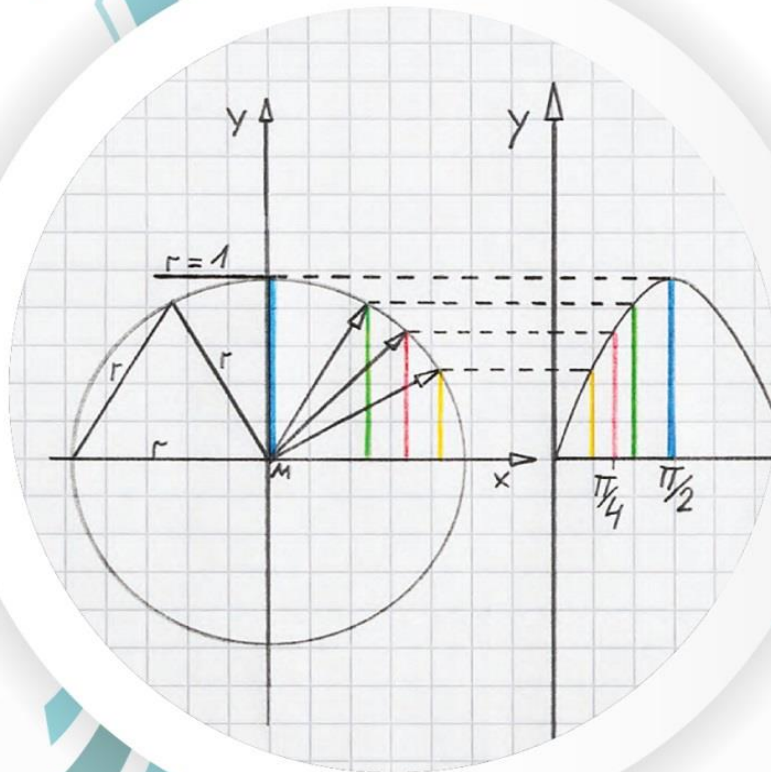


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## CREATION OF A DEVICE TO SEPARATE FINE AND HEAVY MIXTURES IN RAW COTTON

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### Abstract

**Object.** The new device for catching heavy impurities doubles the efficiency of catching heavy small and large objects in seed cotton raw materials and eliminates the risk of damage to its cotton impact parts.

**Methods.** The proposed device has two pockets, the working surface has a double "Spiral" appearance, and a spring plate is installed on the working vertical surface, which is installed on the second vertical surface. an artificial intelligence opening device is installed, which ensures efficient discharge of heavy mixtures.

**Results.** Automatic opening and closing of the device's pocket plates that expel heavy impurities from the working part prevents air ingress, sensors are installed, robotic technology is used, and control is in our own hands by automatically transmitting messages from the sensor to smartphones and computers through the program through artificial intelligence. This ensures that heavy impurities are efficiently removed from the device. A spring-loaded plate installed on the working surface prevents cotton from being damaged by impact.

**Summary.** This device ensures the good operation of the equipment for cleaning impurities, separating the seeds from the fiber in the cotton ginning plants, and protects against fire in the drying equipment. Protects cotton and fiber from damage to seeds.

**Key words:** Tray, pocket, heavy mixtures, plate, sensor, artificial intelligence, spring, vertical surface, horizontal surface, seeded cotton, camera, floor.

