WAYS TO ELIMINATE DENSITY IN THE CHAMBER OF SAW GIN

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Abstract
The density in the working chamber increases due to the fact that raw cotton unevenly enters the saw gin feeders. To prevent this, our scientists have effectively carried out experiments and tests based on various proposals. The article provides details of a study conducted by scientists of our republic.

Keywords: density, cotton, fiber, automation, seeds, quality, design.

Introduction

The technology of preliminary processing of cotton is developing in the world, in particular, the process of separation (cleaning) of cotton fiber from seeds, the development of techniques and technology, including the creation of scientific foundations for increasing the efficiency of the cotton cleaning process, the development of science-intensive, automated, and resource-saving methods and technologies, science - special attention is paid to issues of improving the quality of cotton products and reducing their cost price through the widespread introduction of the latest technological achievements in the production industry. In this regard, in the process of separating cotton fiber from seeds, the issues of creating compact technologies and simple equipment designs that allow preserving the original quality indicators of fiber and seeds and managing product quality are among the main areas of development of the cotton industry in the world. In his PhD thesis, H. Usmanov proposed a block diagram of the automation of the feed system for saw and roller gins.

Figure 1. Feed system - working chamber with automated system in saw gin.

Electric motor of the roller providing EM TV

Electric motor of the roller providing EM TV

Electric motor of the working chamber EM IK

Automatic control unit ABB

D — sensor measuring the force required by the saw cylinder.

In order to find a solution to some problems in the ginning process, a system for monitoring the density and ensuring the uniformity of the gin was developed, since the precise feeding depends on the density of the raw roll during the ginning process. The new system created for the saw gin feeding system works as follows: the rotation of the feed rollers depends on the load applied to the saw cylinder by increasing or decreasing the density of the raw roll. The sensor is connected to the saw cylinder motor, the signal from it is sent to the feed drum motor, and the feed increases or decreases depending on the load.

The sensor displays the received signals about the density of the raw material roller on the display of the control panel, and the IVA variator controls the received signals. If the density is high, the sensor signals shaking, if the density does not decrease even after two or three shakings, the feed will decrease, if the density does not decrease, the feeding process will be stopped completely.

In the dissertation work of A.A. Umarov, a sensor was connected to the saw cylinder electric motor to correct the saw power supply process. It consists of changing from 0 to 14. Power is supplied to the saw drum by making it difficult to turn the raw material roller when the density

of the raw material becomes higher than normal, and this voltage is reflected on the sensor in amperes. If the display indicates that the specified current is exceeded, the speed of the feed valve will change accordingly in the opposite direction.
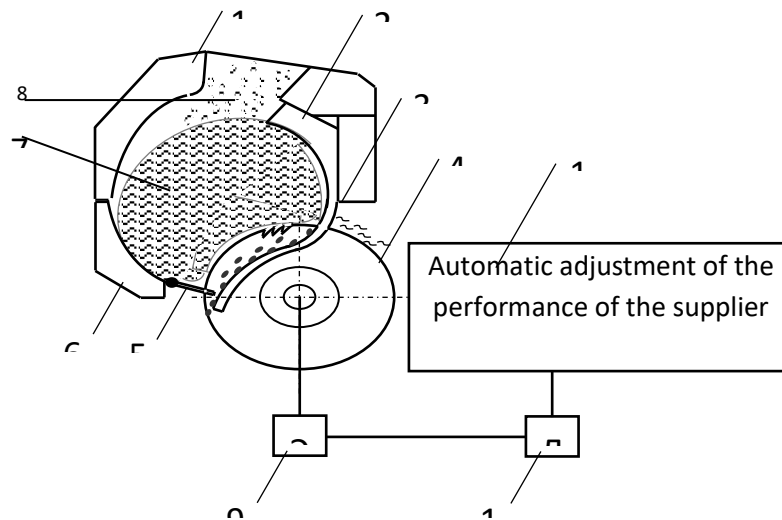
1 – front apron; 2 – upper brush; 3 – grate; 4 – saw cylinder; 5 – seed comb; 6 – lower apron; 7 – raw cotton roller; 8 – raw cotton; 9 – saw cylinder electric motor; 10 – saw cylinder electric motor load current control sensor; 11 – device for automatic adjustment of feeder electric motor operation.

