

by deliberately and intentionally advocating the inaccurate stop-watch method of time study, or misinforming the profession as to the best methods of time study, as has been done with his unqualified approval in the book "Time Study for Rate Setting"? Can Mr. Barth cite the possible poverty of an institution as sufficient reason for his first public expression of any praise whatever of the micromotion study plan, coming after our indictment of the rule-of-thumb stop-watch method?

16. The situation in the colleges is serious. Some in this country have already adopted micromotion study, and the securing of accurate times as a by-product of method records. Others, under the influence of stop-watch time study men, and taught by professors, who, realizing their lack of training in Scientific Management, have entrusted the subject of timing to "time study experts," have little knowledge, no knowledge, or misinformation as to micromotion study. A third group have been taught "that the stop watch method and the micromotion method are alternatives" and never find out till they have learned wrong habits of taking times and lived thru the heart-breaking experience of finding their carefully accumulated data worthless, that they have been devoting themselves to acquiring what is fast, and deservedly, coming to be a "lost" art, instead of a science, founded on a rapidly accumulating body of facts.

17. Our indictments of stop-watch time study, psychological and statistical, have been made primarily to inform the young men on the subject,—and the educational indictment to follow in forthcoming books will be developed along these lines.

18. We agree absolutely with paragraph 7. By "means" Mr. Barth evidently means devices. Having conceded the superiority of our devices he turns to a defense of stop-watch time study methods. We wish to state only that Mr. Barth, in his own attempts to make the findings of the stop-watch more accurate by applying his own knowledge of mathematics has shown the untiring devotion of the true scientist. It seems a pity that he has been handicapped so many years by the fact that the inaccuracy of the data he has had to work with has made his task such an ungrateful one. For example, such minute times as are derived by the algebraic equations in "Stop Management," American Society of Mechanical Engineers' edition, paragraph 377-378, Harper edition, pages 172-173, have been recorded in greatest detail as to method and with errorless times by a small boy with three or four revolutions of the handle of the camera.

19. In paragraph 8, Mr. Barth rightly says that our apparatus "cannot automatically pick out the most suitable in a group of workers to which to apply it." We have never claimed any such human intelligence for our devices. It can, however, be said to their credit that neither do these inanimate apparatus warn their users, as does Mr. Barth in Mr. Merrick's book, page IX, not to seek to record the "extraordinarily expert operator."

20. Mr. Barth has never had the experience, and could not with the stop watch, obtain and study new information pertaining to skill study usable for making the workers more productive, increasing their earning powers, and adding to their comfort, that the micromotion method acquires. He therefore criticises it as he does in the concluding part of the paragraph, as follows: "I cannot see that it can do much more for us than to measure more accurately the elementary operations performed by the particular worker photographed."

21. Believing, as he does, that the prime aim of studying the activity is to determine "a fair time," (Barth paragraph 1), and apparently thinking that the micromotion method has for its aim simply getting more accurate times, he naturally fails to appreciate that it bases its superiority on its ability to furnish data for skill study, the obtaining of the One Best Way to do work, and the education of the worker, and regards the times simply as a valuable by-product of its real work, which is the *recording of methods*.

22. In our books "Primer of Scientific Management," page 56, "Psychology of Management," chapter 8, and "Motion Study," page 36, we called attention to the great possibilities resulting from the transference of skill, and, while the majority Committee of the American Society of Mechanical Engineers recognized this principle and made it the subject of their epoch making paper 1378 at the December meeting, 1912, the discussors of our paper in 1921 completely fail to grasp the possibilities of finding and recording the details of the One Best Way and transferring the skill of the most expert to all the others.

23. Mr. John G. Aldrich, an expert on engineering and management, wrote in 1912, "Micromotion Study furnishes a means for the transference of skill from man to machine. More important than this it furnishes a means for the transference of experience from a man who has had it to one who has never had it."

24. In paragraph 9 Mr. Barth apparently has and gives an entirely wrong impression of our work. We

have today for his inspection over nine thousand written standards and standing orders pertaining to management, some of which date back to 1897, two years before Mr. Barth had ever worked for Dr. Taylor. Our work consisted for twenty-six years of handling thousands of men on our own payroll, from Eastport, Maine, to the Pacific, and from Montreal to the Gulf of Mexico. Prior to this we had seven years experience as superintendent and head superintendent in responsible charge of large work, with a grand total of thirty-six years studying and practicing management.

25. The experience has been supplemented by complete installations of Scientific Management. In many instances the work of making micromotion study has been but a small part of this. However, it is true that it is the basis upon which we have founded our standards and standing orders for the installation of management, which have been applied not only to "repetitive work implying exceedingly minute motions," such as textile and cloth handling industries, scientific instrument industries, and all branches of office work, but also to such machine shop work as has to do with automobiles, battleship crank shafts and screw shafts, and many kinds of industries in between. We grant that the micromotion method has been highly successful also on repetitive work that the stop watch demonstrated itself utterly unable to better or cope with, though handled by its most highly trained advocates and users.

26. Mr. John G. Aldrich, President of the New England Butt Company, speaking of the micromotion method and process, stated in 1912: "previous times have been reduced over two-thirds." This work can now in his factory be seen being done, today, nine years after, in the same way as we laid it out in 1912, the reason for no change being that it was done near enough to the One Best Way in 1912 to warrant letting it alone ever since.

27. Paragraph 10 is evidence of the weight that Mr. Barth gives to the profit that comes from the study of the machine, as compared with the human element,—not as disparaging the latter, but as an expert in improving the former.

28. We are glad to have this opportunity again to express our appreciation of the fine work of Mr. Barth in respeeding and rebuilding machines, as outlined in paragraph 11. In our installations we do not attempt to handle these thru micromotion study alone,

as we have also, of course, available the other methods of betterment of scientific management, yet even in this field we have seen many a machine completely rebuilt as a result of the examination of the micromotion films. As to tool rooms, which he cites, we have seen none that compared in efficiency with those that have been installed with knowledge of and due regard to the underlying laws of motion study that have been derived from an intensive study of micromotion data. The laws of tool handling, moving, storage, repair and tool maintenance, developed in the course of our years of micromotion studying the complete Taylor system, warrant any large organization whose tool rooms have been done without such micromotion experience and view point having them done over again.

29. In one instance a "direct disciple" after long effort succeeded in getting one of our clients to let him try to improve a tool room that had all the Taylor merits and practice plus the refinements that come from such micromotion method of analysis. At the end of a few months his services were dispensed with and those things which he did not understand and therefore changed, were put back to the condition left by the micromotion method. Many similar instances can be quoted where accurate measurement cannot be improved upon by mere knowledge of tradition, without the knowledge of the theory.

30. In paragraph 11 Mr. Barth advocates "past general experience and the common sense that goes with it." He ought to know that these do not forsake the user of the micromotion method, tho their use alone savors of the "rule-of-thumb" that Dr. Taylor so strenuously tried to supersede. The micromotion method gives one a *measured experience*, and common sense backed up by measured proof, that correct and supplement the findings of general observations.

31. In paragraph 12, Mr. Barth again overestimates the emphasis placed by the micromotion method on its ability to get *more accurate* "times" for *rate setting purposes* than does the stop watch. We claim that it costs us nothing to get "absolutely accurate times" since these occur on our records simultaneously with the *record of methods*, the value of the latter paying for *all* the data, even that taken on work that has been already stop-watch time studied. But we also say that no time data, no matter how accurate, can compare in value with motion data.

32. There is no doubt, as Mr. Barth says in paragraph 13, that electrification does add a variable to the study of machines, but this was to be expected and is

¹See Transactions of the A.S.M.E.—Page 1184.