adoption of the scientific principles are well shown in an example given by Mr. Taylor, the handling of pig-iron. The handling of pig-iron is unskilled labour of the most elementary kind. The labourer "stoops down, picks up a pig weighing about 92 pounds, walks for a few feet or yards, and then drops it on to the ground or upon a pile." There were 80,000 tons of pig-iron to be handled in the Bethlehem Steel Company, and a gang was loading on an average about $12\frac{1}{2}$ tons per day per man. The first step taken was a study of what Mr. Taylor calls the science of handling pig-iron. One of the most important laws of this science is the law that "for each given pull or push on the man's arms it is possible for the workman to be under load for only a definite percentage of the day," *i.e.*, where each pig weighs 92 pounds the percentage is 43. Further, if an average workman worked "at an even gait," *i.e.*, working and resting at proper intervals in such a way that he was under load for 43 per cent. of the day, he ought to handle not $12\frac{1}{2}$, but 47 to 48 tons per day. The management then carefully selected and trained workmen to work in this way. The results were :—

(1) That the pig-iron was handled at the rate of 47 to 48 tons per man per day, an increase in efficiency of between 300 and 400 per cent.

(2) That the workmen earned under the new system \$1.85

instead of \$1.15 a day under the old, an increase in wages of more than 60 per cent.

This example will show how the principles of this science have actually been applied. There are many other examples in the four books which show that the principles, if applied in the spirit in which Mr. Taylor desires to apply them, do result in an enormous increase in efficiency, and a large increase in the workman's earnings and the employer's profit. Many questions of great interest and importance, which we must pass over, are raised by Mr. Taylor; there are, however, two points which we must notice; they both affect the position of labour under the new system.

It has been claimed for the system that it not only enormously increases the wages of labour, but that it educates the workman and produces harmony between the employer and employed. But it is obvious, and Mr. Taylor himself recognises this, that such a result depends entirely upon the spirit in which the principles are applied. The manager of the future will study his workmen as he will study his machinery: he will know with the exactitude of a science the limit of a man's capabilities, whether he is lifting weights or shovelling dirt. Such knowledge may truly be said to be a powerful instrument and an instrument which can be used against, as well as in, the interests of labour. The attempt has already been made to use it in order simply to increase profits and output by driving the workman and speeding up. The result was a series of strikes. But even if the new knowledge be used with the greatest scrupulousness there is the further danger that, as Miss Goldmark says, the efficiency engineers fail "to gauge fairly the tax of increased productivity upon the workers." The result of investigation in three large establishments where the new management seem to have been honestly trying to apply the new principles showed that in some instances the result was fortunate, and in others unfortunate for the health of the working women.

The other point is a psychological, some people would call it a sentimental, one. At any rate, it is a point to the consideration of which Mr. Taylor himself is continually inviting us. His interest in the minds and characters of the workmen and in the effect of efficiency upon their minds and characters appears in every page of his book. It is clear that, in his opinion, almost the greatest blessing which would result from the adoption of Scientific Management, is that it would make the workman "a happier and better man." And it would achieve this result by educating

and training him "to his highest state of efficiency," to the capability of doing "a higher class of work," to "a friendly mental attitude toward his whole working conditions."

And yet there are few people who could read Mr. Taylor's book, and no one who could read the report of the Amos Tuck School Conference, without having moments of doubt in so optimistic a view. To the scientific manager, at any rate in the factory if not on paper, the workman is a machine, a little more complicated than a shovel, but not nearly as complicated as the metal-cutting machine, the problem of whose efficiency entails the solution of a mathematical problem, in which the effect of twelve independent variables has to be determined. And in almost every case it seems that the highest efficiency of the human machine is obtained by reducing its operation to a few simple movements continually repeated at a high rate of speed. Miss Goldmark's book furnishes ample proof of the dulling and deadening effect of the monotony of such work. It is true, of course, that the tendency to reduce the workman to a machine is not peculiar to scientific management. It is a characteristic of the infinite subdivision of labour in modern industry. It is, however, so marked in Scientific Management because Mr. Taylor's principles only carry the conditions of modern industry to their logical conclusion. "We want for handling pig-iron," says Mr. Taylor, "a man with a mind like an ox." Well, no doubt there are plenty of men with minds like that of an ox, and it is probably better to employ them on the work of handling pig-iron than on more intellectual work. But what Scientific Management seems to do, by its time studies and stop-watches and simplification of movements and efficient monotony, is to reduce the minds of all its workmen to that of a squirrel perpetually revolving in a cage.

L. S. WOOLF

Das Problem des unverdienten Wertzuwachses und dessen Besteuerung mit besonderer Rücksicht auf Österreich. By DR. RENÉ PERIN. (Vienna : Manzsche. 1912. Pp. xii + 151. K. 4.80.)

Der Wertzuwachs im Reichszuwachssteuergesetz. By DR. STRUTZ, Senatspräsident des preussischen Oberverwaltungsgerichts. (In Finanz-Archiv, Zweiter Band, 1911. Pp. 50.)

THE adoption of a tax upon the unearned increment in ground values in Tyrol and Carinthia, and the fact that a similar tax