

IMPROVEMENT OF THE SEED SORTING TECHNOLOGY

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Abstract

This article describes the method of improving the seed sorting device and carrying out experiments in the seed sorting process. As a result, advantages over the existing ones and efficiency gains from its introduction were determined.

Keywords: Cotton seeds, seed selection, sown seeds, device, waste, technical seeds, processing, fractions, construction, cleaning.

Enter

In order to ensure the operation of the improved pneumatic seed sorting device at the required performance, a method of experimental work was developed to justify its optimal dimensions. Experimental work on the method [1] is divided into the following stages:

1. Basis the size of the tube in the seed inlet of the seed sorting machine.
2. Seed installed in the seed sorting chamber of the device justify the dimensions of the router and the additional camera.
3. Determination of the main dimensions of the improved seed sorting device by the method of mathematical planning.
4. Development of an improved pneumatic seed sorting device testing under release conditions.

The seed cotton seed sorting device was designed by studying the existing scientific and technical problems in the SPS brand seed sorting device [2] used in seed processing technology. SPS feather seed seed sorters are designed to sort seed in a horizontal airflow. This device drops the seed from the hopper collector into the working chamber through a seed transfer device and a slide. Based on air spraying by the fan, the worker separates the seeds that have entered the chamber into fractions. The adjustment of the aerodynamic modes of the seed sorter is performed by the barriers installed in front of the suction and spraying fans. Separation of seeds into seed and technical fractions is done by adjusting the position of barriers. The main disadvantage of the device is the low sorting accuracy and the removal of seeds with the used air. In addition, the design of USM-A pneumomechanical cleaning and sorting unit [3-4], which is considered to be its analogue and successfully used for seed sorting, was studied in detail during the creation of the new device. The principle of operation of the pneumomechanical seed cleaning device is based on the separation of seeds into waste and other fractions by suction with air flow generated by centrifugal fans, based on the difference in their speed.

Depending on the initial state of the cotton seeds, the waste mass separated by this device is 0.1-0.2% of the initial mass of the seeds. The amount of seeds (whole, broken) and fibrous material in waste is 18.5-19.6 and 11.8-55.4%, respectively. The main disadvantage of the pneumomechanical seed cleaner is the low cleaning efficiency of small debris - only 20-25%, and the need for relatively large power (12.85 kW) and the need to regularly adjust the aerodynamic working order of the device. Such shortcomings do not satisfy the requirements of the cotton ginning industry at all. The device is easy to prepare, reliable in operation, but when used together with the USM-A seed cleaning process line, it leads to excessive energy and metal costs.

Today, cotton raw materials are separated into fiber and seed during the ginning process at cotton ginning plants, and then the seed is linted in the linting process. The seed is sent to seed and technical seed processing technology. In this process, sorting, cleaning, linting, medication, packaging are carried out. In the process of sorting seeds and technical seeds, impurities, loose and broken seeds are mixed with air. As a result, there is a violation of the ecological condition in the territory of the enterprise, there are cases of contamination of seeds and technical seeds [5]. Taking this into account, in the newly improved seed sorting device, small impurities from the content of seed and technical seed, as well as broken and broken seeds, are prevented from being added to the dusty air.

The main part

The task of the newly proposed seed sorting device is to separate various small impurities, loose and broken seeds in the seed and prevent the dust from mixing with the air during the seed processing in the cotton primary processing plants during seed and technical seed sorting (Fig. 1). The improved seed sorting device increases the efficiency of catching fines, loose and broken seeds, and prevents fines, loose and broken seeds from mixing with dusty air. The improved sorting device consists of the following main parts: 1 collecting conveyor, 2 seed suction pipe, 3 seed barriers, 4 separation chamber, 5 moving drill, 6 hoppers, 7 air suction pipe, 8 dust air pipe, 9 vacuum valve.

In the new seed seed sorting device, two hoppers are installed to separate the impurities, empty seeds, and technical seeds into fractions by sucking the seed through the air, in addition, a moving seed auger is installed between the two hoppers to separate the seeds into fractions.

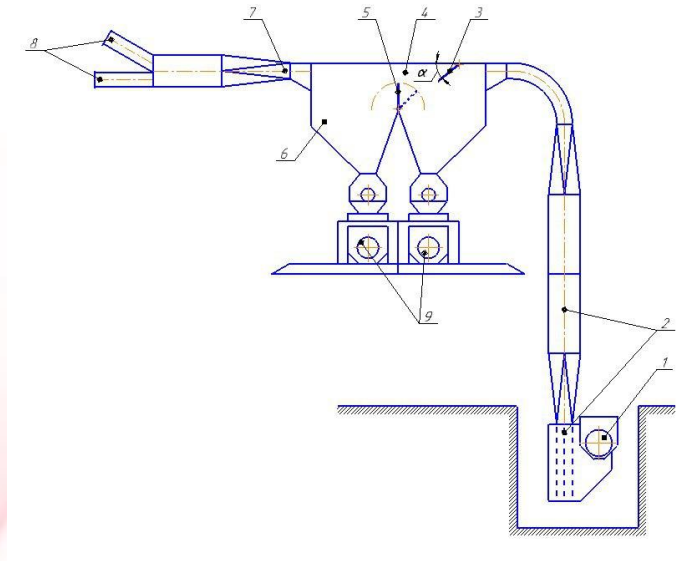


Figure 1. Technological scheme of the improved seed seed sorting device

1. collecting conveyor, 2. seed suction pipe, 3. seed barriers, 4. separation chamber, 5. moving drill, 6. bunkers, 7. air suction pipe, 8. dust air pipe, 9. vacuum valves

The device works as follows: in the technological process of processing seeds of cotton gins, the seeds that have arrived on the collecting conveyor 1 pass through the suction pipe 2, come to the improved seed sorter and hit the seed barrier 3, and fall into the separation chamber for seeds 4. The mass passing through it (mainly waste, broken seeds and impurities) hits the moving drill 5 and falls into the technical seed chamber 6 in the direction of the drill. The tilt angle of the moving drill is changed depending on the dirt content and condition of the seed. Fractionated seeds are sent to the next process through vacuum valves 9. Seed seeds undergo cleaning and treatment processes, and technical seeds are sent to seed warehouses. Considering the first camera in this device, it is possible to separate 3 fractions in the mass of seeds, heavy bodies, seeds and technical seeds.

From the above experiment, it can be seen that the greatest efficiency was achieved in seed sorting at air speed of 18 m/sec, chamber width of 600-800 mm, and tilt angle of the moving auger at 300. From the results of the experiment, it was known that the tilting of the bottom part of the tarvan ensures the correct direction of the seeds so that the seed mass coming out of the entrance of the seed sorting device takes the necessary speed and goes up along the air pipe. Therefore, in order to correctly direct the seeds to the seed sorting device under production conditions, the radius of the plow $R=160$ mm, the slope angle of the plow $\alpha=60^\circ$ was adopted.

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