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Improving The Design Of The Multi-Pocket Stone Trapper

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Abstract: This article presents the results of scientific research carried out on the comprehensive study of the working processes of the existing devices that trap heavy impurities in cotton ginning enterprises today and on the elimination of shortcomings.

The Republic of Uzbekistan is the world leader in cotton production and export. Therefore, cotton plays an important role in the country's economy.

The production of high-quality fiber, which meets world standards, sets before the specialists and scientists of the field of cotton processing an important task of improving the existing techniques and technology. On the other hand, the level of improvement of spinning and weaving equipment is increasing, and the quality of cotton fiber needs to be paid attention to.

Heavy objects and metal fragments of various sizes fall into the cotton during the process of weighing cotton, drying it in field conditions, and breaking the scum in cotton gins and transferring it to processing. In this case, objects fall into the working chamber of the machines installed in the cotton processing system, disrupt their work process, damage the working organs, as a result, the productivity of the machines decreases and the working organs quickly fail. At the same time, heavy objects, metal fragments are the main cause of fires in cotton ginning factories. The impact of heavy mixtures on the metal parts of the working bodies rotating at high speed causes a fire.

Therefore, the problem of separating heavy impurities during cotton processing is important.

This article presents the results of scientific research carried out on the comprehensive study of the working processes of the existing devices that trap heavy impurities in cotton ginning enterprises today and on the elimination of shortcomings.

In cotton ginning plants, devices that hold heavy mixtures are mainly installed at the transition from the horizontal part of the pneumatic transport line to the vertical part. In this case, the air velocity that the cotton can lift and move in a vertical direction allows the separation of other compounds that are heavier than it. The biggest disadvantage of the device based on this principle is that the cotton along with heavy impurities falls to the bottom of the chamber.

To overcome this, it is necessary to reduce the dimensions of the pocket at the bottom of the camera. Such a change found a new way to increase the surface of the useful part of the pocket of the stone holder. In this method, it was proposed to install additional pockets at certain distances in the stone holder chamber, not by directly increasing the useful surface area. An experimental device designed to determine the number of pockets was developed with the ability to change the number, size and location of pockets. [1]

Taking into account that the main part of the refrigerator is the separation chamber where the process of trapping heavy objects takes place, it is necessary to determine its structural and geometrical parameters.

The working chamber of the existing linear crushers is often cylindrical or rectangular. Stone crushers with a rectangular working chamber are more common.

The width of the chamber ensures the normal movement of the processed material during the capture of heavy mixtures.

If the width of the chamber is large enough, if the layer of material is smaller than it, good conditions are created for trapping heavy mixtures, and it is easier for these mixtures to fall into the stone collector in the pocket.

When the freezer chamber is small, the thickness of the processed material is large, and it is difficult to separate heavy impurities (especially small objects) from the cotton content. In this case, the unity of heavy objects with cotton will be more perfect.

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Pockets were placed in the separation chamber to increase the efficiency of the process of trapping heavy objects from cotton. These pockets are highly effective in retaining heavy impurities. Now, in the intermediate distances between these pockets, a slanted mesh surface is placed (Fig. 1)

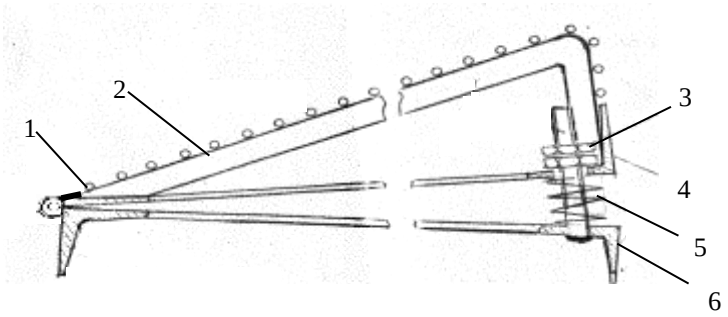

Figure 1

1 - rod, 2 - frame, 3 - bolt, 4 - angle, 5 - spring, 6 - support

The scheme of the elastic grid for removing small impurities installed between the pockets in the multi-pocket dryer works as follows: the heavy impurities in the cotton entering the working chamber of the multi-pocket dryer fall between the pockets. As a result of the small impurities in it hitting the elastic grid between the pockets, it is observed that the small impurities fall into the pocket collecting the small impurities.

In the working chamber of the refrigerator, gravity and centrifugal force are used at the same time. This causes the maximum amount of heavy objects to be pocketed. The upper part of the pockets located in the working chamber of this selected stone catcher is equipped with an elastic grid. (Figure 1)

The stone catcher consists of the following main parts: an inlet pipe 1, a separation chamber 2, an outlet pipe 3, a hopper 4 for collecting heavy objects and pockets 5 for collecting small impurities.

When the stone catcher is working, the cotton enters the separation chamber 2 through the inlet pipe 1 with the help of air flow. Since the size of the separation chamber is large compared to the inlet pipe, the speed of the cotton decreases. Part of the heavy objects falls into the first, the rest into the second and third pockets, and accumulates in the hopper 4. Cotton cleaned from heavy objects is transferred to the next machine through the outlet pipe 3 with the help of air flow. At the same time, as a result of the cotton hitting the elastic bars 5 installed on the upper part of the pockets, the movement of the cotton flow is not uniform, a high-frequency vibration of small amplitude is formed in the bar, the sieving process takes place in the cotton, and it creates an opportunity for the separation of small heavy impurities from the cotton content. The device is made with the ability to adjust the amplitude of the vibration in relation to the current strength. The fact that the mesh surfaces are installed on an elastic base significantly reduces the impact force. As a result, the factors affecting the quality of seed cotton, which have a mechanical effect, are eliminated to a certain extent.

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