Improving the Process of Separating Row Cotton from Air in Order to Preserve its Natural Properties

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ABSTRACT

The article is devoted to the study of the equipment of a cotton fibers processing plant. At the same time, an improved version of the cotton fibers Separator is recommended. The results of the enhanced separator's experimental results are also presented. The scientific significance of the research results is justified by the development of a separator design ensuring the preservation of the initial quality indicators of cotton by protecting it from mechanical influence, as well as by developing a method for preventing obstruction during separation of cotton from air, by rational arrangement of the air chamber in the separator working chamber, and by increasing the efficiency of the separation process by establishing special guides after the inlet pipe

Keywords: separator, vacuum clever, fiber, insulating chamber, raw cotton

Introduction. In today's rapid development of modern scientific and technical information, it is important to pay special attention to updating new technologies and technologies along with the national economy.

We see this in the process of modernizing the Republic of Uzbekistan with foreign countries, entering Uzbekistan into international trade, increasing exports and imports of goods, modernizing development programs of leading developed countries, re-equipping industries with new technologies. One such industry is the ginning industry.

Currently, more than 80 countries are engaged in the production of cotton. Today, the main producers of cotton are the United States, China, India, Brazil, Uzbekistan, Pakistan and Mexico.

At the present stage of development of the cotton ginning industry, technical and technological measures are being implemented to ensure the timely processing of the cotton crop and its timely delivery to consumers, with high natural preservation of its natural properties. It is also important to note that the use of existing technology based on existing technology, its timely setup and control are very important.

Improving the efficiency of existing equipment and equipment in factories, improving the quality of products obtained in many respects corresponds to the technical requirements for these devices, the correct choice of technological regulations and the correct maintenance of aerodynamic standards in systems.

Analysis of modern technological and aerodynamic conditions, selection and implementation of alternatives, production efficiency, identification of factors affecting the natural properties of cotton, and the search for ways to eliminate them, making suggestions for preventing cotton loss in the aerodynamic system and is important in its implementation. An in-depth analysis of the separators commonly used today in factories is of great importance, the most common of which is the SS-15A.

This is because cotton, which is widely used in separators, causes damage to the fiber and cotton, the main product.

Therefore, it is very important to identify ways to address the aforementioned drawbacks and introduce new improved separators.

The proposed chamber separator creates a vacuum zone in front of the insulating access zone. In the area of the cavity, the suction and air pressure are 0, and the pressure that presses the cotton to the surface is 0.

A pressure force of zero is between the fiber and the mesh surface reduces friction. This is because cotton is made from mesh. Resulting in reduced separation strength. As a result, cotton falling from the surface of the grate falls without any excessive force.

Obviously, the introduction of these new devices will preserve the natural properties of cotton and increase its yield by preventing the destruction of the fiber.

An increase in fiber yield can be achieved by preventing the formation of short fiber and its loss.

Figure 1 shows a axonometric longitudinal section of a new insulating chamber.

The separator works as follows: The separator chamber 1 with the air flow through the separator 2 enters the separation zone. As soon as cotton enters the separation chamber, it redirects the vacuum valve 4 at its own speed and is removed from the separator by means of a vacuum valve.

The rest of the cotton, together with the air flow, moves to the surface of the net and clings to it with the help of air forces. Cotton is isolated from the surface of the grate using an insulating scraper and transferred to a vacuum valve. During the separation of cotton from the net, the influence of air forces on cotton is lost.

This is achieved by reducing the air pressure due to the insulating chamber 9 mounted on the outer surface of the grid. That is, in relation to the main scraper 8 installed by the separation chamber 5, the insulating chamber 9 is installed to a certain extent, depending on its direction, that is, an angle of inclination of 25 ° to our position.

As a result, when the scraper separates the cotton from the surface with 8 gratings, an insulating chamber, which is installed on the rear of the net, covers the air pressure 9 and increases the pressure of the pressure force on the net, which means that it absorbs air. At the same time, the scraper freely separates the cotton from the surface 8 of the grate.

Because of this, cotton clinging to the surface of the mesh breaks only under the influence of its own weight and enters the vacuum valve.

As a result, the friction force between the surfaces of the cotton and the lattice decreases sharply, which does not increase the mechanical friction of the seeds, preventing fiber breakage and reducing the amount of fiber.

This equipment was installed at the Chelaksky ginnery in the Samarkand region based on the advanced separator SS-15A.