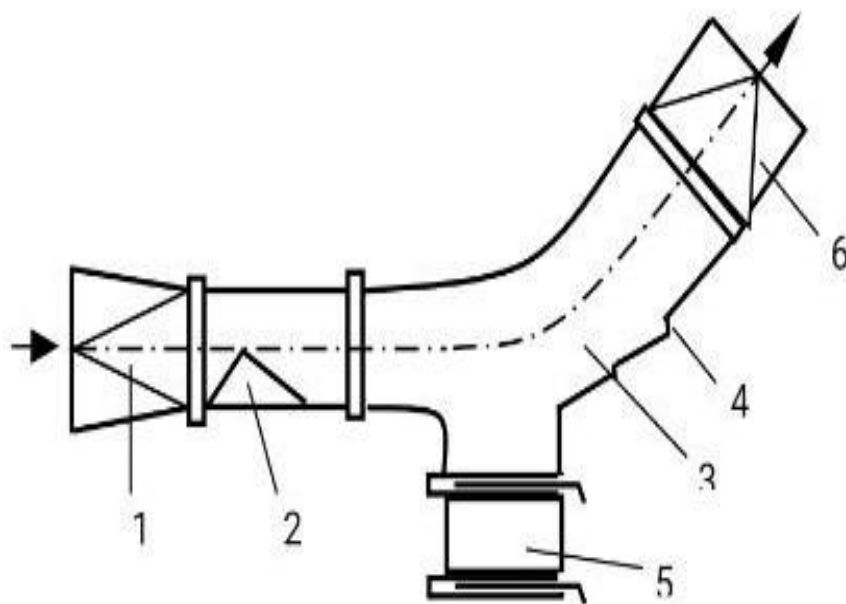
**Introduction.** Due to the high demand for cotton fiber in the world economy, special importance is attached to the issues of improving the technological processes of its production, creating a new construction of cotton raw material transportation devices, and producing high-quality cotton fiber. Today, "... 23-24 million tons of cotton fiber are produced worldwide, but its annual consumption is 23.5-25.0 million tons." Globally, raw cotton is recognized as a global commodity, and in the technological processes of its cultivation, picking, transportation, harvesting, storage and preliminary processing, identification of factors that negatively affect the quantity and natural quality of the product, production requires increasing the efficiency of product production by reducing its costs by reducing costs. In this regard, special attention is paid to the use of high-quality and energy-efficient equipment and devices in the cotton ginning industry.

We love to wear and shop for quality fabrics. For this, we need high-quality yarn to make high-quality yarn, and high-quality fiber is needed to get high-quality yarn. In order to obtain such products, we get the necessary products based on the textile industry and fiber spinning machines, and then on the machines of the cotton ginning plants. In order for us to obtain this quality fiber, we must first improve the processes of ginning, ginning, and drying of seed cotton. It is necessary to increase the efficiency of our pneumatic mechanical machines. And in order to improve its fiber production processes and avoid damaging the saws of gin machines, it is necessary to improve the processes of cleaning cotton from heavy impurities in order to prevent damage to saw cylinders and pile drums.



In cotton ginning enterprises, cotton is transported from the gins to the drying, cleaning and ginning shops of the production enterprises in pipelines with the help of air. During the transportation of cotton in pipelines, stone catcher devices are used to separate the heavy impurities in it. These devices are usually installed in the transition part of the cotton from the horizontal direction to the vertical direction. In the working chamber of this device, cotton changes its direction from horizontal to vertical, and its speed also decreases. Reducing the speed makes it possible to separate heavy compounds from cotton. In the working chamber, the cotton is separated from the heavy impurities during its upward movement in the air stream in the vertical direction. According to the conducted studies, the efficiency of stone catchers installed in the technological process of cotton ginning enterprises is around 70%. The main reason for the low efficiency of stone traps is that the cotton gets into the working chamber in lumps without being shaken. In order to solve these problems, a number of research works were analyzed.

**Methods.** It is proposed to install cone-shaped guides in the inlet pipe of the stone catcher device created by T. Makhamedov (Fig. 1). These guides are placed in a checkerboard shape and serve to cut cotton coming into the working chamber. In addition, in the working chamber of the stone catcher of cotton, the working chamber prepared as a step on the surface in front of the inlet pipe helped to tighten the cotton [1].

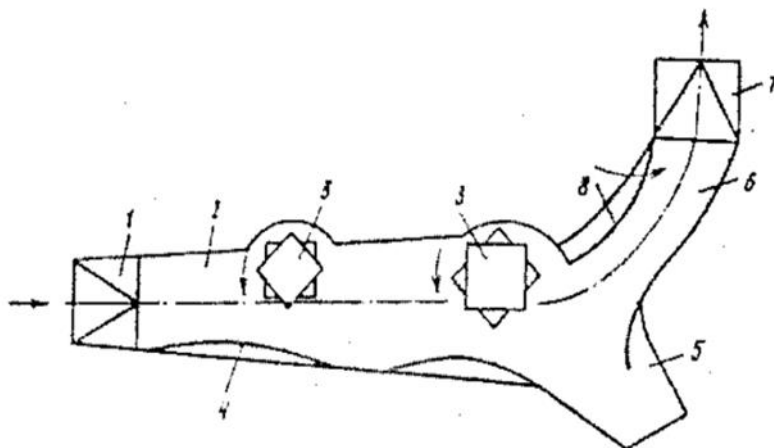


**Figure 1. Stone holder**

1-inlet pipe, 2-cone-shaped divider, 3-separation chamber, 4-stair-shaped returner, 5-pocket, 6-outlet pipe.

