

still be a large profiler by paying his men \$10 a day, would he not?

Mr. Taylor. In that particular case I think he would, Mr. Redfield.

Mr. Tilson. May I ask a question there; what about the conditions under which the men work? Did you not tell us something about the additional appliances that were used?

Mr. Taylor. Yes. The scaffold was so arranged that the workmen were kept at the same relative height to the wall all the time. The scaffold was raised alongside the building as the wall went up.

Mr. Tilson. That was probably somewhat more expensive for maintenance than the old way?

Mr. Taylor. Very much more expensive. They had to have helpers to coordinate the bricks for them.

Mr. Tilson. Placed in the proper position?

Mr. Taylor. Yes; then they had to have men place it just right in the proper position. The labor cost more to temper the mortar than it did before. They had to have paid teachers to go around and show these men how to make their new motions. That was an additional expense. I just wanted to bring out the difference and the improved conditions under which the men work now, and show that these improved conditions were paid for by the management.

Mr. Redfield. What about the chain blocks to carry the scaffold?

Mr. Taylor. The scaffold is a patented one of Mr. Gilbreth's which does not work with the chain blocks. It works by jacking up—

Mr. Redfield. Then it is your desire to have us understand that this increase of nearly three times did not represent a net profit—the whole of it?

Mr. Taylor. Certainly not.

Mr. Redfield. But was largely absorbed by additional outlay to produce this higher efficiency?

Mr. Taylor. Well, I should hardly say "largely absorbed." Partly absorbed, not largely absorbed. But in this connection I want to be perfectly frank. I will put it in this way so as to show an extreme case, that if, we will say, in a machine shop, a workman were today

using any series of movements on a machine which would turn out 5 pieces a day of a certain kind, and if any individual, a foreman, or another workman, or the management, or a group of men in the management were to devise a new series of motions, which causes the workman to exert no greater effort than he had before exerted, and if the workman could turn out 500 pieces instead of 5 in a day with the new method, that man would do his work tomorrow for his 30 per cent premium just the same as he had yesterday. I want to show this entirely new mental attitude. If, owing to no extra exertion on the part of the men, no new invention on the part of the man, a new and superior device has been adopted for doing the work—we will say, a new machine has been introduced that never was used before, and if that machine can turn out five or ten times the number of pieces the old machine turned out, the man is paid just the same 30 per cent increase in his wages as he was yesterday. I want to make the fact perfectly clear that there is no implied bargain under scientific management that the pay of the man shall be proportional to the number of pieces turned out. There is no bargain of that sort. There is a new type of bargain, however, and that is this: Under scientific management we propose at all times to give the workman a perfectly fair and just task, a task which we would not on our side hesitate to do ourselves, one which will never overwork a competent man. But that the moment we find a new and improved or a better way of doing the work everyone will fall into line and work at once according to the new method. It is not a question of how much work the man turned out before with another method. Mr. Barth here has perhaps been the most efficient man of all the men who have been connected with scientific management in devising new methods for turning work out fast. I can remember a number of—one or two—instances in which almost overnight he devised a method for turning out almost twenty times as much as had been turned out before with no greater effort to the workman. In that case you could not pay the workman twenty times the wage. It would be absurd, would it not?

The Chairman. I understand from your de-

scription now of the bricklaying system of Mr. Gilbreth that part of the increased productivity was due to a patented device which Mr. Gilbreth had invented, or that someone had gotten out?

Mr. Taylor. I think it is patented. I am not sure.

The Chairman. Whether patented or otherwise, it is an improved device, is it not?

Mr. Taylor. Yes. That scaffold that I told you about had a table on it, where on the old scaffold they had no table. The table is put in the middle of the scaffold.

The Chairman. You do not for a moment want the committee to believe, do you, that there could be no improvement in machinery were it not for scientific management?

Mr. Taylor. Of course not, Mr. Chairman.

The Chairman. Is not that also true with regard to your art of cutting metal, that that also is an improved device for cutting metal?

Mr. Taylor. No, sir.

The Chairman. And no improvement?

Mr. Taylor. No, sir; that is the study of an art. That represents the evolution of a science which took years to develop, and is in no sense analogous to the invention of a new machine.

The Chairman. Is it any part or parcel of the management, or is it the study of the art itself separate and apart from the management?

Mr. Taylor. The moment that scientific management was introduced in a machine shop, that moment it became certain that the art or science of cutting metals was sure to come. When it became the duty of the management to answer the two questions: What speed shall the machine run at and what feed shall be used, it was inevitable that they should seek for exact knowledge wherewith to answer these questions instead of guessing at the answer as the workmen have done in the past, and this would start the series of experiments which lead to the development of the science of cutting metals. It is the new mental attitude of the management that it is "up to us" to know and direct every element of the work instead of "up to the workman," which inevitably leads to the development of a science. When it becomes the duty of the management to make a

careful study of any group of facts, then the results of that study naturally formulate themselves into laws, into rules, into the development of a science. I want to make it clear, Mr. Chairman, that work of this kind undertaken by the management leads to the development of a science, while it is next to impossible for the workman to develop a science. There are many workmen who are intellectually just as capable of developing a science, who have plenty of brains, and are just as capable of developing a science as those on the managing side. But the science of doing work of any kind cannot be developed by the workman. Why? Because he has neither the time nor the money to do it. The development of the science of doing any kind of work always required the work of two men, one man who actually does the work which is to be studied and another man who observes closely the first man while he works and studies the time problems and the motion problems connected with this work. No workman has either the time or the money to burn in making experiments of this sort. If he is working for himself no one will pay him while he studies the motions of some one else. The management must and ought to pay for all such work. So that for the workman, the development of a science becomes impossible, not because the workman is not intellectually capable of developing it, but he has neither the time nor the money to do it and he realizes that this is a question for the management to handle. Furthermore, if any workman were to find a new and quicker way of doing work, or if he were to develop a new method, you can see at once it becomes to his interest to keep that development to himself, not to teach the other workmen the quicker method. It is to his interest to do what workmen have done in all times, to keep their trade secrets for themselves and their friends. That is the old idea of trade secrets. The workman kept his knowledge to himself instead of developing a science, and teaching it to others and making it public property.

So that many of the similar improvements in methods which doubtless have occurred to workmen in the past, instead of being formulated into a science as they are under sci-