Figure 2. Scheme of operation of the working chamber of the improved saw gin
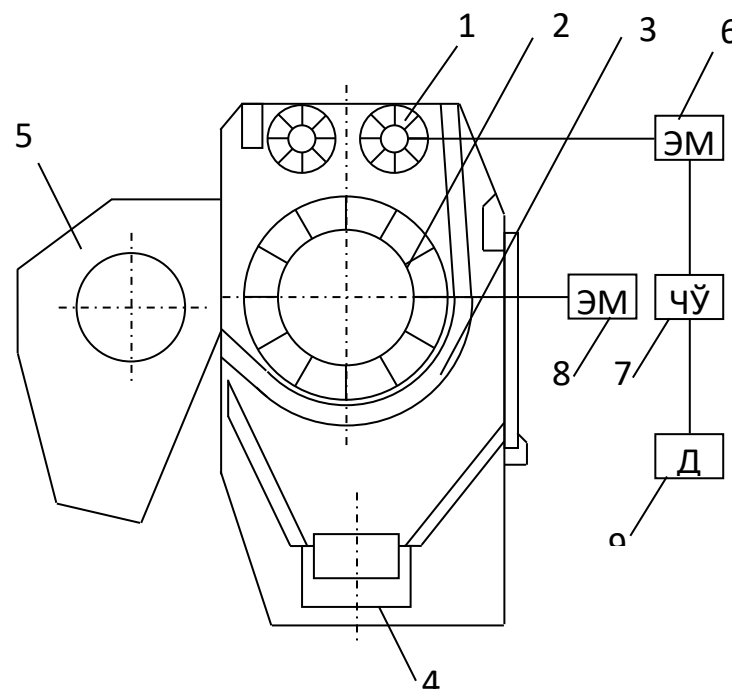
1 – feed rollers; 2 – peg drum; 3 – mesh surface; 4 – impurity conveyor; 5 – raw cotton feed channel into the gin working chamber; 6 – feed roller electric motor; 7 – frequency converter; 8 – peg drum electric motor; 9 – generator electric motor load current sensor.

Figure 3. Operational diagram of the improved saw gin feeder

The saw gin feeder operates as follows. When the density of the raw roll changes to a value greater than the permissible value, the load current sensor of the electric motor sends a signal to the frequency converter. The frequency converter regulates the rotation frequency of the electric motor rotating the feed rollers, and thereby changes the speed of feeding cotton into the gin working chamber so that the set value of the density of the raw roll is restored. The process occurs steplessly and continues in this mode without stopping.

K. Ortikova in her PhD dissertation changed the speed of the saw cylinder electric motor in accordance with the diameter of the saw cylinder using a frequency converter.
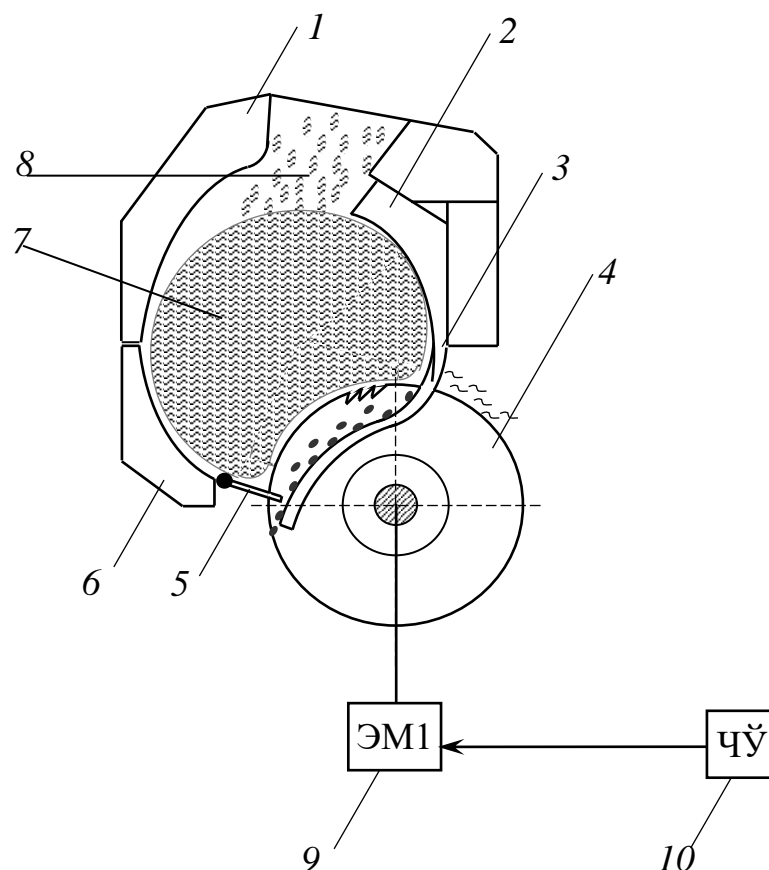
1 – front apron, 2 – front grate, 3 – grate, 4 – saw cylinder, 5 – seed comb, 6 – lower apron, 7 – raw material roller, 8 – cotton, 9 – saw cylinder electric motor, 10 – frequency converter
**Figure 4. Adjusting saw cylinder in a saw gin**

