

"We on the management side have the means of directing in detail the treatment of every batch of stock in every beater day and night and of taking the full responsibility which belongs to us for the results."

Our efforts, ever since we began to realize the workman's point of view, have been *not* to take responsibility from him. It is our plan to increase his responsibility and we feel that it is our duty to teach him to exercise his reasoning power and intelligence to its fullest extent. There is no advantage gained by stimulating a man's reasoning power, and through this means his creative faculty, if the management relieves the man of the responsibility for each individual operation. The opportunity for self-expression, which is synonymous with joy in work, is something that the workman is entitled to and we employers who feel that management must become a true science must begin to think less of the science of material things and think more of the science of human relationships. Our industries must become humanized otherwise there will be no relief from the present state of unrest in the industries of the world.

In this connection it might be well to observe that our experience in the pulp industry has been that instructions which go *too much* into detail tend to deaden interest in the work. We realize fully the value of sufficient instructions to get uniform results, but we try to leave as much as possible to the judgment of the individual operator, making our instructions take more the form of constant teaching of principles involved in the operation than of definite fixed rules of procedure. It is necessary to produce a desire in the heart of the workman to do good work. No amount of coercion will enlist him thoroughly in the service.

It has been our experience that this is the only way to get the initiative of the man to the fullest extent and my personal opinion is that the splendid results obtained by Dr. Taylor, in his own individual operations, were due largely to the fact that he stimulated the reasoning powers of the men to a wonderful extent, through his keen insight into human nature. He described to me, on several occasions, how he used the men themselves and made them realize that they were co-operating in obtaining the results.

There is a qualifying clause in column two of page five, which I will quote as follows:

"We have by no means rendered the beater man's job less skilled or less interesting. We have simply made it precise. We have given him a guide. There is skill in following that guide of even a higher grade than the skill of going without it and the beater man always has the advantage of knowing where he stands and how he is coming out."

This clause seems to indicate that Mr. Green is giving his men a record of their work, so that they can from day to day see how well they are accomplishing their task. If this is the case, I may have partly misjudged him. I feel, however, that such quotations as I have made previously, added to a quotation from the last paragraph on page five, reading as follows:

"To be sure, we think that we have some data that would be useful for that purpose; but our object was to control the process, to understand it better than our beater men do, to qualify ourselves to direct it in detail day and night for every order that goes through the plant and to take our own right responsibility for the results"

indicate that there is a very decided effort in his organization to control by "law" and to direct the work of the operatives too much in detail. I cannot see how this can lead to anything but discontent in the organization and I feel that it is necessary for me to issue a warning note of protest, not with the idea of being critical or fault-finding, but with the idea of being helpful to him in his work.

I heartily agree with Mr. Green's plea made in the last four paragraphs of his paper, on page 6, urging our society to concentrate its attention upon the problem of bringing order out of the present great chaotic turmoil in the industrial world of today. I think however, that we will have to change our conception of what constitutes efficiency. This, in my opinion, is not going to be as Mr. Green suggests, a further analytical process whereby we can obtain "better ordered and more complete knowledge than the workman himself possesses", but a synthetic process which will enable us to build a philosophy of management which will get at the true principles underlying human activity.

The new efficiency is going to reckon a great deal more with the needs of the individual man; but in order to do this it must have some philosophical conception of the reason for man's existence. It is beginning to be understood that when we deny the opportunity to do creative work to vast numbers of individuals we are violating a great universal law.

Man never creates matter nor force, but he does create conditions for the expansion of these great primary universal forces and it was for this purpose that man, considered generically, was created. The degree of efficiency of an organization, therefore, can be measured by the extent to which it permits the individual men in its employ to do creative work, which as I have said before gives joy to the worker because it gives him an opportunity for self-expression.

I feel that the tendency among many of our scientific management operators is to design an or-

ganization that will do the thinking for the man rather than designing one which will primarily utilize the tremendous creative forces of the men and stimulate and direct these forces, which when properly controlled will solve all of the problems that have to do with quality, quantity, and economy of operation.

