

IMPROVEMENT OF VACUUM VALVE OF SS-15A SEPARATOR USED IN PTKS

Azizbek Rakhimjonov

Assistant, Department of Natural Fibres, Fergana Polytechnic Institute, Fergana,
Uzbekistan

E-mail: a.raximjonov@ferpi.uz

Hilola Maksudova

Student, Fergana Polytechnic Institute, Fergana, Uzbekistan

Abstract

In PTKs, the pneumatic method is used to transport seeded cotton between departments. SS-15A separators are used to separate the seeded cotton from the air stream coming through the pneumatic conveyor. Improving the performance of the SS-15A separator by improving the vacuum valve.

Keywords: SS-15A separator, vacuum valve, shovel, seed cotton, number of revolutions.

Introduction

In order to ensure the maximum economic efficiency of cotton production in our republic, concrete measures were developed between the International Bank for Reconstruction and Development on the cotton project in order to determine the quality of cotton fiber and other similar products obtained from cotton processing.

Therefore, cotton products produced by cotton ginning enterprises have high quality indicators and meet the requirements of world standards, which is the main factor for their popularity in the world market [1-3]. Our cotton fully meets international standards for color, fiber length, hardness and micronaire indicators. This is one of the most important aspects that ensure its purchase in the world fiber market. But, as the President said, what if we reprocess this fiber at home and take it to the world market in the form of a finished product? It is natural that the income will increase several times. In addition, there are hundreds of other products that can be obtained from the cotton plant, all of which increase the economic efficiency several times. Most importantly, many new jobs will be created. In accordance with

the concept of administrative reforms in the Republic of Uzbekistan, a decision was made "On measures to fundamentally improve the management system of the cotton industry" [4-7].

Increasing the quality of fiber is one of the most urgent issues in the cotton ginning industry today. Therefore, the main focus is on reducing the small and large impurities in the seed cotton, preventing the seed cotton from mixing with impurities, and reducing the time and costs of equipment repair.

The main part

Currently, one of the main types of transportation of seeded cotton from warehouses to production and interdepartmental transportation in cotton ginning enterprises is pneumatic transportation.

The pneumatic conveying system is easy to use and maintain, reliable and does not lose raw materials during transportation.

Cotton separators used in the pneumatic transport system are very important. Separators are the only piece of equipment that affects the normal operation, performance and aerodynamic performance of the air transport system.

Currently, SX and SS-15A types of separators are used in production. Separators are used to separate the seeded cotton from the air stream coming through the pneumatic conveying device. Also, the separator cleans the cotton from dust and some small impurities as it transfers the dust and small impurities in the cotton together with the air [8-10].

SS-15A - model cotton separator - The separator is completely made of iron (metal), it is reliable during operation, it works with high efficiency. Figure 1-2. The scheme of the technological process in the transverse and longitudinal section of the scraper separator SS-15 is shown.

The seed cotton mixed with air falls at a high speed through the pipe into the separation chamber (2) of the separator. The cotton moves by its inertia through the wall of the separation chamber and rests on the rotating blades of the vacuum valve (7), and due to the rotation of the blades, the cotton is thrown out of the separator. If there is air, it loses its initial speed inside the chamber, then changes its direction and is directed to the dust collection devices through the air transfer pipe (6) due to the suction of the fan from the holes of the mesh (4) on the two sides of the chamber.