The saw cylinder equipped with a frequency converter allows changing the rotation speed of the saw cylinder, increasing the productivity of the machine and maintaining the quality of the product. The saw cylinder with adjustable rotation speed works as follows.

The incoming raw cotton forms a raw roller, which contacts the saw cylinder. The fiber is removed from the working chamber using the saw cylinder through the grate bars from the raw roller, in which the seed output is regulated by the position of the seed comb.

When replacing the saw cylinder with a smaller diameter, the frequency converter ensures its linear speed of 12.2 m/s, accordingly adjusting the rotation speed of the saw cylinder electric motor.

At the same time, equipping the electric motor with a frequency converter increases the machine's productivity. In Sh. Usmanov's work, he considered the automation of the lifting and lowering device in the working chamber (manual process) in order to prevent jams caused by an increase in the density of the raw material roller in the working chamber, and the mechanism operates in 2 different modes: local and automatic control. In the local control mode, the lifting and lowering process is controlled by a button on the control panel.
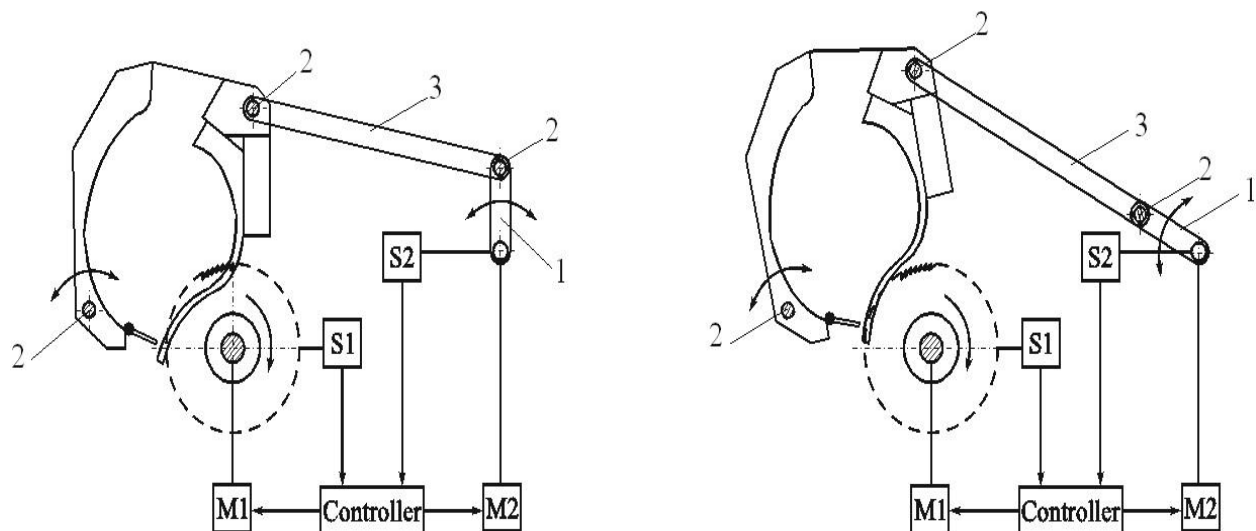
1 – crank; 2 – pin; 3 – connecting rod; M1 – saw cylinder electric motor; M2 – chamber pusher mechanism drive; S1 – saw cylinder electric motor sensor; S2 – chamber drive mechanism actuator sensor

Fig. 5. Working chamber proposed by Sh. Usmanov

Conclusion

The innovations proposed by our above-researched scientists to accelerate the yield of seeds collected in the working chamber of the saw gin and improve the fiber quality indicators by preventing thickening showed that cotton ginning led to an increase in the productivity of enterprises and economic indicators increased significantly.

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