

Lower Costs and Higher Wages — A Classic Invention

Factory Management

SHOP MANAGEMENT, by Fred. W. Taylor, Philadelphia. Presented at the Saratoga meeting (June, 1903) of the American Society of Mechanical Engineers, and forming part of Volume XXIV. of the Transactions.

IT is safe to say that no system or scheme of management should be considered which does not in the long run give satisfaction to both employer and employee, which does not make it apparent that their best interests are mutual, and which does not bring about such thorough and hearty co-operation that they can pull together instead of apart. It cannot be said that this condition has as yet been at all generally recognized as the necessary foundation for good management. On the contrary, it is still quite generally regarded as a fact by both sides that in many of the most vital matters the best interests of employers are necessarily opposed to those of the men. In fact, the two elements which we will all agree are most wanted on the one hand by the men and on the other hand by the employers are generally looked upon as antagonistic.

What the workmen want from their employers beyond anything else is high wages, and what employers want from their workmen most of all is a low labor cost of manufacture.

These two conditions are not diametrically opposed to one another as would appear at first glance; on the contrary, they can be made to go together in all classes of work, without exception, and in the writer's judgment the existence or absence of these two elements forms the best index to either good or bad management.

THIS PAPER IS WRITTEN MAINLY WITH THE OBJECT OF ADVOCATING HIGH WAGES AND LOW LABOR COST AS THE FOUNDATION OF THE BEST MANAGEMENT, OF POINTING OUT THE GENERAL PRINCIPLES WHICH RENDER IT POSSIBLE TO MAINTAIN THESE CONDITIONS EVEN UNDER THE MOST TRYING CIRCUMSTANCES, AND OF INDICATING THE VARIOUS STEPS WHICH THE WRITER THINKS SHOULD BE TAKEN IN CHANGING FROM A POOR SYSTEM TO

This is the paper that marked an epoch in the machine age and inaugurated the much-discussed motion study. Taylor's attitude on the human side of labor problems is shown in his words: "No system of management, however good, should be applied in a wooden way. The proper personal relations should always be maintained between the employers and men; and even the prejudices of the workmen should be considered in dealing with them. . . . The opportunity which each man should have of airing his mind freely, and having it out with his employers, is a safety-valve; and if the superintendents are reasonable men, and listen to and treat with respect what their men have to say, there is absolutely no reason for labor unions and strikes."

THE BETTER TYPES OF MANAGEMENT.

The condition of high wages and low labor cost is far from being accepted either by the average manager or the average workman as a practical working basis. It is safe to say that the majority of employers have a feeling of satisfaction when their workmen are receiving lower wages than those of their competitors; and on the other hand that very many workmen would feel contented if they found themselves doing the same amount of work per day as other similar workmen do and get more pay for it. Yet employers and workmen should alike look upon both of these conditions with apprehension, as they are either of them sure, in the long run, to lead to trouble and loss for both parties.

Through unusual personal influence and energy, or more frequently through especial conditions which are but temporary, such as dull times when there is a surplus of labor, a superintendent may succeed in getting men to work extra hard for ordinary wages. After the men, however, realize that this is the case and an opportunity comes for them to change these conditions, in their reaction against what they believe unjust treatment they are almost sure to lean so far in the other direction as to do an equally great injustice to their employer.

On the other hand, the men who use the opportunity offered by a scarcity of labor to exact wages higher than the average of their class, without doing more than the average work in return, are merely

laying up trouble for themselves in the long run. They grow accustomed to a high rate of living and expenditure, and when the inevitable turn comes and they are either thrown out of employment or forced to accept low wages, they are the losers by the whole transaction.

The only condition which contains the elements of stability and permanent satisfaction is that in which both employer and employes are doing as well or better than their competitors are likely to do, and this in nine cases out of ten means high wages and low labor cost, and both parties should be equally anxious for these conditions to prevail. With them the employer can hold his own with his competitors at all times and secure sufficient work to keep his men busy even in dull times. Without them both parties may do well enough in busy times, but both parties are likely to suffer when work becomes scarce.

The possibility of coupling high wages with a low labor cost rests mainly upon the enormous difference between the amount of work which a first-class man can do under favorable circumstances and the work which is actually done by the average man.

That there is a difference between the average and the first-class man is known to all employers, but that the first-class man can do in most cases from two to four times as much as is done on an average is known to but few, and is fully realized only by those who have made a thorough and scientific study of the possibilities of men.

The writer has found this enormous difference between the first-class and average man to exist in all of the trades and branches of labor which he has investigated, and this covers a large field, as he, together with several of his friends, have been engaged with more than usual opportunities for twenty years past in carefully and systematically studying this subject.

This fact is as little realized by the workmen themselves as by their employers. The first-class men know that they can do more work than the average, but they have rarely

made any careful study of the matter. And the writer has over and over again found them utterly incredulous when he informed them, after close observation and study, how much they were able to do. In fact, in most cases when first told that they are able to do two or three times as much as they have done they take it as a joke and will not believe that one is in earnest.