Several new constructions have been invented by the researchers who conducted scientific research in this direction in order to increase the efficiency of stone traps. It was proposed to install a pair of drums with blades intended for crushing cotton in the inlet pipe of the working chamber (Fig. 2).





**Figure 2. Cotton cleaner from heavy impurities. SU 1516518.**

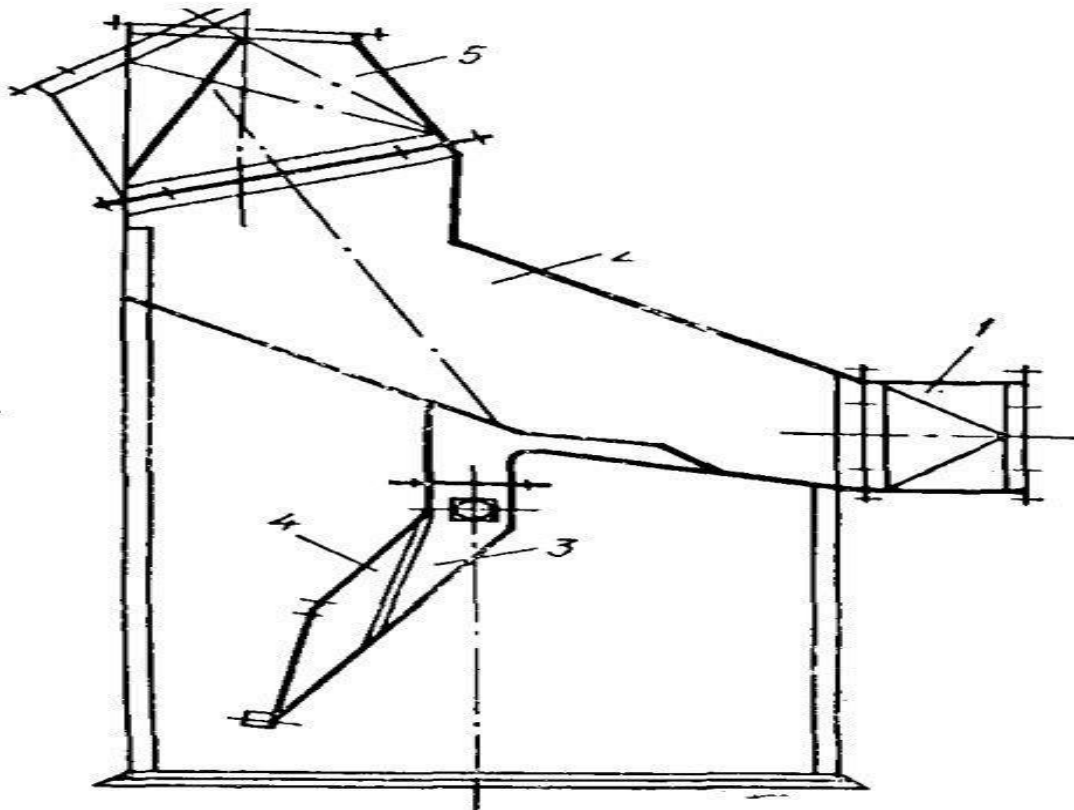
1- inlet pipe, 2- chamber, 3- accelerating drums, 4- rib guide, 5- dirt separation chamber, 6- corridor, 7- outlet pipe, 8- guide upper rib.

