"JOURNAL OF SCIENCE-INNOVATIVE RESEARCH IN UZBEKISTAN" JURNALI
VOLUME 2, ISSUE 4, 2024. APRIL
ResearchBib Impact Factor: 8.654/2023 ISSN 2992-8869

IMPROVEMENT OF THE CONSTRUCTION OF THE 2-CHTL STONE CATCHER USED IN THE COTTON CLEANING PLANT

H. E. Turdiyev
Lecturer, Fergana Polytechnic Institute, Fergana, Uzbekistan
E-mail: h.e.turdiyev@ferpi.uz

M.Mamasoliyeva
Student, Fergana Polytechnic Institute, Fergana, Uzbekistan

Z.Mansurova
Student, Fergana Polytechnic Institute, Fergana, Uzbekistan

Sh.Mukhtorov
Student, Fergana Polytechnic Institute, Fergana, Uzbekistan

Abstract

This study focuses on the enhancement of the construction of the 2-CHTL stone catcher utilized in cotton cleaning plants to improve efficiency and productivity. The stone catcher plays a crucial role in removing stones, debris, and other impurities from raw cotton, ensuring product quality and minimizing damage to downstream equipment. By optimizing the design, materials, and operation of the 2-CHTL stone catcher, this research aims to address common challenges such as durability, maintenance, and performance variability. Through innovative design modifications, material upgrades, and integration of advanced technologies, the goal is to develop an improved version of the 2-CHTL stone catcher that enhances cleaning efficiency, reduces downtime, and enhances overall operational effectiveness in cotton processing plants.

Keywords: airflow, pipe, air pressure, mesh surface, air distributor.

Introduction

The 2-CHTL stone catcher is an essential component of cotton cleaning plants, responsible for removing stones and other heavy impurities from raw cotton before further processing. However, there is room for improvement in its construction to optimize performance and reliability. This study aims to identify key

areas for enhancement and propose innovative solutions to address these challenges [1-4].

Key Areas for Improvement:

1. Durability and Robustness: Evaluate the structural integrity of the stone catcher and identify areas prone to wear and tear. Strengthen critical components, such as frame structures and mesh screens, using durable materials such as stainless steel or reinforced alloys to withstand abrasive materials and prolong the equipment's lifespan.

2. Efficient Debris Removal Mechanism: Enhance the design of the stone removal mechanism to improve the efficiency of debris separation and discharge. Incorporate features such as adjustable conveyor speeds, optimized chute designs, and automated cleaning systems to ensure continuous operation and minimize blockages.

3. Maintenance and Accessibility: Simplify maintenance procedures and improve accessibility to key components for inspection and servicing. Design removable panels, access doors, and quick-release mechanisms to facilitate easy access to internal components, reducing downtime and maintenance costs.

4. Integrated Monitoring and Control Systems: Implement advanced monitoring and control systems to provide real-time feedback on equipment performance and condition. Utilize sensors, actuators, and data analytics to optimize operational parameters, detect anomalies, and prevent equipment failures proactively.

5. Compatibility and Adaptability: Ensure compatibility with different cotton varieties, processing conditions, and plant configurations. Design modular components and adjustable settings to accommodate variations in feedstock characteristics and processing requirements, enhancing versatility and adaptability.

The principle of operation of the air conveying device is that, under the flow created due to the pressure difference, the atmospheric air pushes the material transported along with it into the pipe. The cotton moves in absolute condition in the pipe and reaches the separator [5-7].

The main part

The advantage of the transport device with the help of suction air is that it is possible to easily change the working pipe system depending on the location of the storage areas of cotton ginning enterprises, and the length of pneumotransport can

be extended by connecting additional pipes to the initial pipes. The production efficiency of the air transport device depends on the production capacity of the cotton ginning enterprise**.**

The composition of seed cotton significantly affects the efficiency of the installed technology in the technological process of cotton ginning enterprises, and their continuous operation. Heavy impurities in cotton during its processing cause damage to the working parts of cleaning machines and saw teeth of gins and linters. Such a change causes damage to the seed and fibres during the extraction of fibre from the seed in the gin machine.

This causes a decrease in the cleaning efficiency of cotton cleaning machines and the addition of impurities to the cotton in the waste composition. In addition, heavy impurities are the cause of the fire as a result of hitting the metal working bodies of processing machines. Because of this, the entrapment of heavy impurities in the working chambers of cotton processing machines has always been a concern of scientists and industrial experts in the field, who have sought ways to keep the heavy impurities fully contained in the air conveying device.

D. L. Kelbert found out the causes of fire in the process of separating the fiber from seed in saw teeth of cotton cleaning, gin and linter machines. It was determined that metal fragments (nails, nuts, washers) contained in heavy alloys are the main cause of this. The composition of the heavy impurities trapped by the stone separators installed in the technological process of cotton ginning enterprises is shown [8-10].

The principle of operation of the air conveying device is that, under the flow created due to the pressure difference, the atmospheric air pushes the material transported along with it into the pipe. The cotton moves in absolute condition in the pipe and reaches the separator. The separator separates the material from the carrier air and transfers it to the next technological equipment.