It must be distinctly understood that in referring to the possibilities of a first-class man the writer does not mean what he can do when on a spurt or when he is over-exerting himself, but what a good man can keep up for a long term of years without injury to his health, and become happier and thrive under.

The second and equally interesting fact upon which the possibility of coupling high wages with low labor cost rests, is that first-class men are not only willing but glad to work at their maximum speed, providing they are paid from 30 to 100 per cent. more than the average of their trade.

The exact percentage by which the wages must be increased in order to make them work to their maximum is not a subject to be theorized over, settled by boards of directors sitting in solemn conclave, nor voted upon by trades unions. It is a fact inherent in human nature and has only been determined through the slow and difficult process of trial and error.

The writer has found, for example, after making many mistakes above and below the proper mark, that to get the maximum output for ordinary shop work requiring neither especial brains, very close application, skill, nor extra hard work, such, for instance, as the more ordinary kinds of routine machine shop work, it is necessary to pay about 30 per cent. more than the average. For ordinary day labor requiring little brains or special skill, but calling for strength, severe bodily exertion and fatigue, it is necessary to pay from 50 per cent. to 60 per cent. above the average. For work requiring especial skill or brains, coupled with close application but without severe bodily exertion, such as the more difficult and delicate machinist's work, from 70 per cent. to 80 per cent. beyond the average. And for work requiring skill, brains, close application, strength and severe bodily exertion, such, for instance, as that involved in running a well-run steam hammer doing miscellaneous

work, from 80 per cent. to 100 per cent. beyond the average.

There are plenty of good men ready to do their best for the above percentages of increase, but if the endeavor is made to get the right men to work at this maximum for less than the above increase, it will be found that most of them will prefer their old rate of speed with the lower pay. After trying the high speed piece work for a while they will one after another throw up their jobs and return to the old day work conditions. Men will not work at their best unless assured a good liberal increase, which must be permanent.



Frederick W. Taylor

It is the writer's judgment, on the other hand, that for their own good it is as important that workmen should not be very much overpaid, as that they should not be underpaid. If overpaid, many will work irregularly and tend to become more or less shiftless, extravagant and dissipated. It does not do for most men to get rich too fast. The writer's observation, however, would lead him to the conclusion that most men tend to become more instead of less thrifty when they receive the proper increase for an extra hard day's work, as for example, the percentages of increase referred to above. They live rather better, begin to save money, become more sober, and work more steadily. And this certainly forms one of the strongest reasons for advocating this type of management.

In referring to high wages and low labor cost as fundamental in good management, the writer is most desirous not to be misunderstood.

By high wages he means wages which are high only with relation to the average of the class to which the man belongs and which are paid only to those who do much more or better work than the average of their class. He would not for an instant advocate the use of a high-priced tradesman to do the work which could be done by a trained laborer or a lower-priced man. No one would think of using a five trotter to draw a grocery wagon nor a Percheron to do the work of a little mule. No more should a mechanic be allowed to do work for which a trained laborer can be used, and the writer goes so far as to say that almost any job that is repeated over and over again, however great skill and dexterity it may require, providing there is enough of it to occupy a man throughout a considerable part of the year, should be done by a trained laborer and not by a mechanic. A man with only the intelligence of an average laborer can be taught to do the most difficult and delicate work if it is repeated enough times; and his lower mental calibre renders him more fit than the mechanic to stand the monotony of repetition. It would seem to be the duty of employers, therefore, both in their own interest and that of their employees to see that each workman is given as far as possible the highest class of work for which his brains and physique fit him. A man, however, whose mental calibre and education do not fit him to become a good mechanic (and that grade of man is the one referred to as belonging to the "laboring class"), when he is trained to do some few especial jobs, which were formerly done by mechanics, should not expect to be paid the wages of a mechanic. He should get more than the average laborer, but less than a mechanic; thus insuring high wages to the workman, and low labor cost to the employer, and in this way making it most apparent to both that their interests are mutual.

To summarize, then, what should be aimed at in all establishments is:

1. That each workman should be given as far as possible the highest grade of work for which his ability and physique fit him.

2. Each work- (Turn to page 206)

Announcing

the first volumes in the

APPLETON NEW WORLD OF SCIENCE SERIES

Watson Davis, Editor

This series of books will consist of lively and quickly digested discussions of the role which science is playing in the world about us. The appeal will be to the intelligent general reader. Each volume will be written by an outstanding authority in its field. The first two volumes are now published.

New Frontiers of Physics

By PAUL R. HEYL, Ph.D.
Physicist, U. S. Bureau of Standards

A leading American physicist discusses the revolutionary advances in the study of matter, energy, space and time, the Einstein theory and other topics and looks forward to the future. Illustrated. \$2.00.

Antarctic Adventure and Research

By GRIFFITH TAYLOR, F.R.G.S.
Professor of Geography, University of Chicago

A thrilling and popular description of the history, climate, geography and resources of the South Polar regions. Illustrated. \$2.00.