This stone holder works as cotton[2]. The seeded cotton coming with the help of pneumotransport enters the working chamber 2 of the device through the inlet pipe 1 and transfers the seeded cotton to the accelerator 3 in the ribbed guide 4, and the heavy mixtures are removed from the seeded cotton by the ribbed guide 8 installed in the upper part of the chamber. The bottom camera helps to drop to 5. The seeded cotton, cleaned of heavy impurities, leaves through the exit pipe 7 through the corridor 6. Due to the many shortcomings of this device, we offer a new stone crusher. This device is somewhat different from others in terms of its construction, and the structure of its working surfaces and its new type of mechanisms are used. Cotton gins are very important for transportation of cotton raw materials and production of fiber from them. Because this device is one of the main devices, catching the heavy impurities in the raw cotton prevents fire in the passage of the cotton in another process, i.e. the separator, in the device to separate the air from the cotton. stones, pieces of iron, shards, etc. can cause a dangerous fire due to friction on the surface of the drying drum. it causes some aggregates to break, eat, stop, and the stop causes the motors to burn out. It causes damage to the fiber and seed of cotton raw material. It leads to serious damage to sawing devices, breaking of saws and stopping of sawing, this is a conclusion that comes from experienced practice. All in all, it will cause great damage to the cotton ginning plant. It causes a lot of money to be wasted.

**Currently**, cotton ginning enterprises use the 2CHTL type sieving device, which captures heavy impurities in raw cotton. Its operation makes a great contribution to the rapid operation of all technological processes. Every cotton ginning enterprise uses a sieving device that captures heavy impurities of various types. In the age of modern technologies, this device, i.e. the stone crusher, is used in other processes. We are currently talking about the clarifier that captures heavy impurities, as an example at the Chust cotton ginning enterprise. This device has been overhauled and used every year since the cotton ginning plant was built. The structure of the heavy-mix trap device is simple and simple.

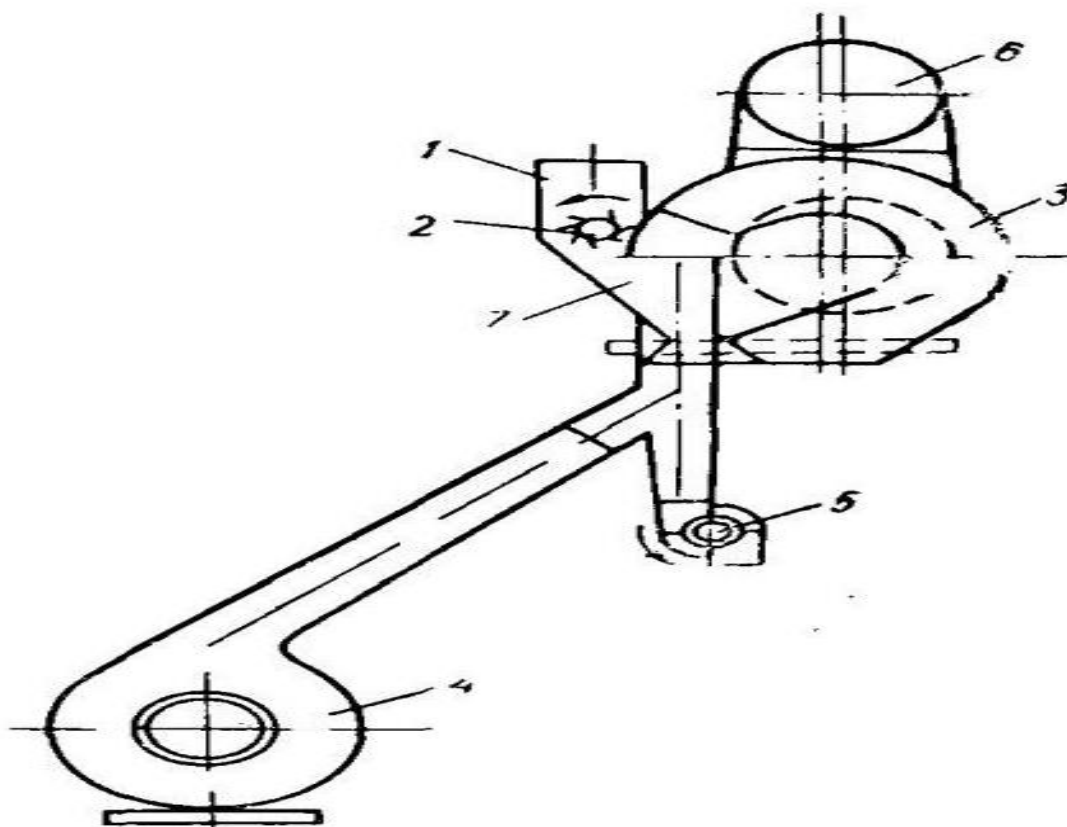
Cotton is pulled at a certain speed through a pneumatic transport, that is, a mechanism that helps to pull cotton raw materials with the help of pipes. Into these pipes the seeded cotton in the bundles is thrown by the workers with the help of tools and it is pulled out at high speed by this device. along with it is pulled by pneumatic transport in horizontally placed pipes, in the process of pulling, seeded cotton raw material encounters a device that captures heavy mixtures, one part of which is horizontal and the other part of which is vertical. . The seed cotton raw material from the horizontal part of this device is hit on the vertical surface, and another main part of this device is the

