ISSN 2181-8622

Manufacturing technology problems

Scientific and Technical Journal Namangan Institute of Engineering and Technology

INDEX COPERNICUS INTERNATIONAL

Volume 10
Issue 1
2025

Google Scholar Crossref doi SLIB.UZ Scientific library of Uzbekistan

UDK 677.21:021

AN INNOVATIVE APPROACH TO CLEANING COTTON LINTERS

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Abstract: The review of scientific research works devoted to the improvement of the linterization process is devoted to the analytical analysis of literary sources and the current state of technology and technology of the linterization process. This article analyzes the results of research conducted to improve the designs of linter machines.

Keywords: linter, lint, technology, quality, seeds, adaptations, analysis, result, laboratory research.

Introduction. The review of research works devoted to the improvement of the lintering process is devoted to the analytical analysis of literary sources and the current state of the technology and technology of the lintering process. In this, the results of studies conducted with the aim of improving the designs of linter machines are analyzed.

After ginning, the seeds contain mineral impurities, small debris, leaves, and metal particles. In addition, the seed mass contains small seeds that are not well developed and not ripened. They are crushed and crushed during various processes, which also leads to increased contamination of the lint and seeds. In particular, the seeds fed to the lintering process contain various small foreign impurities and foreign objects, they clog the composition of the linter. Therefore, in many processes, the seeds after ginning are sorted into different fractions and sent to the next process, in addition, among the implemented technologies there are also special devices that make it possible to clean the contamination of seeds in the linter feeder. In general, it is necessary to conduct an analysis, as well as a comprehensive study of scientific research work carried out on cleaning seeds and then submitting them to the lintering process.

To clean the debris from the seed composition, pneumatic seed cleaners of the SKhA, ChSP or USM brands are installed in front of each battery of linters, and the screw conveyors transporting the seeds are equipped with large mesh trays with 3-5 mm holes. The amount of air supplied to the pneumatic system of the seed cleaner is regulated by changing the state of the valve installed in the suction or discharge pipe. Seed cleaners of the SKhA-10 and SKhA-3 brands separate 10-12% of debris, 14-17% of shrunken seeds and 70-80% of heavy impurities from the seed composition.

At present, USM seed cleaners are excluded from the technology at cotton ginning plants. Due to the large number of seed damages, the use of USM was discontinued in 2006-2008. Here, the seeds fed from the gin are cleaned using USM pneumatic cleaners and the seeds with a large amount of fiber, captured by the regenerator of under-ginned seeds, are returned back to the gin. Afterwards, the seeds pass through a mechanical seed cleaner SM. In this process, during the passage of seeds through cleaners, the negative impact on fibers and seeds increases, leading to a decrease in quality. In addition, the process consumes a lot of energy and material. Based on the above, in the current

conditions, it can be noted that it is necessary to develop devices that work with a reduction in negative impacts on seed quality and high reliability in the seed cleaning process.

At the cotton processing plant, the seeds coming from the gin continue to be processed: they are cleaned of debris, lintered, delintered, sorted into grades and disinfected (the last two processes are performed for sowing seeds). Some of the debris in the cotton during the ginning process, without being separated from the fiber and uluk, is released together with the seeds and contaminates them. The seeds coming out of the gin are contaminated with sand, debris, accidentally caught metal parts and small stones. In addition, there are also unhealthy (shriveled and unripe) seeds, which are crushed during transportation by belt conveyor and elevator, increasing the contamination of the linter. During operation of the gin, when opening the working chamber, cotton volatiles can get into the seeds. Especially seeds obtained during ginning of machine-harvested cotton are more contaminated. Therefore, maximum cleaning of seeds is required before lintering.

