

IMPROVING FIBER QUALITY BY IMPROVING THE DESIGN OF THE SAW GIN WORKING CHAMBER

<https://doi.org/10.5281/zenodo.17290853>

**Komilov Shukhrat, Mamadaliyev Nodirbek, Rustamova Navbakhor
Muradov Rustam**

¹Namangan State Technological University, PhD, Namangan, Uzbekistan

Phone: +998 93 562 77 92, E-mail: komilov92@gmail.com

Annotatsion

In order to improve the quality of the fiber coming out of the saw gin, various research works have been carried out by our scientists. As a result, economic efficiency indicators in cotton ginning enterprises increase. As a result of the research, we can see in this article that special attention is paid to reducing the density and reducing the number of defects and impurities in the fiber.

Key words

Fiber, density, defect, working chamber, saw, grain.

Introduction. In the world, special attention is paid to the development of primary cotton processing technology, in particular, the process of separating cotton fiber from seeds (ginning), techniques and technologies, including the creation of scientific foundations for increasing the efficiency of the cotton ginning process, the development of scientific, automated, and resource-saving techniques and technologies, and the wide introduction of the latest achievements of science and technology into the industry to improve the quality and reduce the cost of cotton products. In this regard, the creation of compact technologies and simple, low-material and energy-consuming designs of equipment that allow maintaining the initial quality indicators of fiber and seeds and controlling product quality during the process of separating cotton fiber from seeds is one of the main directions of development of the world cotton industry.

Methodology & empirical analysis. The efficiency of the gin is of great importance for cotton ginning enterprises. Below we will consider several factors that affect efficiency. The density of the raw material bale formed in the working chamber of the saw gin is one of the most important factors affecting efficiency.

Experimental data on the effect of raw material bale density on the quality of fiber and seed were obtained by B.I. Bekmirzayev. It can be seen from them that the least fiber damage is observed in grade I cotton when the raw material bale density is 325 kg/m³, and in grade III cotton - 290 kg/m³.

Among the factors that affect the energy consumption during sawing, it is necessary to take into account the condition of the saw's working surface, the most important of which is the friction force generated between the bars and the raw material chamber.

The issue of sawing power is solved by dynamically analyzing the interaction between the working body and the cylinder and the raw material shaft.

Having studied the scientific works in the field of sawing, it can be seen that for many years the main theoretical and experimental research has been aimed at determining the optimal shape of the working chamber, the parameters of the saw teeth and their coverage, as well as the influence of the density of the raw material on the quality indicators of the manufactured product. However, the studies presented here have paid little attention to energy consumption, fiber and grain damage during sawing, and they have not taken into account the actual load and individual parameters and dynamics of the machines.

The scientific research work of Kh.T. Akhmedkhodjaev [7] is aimed at creating an opportunity for the separated grains from the fiber to leave the working chamber of the saw fiber separator faster by installing grooves, i.e. depressions, on the working surface of the coulters and a device that ensures the constancy of the density of the raw material roll. In this case, the separated grain from the fiber falls onto the concave working surface of the coulter between the saws and moves downwards along this groove under the influence of its own weight. Since the surface of the coulter is in contact with the raw material roll, some of the separated grains from the fiber may not fall down, but get stuck in the raw material roll. Due to the grooves on the surface of the proposed coulter, the separated grains from the fiber roll down this groove under the influence of their own weight.

N.M. Safarov [8] in his research on the development of a method for determining the dynamic and technological parameters of ginning at different densities of the raw material roll revealed the importance of reducing the time of the grains staying in the working chamber and showed ways to do this.

R.Muradov, A.Karimov, A.Sarimsakov et al. [9] studied the effect of new improved structural elements in the working chamber of the gin on the quality of the fiber, practical and theoretical static calculation of the processes in the working chamber of the saw gin. The forces of interaction of the raw material roll with the saw cylinder, the law of motion of the raw material roll during its passage through the ginning zone in the working chamber were determined and graphs were constructed on them.

Results. In his work [10], B.I. Bekmirzayev proposed an accelerator consisting of a perforated tube with a gear disk driven by an electric motor in the center of the

working chamber of a sawtooth generator, and equipped with a handle connecting an amplifier and a variator.