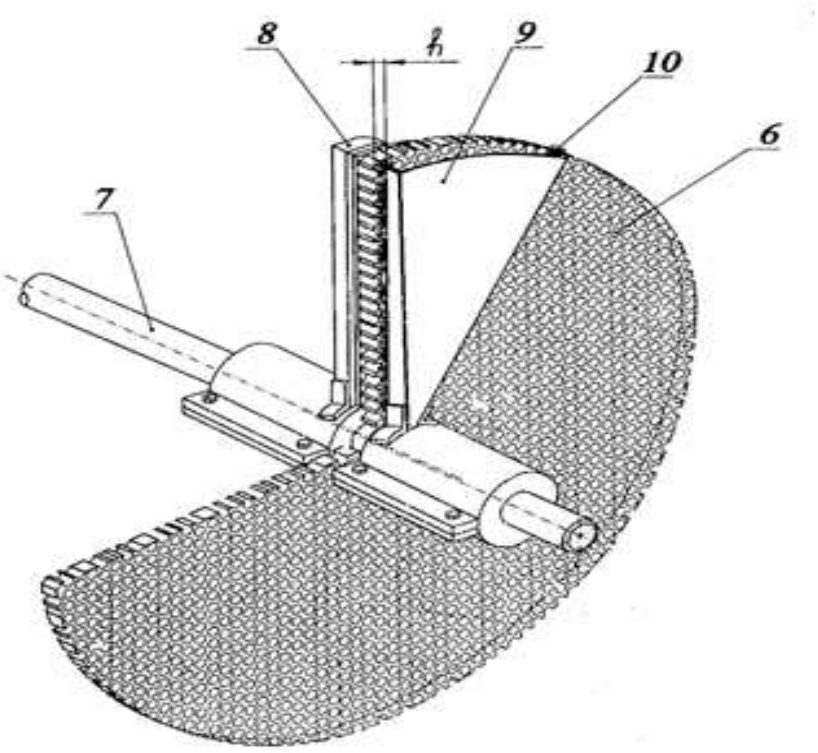

Figure 1. Axonometric view of the insulating chamber.

Following the modernization of the SS-15A separator, extensive production experiments were conducted. The experiments are mainly available in two types of separators: the first is the improved SS-15A separator, and the second is widely used in production.

The experiment was conducted at the Chelak ginnery in the Samarkand region. During the tests, an SS-15A dryer drum was used at the top of the drum, as well as an improved SS-15A separator mounted on a UHK cleaning stream. The SS-15A separator at the top of the dryer drum is shown in Figure 4.

Numerical results and discussions. The amount of fiber added to the waste was selected as the main object of analysis, and the following method was used to determine the amount of fiber. The waste was removed from the dust bag in a bag for 10 minutes and weighed 0.01 g. This waste was then sieved through a 3x3 mm sieve to remove all impurities. The rest was garbage and then weighed. The level of mechanical damage to the seeds was determined by the existing method. The experiment used industrial varieties of cotton I, III, IV, and V. One piece of cotton was used to test the separators. In the experiment, the sultan used a selective cotton variety. I degree of pollution of industrial purity 2.05%, humidity 8.6%. Pollution degree 3 industrial grade 3.98%, humidity 10.92%, industrial grade IV cotton pollution 6.8%, humidity 13.5%, industrial grade B class 11.4% and humidity. and 16.5%, respectively. The amount of air consumed is the same in both separators and the productivity was 10-15 t / h. As shown in tables 1 and 2, the total mass of fiber added to the waste of the improved separator was 0.46 kg / h and 1.05 kg / h for cotton grade III. This is 0.23 kg / h less than a conventional separator, and 0.72 kg / h for class III cotton.

The results obtained in the experiments are presented in table 1.

Results of an existing separator test with an improved SS-15A separator.

1-Figure

Grade of cotton	The amount of fiber removed from the waste compound, %		
	The level of pollution and humidity of cotton,%	SS-15A	An improved SS-15A, %
I	3=2,05 W=8,6	0,29	0,17
II	3=2,05 W=8,6	0,37	0,23
III	3=3,98 W=10,92	0,51	0,31
IV	3=6,8 W=13,5	0,67	0,41
V	3=11,4 W=16,5	0,87	0,52

We graphically present the results obtained from experiments.

Figure 6 shows the change in the amount of free fiber added to the exhaust from the SS-15A separator with an improved separator. By analyzing this diagram, the SS-15A separator shows that the amount of free fibers in the separator is 50-70% greater than the amount of free fiber produced in the improved separator. So, in Industrial Class I, it increases from 0.46 kg / h to 0.7 kg / h; In industrial class II, it increases from 0.78 kg / h to 1.18 kg / h; In the industrial class III class, it increases from 1.05 kg / hour to 1.78 kg / hour. In the fourth grade, cotton IV will increase from 1.16 kg / hour to 2.07 kg / hour. Finally, industrial-grade cotton V grew from 1.32 kg / h to 2.26 kg / h. This means that the SS-15A separator has a fiber break between the surface of the grill and the scraper, as a result of which the disconnected fiber passes through the mesh hole through the air stream and is collected in a dust collector.

