European Journal of Emerging Technology and Discoveries
ISSN (E): 2938-3617
Volume 2, Issue 9, September - 2024

WAYS TO INCREASE THE EFFECTIVENESS OF CLEANING IMPURITIES IN COTTON

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Abstract
Effective research has been carried out for several years on ginning cotton and obtaining high-quality fiber by purifying the bleak added to cotton. This article analyzes the technologies proposed by scientists from foreign countries and scientists from our republic.

Keywords: cotton, fiber, uluk, seed, cleaning, impurities.

Introduction

The production of cotton and fiber products of a wide range, high quality and low cost based on growing raw cotton in Uzbekistan, preserving its natural properties and deep processing using local technologies, as well as comprehensive measures to increase the competitiveness of these products. is being implemented. In the new Development Strategy of Uzbekistan for 2022-2026 [1], among other things, on the advanced development of the national economy and ensuring high growth rates: Increasing the volume of production of textile industry products by 2 times, the tasks of increasing and widespread implementation are determined programs to increase labor productivity in industries. " In achieving these goals, including preserving the natural properties of cotton fiber produced in the cotton gin industry and preventing fiber from being discarded using resource-saving local technologies, are considered important issues of modern production.

One of the main tasks in the technological processes of many cotton gins in the world is to clean cotton raw materials from various impurities on the basis of highly efficient technological processes and at the same time preserve its natural properties. In terms of creating effective technologies for cleaning cotton raw materials, the United States of America, Australia, China, India and some Central Asian countries have focused on increasing the volume and efficiency of cotton fiber production, creating resource-saving technologies, modernization, attention is paid to technological processes and increasing the competitiveness of fiber. A lot of research work is underway aimed at obtaining the economic benefits of the enterprise through the use of automated and energy-saving techniques and technologies in the technological process of primary processing of cotton and the preservation of natural properties. fibers. Many researchers are engaged in cleaning cotton raw materials from foreign impurities, introducing various innovative developments into technological processes, using technologies and systems for mechanical and air cleaning from small and large impurities.

Theoretical Studies

A cleaning plant consisting of a large diameter saw drum, a cast-iron drum, two knives and a removable brush drum BCH-01 originally created to clean raw cotton from large contaminants [2].

In the 60s of the last century, a more powerful ChKh-3M purification plant was created, the apparatus consists of a fine impurity purification section, two large impurity purification sections and a section for regenerating lumps of cotton raw materials separated by flaps.

Large section of cleaning from large impurities consists of saw drum, fixed sliding brushes and trapezoidal grates installed around saw drum. Each node of the cleaning section has been studied by many researchers. Among these studies, initial results should be noted [3]. In this work, the influence of each working organ on raw cotton was studied theoretically and experimentally. The working organs of various diameters were studied. Since the linear velocity of the drum is limited by the consistency of the cotton seeds, a decrease in the diameter of the drum leads to an increase in centrifugal force and, in turn, to an increase in cleaning efficiency.

Various types of grates were also investigated, in which the advantages of trapezoidal grates compared to round grates, which have high cleaning efficiency and low air flow, have been identified, which is due to their high manufacturing technologies in recent years, round grates have found application in the construction of large treatment facilities.

Studies of the effect of the gap between grate bars and saw drums have shown that increasing the gap between grate bars increases cleaning efficiency and leads to an increase in the amount of leaves in the waste.

Studies have shown that with an increase in the diameter of grates, the efficiency of cleaning and the passage of air into waste decreases [5]. By reducing the diameter of the grates from 25 mm to 15 mm, an increase in cleaning efficiency from 62.0% to 79.5% was achieved, and the transition of fluff (cotton wool pieces) to waste was reduced from 3.0% to 4.7%. It is recommended to make the column diameter 20 mm. Future research focuses on improving colossal fences. Rotary round columns, spiral and comb columns are offered. To increase the efficiency of purification, it is proposed to install columns in a decreasing sinusoid in [4].

R.V. Korabelnikov, K.I. Ibrokhimov [5] in their scientific works (K0) gave a complex indicator. Permissible values of the complex indicator (K0) were determined on the basis of recommendations [6]. Based on this, the maximum number of stacked sections in the flow line (based on the permissible damage to the seeds) when cleaning cotton raw materials should be more than Nd = 40 pcs. It is recommended to reduce the number of sections to Nd = 32... 35, taking into account cotton fiber in addition to impact wear.

It was found [7] that the amount of air volatiles can be 3 and 5% in the waste of the cleaner type UHK when cleaning first and low-grade cotton. [6,7] In research work, depending on the working conditions, it is recommended to increase the value of the front angle in the presence of notches on the tape or saw.