THE SEA

By H. A. MARMER
U. S. Coast and Geodetic Survey

The modern science of oceanography and the methods and instruments of scientific investigation simply and clearly described. Illustrated. \$3.00.

At All Booksellers or from the Publishers

D. APPLETON AND COMPANY

35 West 32nd Street New York

Taylor System—Continued

man should be called upon to turn out the maximum work which a first-class man of his class can do and thrive under.

3. Each workman, when he works at the best pace of a first-class man, should be paid from 30 per cent. to 100 per cent. according to the nature of the work which he does, beyond the average of his class.

And this means *high wages* and *low labor cost*. These conditions not only serve the best interests of the employer, but they tend to raise each workman to the highest level which he is fitted to attain by making him use his best faculties, forcing him to become and remain ambitious and energetic, and giving him sufficient pay to live better than in the past.

Under them the writer has seen many first-class men developed who otherwise would have remained second or third class all of their lives.

Is not the presence or absence of these conditions the best indication that any system of management is either well or badly applied? And in considering the relative merits of different types of management, is not that system the best which will establish these conditions with the greatest certainty, precision and speed?

In comparing the management of manufacturing and engineering companies by this standard, it is surprising to see how far they fall short. Few of those which are best organized have attained even approximately the maximum output of first-class men.

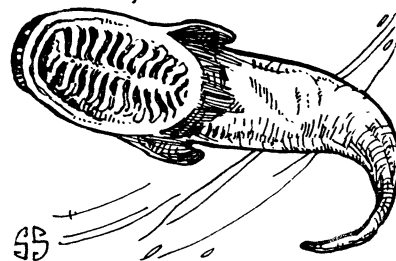
Science News-Letter, March 29, 1930

Staff of Science Service—Acting Director, Vernon Kellogg; Managing Editor, Watson Davis; Staff Writers, Frank Thone, James Stokley, Emily C. Davis, Jane Stafford, Marjorie Van de Water, J. W. Young; Librarian, Minna Gill; Sales and Advertising Manager, Hallie Jenkins.

Board of Trustees of Science Service—*Honorary President*, William E. Ritter, University of California. Representing the American Association for the Advancement of Science, J. McKeen Cattell, *President*, Editor, Science, Garrison, N. Y.; D. T. MacDougal, Director, Desert Laboratory, Tucson, Ariz.; Dr. Raymond Pearl, Director, Institute for Biological Research, Johns Hopkins University, Baltimore, Md. Representing the National Academy of Sciences, John C. Merriam, *President*, Carnegie Institute of Washington; R. A. Millikan, Director, Norman Bridge Laboratory of Physics, California Institute of Technology, Pasadena, California; David White, Senior Geologist, U. S. Geological Survey. Representing National Research Council, Vernon Kellogg, *Vice-President and Chairman of Executive Committee*, Permanent Secretary, National Research Council, Washington, D. C.; G. G. Abbot, Secretary, Smithsonian Institution, Washington, D. C.; Harrison E. Howe, Editor of Industrial and Engineering Chemistry. Representing Journalistic Profession, John H. Finley, Associate Editor, New York Times; Mark Sullivan, Writer, Washington, D. C.; Marlen E. Pew, Editor of Editor and Publisher, New York City. Representing E. W. Scripps Estate, Harry L. Smith-ton, *Treasurer*, Cincinnati, Ohio; Robert P. Scripps, Scripps-Howard Newspapers, West Chester, Ohio; Thomas L. Sidlo, Cleveland, Ohio.

NATURE RAMBLINGS

By Frank Thone



Piscine Hitch-Hiker

We commonly think of parasites as animals or plants that get their food by theft from some other individual who acts as an unwilling, or sometimes an unwitting host. But this is not the only kind of parasitism. We have on our own highways numberless human parasites who sponge upon motorists for free transportation. "Hitch-hikers," they term themselves, though most of them do more "hitching" than "hiking."

This system of getting along in the world by letting some other fellow take you along was invented long ago, probably long before man appeared on the earth at all, by a fish. Called *Remora* by the learned, and "pilot-fish" by simpler seafaring men, this strange creature of tropic waters "catches rides" on sharks and other large fish, sometimes even on boats, by attaching itself to them with a powerful sucking-disk apparatus which covers the whole top of its head.

The shark often takes its volunteer passenger with a very bad grace but once the pilot-fish has attached itself to his belly there is nothing for his sharkship to do but grin and bear it; for the pilot-fish cannot be dislodged by any means at the shark's command. The remora, however, limits its parasitism to this ride-stealing. It does not depend on its host for food, except possibly to snatch morsels dropped during a meal.

W. P. Pycraft, a well-known British naturalist, states that in some tropical countries the pilot-fish is used as a sort of self-directing fish-hook to catch big sea-turtles. When they find a turtle floating asleep on the surface, they release a pilot-fish with a cord tied around its tail. The fish follows its instinct, attaches itself to the breastplate of the turtle with an unbreakable suction-grip, and the fishermen haul in their catch

Science News-Letter, March 29, 1930