without fail. It never will work without the spirit of co-operative assumption of responsibility, and one of the first moves of the managers who put in this type of management, whose whole bringing up would be to take all the profit they can get as long as they are paying running wages, is to increase wages very considerably in order to get those things absolutely essential to precise control—goodwill and co-operation. If Scientific Management is working successfully in any plant, it is proof that there is fine spirit there, because it would fail without that spirit. This increasing of wages and salaries by owners because they do so as a means of securing the goodwill essential to precise control, has developed with discussion and with the enlightenment and broadmindedness that has come from discussion, so that the dominant motive today as contrasted with ten years ago is to share the increased profits as a matter of social justice, a very radical modification in motive resulting from largeness of mind. That is one of the effects of this philosophy of management.

Development of Scientific Management

It is pretty hard to trace this development. The number of places where real Scientific Management exists, contrasted with the number of the businesses in the country, is so small that it is difficult to say that there has been any development in it. You must distinguish between real and fake Scientific Management. It is like real religion and fake religion; real anything or fake anything. Now from the point of view of professional practitioners of real Scientific Management the development has been slow and sudden. Back in the eighties Mr. Taylor conceived the idea that his problem of management could be solved only by knowing more about his business and having more precise control of operations. Now a great many men would have rushed into print with results within twelve months. Mr. Taylor took twenty years at that problem, and worked the whole thing out in his own shops before he said a word in public. In 1903 he made an address before the American Society of Mechanical Engineers, a classical statement of his philosophy of management, called "Shop Management." Only one or two of that body of engineers, highly trained men, grasped the significance of it. Mr. Towne, in the discussion following the paper, said it was revolutionary. He prophesied it would be one of the greatest contributions to industrial life that had ever been made. But referring to managers as a whole, the significance of it was not grasped. We did not hear much more about it until in 1906 Mr. Taylor published a paper on "The Art of Cutting Metals." That was hailed the world over as a great technical paper on the cutting of steel. Few saw the philosophy of management in it. In 1910, a very brilliant lawyer, representing the shippers before the Interstate Commerce Commission, in a case between the shippers and the railroads, —a brilliant lawyer, and I am glad to say one of our Supreme Justices (applause)—I am glad to see that others agree with me—saw how he could make his point before the Interstate Commerce Commission, and over night the country heard of Scientific Management, and then there began to be a good deal of thinking about it. It was at this time that the public first grasped the significance of it. A dozen or fifteen men who represented real Scientific Management had been practising quietly, but it is not the kind of thing that can be spread rapidly. It is not a machine that you can build and ship to a plant and put in. Scientific Management means going into every separate plant and working it out there according to the local conditions. That requires two things—first, a man capable of doing work, of breadth and vision; and second, time. Scientific Management is bound to develop very slowly. I do not believe there is real Scientific Management in fifty plants in the country. I do not know of that many.

There is a development you cannot measure that has a great significance. That is the growth in the public mind of the idea of Scientific Management and inquiry concerning it. You cannot measure growth of that store.

Range of Application

In the first place Scientific Management has been applied almost entirely in manufacturing establishments, for the very obvious reason that manufacturing operations are capable of much more precise control than merchandising operations, and the operations of auxiliary businesses. Second, the demand for the services of the men capable of applying Scientific Management in these manufacturing industries has been so great as to absorb nearly all of their time. They have not had deliberately to pick out the hardest industries. A number of applications were first worked out in machine shops, and most illustrations are naturally from that industry. As a matter of fact, without any literature resulting from it, the philosophy of Scientific Management has been applied to a great variety of industries, represented by such a variety as iron and steel, books and binding, textiles, clothing, building construction, and even banking.

It is very interesting to know that the exponents of Scientific Management are now educating the public with respect to something they have known but which the public has not—that Scientific Management is not a rigid thing. It is not the same here and there, but must be different in every kind

of plant, because of different local conditions; and in different types of industry different features of the mechanics and principles must be emphasized. They have worked out three principal types of industries:

1. Industries with continuous processes; uniform product with uniform specifications; single purpose machines; uniform operations; simple routing. Illustrated by the manufacture of paper and pulp.
2. Industries with non-continuous processes; uniform product with varying specifications; single purpose machines; uniform operations; simple routing. Illustrated by the manufacture of envelopes, books, and handkerchiefs.
3. Industries with non-continuous processes; varying products with varying specifications; multiple purpose machines; varying operations; complex routing. Illustrated by machine shops.

Effect on Production and Distribution

Where real Scientific Management has been applied there is observable the following effect on productive and distributive processes,—all resulting from precise control made possible by intensive continuous investigation:

1. Greater efficiency of the individual workman, without greater expenditure of physical and nervous energy.
2. Greater efficiency of equipment.
3. Greater efficiency of material.
4. Resultant lower costs, greater profits, higher wages, and in many instances lower selling prices.
5. Greater precision in deliveries.

Effect on the Industrial Workman

I do not know of any phase of the subject about which there are more incorrect statements, based either on prejudice or ignorance, than the influence on the workman. There is only one safe way to know what the facts are: that is to go and visit real Scientific Management plants. You cannot rely on printed literature. These misleading statements are in many instances deliberate falsehoods, but on the whole, I believe, rather a misinterpretation of facts because of the bias of some industrial philosophy. I am going to present the following generalizations based on personal observation and inquiry, concerning the effects of Scientific Management on the individual workman.

First: The health of working people is not impaired, but on the other hand is usually improved by the better general working conditions established.

Second: There is always increased wage. In some cases it is very considerable—twenty-five or thirty per cent. Where it is not as considerable as that it takes the other form of shorter hours. In many cases it is a combination of increased wage and shorter hours.

Third: The attitude of mind and spirit of the working people in the plants I have inspected is conspicuously better than the attitude of mind and spirit I have seen under other types of management. Scientific Management to survive, depends upon that thing. The idea of precise control is impossible without it.

Fourth: Contrary to your first impressions, based upon misinformation and upon a misconception of the nature of standardization, Scientific Management offers a greater opportunity for the promotion of working people freely from one position to another.

Fifth: According to my observations, as a result of the spirit in the plant, and increased wage, and sometimes shorter hours, the standard of living of the working people is more satisfactory than that which accompanies ordinary conditions of management. This results not merely from the ability to enjoy more things; it arises also from a different attitude toward things and toward each other.

Finally: I think I see in it the opportunity for regularizing employment. One of the serious social problems confronting us is irregularity in employment. I do not see any possibility of regularization without precise knowledge of facts, ability to predict, and precise control; and one plant—a Scientific Management plant—has had the nerve to tackle the problem of regularizing employment by deliberately not making all it can in full season and holding production over to the dull season. It feels confident of what it is doing, because of precise knowledge and precise control of its operations.

These effects of Scientific Management on the individual workman, reflected in the home and multiplied by the number of homes, represents its effect on the community. Higher wages make possible the enjoyment by the community of a greater number of things of life, and shorter hours of work afford the time for this enjoyment. The spirit of "the best way" and of "the reason why," developed in the shop, is carried into home and community life, as is also that broadmindedness and tolerance which develops with co-operative activity.

Modifications of Scientific Management

Just as there were fake physicians and shyster lawyers when medicine and law were young professions, so we have at present fake organizing engineers. They do as much damage to the plants by which they are engaged as the fake physician did to