ISSN 2181-8622

Manufacturing technology problems

# Scientific and Technical Journal Namangan Institute of Engineering and Technology

INDEX COPERNICUS INTERNATIONAL

Volume 9
Issue 4
2024

Google Scholar Crossref doi SLIB.UZ Scientific library of Uzbekistan

# INCREASING THE USEFUL SURFACE OF THE MESH SURFACE

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**Abstract**: Particular attention is paid to the design of the cotton separator used in the process of separating raw materials from air in the technology of primarily processing cotton. This process is crucial for preserving the natural quality indicators of cotton and cleaning it from small impurities. The cotton separator operates based on the efficiency of the mesh surface when separating air and raw material mixtures. The study investigated reforms aimed at increasing the useful surface area of the separator's mesh surface. This not only increases the efficiency of the separator, but also makes the process of cleaning cotton from small dust and impurities more efficient.

**Keywords:** cotton, fiber, seeds, inlet pipe, working chamber, separator, mesh surface, scraper, vacuum valve, free fiber, dust, suction pipe, fan, cyclone, outlet pipe.

**Introduction.** In our country, special attention is being paid to the development of the cotton industry and the production of products with high added value through deep processing of its value chain. For this purpose, the cluster method is being introduced, which provides for effective management of processes ranging from cotton cultivation to the production of finished products. The advantage of the cluster method lies in the fact that it allows for the integration of all processes into a single integrated system, resulting in improved product quality, reduced costs, and increased export-oriented products. Development Strategy of New Uzbekistan (2022-2026). This strategy outlines specific tasks for ensuring the stability of the national economy and increasing the share of industry in gross domestic product. In particular, it is planned to increase the volume of industrial production by 1.4 times. The cotton industry plays a crucial role in achieving this goal.

It is important to introduce scientifical-based technologies for the transfer of raw cotton into the production process without affecting its quality indicators. At the same time, work should be carried out in the following areas: maintaining quality indicators, eliminating factors leading to breakdown, and implementing effective technologies. Therefore, in the process of processing cotton, high-quality and value-added products are produced based on scientific and technical approaches. This will contribute to the further development of the national economy.

**Methods.** The primary processing of cotton consists of a number of technological processes (placement, storage, transportation, drying, cleaning, fiber separation, etc.), forming a specific technological chain. This chain is closely related to the productivity of each machine and the quality of work of the machines. Considering this issue, it can be concluded that the influence of technological chain equipment on cotton quality indicators is significant.

Delivery of raw materials from warehouses and stacks located on the territory of cotton ginning plants to manufacturing sectors is mainly carried out by air pipelines. The main reason for the widespread use of this method in cotton mills is that it avoids the loss of raw cotton during its transportation, and its pipes can be installed in the required direction on the plant's territory.

The separator is one of the main elements of the system, which consists of pipelines for transporting cotton by air. The separator is primarily used to separate cotton from the air stream and tiny dust particles.

The separator SS-15A consists of an inlet pipe (1), a separation chamber (2), a cleaner (4), a vacuum chamber (5) and an air duct (6) that cleans the mesh barrier (3) contained in it. The scraper (4) scraps the cotton from the mesh (3) located on the sides of the separation chamber (2) and directs it to the vacuum chamber (5). The vacuum chamber discharges cotton from the separator chamber and prevents air from being pumped into the separator chamber through the outlet.

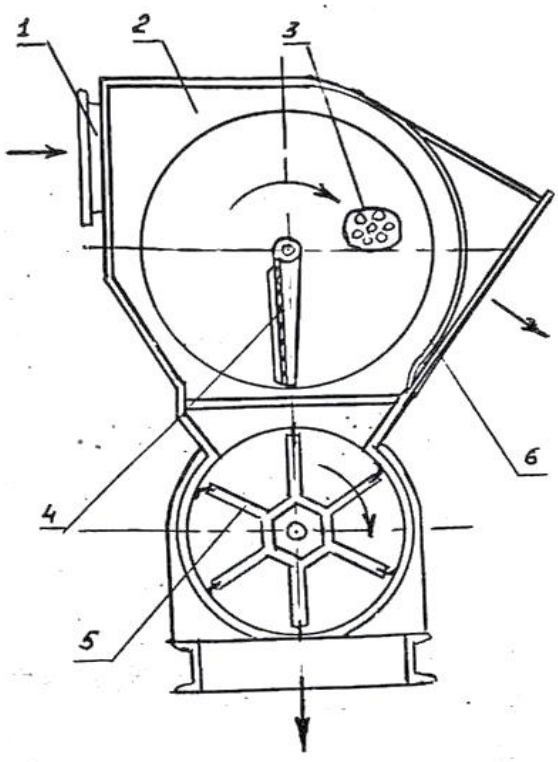


**Figure 1. SS-15A Separator**

1-inlet pipe; 2-separation chamber; 3-grid barrier 4-screw; 5-vacuum valve; 6-air duct.

