



Figure 17

General View of Folding Department.

the case with a new tool, no packing is required. If it comes to line *A* packing piece *A* is required; if line *AB* packing pieces *A* and *B* are required.

The tool stand itself is an interesting example of standardization. It will be noted by reference to Figure 13 that it provides places for not only the tools for the job in process and jobs ahead but also for the drawings, instruction cards, etc. There is no uncertainty as to where they are and no time lost in finding them when wanted.

The establishment and maintenance of standards in connection with leather belts for transmitting power is an essential feature of machine standardization. It ought to be so well known and understood as to require no reference here. At any rate it would require more time and space than may be devoted to it. I

would refer those who may desire complete information on the subject to the following literature:

"Notes on Belting," a paper presented at the December, 1893, meeting of the American Society of Mechanical Engineers, by F. W. Taylor.

"The Transmission of Power by Leather Belting," a paper presented January 12, 1909, at a meeting of the American Society of Mechanical Engineers, by Mr. Carl G. Barth. Attention is directed to the discussion of this paper by Mr. Walter C. Allen, by Mr. F. A. Waldron and by the writer, describing the practical application of the work of Mr. Taylor and Mr. Barth.

"A Practical Solution of the Belting Problem," a pamphlet issued by the Tabor Manufacturing Company, Philadelphia.

Standardization of Work Places and Facilities for Transporting and Storing Materials

In many industries "hand work" done at benches, tables or work places predominates. The standardization of equipment and conditions is of no less importance than in the case of work in the performance of which machines are employed. Figure 14, taken in the Lebanon, Pennsylvania, plant of Herrmann, Aukam & Company, manufacturers of handkerchiefs, is almost self explanatory. The individual work place for folding handkerchiefs is just the right size, height and slope of the top, permitting the operator to work equally well either sitting or standing and thus to vary the monotony, and there are two standard trucks, one on the left of the operator containing the handkerchiefs flat, in units of convenient size on the board as they come from the ironing machine, and one on the right to receive the handkerchiefs after being folded. I would call your attention to the special open-side container in the truck for finished work, drawn out and resting on a shelf attached to the "work place" at just the right height to receive the folded handkerchiefs and with the hinged end let down so as not to be in the way of the operator's arm. The weight of the units both before and after folding is designed to be such as to be easily handled by the operator and to afford a change from the monotony and fatigue of folding at sufficiently frequent intervals; having folded the handkerchiefs contained on a board and having filled a container, the operator places the container in one of the truck's compartments, puts an empty one in its place on the shelf and takes another unit of flat handkerchiefs from the truck on the left, placing it in position for folding. Regular rest periods are, however, also provided. The trucks are moved to and from the work place by "move men" in accordance with orders from the Planning Department.

Contrast this condition, the result of exhaustive study and experiment, with what existed before when the equipment consisted of tables, about four

"The writer desires to give credit for work done previous to his connection with this undertaking to Major Frank B. Gilbreth, particularly in the development of individual "workplaces," means for handling ironed handkerchiefs in convenient units, and a standard method of folding! Credit should also be given Major M. C. Herrmann, Mr. Charles Hoffman and Capt. D. J. Walsh for the further development of these methods and means.

feet wide, thirty feet long, the tops about twenty-four inches from the floor, running lengthwise across the factory with an aisle at either end. The operators sat on both sides of these tables, and a person to get through had to pass between the backs of the chairs of the operators. Work was delivered from ironing machines in an ordinary box truck, from which it was taken and stored on any unoccupied table space, in boxes under the tables, on chairs, or in any available floor space. It was "given out" to the operators by the forewoman in batches of from ten dozen to thirty-five dozen at a time—one-fourth to three-fourths of an hour's work; the operator leaving her work place, carrying her finished work to the forewoman's table and getting another job—an awkward arrangement owing to the congestion and to the small jobs given out, partly to equalize injustice or inaccuracy in piece rates by distributing "good work" and "bad work" to all, and partly because about twenty-five dozen was all a girl could conveniently carry and take care of at her work place. There were usually several girls changing jobs at the same time and consequently there was considerable loss of time and confusion. Naturally under such conditions and with a great variety of product there could be little control of the various lots or orders in progress, materials were damaged owing to poor methods of handling and storing while in progress, production was low and the operators dissatisfied.

As a result of the standardized conditions, of adequate planning and control, and of the establishment of task and bonus the average production on this operation was increased two hundred per cent, and the average earnings of the operators increased one hundred and thirty-six per cent. The operator in Figure 15 earned her bonus, completing each job in the time allowed on all but three jobs during eight months. Throughout the department the production reached an average between ninety and ninety-five per cent of that established as the standard of accomplishment. A typical weekly report showed that out of twenty-nine operators thirteen accomplished all of their jobs in the time allowed, six earned bonus on between ninety and ninety-six per cent of their work, four between eighty-three and eighty-six per cent, four between seventy-two and seventy-eight per cent, one sixty-two per cent and one forty-three.