In cleaning devices, capron brushes with thread 70 mm long and 0.7-0.8 mm in diameter are used. Brushes are installed on drum surface at acute angle without gaps between threads. The results of the practice of using saw cleaners on cotton gins have shown that the service life of nylon brushes is short, and the brushes quickly wear out as a result of foreign substances, stones and metal objects entering the cleaner. At the same time, when the gap between the brush and the saw drum is up to 5.5 mm, this leads to a rapid loss of cotton.

When processing one batch of cotton raw materials, up to 25 tons of large and small impurities can be separated, and fiber losses as a result of eating brushes can be more than 1 ton.

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Machines for cleaning raw cotton from large impurities, created in the USA, technologically differ from cleaners in Uzbekistan in that the distance between the columns in the main cleaning plant is 80-100 mm. In the regeneration unit, the column spacing is reduced from 80 mm to 30 mm. The diameter of the cleaning saw drum and the separation brush drum shown in Figure 1.2 is 762 mm.

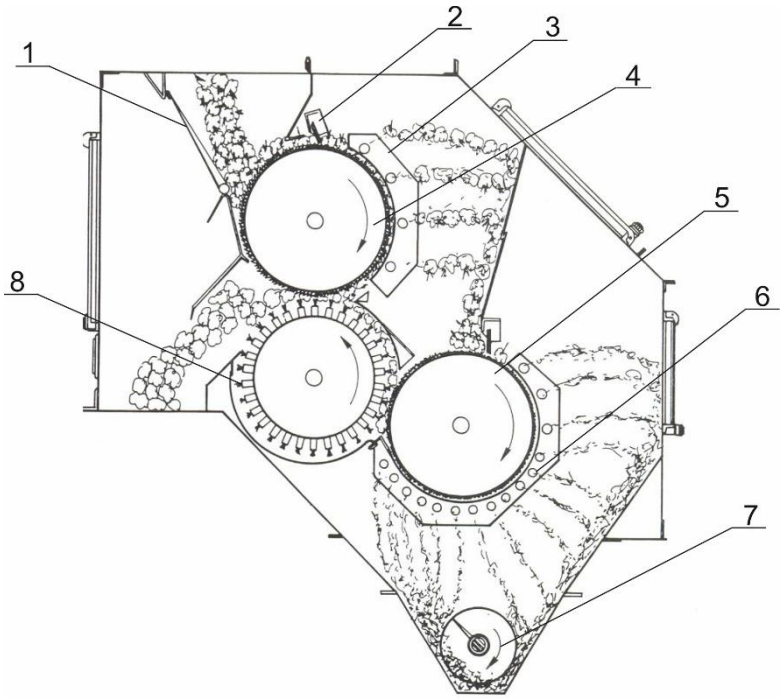

Figure 1. US Cotton Gin Cleaner
1 - valve; 2- paying brush; 3, 6 grizzly; 4, 5 saw drum; 7-screw 8-plug brush drum

The difference between local cleaners and other US cleaners is that in our cleaners raw cotton is cleaned in two or three saw drums, and then exported, and in them cotton is divided into fractions (parts), that is, cotton raw materials adjacent to the first drum, hit the grates, cleaned once and cleaned with a brush, separated by the drum and removed from the cleaner, the impurity is separated in the first drum and the cotton raw materials that fall out with it enter the next cleaning process is cleaned and added to the cleaned cotton raw materials in the first saw drum. Researchers at Cotton Cleaning IICHB JSC, who studied this method, called this cleaning method a differential cleaning technology. Taking into account the cleaning process in the currently used cleaners, i.e. the cotton fed to the cleaner is continuously cleaned in two sawing drums and then transferred to another process, these cleaners can be referred to as cleaners with continuous cleaning technology. In these cleaners, cotton pieces divided into two cleaning drums are regenerated in a separate drum.

In cleaners with differential cleaning technology, cotton entering the first drum is cleaned and removed from the cleaner. Therefore, it is better to replace the term "differential cleaning technology" with the term "sequential cleaning technology." This cleaning technique was used

in the ChKh-5 cleaner, and a ChKh-5M cleaner was created. The working process of the ChKh-5M cleaner, based on sequential cleaning technology, is as follows: cotton is transferred using a feeder to a pile drum, cotton scraped off in a pile drum is transferred to a saw drum, cotton The tooth adjacent to the saw is fixed with a compacting brush, and two in the direction of movement is cleaned by hitting the grate of grates.

