

ly wound up by forcing the mechanism of scientific management in many departments of the company, where the proper spirit did not exist among the employees at all, and that led to just what I told them it would lead to when they first came to me. I told them, "If you do not go slow enough; if you do not allow the workmen to see that the new system is a fine thing for them, and get them into the proper frame of mind, so that they will cooperate with you thoroughly, the time will come when the whole thing will fall." As I have said before, the chief trouble with the whole undertaking lay with the board of directors. Their attitude was wrong. It was the owners who finally made the thing go wrong.

Mr. Redfield. Mr. Taylor, how far is scientific management in use by any of the large railway systems of the country?

Mr. Taylor. There is one of the large railways in this country that is using it to a very large extent. I have some of the data here which was given to me in confidence by the man who spent, I should think, some three, four, or five years in introducing the principle of scientific management very largely in one of our great railway systems. The result of his work has been that during the whole time in which he has been working there and up to the present time there has existed almost perfect harmony between the workmen and their employers. The workmen are earning higher wages I understand than corresponding workmen in any other railway system in the United States. If I remember rightly he told me that all the repairs on 20 types of locomotives were made with proper instructions as the result of accurate, careful time studies, and that the men who were making those repairs were all working under piecework. I may be wrong in the figures, but my remembrance is that he said that 70,000 items of repairs had been studied in that way on the locomotives and cars of this section of the line. I regret that I am unable to give the name of the man and the road which is doing this, because it came to me in confidence, and while I should be very glad and delighted to help you in getting a complete knowledge of this work I always feel that I am bound to strictly maintain a confidence of that sort.

Mr. Redfield. In other words, you were his professional adviser?

Mr. Taylor. In a way, yes; he started because he had read what we have written on the subject. He came down to see me at intervals and talked the matter over, but I could not say that I was his professional adviser. I was merely a friend having the interest I have in all earnest endeavors to introduce the principles of scientific management. I should be delighted to show you samples of the piece-work schedules that he gave us. Here are two lists of these piece-work prices.

Mr. Redfield. Did you say that there was 70,000 of them?

Mr. Taylor. They are simply samples of the 70,000. These are two of the various schedules which he left with me. My impression is that there are 70,000. My recollection is that on another branch of the same road there are over 100,000 items of locomotive and car repairs carefully studied and put on piece-work in this way. I am sure the number of operations was 100,000 to 130,000 on one of the branches of that line, and somewhere near 70,000 on another. In a recent conference the vice president of the road told me, "No set of men on the face of the earth can ever stir up any sort of discord between us and these employees of ours who have come under these new principles. We have become the best of friends under this system." That is the principal reason why I have concluded that in this railway company the principles of scientific management exist. In talking with him lately I asked permission to place this information before your committee. He said, "Yes, as far as I am concerned, but the request ought to go to the board of directors of our company; I have not the authority to do that sort of thing without their permission. I think I can get the authority. As far as I am personally concerned I am delighted to have this knowledge go anywhere, but you understand I am not the whole thing, I am not the railway company, I don't know what our board of directors would say."

The Chairman. Mr. Taylor, without making the name of this particular railroad public, or without any desire to put the name of the railroad company in the record, in view of your

explanation, is it not true that within a year that railroad company had very extensive strikes in its railroad shops?

Mr. Taylor. Certainly in none of the shops where this was introduced. I am absolutely sure of that. As to what occurred in other shops I do not know. There is one large section of that line that has not yet come under these principles, and what occurred there I do not know. My impression is, as you say, that there was a strike in the section, still working under the old system, but nothing of the kind in the two sections where our system of management was in use. That I am sure of.

The Chairman. I think you said, Mr. Taylor, that scientific management was to a great extent a state of mind.

Mr. Taylor. Without a certain state of mind scientific management cannot exist. There must, however, be something more than a state of mind. There must first be a certain state of mind—that is, a certain new outlook on both sides. The idea of peace must replace the old idea of war on both sides. Then in addition to this change in mental attitude both sides must come to look for exact facts and exact information as the foundation of their action. That is, exact science should be the basis for every action instead of the old rule-of-thumb knowledge or guesswork.

The Chairman. Would not a state of mind be a very unstable and changeable thing upon which to base materialistic production?

Mr. Taylor. I think there is nothing more stable in life than our convictions. If there is anything stable in life it is a state of mind. It is principles, and there is nothing more permanent than the principles which have become deep rooted in us. The principles of religion, the principles which govern men's daily actions are the most stable things in us. Our outward acts may change, our knowledge may change, our views may change, but once we have fundamental principles they rarely change materially.

The Chairman. It is a noted fact that the state of mind frequently changes?

Mr. Taylor. Yes, in minor matters they do, but when people are gradually convinced, when men adopt a new mental attitude toward

one another, and toward their duties, and scientific management is a revolution as to their duties toward themselves and their fellowmen—that is, a slow revolution, difficult to bring about, but once it is brought about it is apt to be very stable.

Mr. Tilson. Is there not this further fact that if your contention is true that it is not only a state of mind that is just but it is profitable to both parties?

Mr. Taylor. Exactly; immensely profitable.

Mr. Tilson. So that their particular interest will coincide with this state of mind if your contention is true?

Mr. Taylor. Yes, sir.

Mr. Redfield. How is it possible to study how long the workman should take in that part of the work that is purely mental? For example, how long he should take in making up his mind how work should be done or in reading and grasping a drawing?

Mr. Taylor. The first piece of time study that I ever saw made by anyone was made in the study of just that thing, a study of the mental capacity of boys. When I was at Phillips Exeter Academy, Mr. George W. Wentworth was the professor of mathematics, and he worked off his first geometry while it was in manuscript and his first algebra on my first class, the class of '74. He worked those books off on us for the two years while I was there. I, as a student, wondered how it was possible (that right along steadily, right through from the beginning to the end of the year, as we went on from month to month) that old bull, Wentworth, as he was called, gave us a lesson which it always took me two hours to get. For the two years I was there I always had to spend about two hours getting that lesson, and finally we got onto his method. We were very slow in getting onto it, however.

Mr. Wentworth would sit with his watch always hid behind a ledge on the desk, and while we knew that it was there we did not know what the darn thing was used for. About once a week or sometimes twice a week he went through the same kind of exercise with the class. He would give out a series of problems and insisted that the first boy who had them done should raise his hand and snap his fingers.