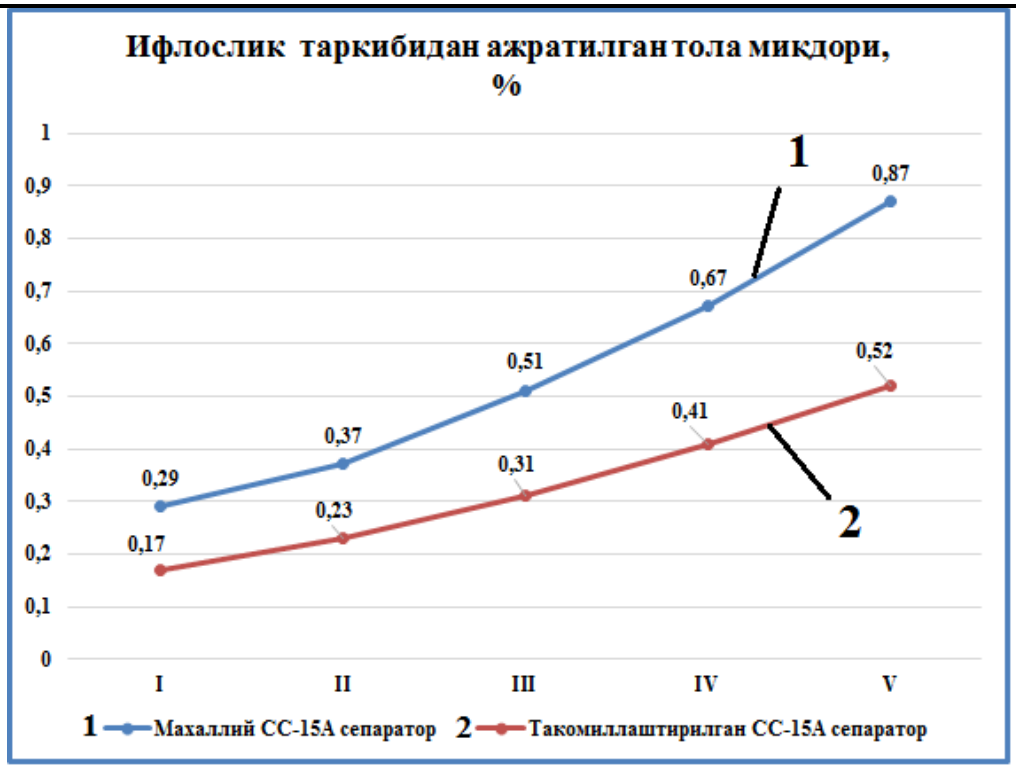

Figure 2. Changes in the amount of free fiber in the type of waste depending on the industrial grade of cotton in the separator.
1- in an improved separator; 2- In the separator SS-15A.

As can be seen from the graph in Figure 6, with the fall of the industrial grade of cotton, the amount of free fibers increases in waste. Figure 7 shows the effect of an advanced separator with an SS-15A separator on the amount of mechanical damage to seeds. As can be seen from this graph, with the change in industrial varieties of cotton, the amount of mechanical damage to cotton seeds changes.

That is, the level of mechanical damage to cotton seeds in I-type cotton increased from 1.08% to 1.32%; While the industrial grade II increased from 1.21% to 1.41%; While the industrial grade III class grew from 1.38% to 1.52%; In the 4th grade of industrial grade cotton, it grew from 1.87% to 2.07%. Finally, grade 5 grew from 2.57% to 3.38%. Therefore, the amount of mechanical damage to the cotton seeds changes as a result of the movement of the cotton through the air flow between the surface of the grating of the separator SS-15A.

Conclusion. The results show that the increase in the amount of free fiber and the increase in mechanical damage to the seeds is due to the pressure exerted on the surface of the cotton by the air flow in the separator chamber. An increase in compressive strength causes an increase in the number of free fibers, that is, an increase in the number of free fibers and an increase in the degree of mechanical damage to the seeds. In conclusion, it is important to reduce the pressure on the surface of the cotton. Therefore, the isolation chamber recommended in the advanced separator reduces this pressure. This can be seen in the graphs in Figure 2.

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