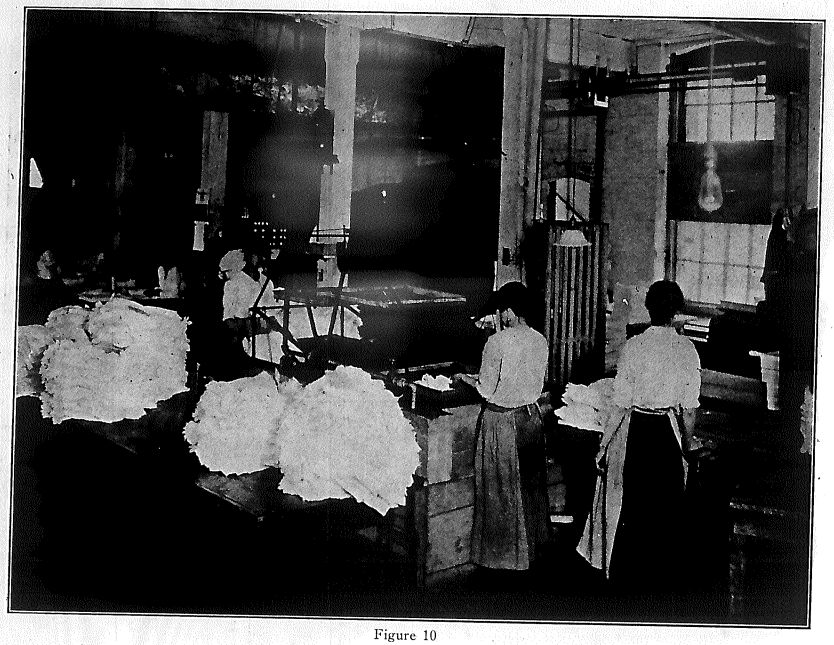

Figure 10

Special Machine for Dampening Handkerchiefs.

the carpenter's plane. This indicated that the tool was "cutting the metal off" with a knife-like action and not "pushing" or wedging it off.

Without going too far into the theory of cutting metals, it was demonstrated by the work of Taylor and his associates that (except for the fine finish cuts) the wedging action is correct in cutting steel or cast iron, the "chip" striking and sliding and breaking up on the top surface of the tool at a point some distance back of the cutting edge. At first the chips are broken off in short pieces, but little by little the chip sliding on the surface of the tool as it comes off wears it to a curve which becomes deeper and wider until it accomplishes what was effected at the start by grinding, as I was taught to do it, and finally the chip comes off in a long continuous helix. When the curve worn by the chip reaches the cutting edge we have a thin wedge section, becoming thinner and thinner until it finally crumbles or is burned away by the heat generated in cutting.

From this I think it will be apparent to you that in grinding a tool in the way the old first-class mechanics taught me to do it, I was simply artificially wearing it out and shortening its cutting life. The result was more frequent changing of tools, at uncertain intervals; more frequent grinding; more frequent dressing and waste of expensive tool steel. Standard cutting tools which under a given set of conditions may be relied upon to cut for a definite length of time are absolutely essential if a definite time is to be set for a job in which the cutting time is computed by Barth's slide rules, and the time for changing tools as well as all other items of hand

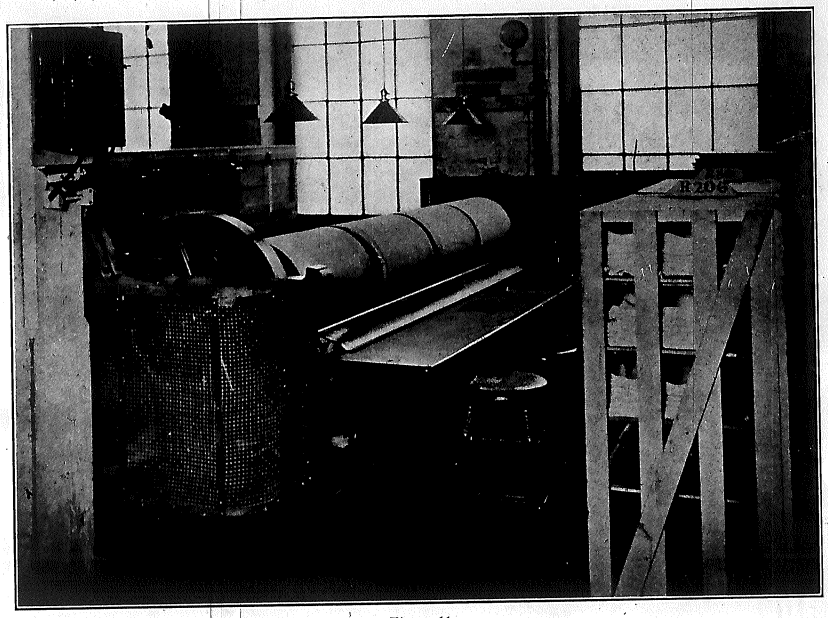

Figure 11

Standardized Ironing Machine, showing "Damp Closets" containing work to be done, which prevent its drying out; also trucks to receive ironed handkerchiefs. Note pressure gauge on steam pipe leading to machine.

work is definitely allowed on a basis of elementary time study.

Figures 7 and 8 show four lathe tools all supposedly the same—or at least used for the same purpose—which were gathered up in a shop in which each man ground his own tools. At the bottom of each photograph is shown a standard tool. It does not take a machinist to understand or appreciate this illustration.

In a plant winding small magnet coils, somewhat similar to those which you have all seen in electric bells, our time studies showed that the operator had to use during the operation, a pair of scissors, a small knife, and a soldering iron. These tools proved to be an important source of lost time and variation in output. The scissors and the knife had always been provided by the operator and there was the greatest possible variation in type, size, quality and condition. No regular provision had been made for keeping them sharp. Our studies enabled us to establish a standard of type, size and quality; from there on the company supplied them and systematically kept them in first-class condition.

While the soldering irons had been supplied by the company, no standard had been established; some of them were about six inches long over all and weighed about half a pound; and from this they ranged in size and weight up to about twelve inches long and two pounds in weight. Imagine a girl using the latter to solder together the ends of a wire 1/64 of an inch in diameter! Furthermore, it was found that the points of the soldering irons were in many cases badly in need of dress-