If the seeds are cleaned after ginning, the linter becomes less clogged, the linter saws are not damaged, and their service life increases. In addition, the quality of the outgoing linter from the linter also deteriorates. The quality deteriorates due to the degree of clogging. At present, seed cleaning devices have been excluded from the production technology at cotton mills, and the arc-shaped feeder grid and the pin drum distributing the seed flow have been removed from the 5LP linter machines. When studying the reasons, it was found that when using seed cleaners SHA-10, ChPS and USM in the technological process, along with contamination, seeds suitable for processing are also released. And the reason for removing the arcuate mesh and the peg drum distributing the seed flow is a large number of damage and losses of seeds.

Based on the above, the main objective of this scientific work is to clean debris using a vibrating mesh surface in the feeder of the 5LP linter machine in order to increase the durability of the linter machine saw and improve the quality of the produced linter.

Republican and foreign scientists have conducted a number of studies devoted to cleaning seeds coming from the gin, but in the feeder of linter machines, devices with the ability to effectively clean seeds from debris without negatively affecting the technological process have not been created and introduced into production. Basically, the devices proposed to date, as a result of the low degree of usefulness of the cleaning surface, the cleaning effect is insufficient, and the devices of foreign companies are expensive for enterprises from an economic point of view. The purpose of the study is to create the possibility of effective seed cleaning in feeders of linter machines, using domestic scientific materials by conducting theoretical and practical research.

As stated in the above studies, the seeds fed to the lintering process of the primary cotton processing technology contain 25-30% of small debris, which negatively affects the quality of the linter, cleaning which makes it possible to maintain the quality that meets market requirements. This task prompted the dissertation to improve the linter machine with a cleaning part, which makes it possible to reduce the debris in the linter. In

preparing this device, taking into account the task of cleaning the trash impurities from the seeds fed from the ginning machines to the linter, the linter machine of the 5LP brand, operated at factories with an installed cleaner having an oscillating mesh surface in the feeding part, was first studied.

According to the purpose of the research work, when creating a new device, it is necessary to check its technological capabilities. The effective operation of the new equipment depends on the comprehensive improvement of the design, without changing the technological process. And as a result of the study, the cleaning of debris from the lint composition will be achieved by feeding seeds cleaned by the device to the lintering by a total of 85-90% (compared to the debris in the seeds).

The main working element of the proposed device is an oscillating mesh surface, the cleaning process largely depends on the effective operation of this surface. This cleaning surface is shown in Fig. 1.

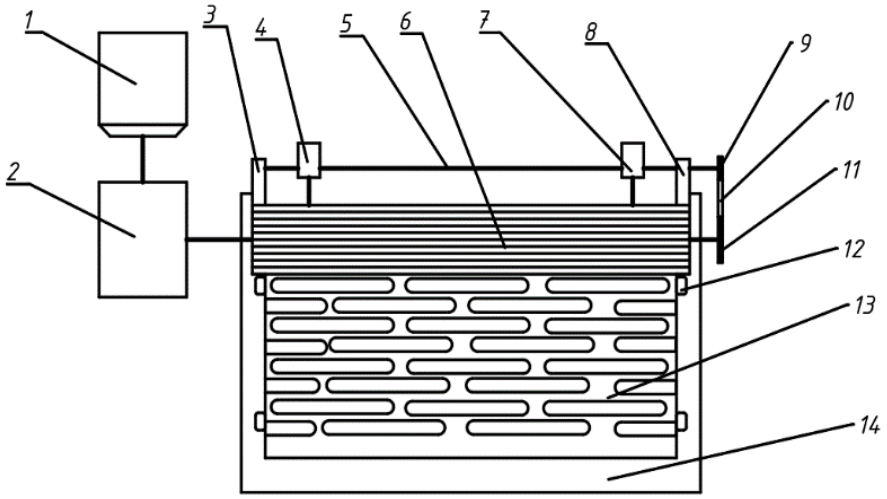

Fig. 1. Kinematic diagram of the oscillating mesh surface installed on the feeder of the 5LP linter machine

1-electric motor, 2-reducer, 3, 8-brackets, 4, 7-eccentric bearings, 5-shaft, 6-feed drum, 9-driving wheel, 10-belt, 11-driven wheel, 12-bearings, 13-mesh surface, 14-working chamber.

