osophy. It was the logical thinking of Taylor which made the various mechanisms fit into a system. The detailed investigation of machine operations and handling times came first; from this, it was possible to deduce standard methods of operation. Standard methods of operation required, for their continuous performance, standard conditions of working. There were devised, consequently, such mechanisms of management as the Tool Room. But this divided the worker from his implements and materials. A condition of obtaining standard output was the delivery of "the right materials and the right tools in the right condition to the right man at the right machine with the right instructions at the right time." This inevitably led to the development of planning. But how to get the worker to operate correctly? The only way was to supply detailed written instructions; and, in order to have those instructions scrupulously observed, to devise a wage-system which would provide extra wages for following the instructions. Thus, in a series of consequential stages, Taylor came to his functional organization,—looking back, a remarkable feat of logical thinking. As Dr. Person said, when, under his direction the Amos Tuck School made Scientific Management the basis of its instruction in management—"We found that the Taylor System was the only system of management which was coherent and logical, and therefore was teachable."

Of the further quality of inventiveness which Taylor possessed, there is little need to speak. His inventiveness was implicit in his spirit of scientific enquiry. His inventions were not born of revolutionary genius, but of the naked truths which his minute investigations brought to light. His famous steam hammer,—of which Gantt said, "I do not know of any more daring piece of engineering construction"—was not the outcome of what Mr. Copley calls "an egotistic desire to be original, to do great and glorious things," but rather was it the logical consequence of a long and painstaking survey of other steam hammers and of what a steam hammer ought to be and do. But I do not dwell on this, for Taylor's inventive work was due to attributes which we have already discussed.

That there were flaws in Taylor's mental equipment will be readily understood. His abilities were outstandingly those of what we have come to call the "engineering" type of mind—the mind which, "works for the solution of a single technical or engineering problem and is concerned with the determination of the solution rather than the application of that solution to practical activities." As an executive, it cannot be doubted that, despite a high order of ability in management, he had serious defects,—the defects of a man who has thought far ahead of the practice, and is impatient that the practice should catch up; the defects of a man who has probed to the very truth of things and is careless of aught but the truth; the defects of a man who followed where logic led him, and was scornful of the roundabout way of reaching a conclusion. I think, too, we must class among his defects his antipathy (if the word is not too strong) to the "academic" and the "humanities." It is a common fault of practical men, though most successful practical men, unknowingly perhaps, are already possessed of those qualities which real culture furnishes. "Real culture," says Mr. Copley, "is that which widens one's sympathies and thus is the cure for egotism or the inability to see oneself and one's work in proper relation to the universe." That is as good a definition as I have heard, and it is true to say that, in many respects, Taylor stood in need of no such cure. But, here and there in his life, one can see how this refinement of culture was lacking. He had great difficulty in formulating the philosophy of his achievements. None of his published works completely portray the essence of his philosophy. There was just lacking that breadth of perspective as a permanent attribute of the man. In flashes it came; within himself, inchoate and uncrystallized, it was there; but it was not a lasting light which he could turn on at will to reveal the inwardness of his life work. That others, who have taken upon themselves leading parts in the subsequent work of Scientific Management, have been university men, replete with the qualities which that training provides, is evidence that a movement so broad and so revolutionary has need of and can find niches for every type of mind.

To dwell upon the flaws in a mental armoury so commanding as that of Taylor is, however, to pick holes in the sky. I have left little enough space to consider what great thing it is that Taylor has contributed to the progress of the world, and to what particular end he himself considered his work had contributed.

Too little emphasis has, in general, been laid—an omission which this Life amply rectifies—upon the motive which caused Taylor to start upon and continued to inspire him in the work he achieved. Again and again, throughout his life, in terms which are absolutely unmistakable, Taylor testified to the one

main purpose which dominated his work. In 1912, when referring to his first steps in developing his system, he said: "My whole object was to remove the cause of antagonism between the boss and the men who worked under him; to try to make both sides friends in the place of tactical enemies." The same thought is uppermost when, in 1914, in reply to certain criticisms, he wrote: "I cannot agree with you that there is a conflict in the interests of capital and labor. I firmly believe that their interests are strictly mutual, and that it is practicable to settle by careful scientific investigation the proper award that labor should receive for the work which it renders."

It is usual to speak of Scientific Management as a powerful lever in the elimination of waste, as the means best calculated to arrive at effective management, and as a sound set of principles to govern the development of an organization. But that was not the primary point of view which Taylor took, though the "engineer" within him could not but be gratified by such results. To Taylor, his system of management was primarily a means to eliminate the cause of friction between management and men. He held the old type of management responsible for the chaotic condition of industry in its "humanics." He drove to the heart of it, and determined not merely to effect a cure, but to remove the cause. We should regard Scientific Management, therefore, as preeminently a plan to solve the great social problem of industry, and secure an enduring industrial peace. It is for that reason, prime amongst others, that I regard the philosophy of Scientific Management (and, indeed, many of the mechanisms which Taylor introduced to put his philosophy into practice) as among the greatest of modern contributions to the progress of our social economy. It is not simply and solely a means to greater output and efficiency; still less is it a means to greater profits for the individual business. Primarily, its object is to remove the cause of strife and promote peace. Its field of service is not limited to this or that business; it is not even bounded by the confines of industry. Its service is to the world.

It is strange that, with this motive and object inspiring the work of its founder, Scientific Management should have been so strenuously attacked for its effect upon the worker. It has been accused of making men into machines, of creating narrow specialists in place of all-round operatives, of creating and furthering the monotony and consequent fatigue of the workers' life, of reducing the chances of a "square deal," of dispensing with the need for skilled workers, of overworking men and causing physical ills, of destroying initiative, inventiveness and ingenuity, of aiming to do away with unions, and of robbing the worker of his legitimate earnings By far the most formidable attacks upon Scientific Management have been from this angle. Yet Taylor himself said, "It appears to me that the effect of the system upon the workman is in the end the most important element in the whole problem," upon which Mr. Copley comments, "He regarded the reduction of labor costs as *very* important, and he regarded the increasing of wages as *very* important. But it was his deliberate opinion that the *most* important feature of any system must be its effect upon the workman's character." Of this fundamental purpose in Taylor's work his opponents, and perhaps some of his supporters and followers, have been neglectful. If for no other reason, the writing of this book would be well worth while, for its reminder to us that the main object of Scientific Management, in the conception of its greatest protagonist and exponent, was to better the human side, the "humanics" of industry.

There is, even amongst the most progressive employers, a tendency to think that the solution of the great human troubles of industry is not a matter for scientific research or for scientific administration. They fancy that it is a question of the heart rather than of the brain, thereby omitting to realize that the one is essential to the interpretation of the other. They often quite properly set up Employment or Personnel departments, but fail to realize that, though one may segregate in special units of the organization certain specific activities affecting the workers, one cannot by any means, divorce the broad problems of industrial relations from the day-to-day management. For management is essentially a daily relationship with the workers; these relations constitute the main problem of management. Any remedy must resolve itself into an improvement of the management. Any study of the causes of the problem must be a study of the methods of management. This is, indeed, fundamental to Taylor's philosophy. He would claim that the contribution of industry to social welfare is to be judged, not merely by the presence or absence of employment and welfare work, but by the extent to which *all* the work of management is motivated by and conduces to sound industrial relations. He would, I surmise, strongly deprecate the conception, which arises even in the best regulated industries, that man-