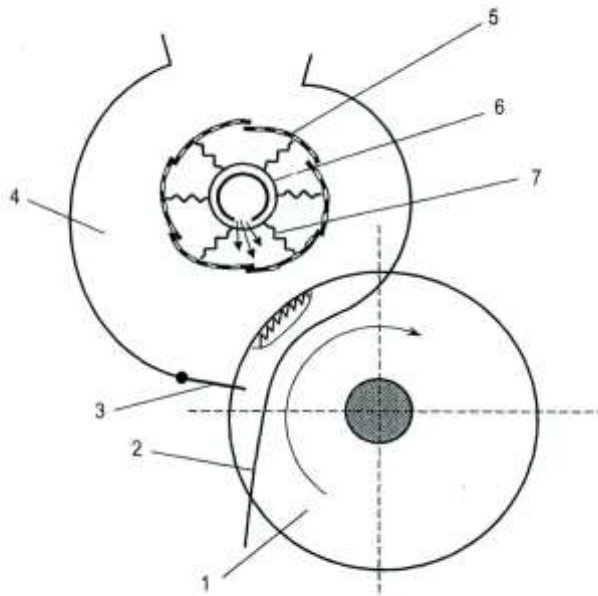
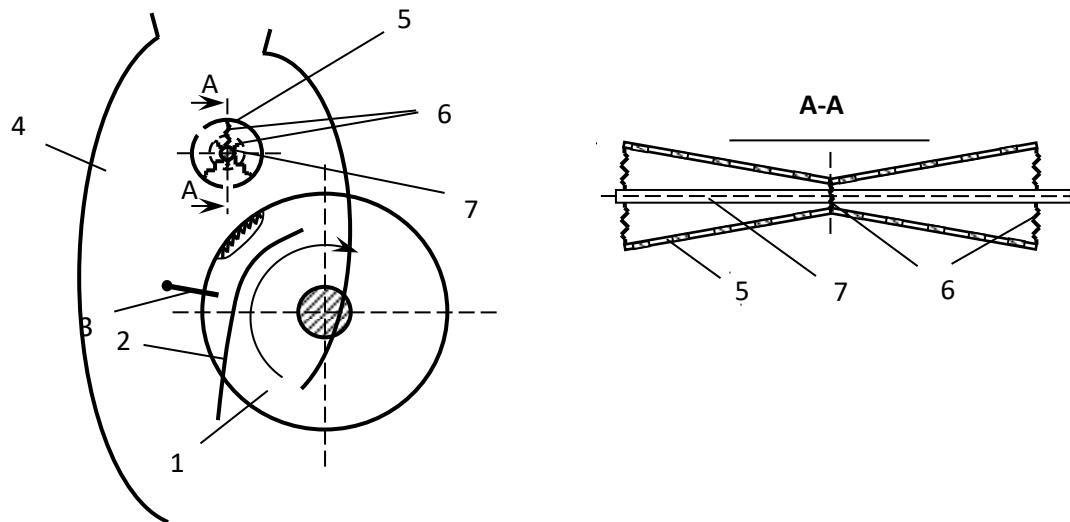


Figure 1. Fiber separation device

1 – saw cylinder, 2 – comb, 3 – grain comb, 4 – working chamber,
5 – mesh drum, 6 – fixed pipe for blowing hot air, 7 – spring.

During the research of R. Muradov et al., it was found that the fibers separated from the fibers accumulate in the middle of the raw material roll formed during the separation of the fibers from the seeds in the working chamber (Figure 1.3). He suggested installing a cylindrical drum in the middle of the working chamber to remove these seeds. The seeds in the raw material roll pass between the rods installed on the elastic element (base) at the top of the drum, pass along the inclined plate, and exit through the pipe [11].



Figure

2. A drum that accelerates the emergence of seeds installed in the working chamber

1-saw cylinder; 2-barrel; 3-seed comb; 4-working chamber; 5-conical mesh drum; 6-springs; 7-shaft.

