The line cycle is 1.25 sec. The output reaches 17,000 segments in 7 hrs which is almost double the production on hand-operated heated coils. One operator runs the line. The shift electrician takes care of the electromechanical part.

The introduction of this automatic heat-treating line for cutting segments for harvesters released some of the workers performing heat treating operations, improved working conditions, and reduced the cost of the electric energy of heat treating The saving resulting from a single line was 7,943 rubles annually.

INCREASING THE PRODUCTIVITY OF VERTICAL FURNACES PN-32

Eng. V.A. Maslennikov

PN-32 furnaces are used for low tempering. To increase their output we suggested the employment of an enlarged muffle stead of the typical charging basket, Fig. 1. The muffle remains in the furnace at all times. Heavy parts are loaded into the furnace in a large charging basket, and small ones in small baskets using an electric winch, Fig. 2.

The use of such a muffle enabled us to double the charge of parts in the furnace. The power input was reduced from 36 to 18 kw to prevent overheating of parts adjacent to the charging basket wall.

The remodeling of furnace PN-32 can be performed in the heat treating shop of any machine building plant. There is no problem with fabricating an enlarged muffle and suitable charging baskets. Fig. 3 shows the location of the new muffle and of a typical charging basket in the furnace.

Prior to introducing the new charging method, the operation of a PN-32 furnace was checked at 150, 180 and 200°C with a full load of parts in the muffle. Controlling thermocouples were placed at various points of the muffle. Checks showed that when the size of the muffle is changed, the shell of the blower set in the cover must also be altered. This was unavoidable to provide normal air circulation and uniform heating of the parts.

Temperature records showed that the time of through-heating using the enlarged muffle did not change despite the doubled charge weight. This is explained by the lesser space between the muffle and the walls after reconstruction; for this reason the air passing between the heaters is heated better and the improved heat transfer secures a heating of a larger number of parts per unit time.

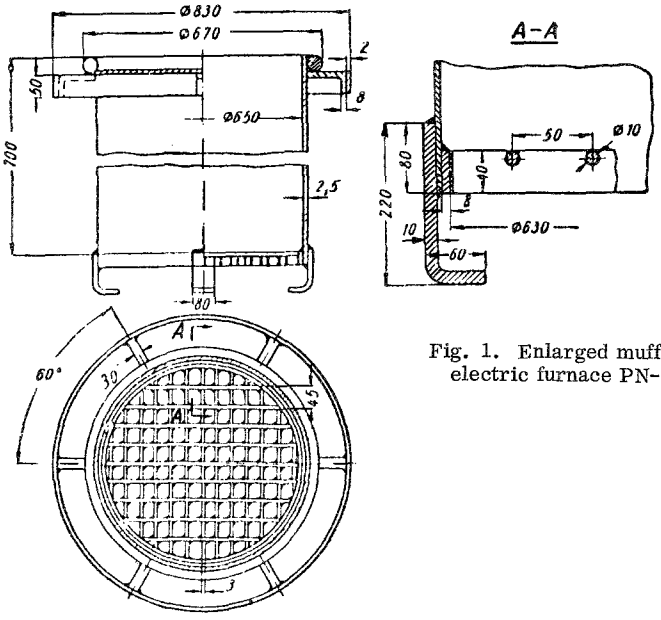

Fig. 1. Enlarged muffle for electric furnace PN-32.

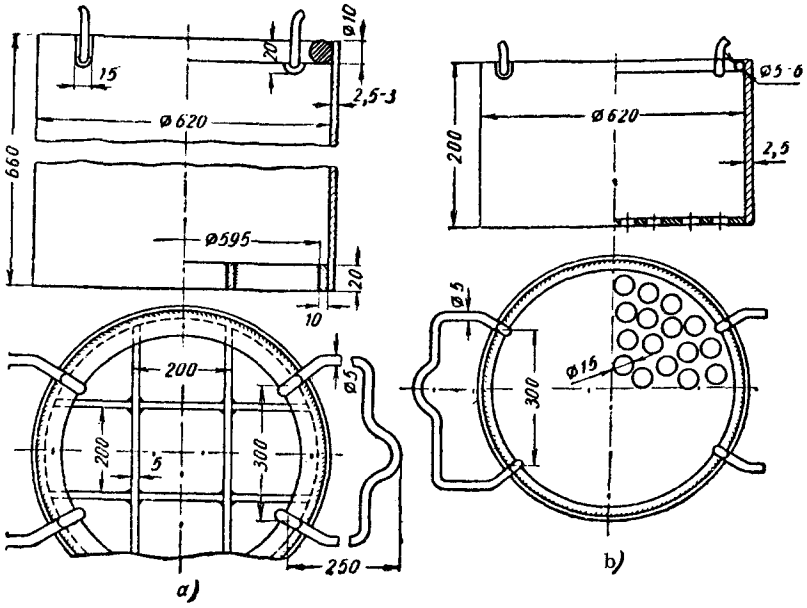

Fig. 2. Charging baskets for the enlarged muffle: a - large, b - small.

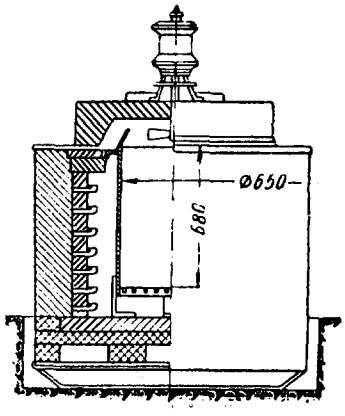

Fig. 3. Location of enlarged muffle and a typical charging basket in the furnace.

The availability of several charging baskets enables the muffle to be loaded immediately after discharging the previous batch after low tempering. This again increases the useful output. The actual soaking time increases for the same overall process duration which improves the quality of the parts thus tempered.

The service performance of several furnaces modified in this manner gave satisfactory results. This experience with PN — 32 furnaces indicates that the working area of similar but smaller vertical furnaces PN — 31 can be enlarged in the same fashion.

OXIDATION-FREE HEATING OF METAL FOR FORGING AND PRESSING

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One of the most important conditions for obtaining accurate forgings is heating of the billets without scaling and decarburization. Along with a substantial metal saving resulting from reduced scaling and machining allowance, oxidation-free heating relieves many machine tools, shortens the production cycle and reduces costs. Oxidation-free heating makes it attractive to exchange the obsolescent hammer for excentric forging presses, and also is advantageous for automation purposes.

The most important factor which determines the tendency to scaling in a furnace atmosphere is the value of the equilibrium constants of the gas components CO/CO_2 and H_2/H_2O [1].

Combustion resulting in an excess of reducing CO is possible only at high temperatures; however, with an excess of CO, the ordinary forging furnace temperature of about 1350-1400°C cannot be attained. On the other hand, feeding