This design is simple and does not affect the technological process at all. The seeds fed for lintering from the feed drum 6 fall on the mesh surface 13 and here, as a result of the formation of vibrations, are cleaned of small debris using eccentrics 4, 7. The degree of cleaning from small debris depends on the vibrations of the mesh surface, which will be studied during the research and its rational value will be determined.

The width of the mesh surface is the same as the width of the linter machine feed table and is 620 mm. And the side parts of the surface holes have a rounded shape, its length is 1500 mm. The productivity of the mesh surface is on average 2160 kg / h, it has the ability to maximize cleaning and feeding into the working chamber of seeds directed to the linter according to the regulations. In addition, in order to create the ability to retain

various metal particles from the composition of the seeds, a mesh surface with a magnetic device is proposed. This mesh surface is recommended to reduce the negative impact in subsequent technological processes from the ingress of various metal particles into the composition of the lint.

The mesh surfaces of both variants are actually used to perform the same task. Depending on the state of the technological process, one of them can be used.

When developing the mesh surface design, its model was first designed in the Solid Works program, and the dimensions were designated. With the help of this program, it is possible to manufacture the design in accordance with the requirements, as well as identify technological capabilities. In addition, the choice of the mesh surface material is also an important issue, it was determined according to the existing methodology. The angle of inclination and vibration of the mesh surface, as well as the surface condition, significantly affect the uniform movement of the ginned seed. Therefore, determining the rational values of these parameters is a very important event.

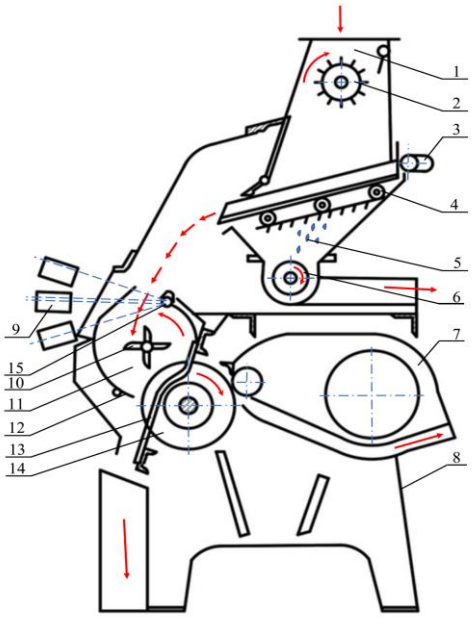

Fig. 2. Schematic diagram of the new linter machine

1-feeder, 2-feed roller, 3-eccentric shaft, 4-vibrating carriage, 5-trash, 6-auger for trash, 7-breathing chamber, 8-frame, 9-regulating unit, 10-agitator, 11-working chamber, 12-seed comb, 13-grit, 14-saw cylinder, 15-density valve

Figure 2 shows the operation of the linter machine, it is no different from the operation of the 5LP machine: technical and sowing seeds after ginning through the distribution screws enter the feeder 1 of the linter, through the feeder roller 2 the seeds enter the vibrating carriage 4, which operates at the same rate. With the help of the eccentric shaft 3 the seeds through the outlet hole enter the working chamber 11 of the linter machines.

Summary

1) In the new development strategy of Uzbekistan for 2022-2026 in our republic, among other things, on the rapid development of the national economy and ensuring high growth rates: "double the volume of production of textile industry products and widely implement programs to increase labor productivity in industrial sectors".

2) To create technology for effective extraction of small impurities from the composition of the seed mass without affecting the technological process during the transfer of seeds from the linter supplier, and to introduce technologies that ensure quality production of lint products at the enterprise.

3) Based on Lagrange's type II equations, the recovery coefficient depends on the shock and bounce speed. Energy consumption is determined by the interdependence of these speeds. The more mature seeds, the higher the recovery rate.

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