

paratus in which you have an interest as a manufacturer?

Mr. Taylor. I hardly understand that, Mr. Redfield. I do not quite understand your question. If you will give me an illustration perhaps I can answer it.

Mr. Redfield. The suggestion has been made at various points in the testimony that while it must be understood that you are not actually engaged professionally and personally in the business of introducing scientific management that you would have a marked financial interest in its introduction arising from the necessary sale, it is suggested, as an incident, as a portion of the installation of the product of certain businesses in which you are a part proprietor.

Mr. Taylor. Mr. Redfield, if anyone wants the profits I am making annually they can have them for the asking from any incidental apparatus that is sold. These slide rules, the use of which I explained to you, for instance, I have never known one of them being sold to anyone. They are given away if anyone will show us that he can use them. Mr. Barth and Mr. Gantt and I, myself, are the joint patentees of those slide rules. If any man can come from any part of the world and show us he can use that slide rule, he may have it for the asking, but he has got to show us that he can use it.

We used to let them have slide rules like these, whether they could use them or not, until we found that they were being used as an object lesson to display the folly of scientific management. Men whom we had given these slide rules to would say, "Why, here, just see what damn fools these fellows are. They use a thing like this to run a machine shop with." When I found that this was the use to which they were being put, we got a little bit wiser. We said, "You cannot have these appliances to make fools of us with. You cannot have them until you can show us that you know how to use them." And in further answer to your question, Mr. Redfield, far from making money out of scientific management, since retiring from money-making business I have each year, for the past ten years, spent more than one-third of my income in trying to further the cause of scientific management, besides giving

my whole personal time and work to the cause without pay.

The Chairman. Is the slide rule an essential part of scientific management?

Mr. Taylor. No, sir. It is not an essential part, but it is a highly desirable instrument; if a man wants to run a modern machine shop as it really ought to be run under scientific management, he must use it. The Midvale Steel Works, my old establishment, are still using the tables which Mr. Gantt and I developed there for running their machines instead of the more modern and far more efficient slide rules developed after we left there. These tables were the limit of the mathematical solution of that problem when we left Midvale in 1889. The same tables are still used by the Midvale Steel Works.

The Chairman. Is it not only applicable where machines are used?

Mr. Taylor. Certainly; this rule is only applicable to the solution of problems connected with the art of cutting metals.

The Chairman. As a matter of fact, is not the so-called scientific management consigned almost exclusively to machine shops, and to the metal trades particularly?

Mr. Taylor. It is in use in flour mills, in paper mills, in cotton mills, in bleacheries, dye works, in printing establishments, lithographing, and the Lord knows what. Mr. Chairman, you can go right along, into the steelworks and ironworks and machine shops of all kinds and sorts, and find it in use in pulp mills, optical works, electrical works, and even a button factory. One of the shops was a bicycle-ball factory. They made some 300,000,000 bicycle balls in a year. There is variety for you.

I may say, as an interesting and new use for scientific management, that the director of public works at Philadelphia was appointed to that position so as to introduce the principles of scientific management in the management of the city of Philadelphia. He is doing it mighty fast. He is making a mighty good start at it. I should like very much to have the director of public works at Philadelphia to appear before the committee if you care to hear him, and have him give you his experience with scientific management, because he was chosen for his present

position on account of his experience in scientific management.

Mr. Redfield. Is not scientific management largely a state of mind?

Mr. Taylor. The essence of it is this new state of mind. The very essence of it involves this new and complete mental revolution as to the duty of both sides, one toward the other; the substitution of the attitude of peace for the attitude of war. There is no question about that.

Mr. Redfield. Was scientific management ever introduced in whole or in part in the factories of the American Locomotive Co.?

Mr. Taylor. I am very glad to state, not what I know, but what I believe to be the truth about the American Locomotive Co. I have never been in their works since they started to try to introduce scientific management; but if such knowledge as I have, and it has been obtained by talking to perhaps 20 or 30 different reliable men connected with the American Locomotive Works, will be of any value to you, I shall be very glad to give it.

In the first place, Mr. Van Alstine, whom I know intimately, and who I have every reason to believe is one of the most upright and straightforward and honorable men in this country, and who is a high-class man, became interested in the principles of scientific management when he was master mechanic of the Chicago & Great Western road; but he met with little sympathy in his attempt to introduce these principles in the shops of that road. He then went to the Northern Pacific as master mechanic, and had very much greater success there. But he found that after all people there had no great sympathy with him. They did not understand what he was driving at. He produced economies which were very notable, and which led them to want him to remain there, however, in the most urgent way. Then he finally went to the American Locomotive Works, with the object of introducing the principles of scientific management into that works. About the time he went there he came to see me, because I had been in consultation with him for several years. He came to see me about the introduction of scientific management in the American Locomo-

tive Works, and the most urgent advice which I gave him (and I gave it in a most emphatic way) was that he should not start in the locomotive works to introduce scientific management until he had the complete backing of the board of directors of that institution, until every man on that board, as well as the president of the company, was with him—until every man on that board wanted scientific management and wanted it badly.

It has been my experience that if a man starts to introduce the principles of scientific management into any company, unless the owners of that company, the directors, the people who have the final power—unless they want it and want it badly, and understand the price that has to be paid for it (and that price is one of long time and patience), my advice to him was that you let that thing alone. Mr. Van Alstine thought he could carry it over, as he said, without bothering the whole board to get a thorough knowledge of the whole matter and everything connected with it, and he started to introduce scientific management, and started in the right way to introduce it—that is, rather slowly. But if I understand the conditions—and I think I do—the board and the president began to put such pressure on him for immediate results, that, contrary to his best judgment, he was tempted to shove the thing too fast.

He attempted to do what is an utter absurdity in any company. He attempted to do, in two years what he ought to have taken five years to do, and in doing so he and Mr. Harrington Emerson, who joined him, abandoned the very essence of scientific management, the one essential thing. They tried to force in a whole lot of mechanism which ought to belong to scientific management; it is all useful and very fine, this mechanism, without waiting to convert the workmen as they went along; that is, to bring about this great mental change on the part of the workmen which is necessary for the success of the system. They went ahead, neglecting the absolute necessity of the mental change both on the part of the workmen and those on the part of the management, which I have referred to so many times in my testimony as the essence of scientific management. They tried to do what is an utter absurdity, and final-