If 90-95% of cotton passes through two sawing drums continuously through the ChKh-3M2 cleaner, then 70-75% of cotton is cleaned in the first drum and removed from the cleaner. 25-30% of the wool separated with dirt gets into the second drum and is cleaned by hitting the grates in the direction of movement, fixed on the saw teeth with a fixed brush. 70-75% of the cotton raw material entering the second drum is cleaned and removed from the cleaner, and the remaining 25-30% of the cotton is cleaned by the third saw drum with separated dirt. Thus, the capacity of this cleaner is 2-3 times higher than the ChKh-3M2 cleaner and is 6-8 t/h. This cleaner has the same efficiency in removing coarse contaminants as the HC cleaner, but less efficiency in removing fine dirt, but less damage to fibers and seeds after cleaning.

The cotton cleaning technology created in the USA and Uzbekistan shows that one of the ways to increase the efficiency of cleaners is to use sequential cleaning technology in the cleaner, and to increase the efficiency of cleaning, the cleaners available in our country are used. In our country, increasing the distance between columns in cleaning units requires studying the possibility of using a variable method.

Results

Currently, cotton gins use axial displacement cleaning devices called regenerators to recover cotton raw materials from waste. For example, PX settlers (1RKh) and they were used in the early 80s of the last century to separate cotton raw materials from RKh-1 settlers and PLPC production lines. It is worth noting that PX and RKh-1 generators have the same cleaning sections, operate under voltage and differ only in the design of their suppliers.

The RKh-1 cleaners were included in the pneumatic conveying system of the flow line and operated in dilution mode, as a result of which their discharge consisted mainly of large impurities and cotton fluff with a very small amount of small impurities. With this composition of waste, the RX type regenerator ensures reliable operation with a capacity of 1 t/h, its regeneration efficiency is 95%, and the treatment efficiency is up to 80%, depending on the level of waste pollution. wasting.

In the 90s of the last century, cotton gins of the UHK type were introduced instead of flow lines of the PLPC type. Its cleaning and cleaning from large impurities is carried out by a saw drum on a grizzly. Separated impurities enter common hopper and are removed from it through auger equipped with loading pipe with brake valves. As a result, the load on the regenerator increases by 2-3 times as a result of mixing small and large impurities. Under the influence of the screw, small impurities are added to the raw cotton fibers, which become difficult to separate. As a result, when cleaning cotton raw materials, the cleaning efficiency of the PX type regenerator is reduced by 50%, and the contamination of the regenerated blades is increased by 70%. In this case, as a result of mixing the regenerated cotton with the raw material sent for cleaning, it becomes difficult to purify fine impurities difficult to clean, and the fiber quality is reduced by one to two classes.

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Recommendations for the separate processing of cotton raw materials and cotton-regenerate, produced in 1995 and included in the future technological regulations, for various reasons are not implemented at all enterprises. Following these recommendations, the quality of raw cotton fiber can be improved by one grade, but the quality of the fiber will decrease by one or two grades due to the regenerated fibers.

Results of PX type regenerator operation control showed that the number of regenerator blades cleaning is 3-4 times. The number of such cleanings is 80% sufficient to ensure the efficiency of the regenerator with a predominantly strong contamination of the regenerating blades with large impurities, which leads to a decrease in the quality of the fiber.

When the number of small impurities in the waste of cotton gins is more than 30%, contamination above 5% is observed, the purification efficiency of the regenerator is below 80%, the level of contamination of the cotton gin is below 80%. regenerated sheets reach 20% and more, which results in reduction of quality of produced fibre as a result of cotton mixing with cotton raw materials sent for cleaning.

References

1. Sultanov M., Khamidov S., Obidov A. Theoretical study of a device for extracting spinning fibers from cotton waste. NamMIT National Online Scientific and Practical Conference, April 22, 2020, pp. 213-216.
2. Obidov A.A., Mamadzhanov Sh. O., Mirzaumidov A.Sh., Akramova K.Sh., Abdurasulov A.N. Electronic study to improve cleaning efficiency by improving the cotton regenerator. DGP 22903, 2023.
3. Obidov A. A., Mamadzhanov Sh. O. Improvement of the device for the regeneration of pure cotton. Scientific Journal of Mechanics and Technology, special issue 2022, No. 3 (3) 479-486 p.
4. Obidov A. A., Mamazhanov Sh. O. Improvement of the cotton regenerator. International Conference on Advanced Research in the Humanities, Applied Sciences and Education, organized in New York, USA https://conferencea.org, November. 28th 2022.
5. Umarov A.A., Kurbanov D.M. Methodological manual for practical training in the specialty "Engineering analysis in the cotton industry." Namangan, 2021. 144 p.
6. Mamadzhanov Sh.O. Theoretical studies on cotton regenerator. Scientific and technical journal NamMTI, No. 1. 2023.
7. Obidov A. A., Mamazhanov Sh. O. Increasing the efficiency of the device for separating cotton from waste. 8th International Conference on Research in Humanities, Applied Sciences and Education held in Berlin, Germany. https://conferencea.org November 30, 2022.