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Research of working bodies and development of an improved design of the ZNK-2M-0 machine for pulling shoes

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ABSTRACT: This article presents a study of the working bodies and the development of an improved design of the ZNK-2M-0 machine for pulling shoes.

KEY WORDS: hot cure, shoe upper, knee lever, tick block, heel support, insole

I. INTRODUCTION

The ZNK-2M-0 machine is designed for tightening and glue tightening of the nose-beam part of the shoe upper blank with the simultaneous application of K-16-20 thermoplastic glue on the insole. The machine is single-section. The right and left half pairs are processed without restructuring the section. The machine tightens shoes with adhesive, injection and nailing methods of fastening, as well as the method of hot vulcanization of the bottom of all kinds, styles and sizes with the change of working bodies.

II. SIGNIFICANCE OF THE SYSTEM

The machine can process top blanks from drum and topcoat leathers (black and color), from textile and artificial materials. Top blanks can be unlined or duplicated.

Blanks of the upper shoe tighten on wooden, plastic or metal pads.

III. LITERATURE SURVEY

The workpieces of the top before tightening are processed in a thermostat-humidifier, which is installed next to the machine, or in a centralized humidification chamber. In the thermostat-humidifier, the preparations for the upper of the shoes are moistened and the toe caps are softened.

The technological operation on the machine is performed as follows. The block with the top blank is installed on the insole 8 (Fig. 1) next to the bottom, its forefoot is inserted into the open lips of the toe mites 7. The complete cycle of the machine takes three cycles.

When you press the left pedal for the first time, the toe ticks are closed. After checking the position of the top blank on the skeleton, its tightening edge is put into the opened jaws of four lateral 3 and two starting 1 ticks, the second time is pressed on the pedal. All six ticks are closed, clamping the workpiece of the top, and after some time the insole stop 8 moves up, pulling it. If the extraction of the top blank is insufficient, then the pliers are additionally lowered by the handles. The skew of the top blank on the block is also eliminated by handles. To eliminate significant

distortions, they press on the knee lever, the insole stops lower. After elimination of distortions, the knee lever is released. The foot rest rises, pulling the top blank.

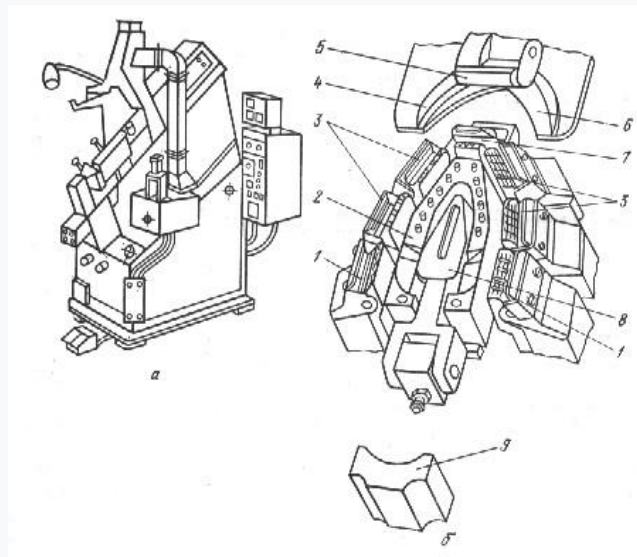


Fig. 1 working boundaries of a protracted machine ZNK-2M-O

When you press the pedal a third time, the toe clip 5 and the heel stop 9 are suitable for the block with the top blank, and the glue-lubricating clip 2 moves to the insole. Through the nozzles of the clip, glue is applied to the surface of the insole. Then, the toe clip 4 and the tightening plates 6 are suitable for the block with the top blank. The toe clip presses the top blank to the block.

When the puffer plates move under the insole, the nose, side and bundle pincers are successively opened and the glue clip is lowered. Before opening, the bundle pincers rotate around the vertical axis, which improves the location of the protracted edge of the top blank on the beam part of the insole.

At the end of the stroke of the drawer plates, the insole rest is lowered, and the toe clip presses the drawbar against the plates. At the same time, when the puffer plates move, a command is sent to the time relay. After a certain exposure time, all the working bodies of the machine return to their original position.

Using the right pedal, you can return the working bodies to their original position at any time in the cycle.

