

Improvement Of The Design Of The Saw-Cutting Machine

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Annotation. This article presents the schemes and the technological process of the pylon-cutting machine for cutting saws for gins and linters designed to simplify the design of the pylon-cutting machine and improve the accuracy of cutting saws.

Key words: Saw-cutting machine

A saw-cutting machine of the SPH brand is known [1]. The machine consists of a bed, a drive shaft with an eccentric that transmits motion from the electric motor through the connecting rod to a swinging caliper mounted on the shaft; the head of the oscillating caliper with a punch holder and a punch, a die with knives fixed on the surface of a horizontal table and a ratchet feed mechanism consisting of a rod sliding in a guide sleeve connected to an eccentric, which is mounted on the drive shaft.

The disadvantage of this saw-cutting machine is the complexity of the design, due to the intermediate transmission mechanisms used, which ultimately affect the accuracy of the die-cutting teeth on the discs, which also manifests itself as a result of adjusting the length of the rod of the ratchet feed mechanism.

The design of the saw-cutting machine has also been developed, where in Figure 1. A side view of a saw-cutting machine is shown, in Figure 2, the same, a top view [2, 3, 4].

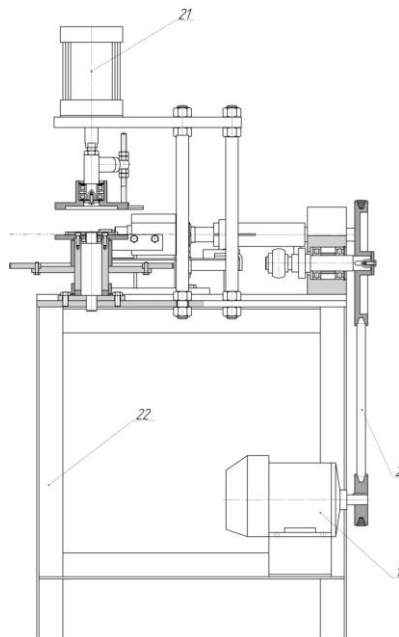


Figure 1. Diagram of the saw-cutting machine, side view

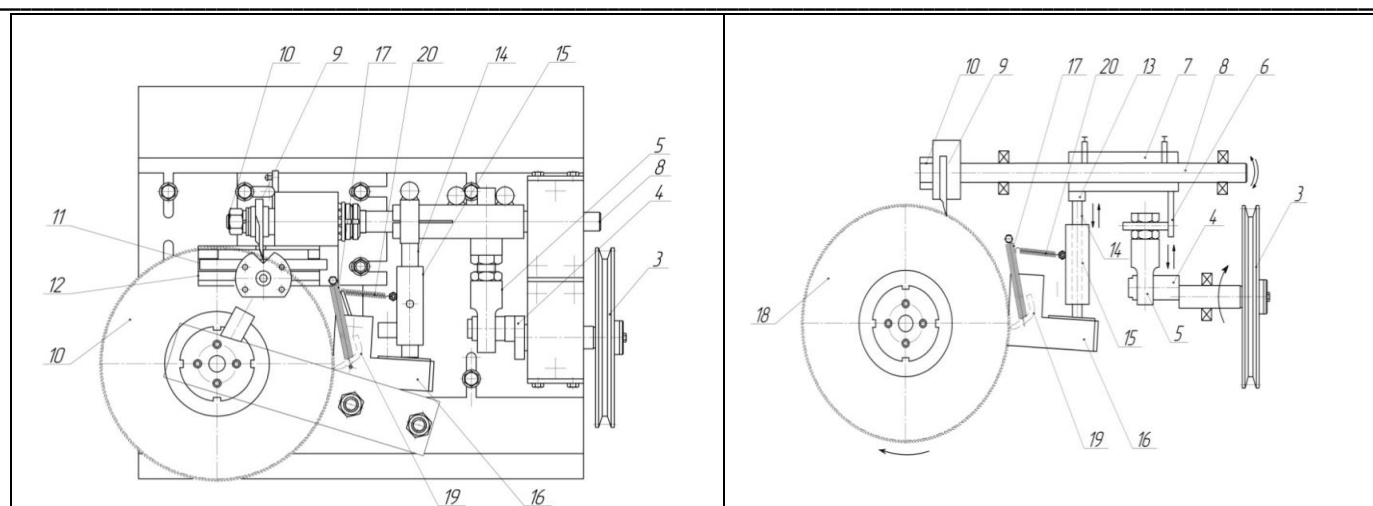


Figure 2. Diagram of a saw-cutting machine, top view