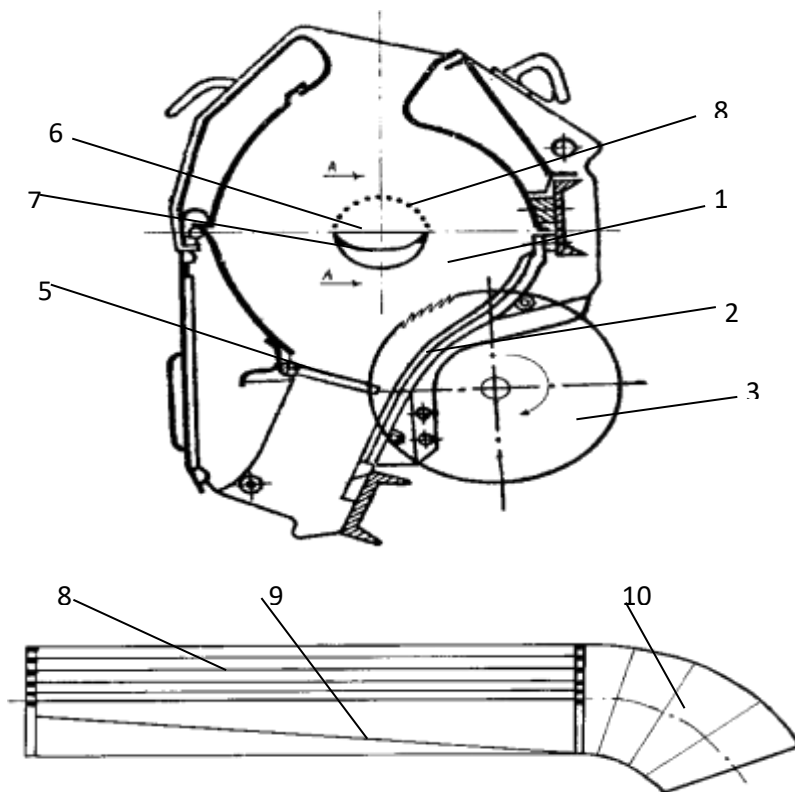


Fig. 3. Rod and inclined plate mounted on an elastic element (base)

1-working chamber; 2-barrel; 3-saw cylinder; 5-seed comb; 6-drum in the form of a cylinder; 7-elastic element mounted inside the drum; 8-rod 9-inclined plate; 10-outlet pipe.

Conclusion. As a result of several analyses, we have learned that improving the working chamber of the saw gin, improving the quality of the fiber, and

accelerating the ginning process have ensured the economic sustainability of cotton ginning enterprises. However, it has become clear that there are still a number of important issues in improving the quality of the fiber, and it is necessary to develop ways to eliminate them.

REFERENCES:

- [1] Sarimsakov, A., Israilov, S., & Komilov, S. (2023). Analysis of the influence of damaged seeds on the abrasion of working surfaces. *International Journal of Education, Social Science & Humanities*. Finnish Academic Research Science Publishers, 11(5), 244-247.
- [2] Nodirbek, M., Shukhratjon, K., Mashkhura, S., & Akmal, U. (2024). Study of the distribution process in pipes in the different air flow transmission zone. *Universum: технические науки*, 9(4 (121)), 47-49.
- [3] Joraeva, M. Sh. Komilov, A. Sarimsakov, R. Muradov.(2023). ANALYSIS OF THE QUALITY INDICATORS OF THE SEED SEPARATE FROM THE FIBER AFTER SPINNING. *Research Focus, Uzbekistan*, 2 (4).
- [4] Juraeva, G., Komilov, S., Mamadaliyev, N., & Muradov, R. (2024). Study on the qualitative indicators of raw cotton and fiber during the ginning process. In *E3S Web of Conferences* (Vol. 563, p. 03063). EDP Sciences.
- [5] Akramjon, S., Sardorbek, I., & Shukhratjon, K. (2023). Improving Fiber Quality Output by Improving the Roll Box of the Gin Saw. *Engineering*, 15(4), 261-268.
- [6] Nodirbek, M., Shukhratjon, K., & Khamit, A. (2021). Influence of the Ginning Process on the Quality of Raw Cotton. *Engineering*, 13(12), 739-748.
- [7] N.Mamadaliyev,Sh.Komilov,A.Umarov,A.Sarimsaqov The oretical analysis of the fiber removing process. *Scientific and Technical Journal Namangan Institute of Engineering and Technology*.2024.
- [8] Usmanovich, A. (2021). Research of Rotational Motion of Seed Roller of the Gin Stand. *Design Engineering*, 10655, 10661.
- [9] Mamadaliyev, N. (2024). 677.21. 021 THE ORETICAL ANALYSIS OF THE FIBER REMOVING PROCESS. *Scientific and Technical Journal of Namangan Institute of Engineering and Technology*, 9(3), 276-281.