bottom-mounted pocket, which is located on the horizontal surface, where the heavy impurities are caught, and this equipment is made of two layers will consist of The first and second floors are closed, and the bottom part of the second floor consists of plates covered with gypsum. In order to prevent the release of air and the addition of seeded cotton raw material together with heavy mixtures, two plastic irons are installed on two stages. Then, when the seeded cotton raw material hit the vertical surface rises up, the heavy impurities inside it fall into the pocket below. In this process, only when the pneumotransport was on a horizontal surface and there was no gap, the heavy mixtures would have been taken to other processes together with the cotton. Therefore, a two-part pocket is installed on the lower part of this vertical surface, in which the cotton raw material rises up according to its lightness. Heavy objects fall down with their own weight. This is called a cooling device. It is written in the next words that the refrigerator is dry. 15 tons of seeded cotton raw material passes through the dryer device per hour. In this process, we have already mentioned that the pocket of the stone crusher is double-layered so that it does not fill up. Assuming that this plate is full of heavy mixtures on the first floor, the first plate is pulled and falls on the second floor, while the bottom of the second floor is covered with gypsum with an iron sheet with the same plate, and heavy mixtures fall on the surface. The first floor plate is quickly plastered closed, and when it is confirmed that it is closed, the second plate is opened, at which time the heavy impurities are expelled through the pocket. The human factor is used to weigh these two plates. Workers tighten the plate by hand and put it back in place, which has a very negative effect on human life and health. A large amount of dust comes out of it, which causes damage to the respiratory tract and lungs. These dusts cause lung cancer and cancer. And when you pull it by hand, it hurts your hands. To prevent these situations, the automatic pocket opening system can be used. In cotton ginning enterprises, we can see the 2TChL brand clarifier (picture 1) and the UTP-1.5 brand clarifier, which captures heavy impurities. The working process of this device has been explained verbatim, its scheme and sketch can be clearly seen in this picture. And the operation process of the dehumidifier device increases the good performance and efficiency of many devices. It ensures effective and high-quality fiber production of seeded cotton raw materials.



**Fig. 3. 2TChL brand stoner**

The 2TChL brand duster (Fig. 3) has a simple structure, and it is convenient to connect it to the cotton suction pipe of the pneumatic transport in the workshop. The heavy objects in seeded cotton coming with the air flow through pipe 1 are separated from the cotton as a result of hitting a fixed surface and losing speed, as well as the air speed in the extended part of pipe 2 being significantly reduced. Heavy objects separated from the cotton fall into the separation pockets 3 and 4 and leave the tube. When passing 15 tons of cotton in one hour, the stone crusher catches 70-80% of the stones mixed with this cotton. When the speed of air in the refrigerator is 22 m/s, its pressure decreases to 295 Pa. Due to the fact that the separators in the line cannot separate all the heavy objects in the cotton, a UTP-1.5 brand device is also installed after the separator.



