

is impossible to finance the result and therefore mending our program to suit our finances.

Now just one other point; that is the great opportunity for *proper* advertising as a means of standardization. I think so far advertising has very largely been abused in that it has been used to foster some specialty. The world will not progress on specialties. My own feeling is that it should also be the endeavor of this Society to turn the mind of the advertiser to the wonderful channel which he has of interesting the public in standardization of product.

QUESTION: Is there any standardization going on in the manufacturing of your line?

MR. COONLEY: I am very glad to say that we are working on the standardization of malleable fittings at the present time. We have asked the help of the American Society of Mechanical Engineers. We are going to use the standard of dimension as a basis for standardization of proper price listing and a proper reflection of standardization throughout all the phases of business.

PAUL T. CHERINGTON¹: My first point is the fact that in many types of product the personal preferences of buyers or kindred influences make standardization impossible or highly undesirable as a practical problem for the manufacturer. Professor Cunningham's case of the minister who objected to having his efficiency measured by the number of conversions per pew-hour, suggests the distinction I want to make between the standardization of the product and the standardization of the combination of the product and the accompanying services which it is the real problem of many manufacturers to deliver. It is unquestionably the task of the minister to bring about the spread of the ideas he is preaching, and the number of conversions is perhaps as good a measure of the spread as could be found, but the real product is a combination of conversions and other human reactions too complex to be standardized. In the field of manufactures, fabrics furnish concrete illustration. In a large measure their value and the salability is due to a lack of standardization. To standardize them in any essential particular would be to destroy their chief desirable characteristics.

The second point I want to make is the obvious one that in the case of such products there is not necessarily any burden imposed on industry by this in-

¹Secretary National Association of Wool Manufacturers, Boston, Mass.

herent lack of capacity for standardization. The costs of this diversity and of the risks it involves are necessarily figured in with the other necessary costs of distribution. The burden, of course, falls on the public, but on the whole it is not heavier than any other burden due to desires for expression of individuality. Those desires are, for the great mass of humanity, ineradicable, even though the ingenuity displayed in expressing them is ordinarily restrained to a pitiful degree.

There is, of course, no fundamental reason why we should not work out standards of dress analogous to the peasant costumes prevalent in certain regions patronized by tourists. By salary, income, occupation, age, or by complexion, or by free range of choice between a few types (as was done with hats for "female yeomen" in the navy) we might standardize clothing for say ninety per cent of the population, leaving the display of taste in fashion with the ten per cent economically competent to bear the necessary cost. However desirable such action might be theoretically, it is, of course, not possible without complete standardization of the humanity under such a regime.

The world might be more thrifty, but for many people it would be insufferably dull. As matters now stand the greater part of the yardage produced in, say, the wool manufacturing industry, is of a relatively few types, but the multiplicity of designs and types in the minority, while it materially complicates the business, cannot be regarded by the manufacturer as an unmixed evil. Nor is it clear what really worth while end would be gained by trying to reduce all fabrics of wool to a basis of production as uniform as screws or wire nails.

A final point is the thought that, both socially and economically, there may be some profitable field for action even in such lines as do resist complete standardization. This action would, in some instances, begin with a recognition of the distinction between those portions of the industry in which standardization is possible and those in which it is not. To continue reference to the wool manufacture, it is not inconceivable that a relatively few standard specifications for blankets, uniform cloths and other staples might be worked out which would permit that substantial portion of the industry which does not depend on style elements to meet the essential demands of its consumers more accurately and at less cost than is now the case. Even in this field, however, the difficulties are serious and there is no simple, off-hand solution

which would leave producer and consumer better off than they now are.

FRANK B. GILBRETH¹: I want to bring out a subject which is very near to my heart,—that is, the importance of the dependent sequence in standardization. The illustration of the rubber depending upon the shoe and the shoe upon the last opens a discussion that has no end to it. I make a proposition that this Society make a study in the standardization of shoes! When you have found a shoe that is right, then take your courage in your hands and insist that the foot upon which the last depends is the same shape this year as it was last year and will be the same next year, regardless of style.

In a sequence of rubbers, shoes, lasts, feet, we are able to build our standard upon something that is known and remains fixed. This is, unfortunately, not always the case in a dependent sequence and the effect upon standardization should be emphasized.

Let me give an illustration. In 1913 Mrs. Gilbreth and I decided to attempt to standardize just one thing in the household. We decided that if we could get one standard that was right, and that all people would agree was right, we could consider that the method used in making that standard was worth while. We decided to attempt to standardize the making of a bed, as a simple operation used in all households, institutions, etc. Having selected bed making, we proceeded to make a survey of how beds have been made, first according to usual household methods, and second by experts. We turned the house into a motion study laboratory and invited the teacher of nurses from one of the most prominent colleges in the country. We invited also a head nurse from a hospital, and two of the best doctors that we could find, one of whom is in charge of the largest hospital of which we know. In an endeavor to trace the dependent sequence we said that as the sheet and blanket and spread must be laundered, we would bring in a teacher of laundering from a college of home economics.

So in the middle of the home-made laboratory we had a real bed and all the coverings and this group of experts, and we set up the motion picture camera and wound up the clock five different times, because the clock only runs about an hour at a time, but we could not get to work because our group of experts could not agree on how the bed should be made. As fast as one would start demonstrating her method, the others would explain why the method would not work, and

¹Consulting Engineer, Montclair, N. J.

finally when we had a method that seemed likely to prove acceptable, the expert on laundering said: "There is not a machine in the world that can iron those sheets the way you want them to make those beds, and it would cost fifty thousand dollars to make laundering devices to fix them." It remains to be said that we have not yet been able to standardize this simple operation, for the one reason that there has not been an agreement as to the method, consisting of an investigation of the dependent sequence and a willingness to standardize the first stage in the sequence and to study and standardize consecutively the succeeding stages. It must be noted that the experts were cooperating, that each was a recognized authority in his or her field and a producer of worth-while results in that field. If, with such a combination, it was impossible in the time available to obtain one simple standard, the difficulty and complexity of the problem may be appreciated.

I have two suggestions to make. One is that we attempt to make one simple, definite, unassailable standard as a sample of what could be done. The other is that we apply measurement to the standards we have made in order to determine their scientific value. A review of the history of standardization before the days of scientific management and since shows that thousands and thousands of standards have been made and abandoned. The amount of money that has been wasted on false standards, homemade standards and pseudo-scientific standards is disgusting. The total cost of existing standards today, as determined by the cost of standardization divided by the number of surviving standards, would shock the scientific managers of the country if they considered it. The need for standardization is obvious.

To return to the illustration of shoes. I had a hand in standardizing the methods of fitting shoes for four million officers and men in the army. The credit of this work should go to Elmer J. Bliss of Boston, who has invented a method and device for fitting shoes. Over eighty per cent of all men in the army were mis-fitted. These are quartermasters' records. If you could see first hand, as I have, the collection of pictures of Colonel Owen in Washington,—that man who did such brilliant, though as yet unappreciated, work of standardization in the Medical Department—if you could see this collection of pictures of "shoemakers' feet," you would be as shocked as I was. It is certainly an indictment of the intelligence of all men. I criticise with reason, for I myself bought six pair of