in undertaking the course of logical and complete development.

Taylor gave his services to these companies without charge, and worked chiefly through younger engineers, secured upon his recommendation for the detail work. Mr. Carl G. Barth and Mr. H. K. Hathaway were his responsible representatives, and both—particularly Mr. Barth, the elder—made their mark upon the development of the Taylor methods. Mr. Taylor remained in the relationship of unpaid consultant and supervisor. Assured of a modest competence as a result of his inventions, he had become able to declare that he was "too busy to work for money."

### IX. LATER ACTIVITIES—LABOR'S ATTITUDE

About the time of his interest in Link-Belt and Tabor he began a career of conferences and public speaking concerning his philosophy and system of management which continued until his death in 1915. "He gave his time and his means freely to showing its operation in the Philadelphia plant to conscientious inquirers. In many instances he traveled far at his own expense to address associations and meetings of manufacturers and managers. Out of his own pocket he contributed to the expenses of young and ambitious engineers who were serving their apprenticeship in Philadelphia.[1]"

Although Taylor's career as foreman in the Midvale days had begun with serious controversy with the workers under his foremanship, *under the then prevailing methods of management*, it should be recorded that in the subsequent development of management in accordance with *his own philosophy and methods* he experienced only the most gratifying cooperation of the workers[2]. The first friction which developed was at Watertown Arsenal about 1909 and 1910, due to over-zealous and improperly measured steps of development by local authorities, especially to the extension of time study to a shop in which the conditions had not been properly prepared. No serious internal trouble developed, but the occasion was seized upon by organized labor as an opportunity for organized opposition from without the Arsenal, and there resulted the famous investigation by a committee of the House of Representatives in 1911. The report of the committee on the results of the new management methods which were being developed was not unfavorable and no legislation was recommended.

However, a few years later, without further investigation, restriction was placed upon the use of time study in government institutions by the so-called Tavenner rider to an appropriation bill. This was in response—not to importunities of workers in plants where scientific management had been developed (their testimony was apparently disregarded!) but to the political pressure of the national organization of labor in accordance with what appears to have been their then larger strategy. As the writer has stated elsewhere[1]: "An almost incomprehensible phase of the history of the scientific management movement is the existence, side by side, of improved industrial relations in those plants in which scientific management has been developed and strong opposition on the part of the management of the American Federation of Labor. The opposition of the management of organized labor seems to have been inspired by fear of the impairment of a fundamental element of their strategy (that their organization must be increased in membership and held intact, for the accomplishment of their large objectives) by one of the least important mechanisms of scientific management, the differential wage system. Inspired by this fear, and taking advantage of certain opinions held by workers (such as the opinion that increased output will cause unemployment) and certain infelicities of speech and illustration on the part of expounders of scientific management (such as the famous Schmidt case), and presenting statements concerning the actual operation of scientific management not based on critical investigation and not conforming to facts (that workmen are speeded up and worn out, that time-studies are secret, that rates are cut, etc.) the management of organized labor undertook a campaign of education of its membership which resulted in an almost solid opposition by the rank and file as well as the officers of organized labor to scientific management. In public discussion, to the opposition of organized labor was added the opposition of many social scientists who, without information derived from either experience or investigation, asserted

[1]Thompson, *Theory and Practice of Scientific Management*, p. 25.

[2]"The danger from strikes comes from the false steps often taken by men not familiar with the methods which should be used in introducing the system. The writer has never had a single strike during the 26 years he has been engaged in this work." *On the Art of Cutting Metals*, p. 54.

[1]*Bulletin of the Taylor Society*, Vol. IV, No. 5, p. 13.



that scientific management would make impossible the achievement of any ideal of industrial democracy. Throughout all this controversy the natural confusion of polemical discussion was worse confounded by absence of critical investigation of facts, inadequate information, and particularly by a failure to distinguish in the discussion of scientific management as a social problem, between management and administration. In this controversy the arguments against scientific management as a system of management technique were ineffective because not supported by the facts; on the other hand the arguments against scientific management with respect to its social implications were significant and of influence, but they were really arguments concerning administrative policy governing the use of management technique, and not more pertinent to scientific than to any other form of management. Superficial critics failed to perceive the point that the effective working of the scientific management mechanisms in particular depends so vitally upon sympathetic cooperation between planner, supervisor and operator, that antisocial administrative policy is inconsistent with its development and technical effectiveness... The status of scientific management has been profoundly influenced by the war. Three influences are noteworthy: (1) Although the prejudice of workers engendered by the sharp controversy preceding the war has not disappeared, open and active hostility of labor has been discontinued and apparently will not be resumed; (2) the demand for output during the war, supported by labor, compelled a wider extension of efficient production methods, in some instances of the methods of scientific management, not only in the United States but also in Europe, and both labor and management have learned by experience that scientific management technique is not inconsistent with wise, humane and cooperative and administrative policies; (3) labor and management have observed that during and following the war managers of scientific management plants and scientific management engineers have been in the van of those inspiring and directing the establishing of the most humane and cooperative administrative policies, in accordance with the most farsighted principles of industrial relationship. War seems to have cleared away prejudice and misunderstanding and to have made possible an appreciation of the value of scientific management as an instrument for the increase of the productivity of human effort under wise administration."

### X. CONCLUSION

To summarize: Scientific management (first called by that name about 1910) was begun to be worked out by Mr. Taylor as long ago as the decade 1880-1889, and has been steadily developing since that time; it arose not out of a preconceived theory but out of the attempt to solve practical problems of production as they appeared one after another; theorizing and the formulation of principles came after the mechanisms had been thoroughy tried; in the course of developments which represented a smoothing out and coordinating of the system there was experienced only the minor and normal friction with workers—in general a splendid cooperation.

In addition it should be observed that in the story there is a lesson for executives and engineers of today. The steps through which Taylor first developed scientific management are essentially the steps necessary for any successful specific development today. Experience has taught that the only practicable order of development in any specific instance is: preliminary analysis as a basis for standardization of conditions; standardization of conditions; provision for maintenance of the standardized conditions; and then the detail job analysis and the setting of rates by the method of unit time study in the environment of standard conditions. Out of the job analyses which follow standardization of conditions may come instruction cards, precise scheduling, bonus or other differential wage systems,—a precise general and specific control. Any other order in the improvement of management in accordance with Taylor principles is almost sure to be ineffective and to lead to trouble.

ATTENTION of members of the Taylor Society is called to the session of Wednesday afternoon, Dec. 8, of the annual meeting of the A.S M.E. (New York, Dec. 7-10.) At that session will be offered, under the jurisdiction of the Management Section of the A. S. M. E., a program on the constructive work in management of the late Henry L. Gantt.