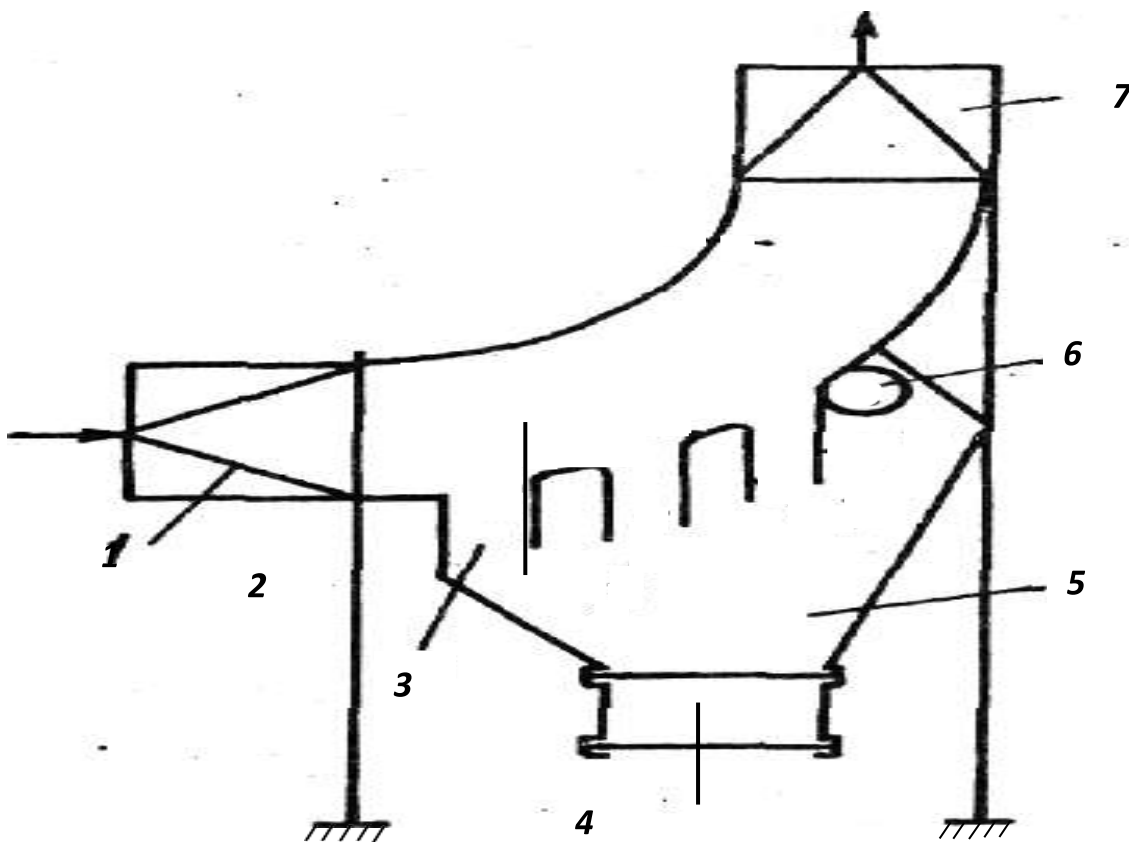
**Figure 4. UTP-1.5 branded charger**

The UTP-1.5 stone crusher consists of a shaft 1, a feed drum 2, a chamber 3, a fan 4, a vacuum valve 5 and a suction pipe 6. Seeded cotton rises along the inclined plane 7 with the air flow and enters the chamber 3. In this case, as a result of a significant decrease in the air speed, the cotton is separated from the air and falls down (Fig. 4). Heavy objects are removed from the device through the vacuum valve 5. Air is expelled through the suction pipe. Productivity of seed cotton is 12 t/h; stone holding capacity is 100% for stones weighing more than 10 g; 94% for stones lighter than 10 g. When the air pressure is 1370 Pa, the consumption is equal to 3.3 m<sup>3</sup>/s. The amount of heavy objects is on average 0.2% in II-grade cotton, and 0.3% in low grades.

One of the main disadvantages of this brand of stone crusher equipment is its low efficiency and the effect of trapping heavy mixtures.

As an example, in the experimental sentence above, which is said to be 70-80%, we have drawn up a plan for a new construction without the participation of the human factor and without affecting life safety, and we want to put it into practice.

A two-chamber dryer works as follows. Cotton comes from the inlet pipe to the lower separation chamber (2) and hits its back wall and is crushed. At this time, the heavy impurities in it fall into the lower pocket (3), and cotton joins the air stream and comes to the upper separation chamber (4). Then, with the other side of the cotton, it hits the back wall of the separating chamber, and the heavy objects left from the first impact are separated from the cotton. Separated heavy mixtures fall into the upper pocket (6). The cleaned cotton leaves through the outlet pipe (5). The results of theoretical studies made it possible to determine the trajectory of movement of cotton and heavy mixtures in a multi-pocket separator, the number of pockets and their location on the lower wall of the separation chamber. On the basis of theoretical studies, a working drawing of a multi-pocket stone crusher was developed. In this case, a rotating magnetic device in the form of a roller is also used.