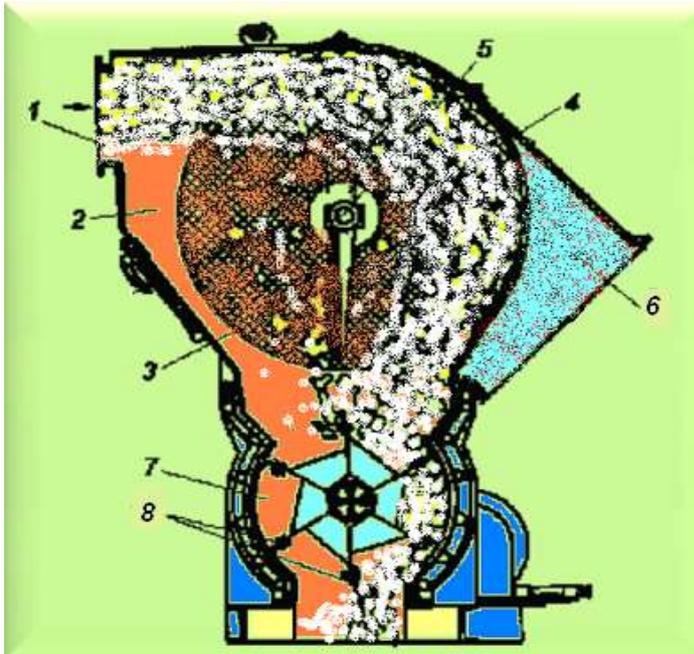


Figure 1 Cross-sectional view of SS-15A cotton

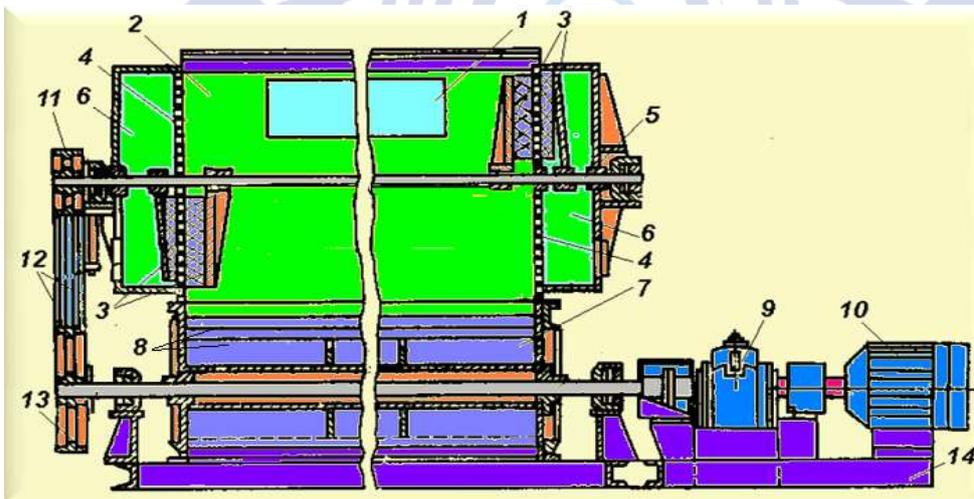


Figure 2 Cross-sectional view of SS-15A cotton separator

1- seeded cotton inlet; 2- seeded cotton air separation (separation) chamber; 3- scraper; 4- a net installed on the sides; 5- scraper axis; 6- dirty air transmission pipe; 7- vacuum-valve; 8- vacuum-valve shovels; 9th reducer; 10- electric motor; 11, 13. Scythians; 12th Band; 14. basis;



If any seeded cotton particles stick to the mesh, then the cotton particles are cleaned by means of a scraper (3) mounted on the axis passing through the center of the mesh and thrown onto the vacuum valve.

The vacuum valve and RM-350 reducer shafts are connected by an elastic coupling and driven by an electric motor. The axis of the vacuum valve is transmitted from the other side by means of drive belts to rotate the axis of the scraper (Fig. 3.)

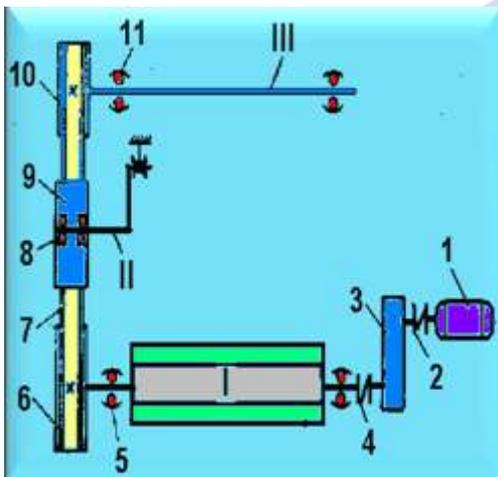


Figure 3 Kinematic diagram of SS-15A type separator

I-Vacuum-valve valve shaft; III-Axle on which the X-rays are installed;

1. Electric motor; 2,4.Muff ta; 3.Reducer; 5.11. Pod bearings; 6.10. Skiffs; 7. Tape; 8.Bearing; 9. Tension roller;

According to the above specifications of the SS-15A separator, the rotational speed of the vacuum-valve rotary vanes, 93 ayl/min , that is, it rotates 93 times in one minute. We can find the number of revolutions of the vacuum valve in one second.

$$n_1 = \frac{93}{60} = 1,55$$

The working capacity of the SS-15A separator is 15,000 kg. We find the efficiency of the separator in one second.

$$q_1 = \frac{15000}{3600} = 4,16 \text{ kg}$$

So, when the vacuum valve rotates 1.55 times, it separates 4.16 kg of seed cotton from the air. We increase the number of revolutions of the vacuum valve in



one second, 1.55 times by 2 times. To do this, we increase the speed of the vacuum valve by changing the number of teeth in the gearbox given in the kinematic scheme. Let's see how much productivity increases as a result. We find the result through proportion.

$$4,16 - 1,55$$

$$x - 2$$

$$x = \frac{2 \cdot 4,16}{1,55} = 5,2$$

As a result of our increased speed, the separator separates 5.2 kg of seed cotton from the air in one second. In one hour, it separates 18720 kg of seeded cotton in the air. Through this proposal, the separator's productivity is behind by 3720 kg. But as a result of this change, jamming may occur between the vacuum valve. In order to prevent this, we can reduce the number of blades of the vacuum valve to one. As a result of my modification, the volume between the vanes of the vacuum valve increases and prevents clogging.

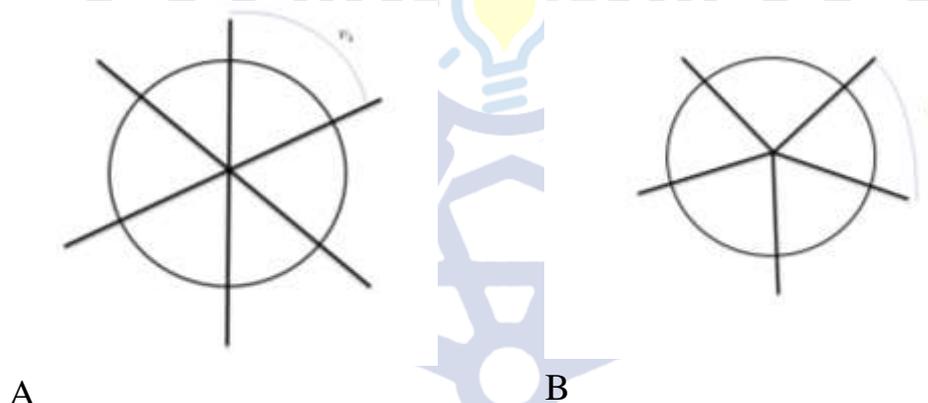


Figure 4. We can see in the picture above A-vacuum-valve in the initial state, B-vacuum-valve in the next state.

In this, v_1 – initial volume, v_2 – volume after modification



Conclusion

As a result of our proposal, the performance of the SS-15A separator is increasing. This result affected the equipment located in the production facilities. In order to apply this proposal in practice, we need to increase the air pressure of the ventilator placed on the separator, or we need to install this separator in roller mills.

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