The advantage of the transport device with the help of suction air is that it is possible to easily change the working pipe system depending on the location of the storage areas of cotton ginning enterprises, and the length of pneumotransport can be extended by connecting additional pipes to the initial pipes. The production efficiency of the air transport device depends on the production capacity of the cotton ginning enterprise. For an advanced cotton gin with one battery, it is 10 tons per hour.

The task of increasing the production capacity, increasing the productivity of the equipment, and improving the quality of the products has been set before the cotton processing industry. The performance of these tasks is more dependent on the operation of the air-borne carrier installed in the area. Because it is directly included in the continuous technological process of the cotton ginning enterprise, it is considered an important part that determines its initial and work pace.

Depending on the place of installation, the sprinklers are divided into two types. The first is the line stones. They are located in the line of the air transport device and are installed up to the separator. The second is non-linear separators, which are installed after the separator.

Remove heavy impurities and metal fragments from the cotton as much as possible. it was necessary to study the movement of cotton in the separation chamber of devices created for the purpose of trapping. The purpose of this is to determine the trajectories of cotton and heavy mixtures in the working chambers of the newly created multi-pocket radial and cylindrical stone crushers. With the help of this trajectory, it will be possible to determine the place of installation of pockets and elastic plates in the working chamber.

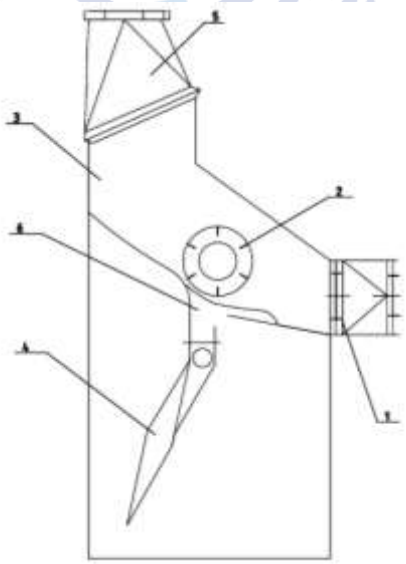

Figure 1. 2CHTL Heavy Mixture Catcher

1-seeded cotton transfer pipe into the device, 2- aspiration chamber, 3- return wall, 4- catch from heavy mixtures, 5- seeded cotton transfer pipe from the device, 6- observation hatch.

The task of increasing the production capacity, increasing the productivity of the equipment, and improving the quality of the products has been set before the cotton processing industry. The performance of these tasks is more dependent on the operation of the air-borne carrier installed in the area. Because it is directly included in the continuous technological process of the cotton ginning enterprise, it is considered an important part that determines its initial and work pace.

Conclusion

The improvement of the construction of the 2-CHTL stone catcher presents an opportunity to enhance cleaning efficiency, reliability, and operational effectiveness in cotton processing plants. By focusing on key areas such as durability, debris removal mechanism, maintenance accessibility, monitoring systems, and compatibility, significant advancements can be made in the design and functionality of the stone catcher. Through collaboration with industry stakeholders, rigorous testing, and continuous refinement, the goal is to develop an improved version of the 2-CHTL stone catcher that meets the evolving needs of cotton processing plants and contributes to increased efficiency and productivity in the industry.

References

1. Salimov, M. Akhmatov "Preliminary processing of cotton". Training manual. Tashkent. "Knowledge" 2005
2. Babadzhanov M.A. "Technological process design" textbook, Tashkent, Cholpon-2009.
3. Turdiyev, H. E., & Ogli, Y. A. K. (2024). To study the analysis of the operation technology, operational characteristics and equipment of the device that transports cotton by air. *Journal of Science-Innovative Research in Uzbekistan*, *2*(2), 508-512.
4. G. J. Jabborov "Technology of seed cotton processing". "Teacher" Tashkent-1987.
5. H.E. Turdiyev "Improving the performance of dust collectors VZP-1200 and adding new innovative technologies" Uzbekistan - 2023, pp. 154-160.
6. Turdiyev, H. E. (2024). Improving the efficiency of the technology of cleaning seed cotton from large impurities. *Journal of Science-Innovative Research in Uzbekistan*, *2*(2), 372-379.

7. Rakhmanov, B., Razzakov, S., & Kosimov, L. (2023). The research on the influence of temperature on the properties of synthetic fibres for load-handling devices. In *E3S Web of Conferences* (Vol. 460, p. 10003). EDP Sciences.

8. Turdiyev, H. E., Tursunaliyeva, D., & Hayitova, M. (2024). Improvement of the column grid of the vtm type fiber cleaner used in foreign technology. *Journal of Science-Innovative Research in Uzbekistan*, *2*(2), 583-588.

9. Turdiyev, H. E. (2024). 2SB-10 model drum dryer improvement of the paddles in order to increase the level of cotton drying. *Journal of Science-Innovative Research in Uzbekistan*, *2*(2), 503-507.

10. Zikirov, M. C., Qosimova, S. F., & Qosimov, L. M. (2021). Direction of modern design activities. *Asian Journal of Multidimensional Research (AJMR)*, *10*(2), 11-18.