The cotton entering into the separator with an air stream through the pipe hits the mesh surfaces (3) installed on both sides of the separator chamber. In this case, the air flow velocity in the separator decreases sharply, and the bulk of the cotton enters the vacuum chamber. A certain portion reaches the mesh surface and from there is dropped into the vacuum chamber (5) with a scraper (4).

In addition to separating the air, the separator also cleans the cotton from small impurities. The cleaning efficiency of the SS-15A separator is 5-10%.

Air ducts are used to carry the separated air from the separator to the fan and beyond.

Existing separators have several advantages, increasing production efficiency, energy-saving, cleaning from a certain amount of small impurities, and effectively supplying cotton to the next process.

Authors R. Muradov, A. Kushimov, and N. Rejapova (No. IAP 06631) investigated the technology for efficient separation of cotton from air. It is shown in Figure 2. The purpose of the work is to preserve the quality indicators of cotton and to clean it from small impurities. The technology developed by the authors not only ensures high-quality cotton, but also reduces energy and resource losses arising in the production process. The technological solutions presented in Figure 2 serve as the basis for implementing innovative approaches in the cotton cleaning process. This developed technology is also of great importance in increasing efficiency and ensuring a high level of product quality in the cotton ginning industry.

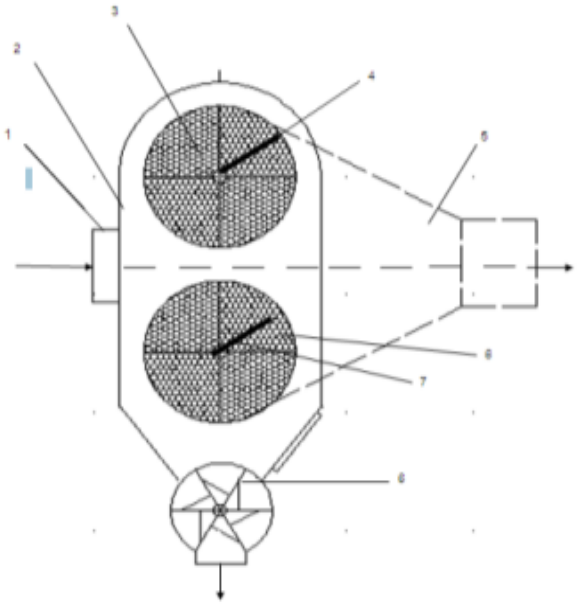

**Figure 2. Improved cotton separator (No. IAP 06631)**

1-inlet pipe, 2-working chamber, 3-upper mesh surface, 4-slipper of the upper mesh surface, 5-air outlet pipe, 6-lower mesh surface, 7-slipper of the lower mesh surface, 8-vacuum chamber.

The improved separator design operates in the following order:

Raw cotton enters the separator's working chamber (2) through the inlet pipe (1). The main part of the cotton, moving along a straight line, hits the working wall of the separator and enters the vacuum chamber (8). The vacuum chamber serves to move the cotton out which is separated from air. A part of the cotton adheres to a mesh surface (3-6) located on the side of the working chamber. The adhesive cotton is separated by a scraper (4-7) and dropped into the vacuum chamber.

Although cotton separators have great advantages in the primary processing of cotton, they also have some drawbacks. It is important to identify these shortcomings and conduct scientific and practical research to eliminate them. If the separator operates above or below the specified parameters, it can negatively affect cotton fiber. This increases the likelihood of damage to fiber length and natural properties.

**Results.** The authors have made significant changes to the design of the cotton separator in order to preserve the natural quality indicators of cotton and increase the efficiency of the cleaning process. These changes are primarily aimed at increasing the useful surface area of the mesh, allowing for efficient cleaning of cotton from impurities and preserving its quality in its natural state. The design changes proposed by the authors will serve to meet the requirements for a higher level of efficiency and product quality at cotton ginning plants. Figure 3 clearly demonstrates the new form of this improved separator and the principles of its operation.