IV. METHODOLOGY

The machine consists of a head, a base of the head, a block of pincers, a base of the machine, a heel stop, a tank for heating glue, an insole stop, an adhesive-grease clip, a nose clip, a hydraulic actuator and electrical equipment. The machine is equipped with a device for exhausting gases from the working area, which is connected to the workshop ventilation, and with additional pliers for pulling the fore part of the top blank.

The head (Fig. 2) consists of a cap and a toe clamp mechanism, designed to press the toe of the shoe against the insole before tightening the workpiece top. The mechanism is a parallelogram consisting of a pivotally mounted hydraulic cylinder 38, at the end of the axis of which the rollers 37 are set. The rollers are placed in the guides 36 mounted on the cover. The lower part of the parallelogram is a compound lever, one end 39 of which is mounted on the axis, and the other 33 ends with a guide. An adjustment screw 30 with a nose stop 29 is inserted into the latter. The axles of the rollers and the lower lever are connected by two straps 35 and a spring 34.

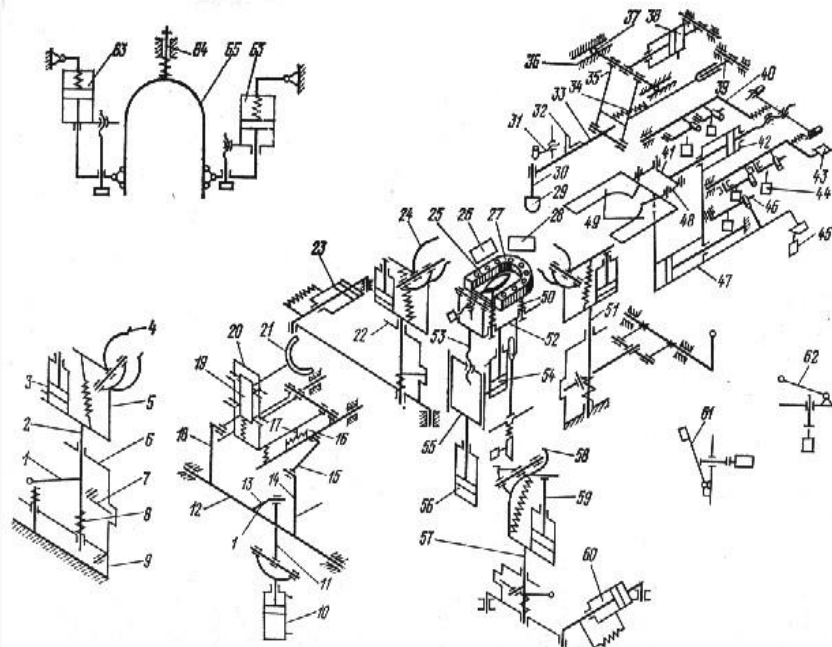


Fig. 2 Kinematic diagram of the machine ZNK-2M-O

When oil is supplied to the rodless cavity of the hydraulic cylinder 38, the rod with rollers moves along the guides. Due to the action of the spring, the lower arm and stop move horizontally. When the emphasis 32 mounted on the lower arm reaches the stop screw 31, the horizontal movement of the lower arm will stop. But as the rod of the hydraulic cylinder 38 continues to move, the straps 35 begin to turn around and turn the lower arm around an axis.

The toe clip will move down and press the pad against the glass stop. The pre-pressing force is regulated by the position of the forefoot 29 in height and the adjustment of the pressure reducing valve. The horizontal movement of the night-stop is regulated by a limit screw.

The head cover is pivotally connected to the base and can be tilted to a certain angle, which provides access to the mechanism during installation and configuration. In the tilted position, the lid is held by a bar. An optical head is installed on the lid to control the position of the workpiece upper on the shoe.

The base of the head consists of a cast-iron housing, the mechanism of the long plates, the hydraulic cylinder 47 for supplying and retracting the long plates.

Tightening plates are designed for bending the tight edge of the workpiece upper on the insole and its molding on the insole. The mechanism of the tightening plates includes two movable plates between which the bodies 49 of the tightening plates move. A hydraulic cylinder 42 is attached to the movable plates, on one rod of which there is a rocker 41. The latter, with slats 48, is connected to movable bodies 49, in which drawback plates are mounted. Cases 49 have two rollers, moving along the curved grooves of the upper plate and setting the necessary trajectory of movement of the protracted plates. The second end of the rod serves to limit the progress of the lamellar plates and install the lever 40, which through levers 46 and stops controls the operation of the hydraulic distributors 44 and the limit switch 43. Hydrodistributors are installed on both sides of the casing and serve to open the side and beam clamps, lower the insole, supply oil under high pressure to the hydraulic cylinder 38.