**Figure 5. Multi-pocket magnetic wallet.**

1-inlet pipe; 2nd separation chamber; 3 pockets; 4-receiving device; 5 stone collectors; 6-magnetic device; Output pipeline 7.

When the multi-pocket magnetic separator is working, the cotton enters the separation chamber (2) through the inlet pipe (1) with the help of air. In the separation chamber, cotton is crushed by hitting the staggered pockets (3), and the heavy impurities in its composition fall into the stone collector (5). It is ejected from the stone collector using the device (4). Metal fragments are captured by a magnetic device (6) and transferred to the next process under the influence of cotton air flow through the outlet pipe (7) (Fig. 5).

**Results.** The new equipment offered by us doubles the efficiency of catching heavy small and large objects in seed cotton raw materials and eliminates the risk of damage to its cotton impact parts. Various types of sensors installed in the internal organs of this device provide us with the



process of its operation through our mobile devices, and through this, we can see how the cotton inside it goes through and the duration of the processes. When the cotton raw material is pulled through the pneumatic device, due to the high speed of the air, the cotton raw material hits the vertical surface of the dryer with a blow, and damages the seed and fiber of the cotton, because the impact is on the cotton, the cotton is damaged. Under the upper layer of the iron plate covered with a soft non-combustible material is fixed to the entrance of the seed cotton and to the upper part of the pocket on a vertical surface and the upper side of the vertical surface is sealed with a slatted mesh, and the lower part is 30 degrees, and a spring is placed between the vertical surface and the plate. This device mainly ensures that the seeded cotton is not damaged and in many cases, the accumulated cotton is crushed and the heavy impurities between it fall into the pocket.

As for the pockets, in order to ensure their automatic opening and closing, magnets are used that automatically open the plates of the two pockets. In this case, a small amount of electricity is used to ensure strong closing and sticking of the magnet, since the plates and pipes are mainly made of iron, rubber is placed around them in order to prevent electric shock. In order for the magnet to open when the pressure drops to 7 kg, a sensor is installed that notifies when a load is placed on it. If a load of 7 kg falls on the first plate, the sensor notifies and the automatic plate opens downwards, drops heavy mixtures on the second plate and closes. The second plate is placed so that it opens at a certain time, and a sensor is installed there, and it is set to open only after the first plate is closed.

**Discussions.** In this way, our proposed device can single-handedly replace both pre-separator and post-separator devices installed in cotton ginning plants, and the effect of trapping heavy impurities is twice as much and more effective. It reduces damage to all equipment in cotton gins. Stones, pieces of iron and hard objects are trapped and do not transfer to other equipment. By increasing the efficiency of the proposed new construction, we distinguish it from other similar devices by the fact that it has more working surface and one more pocket. As a result, the process of trapping heavy impurities in seeded cotton is performed effectively and qualitatively.

**Summary.** The proposed device is mainly to ensure that the seeded cotton raw material in cotton gins does not harm the seeded cotton when all kinds of heavy impurities get mixed with the cotton due to machine and hand picking and negligence by the workers. It has been proposed that it effectively carries out the process of trapping heavy impurities and obtains high-quality fiber and seed. It consists in protecting the seed cotton from damage by passing it through less equipment. The device we offer consists of two-pocket and two-chamber surfaces, and the plates inside the pockets, which expel heavy impurities, are automatically opened and closed to prevent air ingress. Keeping control in our own hands by streaming to smartphones and computers ensures that this device efficiently removes heavy impurities. At the same time, in order to prevent the accumulation of raw cotton in many cases, especially when touching its vertical surface, there is a spring in the bottom part of the iron plate installed at a 30-degree slope, which helps to facilitate the damage and the spread of the accumulated cotton, and then it is transferred to the next parts. In conclusion, it can be said that this device consists in increasing the efficiency of the processes of trapping small and large heavy impurities in raw cotton and using artificial intelligence without the automatic human factor.

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