The problem is not how to "obtain knowledge of what constitutes a proper day's work for a workman and skill to direct that work in detail day and night," but how to produce a desire on the part of the workman to do this work well and then, in a much greater measure than we are doing at present, leave with him the responsibility of controlling the details, after giving him all possible assistance to do the work intelligently.

I do not agree with the conclusions of the special committee of the A. S. M. E. that the new element in the art of management can be summed up as a "Transference of skill from workman to management." I read this paper with very much interest when it came out and did not agree with its conclusions at that time.

I believe, as I stated in the paper on "Individuality in Industry", which I read before the Society in May, 1915, that the new element in the art of management is the unifying power of the wonderful mechanism of scientific control through the use of which the organization can become conscious of its progress and deal intelligently with the material forces it is using in converting raw materials into articles of commerce.

It will not, however, be thoroughly scientific until it uses this same organization consciousness to develop the human units, of which it is composed, into reasoning, thinking human beings, giving them opportunity to accumulate experiences and thereby unfold their higher spiritual natures. This is what *esprit-de-corps* means.

MR. SANFORD E. THOMPSON<sup>1</sup>: I have been much interested in listening to Mr. Green's paper especially as I have had occasion from time to time during the past year or two to learn from him the plans he has been carrying out in developing this feature of the paper-making problem.

It is surprising, unless one is familiar with the paper-making industry, how varied are the problems in management that are presented even in a single mill and the diversities that occur further in different plants.

In this connection, it is well to bear in mind the discussion of the various types of management that were discussed at the Round Table conferences at Ann Arbor last May. In the paper I presented at that time, which preceded the discussion, the types of

<sup>1</sup>Consulting Engineer, Boston, Mass.

management in which were variously emphasized, (1) planning and routing, (2) time study, (3) development of standards, are all leading features in different departments of paper mill work. In the Finishing Department, where in some mills there are hundreds of different kinds and styles of paper, planning and routing is the principle feature, with time study and standardization subsidiary to it. Time study, on the other hand, is the chief necessity for handling the department making wooden shipping cases in order to fix proper rates. The third feature, standardization, is most strongly emphasized in the Making Department, and it is this feature which was taken up in such detail by Mr. Green. We find, however, even in the development of standards for beating the paper, that both time study and the planning are necessary in order to attain uniformity in quality and in production.

Our experience has shown it to be necessary to go further back in the operation of beating than the plans outlined by Mr. Green. The exact determination of the furnish, that is, the materials to go into the paper, is a problem which, while appearing simple, is very difficult to carry out. The rags which are used in the paper contain varying amounts of water; the pulp is of different degrees of dryness; the quantities of each of these two materials and of other ingredients used is exceedingly difficult to catch so as to be sure that they correspond in different orders. It is necessary not only to standardize the methods of handling the beating after the materials are put in, but to find some way of accurately measuring the amount of raw materials so that the furnishes of two beating engines on similar paper are the same. The problem, for example, of determining the amount of water in the rags upon which the actual weight used is dependent, is no simple one and must be solved by special tests of samples in special apparatus so as to make the proper correction.

The necessity for standardization in work of this kind is also shown very definitely in connection with the manufacture of sulphite pulp. At the mill of the Katahdin Pulp and Paper Company, Lincoln, Maine, as well as at the Eastern Manufacturing Company, a task and bonus system is being developed based, in most cases, not on the amount of work accomplished nor even on the output, but upon the maintenance of certain standards: the following out of instructions; the adhering to a definite procedure which tests have shown will produce the required results. For example, in the organization of the cooking of the wood chips in the digesters, the bonus is not given for the quantity of the pulp turned out, but for carrying out the cooking operations in accordance with standard curves of pressure and of temperature; for blowing off the digester at the required color of liquor; and