Limit switch 43 is designed to turn on the pressure switch. The hydraulic cylinder 47 is attached to the movable plates, and the end of the hydraulic cylinder rod to the body. The hydraulic cylinder serves to bring to the working area and withdraw from it the mechanism of the lingering plates. Stops are fixed on the plate for switching the directional control valves 44, lowering the gluing sleeve 27, turning off the limit switch 45 and opening the nose pliers.

The tick block, together with the insole stop, serves to tighten the workpiece upper on the shoe. It consists of night mites 51, four side mites 26 and 28, two bundle mites 59 and 22, two hydraulic cylinders 60 and 23 for turning



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the bundle mites. The pliers are installed on the plate and have adjustments along the length of the block, as well as the possibility of additional manual extraction of the workpiece upper shoe.

V. EXPERIMENTAL RESULTS

By design and principle of operation, all ticks are the same. The difference lies in the shape of the sponges: flat 26 and 28 for lateral ticks and radius 4 for toe and tufts, depending on the model of shoe being processed. Beam clamps can be rotated around a vertical axis 57 for better placement on the block of a protracted edge in the beam part of the workpiece top.

The pliers consist of sponges, a body 5, a rod 3, a rack 2, an arm 6, a sector 7, a guide 9, a handle 1 and a spring 8.

The base of the machine consists of a welded bed on which all the nodes of the machine are mounted. Inside the bed there is a hydraulic actuator, control and regulation equipment, an oil tank, control valves, a hydraulic cylinder 10 for moving the heel stop, a hydraulic cylinder 56 for a steel stop, a coil for oil cooling. Outside, a knee lever 61 for lowering the insole and handle 62 for pumping glue into the tank is installed.

The heel emphasis serves to hold the pads with a - upper part of the shoe top at the moment of movement of the extension plates forward. The heel stop consists of a cast-iron case fixed to the bed, a shaft 12, a lever 13, side levers and 14, two rings 15, guides, a housing 20, a spring-loaded slide 19, a heel stop 21, two racks 16 and two clamps 17.

The heel emphasis receives movement from the hydraulic cylinder 10 located inside the bed. The hydraulic cylinder rod is connected by an AND earring to a lever 13 mounted on the shaft 12. The lever 13 is connected to the shaft by cam couplings, which allow changing the initial position of the carriage with the heel stop depending on the size of the shoe being processed.

When the heel stop moves, it abuts against the block, the body 20 rotates around its axis and presses the fixator 17 against the racks 16. This prevents the reverse movement of the block at the time of tightening the workpiece top plates. The heel stop along with the slider 19 is lowered when tightening the workpiece top plates. The heel emphasis has a tray for dumping the processed footwear.

The tank is designed to heat the glue to the desired temperature. It consists of a reservoir, a hydraulic cylinder, a sleeve, a plunger, a non-return hydraulic valve and a fitting. The hydraulic cylinder is a pump drive. The pump provides the supply of hot glue to the hose; into the gluing sleeve 27. The tank is heated by an electric heater. The hose for supplying glue from the tank to the gluing sleeve consists of pivotally connected tubes on which a heater is installed, covered by thermal insulation. The hose is attached to the tank fitting with a union nut.

The insole is designed to extract the workpiece clamped by the tongs of the upper of the shoe. It consists of a movable plate 55, in the upper part of which is mounted on an adjustable screw 53 a support platform 25 for the pads. At the bottom of it is installed a hydraulic cylinder 54 for lifting the oil-lubricating clip. A bar 52 is fixed on the hydraulic cylinder rod, onto which a plate is mounted with the help of studs and springs 50. A tubular heater for the cage is embedded in the stove. One bolt is attached to the plate (gluing sleeve 27).

The caliper receives movement from the hydraulic cylinder 56 located inside the bed. To maintain the specified temperature of the glue, thermocouples are installed on the glue stick plate, glue supply hose and on the tank. When the specified glue temperature is reached in any place of the tank, they issue a command to turn off the heaters. Replaceable working bodies of the machine are gluing sleeve 27, toe sleeve 65 and protracted plates 49.

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