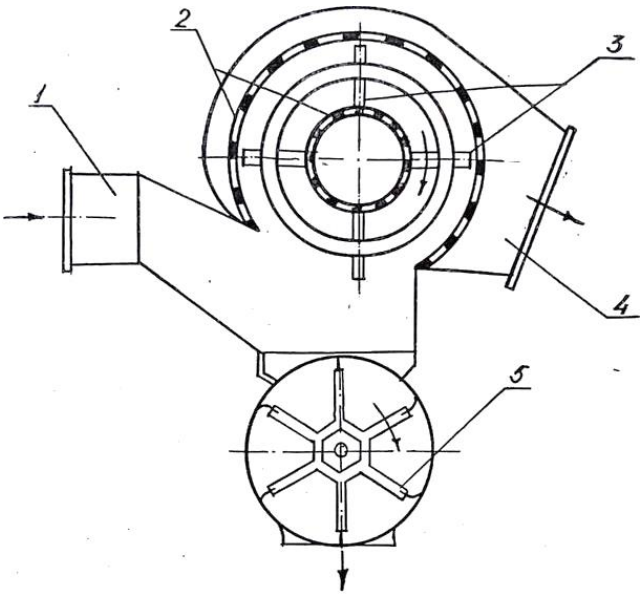


**Figure 3. An improved cotton separator**

*1 - inlet pipe, 2 - mesh cylinder, 3 - scraper, 4 - air duct, 5 - vacuum chamber*

The improved cotton separator operates as follows. Cotton raw material enters the separator using an inlet pipe (1). The cotton rotates inside the mesh cylinder (2). The cotton is separated from the air and with the help of a scraper (3) cleans the cotton sticking

to the wall of the mesh cylinder and throws it into the vacuum chamber (5). Through an air duct, the dust is purified and transferred to the next process.

**Conclusion.** In conclusion, although cotton separators create great opportunities in the production process, they have some drawbacks. To eliminate these shortcomings, it is necessary to introduce new technologies, develop energy-saving and fiber-softening systems. It is also important to continue research on the creation of small-scale and efficient devices that work in accordance with environmental standards.

The cotton separator has special mesh surfaces for separating air and raw material mixture during operation. The useful surface is understood as the area where the air flow interacts with the raw cotton and the process of effective separation is carried out. The usefulness of the surface directly affects the efficiency of the separator. The goal of increasing the useful surface is to maximize the power of the separator's air flow control and the degree of separation of impurities relative to cotton. A new mesh surface structure has been proposed to increase the useful surface, ensuring efficient interaction of the raw material with the air flow. By expanding the area of the mesh surfaces in the separator, it is possible to simultaneously separate more raw materials and air flows.

## References

1. Khusanov S. Improvement of elements of pneumatic transport devices. Phil..science. PhD diss. ... Namangan, 2020.
2. Imomalieva Sh. Increasing the efficiency of the separation process based on optimizing the operating parameters of the belt separator. Phil..science. PhD diss. ... Namangan, 2020. p. 59-60.
3. R. Muradov, M. Salokhiddinova. Improvement of the design of the cotton separator // M onography. "Istedod Ziya Press" publishing house. 2021 year .
4. M. Salokhiddinova, R. Muradov. Research to Reduce Seed and Fiber Strain in Cotton Separator
5. Salomova, M., Rakhimov, F., & Kasimov, Kh. (1992). Improvement of pneumatic transport device elements. Mechanical problems. 2019y, 101-104.
6. Tokhirova, M., Khasanov, A., Salomova, M., Sarimsakov, O., & Muradov, R. (2023, June). To study the process of leveling raw cotton on the horizontal belt surface of the feeder. In AIP Conference Proceedings (Vol. 2789, No. 1). AIP Publishing.
7. Salomova, M., Salokhiddinova, M., & Muradov, R. (2023, June). How to increase the effect radius of the cotton transport process in a mobile device. In AIP Conference Proceedings (Vol. 2789, No. 1). AIP Publishing.
8. Toshpu'latov Mansurbek, Komilov Shukhratjon Rakhimjon o'gli, Salomova Mashhura Arabboy qizi, & Muradov Rustam Muradovich. (2024). Analysis of the system of operation of cotton grinding devices. News of Education: Research in the XXI Century, 2(18), 338 –342.
9. Nodirbek, M., Shukhratjon, K., Mashkhura, S., & Akmal, U. (2024). Study of the distribution process in pipes in the different air flow transmission zone. Universum: technical science, 9(4 (121)), 47-49.

10. Yakubov, I. (2021). Salomova Mashkhura, Mamatkulov Orifjon. Improving the separator design to reduce grain damage // Proceedings of the International Scientific and Practical Conference, 11(23), p 647-649.

11. Salomova, M., Rakhimov, F., & Kasimov, Kh. (1992). Improvement of pneumatic transport device elements. Mechanical problems. 2019y, 101-104.

12. Rahimov, F., Rajapova, N., & Salomova, M. (2019). R. Muradov Create a Device that can Remove Heavy Components from the Chassis Chamber. International Journal Advanced Research Science, Engineering and Technology//Of ijarset, 6(7), 2350-0328.

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