The saw-splitting machine mainly contains an electric drive 1 (Figs. 1 and 2), a belt drive 2, a pulley 3, an eccentric shaft 4, a rod 5 G shaped lever 6 fixed on the pipe 7, a reciprocating rotary shaft 8 (the shaft to the pipe can be bolted) passing inside the pipe 7, at the end of which a punch 9 is fixed, fixed with a nut 10, a die 11 fixed on the die holder 12, cam 13, rod 14, sliding in the guide sleeve 15, pushrod 16 having clamp springs 17, ratchet dividing mechanism 18, pawl 19 with spring 20, pneumatic clamp for discs 21 and frame 22.

The technological process of notching saws is as follows.

The rotational motion of the electric drive 1 is transmitted by belts 2 and pulley 3 to the eccentric shaft 4 (Fig. 2).

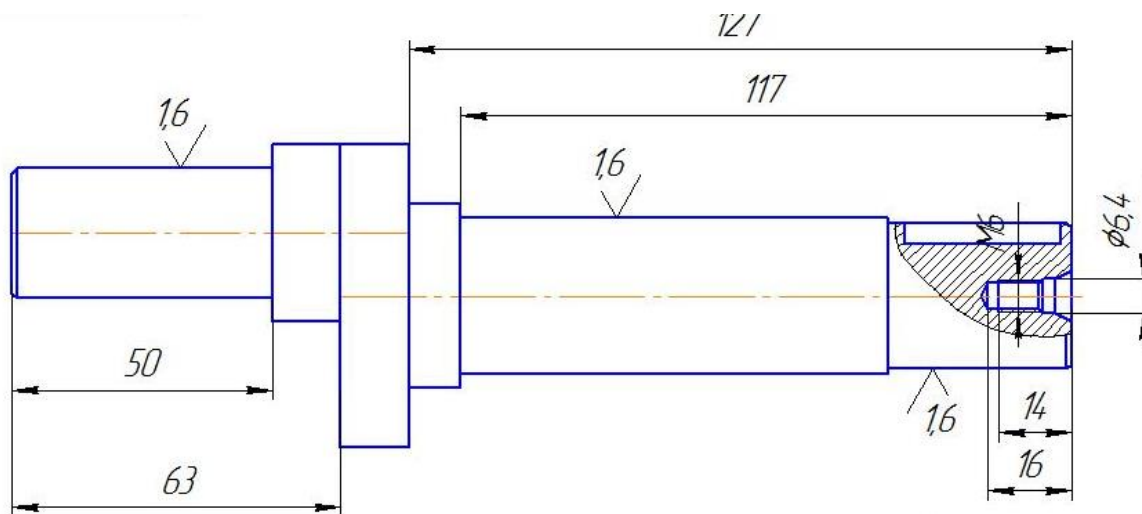


Figure 3. Diagram of an eccentric shaft

The rotational motion of the eccentric shaft 4 is converted into the reciprocating motion of the rod 5 fixed on the eccentric shaft on rolling bearings, then the reciprocating motion of the rod 5 with the help of an L-shaped lever 6 fixed on the pipe 7 is converted into the reciprocating motion of the shaft 8. The semi-disc type punch 9 fixed on the shaft 8 with a nut 10 performs a reciprocating rotational motion, entering the die 11 fixed on the die holder 12. At the moment of lowering the semi-disc type 9 punch down, the teeth are cut in the saw blade. During the reciprocating rotational motion of the pipe 7 (Figs. 4 and 5), the cam 13 periodically strikes the sliding rod 14 in the guide sleeve 15, which transmits the reciprocating movement of the rod to the pushrod 16 and has springs 17 to return the pushrod to its original position.

