HEAT TREATING EQUIPMENT EXHIBITED AT THE ALL-UNION EXHIBITION OF ACHIEVEMENTS OF THE NATIONAL ECONOMY

G. U. DASHEVSKAYA

Installation with Radiant Heating for Annealing and Normalizing of Small Parts.

The aggregate is suitable for annealing and normalizing of small parts. To prevent oxidation, a controlled atmosphere is provided. A reduced consumption of protective gas is achieved by mounting the casting together with the conveyor below the bottom of the furnace.

The aggregate consists of a furnace, cooling box and conveyor. The furnace represents a chamber covered with plates on the outside, lined inside with fire brick and insulated with diatol brickwork.

The metal is heated with 10 radiant tubes of V-shaped section in which the gas is burned. Eight tubes are mounted above the furnace floor and two below it.

The heated parts are allowed to cool to 60-70°C in the cooling zone, which is tightly attached to the furnace and consists of a box with double walls between which water is circulated. The conveyor is made up of a 0.65 m wide Nichrome wire grid, a drive and a tensioning device. The speed of the conveyor can be varied between 0.04 and 0.16 m/min.

The temperatures are controlled automatically. Compared with an ordinary electric furnace of equal capacity, the saving on electrical energy is 150 kw/hr. The aggregate was designed by the State Design Institute for Tractors and Agricultural Machinery.

Technical Characteristic of the Aggregate: output (kg/hr) - 250; max temperature of parts, °C - 900; fuel-natural gas, gas consumption (cu.m/hr) - 30.

Automatic Machine for Surface-Hardening of Gear Teeth, Type AZSh2. This unit is suitable for oxy-acetylene flame hardening followed by water quenching of straight-tooth spur gears. Hardening follows the tooth-by-tooth method. Each tooth is hardened separately in the vertical position.

The automatic contains a burner with six exchangeable end pieces. It can be used for hardening the teeth on gears or pinions of any diameter. A special support is used for gears larger than 1500 mm dia.

Technical Characteristics of the Machine: gear module - 10 to 30; gear dia (mm) - 200 to 1500; No. of teeth - 20 minimum; burner travel (mm) - 400 max.; feed speed (mm/min) - 70 to 200 drive - pneumatic; air pressure (at) - 0.3 to 3.5; bulk dimensions (mm) - 2000 (length) × 720 (width) × 1050 (height); weight (kg) - 260.

The automatic is manufactured by the Odessa Gas Welding Machine Works.


Truck crankshaft forgings made at the Likhachev Automobile Works are normalized at 900°C prior to machining. Normalizing of forgings was formerly performed in pusher-type furnaces. Charging and discharging were not mechanized. After normalizing the forgings were cooled to shop temperature and transferred to the pickling section by hand.

Since 1958 these forgings are normalized in a conveyor furnace utilizing the forging heat. The furnace is located outside the forging department. The forged crankshafts are hung vertically on the conveyor and at 600-620°C they enter the furnace, in which they are heated to 900°C, and held at this temperature in accordance with the technological requirements. Cooling takes place also on a conveyor outside the shop. The cold forgings are transferred on a conveyor to a shotpeening chamber.

The furnace is fully automated and heated with city gas. It gives a saving of about 300,000 rub. per annum.

In-Line, Muffleless Carbonitriding Installation. The same plant developed and introduced into industrial practice a mechanized aggregate for gas carbonitriding, quenching and tempering of parts. Isothermal quenching is performed in oil baths heated to 190-200°C. After quenching, the parts are washed and tempered at 180-200°C.

Carbonitriding is effected using a mixture of endogas with city gas and ammonia. The operating temperature in the carbonitriding zone is 840-850°C. The aggregate is heated with city gas which passes along vertical radiant tubes. The tempering furnace is heated by waste gases. The aggregate is fully mechanized and the treatment process is automated. The output is 350 kg/hr. The annual savings will amount to 5,806,000 rub. by 1965.
Induction Furnace for Heat Treatment of Turbine Drills. Turbine drills manufactured by the Kungursk Machine Building Works are known in the oil industry both in the USSR and abroad. However, until recently the machine builders had no possibility to heat treat on the spot turbodrill parts of considerable length. All this used to be done in one of the Urals plants in vertical furnaces. The various elements had to be transported over long distances, thus increasing the repair cost. In addition, the turbine drills parts were invariably scaled after remaining for a long time in the high temperature zones of vertical furnaces.

The complex problems of heat treating of cut-to-length parts were satisfactorily solved at the maker-plant. For the first time, a suitable induction furnace using high-frequency currents was built in a separate building. The project engineer was A. G. Goglov. The furnace proper represents a stand with electric induction coils. Above it is mounted equipment for lowering and raising of turbine drill shafts, etc. into wells having an ambient air temperature. It was found that the parts which passed through the induction coil zone were heated throughout their section. The time needed for hardening them was 30 to 40 times less than in a vertical furnace, and, what is especially important, the parts were completely free from scale.

Goglov’s invention is very important for plants using heat treatment. It enables parts of any length to be hardened.

This induction furnace gave 1,000,000 rub. in annual savings and improved the quality of turbine drills.

Alumogel Dryer AO-1. This is an apparatus which enables compressed air to be dried by the adsorption method. The dryer delivers dry air for quick drying parts after washing, painting, etc. It is based on the principle of adsorption of air moisture by alumino-gel (“alumogel”).

Through distribution valve 1 the compressed air passes to pipeline 2, is led into the upper hollow of receiver 3 filled with alumogel which removes the moisture. It then proceeds to the lower hollow of the receiver through stop valve 11, whereupon through pipe 7 it is fed to valve 1 and then to the dry air outlet. The total drying cycle for compressed air is 8 hrs.

When the absorbent is saturated with moisture, the dryer is switched to the absorbent drying cycle. Regeneration requires 4 to 5 hrs.

By switching over valve 1, the compressed air proceeds along 7 to the lower chamber of the receiver, closes stop valve 11, enters the spiral corridor of electric furnace 6, where it is heated to 260°C, and proceeds through gap 12 into the receiver chamber filled with alumogel, and dries the latter. Through pipe 2 the air reaches valve 1, from which it is led through pipe 8 into muffler 9 and then ejected into the atmosphere.