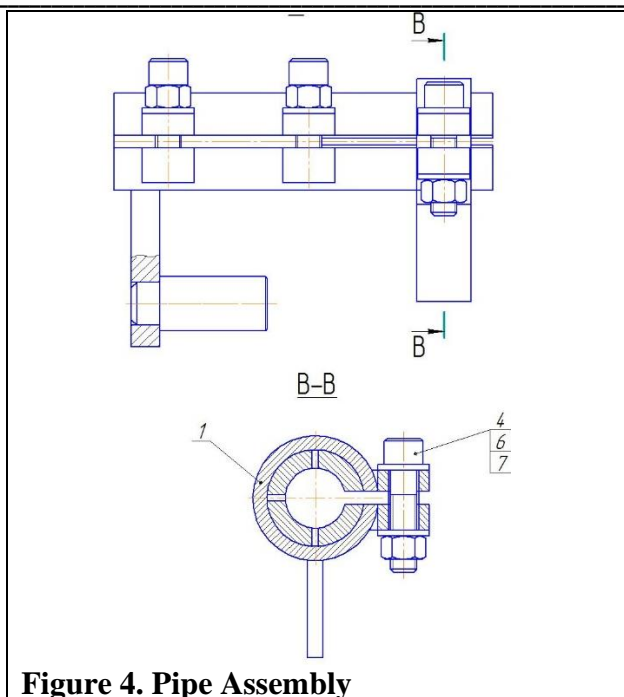


Figure 4. Pipe Assembly

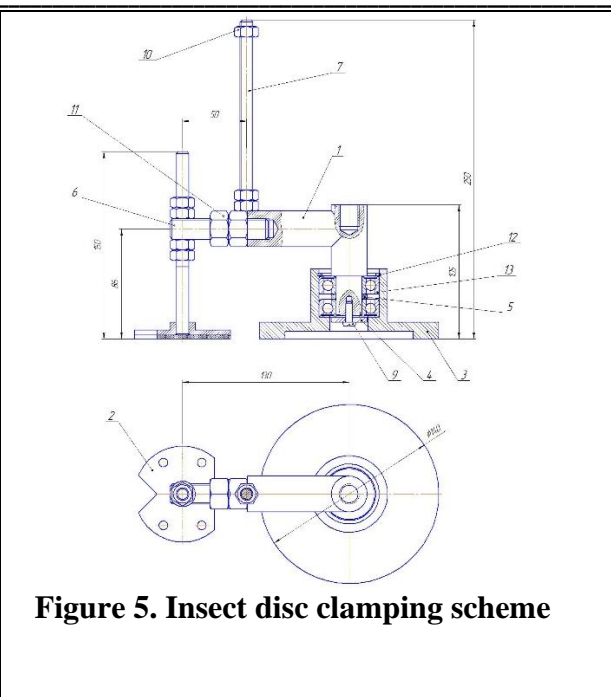


Figure 5. Insect disc clamping scheme

The pusher is mounted on the axis of the ratchet dividing mechanism 18 hinged and a pawl 19 with a pressure spring 20 is fixed on it, which makes the ratchet make a rotational movement. The machine can use the developed circuit shown in Figure 3.5 or a pneumatic clamp for saw blades 21. All these elements of the machine are installed on frame 22.

When using the proposed design of the saw-cutting machine, its design is significantly simplified, intermediate mechanisms for transmitting motion to the actuators are reduced, and it becomes possible to increase the accuracy of cutting saw teeth in comparison with the existing saw-cutting machine.

According to the developed scheme, working structural drawings of units and parts of a new saw-cutting machine for its manufacture were prepared at RIM Ustakhonasi JSC (Fig. 6).



Figure 6. General view of the manufactured new saw-cutting machine in JSC "RIM Ustakhonasi"

The design of the new saw tooth cutting machine has been greatly simplified. Factors that negatively affect the quality of the teeth of the sawmill and cutting saw are reduced. Its installed capacity is 0.7 kW. As a result of comparative experimental work, the productivity of the proposed saw-cutting machine was 130 saws per hour.

According to the results of comparative experiments, the newly developed saw tooth cutting machine has increased productivity by 18.2% compared to the existing SPH equipment. The energy consumption of the saw-cutting machine, as confirmed by the tests, was reduced by 36.3% compared to the existing SPH equipment.

However, the experience of operating this machine showed some of its shortcomings. Firstly, the reciprocating motion of the punch remains the same, which limits the cutting performance of the sawmill. Secondly, setting the punch relative to the saw blade at a certain angle does not provide simultaneous cutting of the entire cutting area on the saw blade, which preserves the appearance of burrs when cutting teeth.

The task of our research is to improve the design of the saw-cutting machine and increase the accuracy of cutting saws.

The tasks are solved by the fact that in the design of the developed saw-cutting machine, the punch with a punch holder will have to have a rotational motion, and the punch when meeting the saw blade must have an angle close to 90°, for simultaneous cutting of the entire area of the tooth on the saw blade. At present, working drawings of an improved saw-cutting machine are being developed and it is to be manufactured and experimental studies are to be carried out to substantiate its main parameters.

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