



TECHNOLOGICAL FEATURES AND PROBLEMS OF EXISTING LINTING MACHINE SYSTEMS

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Annotation:

This article discusses the issues of improving the design of the working chamber of the linter machine, with an emphasis on modernization and improving the efficiency of the agitator . The relevance of the study is due to the need to increase the productivity of linter machines and improve the quality of lint separation , which is an important factor in the textile industry. Analysis of existing designs and technologies of linter machines with a historical perspective. Identification of the main problems associated with the uneven distribution of seeds and lint in the working chamber. Development of proposals for improving the design of the agitator in order to increase the uniformity of mixing and reduce energy costs .

Keywords:

Linter machine, agitator , cotton processing, working chamber, lint separation , efficiency, design optimization, automation, textile industry, modernization, uniformity of mixing, energy consumption , cotton gin, productivity.

Introduction

Linter machines play a key role in the cotton processing process, ensuring the separation of short fibers (lint) from the seeds. Lint is an important raw material for the textile industry, and its quality directly depends on the efficiency of the linter units. In the modern textile industry, special attention is paid to the improvement of technological processes aimed at increasing productivity and improving the quality of products. One of the key units of linter machines is the agitator , which performs an important function of uniformly distributing cotton raw materials in the working chamber and preventing the formation of lumps and stagnant zones, which directly affects the quality of lint separation .

Main part

Technological features of linter machines

Modern linter machines consist of several key components, each of which performs a specific function in the process of separating linters from seeds:

Working chamber: This is the main compartment where the lint separation process takes place . The working chamber contains stirrers and other mechanical elements that ensure uniform distribution of seeds and fibers.

Stirrer : Responsible for mixing and uniform distribution of seeds in the working chamber, which contributes to more efficient separation of lint .

The agitator is an important part of the linter machines, playing a key role in the process of uniform distribution of raw materials (seeds and lint) in the working chamber. Its main task

is to maintain the uniformity of the flow of cotton raw materials and prevent sticking or lumps, which contributes to more effective separation of lint from seeds.

The design of the agitator includes several rotating elements (blades or teeth) that create a mechanical effect on the raw material. This process ensures mixing and uniform distribution of cotton raw material throughout the entire working chamber. The agitator helps prevent the formation of "dead zones" in the chamber, where the lint separation process may be less effective.

The operating principle is based on the creation of mechanical vibrations that enhance the interaction of seeds and linter with the working surfaces of the machine. This helps improve the contact between the seeds and the linter saws, which leads to better separation of the linter .

Problems associated with stirrers

1. **Uneven seed distribution:** Incorrectly adjusted or worn agitators can result in uneven seed distribution in the chamber, which reduces the quality of lint separation and increases production losses.

2. **Energy Costs :** Turners require significant energy to operate, which can increase the overall operating costs of linter machines.

3. **Wear of parts:** Frequent use and exposure of the stirrer to aggressive environments (dust, friction) leads to its wear, which requires regular maintenance and replacement of individual parts.

Solutions to improve the performance of the stirrer

Design upgrade: The introduction of more efficient blades with optimized geometry can improve mixing and uniformity of raw material distribution.

Use of modern materials: The use of new wear-resistant materials for the manufacture of stirrers helps to increase the service life of parts and reduce the frequency of their replacement.

Filtration and Cleaning Systems: Installed to remove dust and small particles, which helps maintain cleanliness and improves the quality of the final product.

Automatic control systems: Modern linter machines are equipped with sensors and automatic controllers that regulate the linter separation process in real time.

Technological improvements

- **Airflow Optimization:** Using computer modeling, it is possible to predict the behavior of air flows inside the working chamber and optimize them to improve lint separation efficiency .

- **Use of new materials:** Modern materials that are resistant to wear and corrosion significantly increase the durability of linter machine components.

- **Innovative designs of stirrers :** The development of new designs of stirrers , including special blades and attachments, improves seed mixing and uniformity of distribution.

Problems with existing systems

Uneven lint separation

One of the main problems faced by linter machines is uneven linter separation . This can lead to a decrease in the quality of the final product and an increase in fiber loss. The reasons for unevenness can be:

- Incorrect adjustment of stirrers

- Insufficient air flow efficiency
- Wear of mechanical components.
- High level of energy consumption

Linter machines consume significant amounts of energy to operate various components, including stirrers, filtration systems and automatic controls. High energy consumption is a serious problem, as it increases operating costs and reduces the overall economic efficiency of production.

Frequent clogging of working chambers

Clogging of the working chambers with dust and small particles is another common problem. This can lead to reduced machine performance, increased downtime and the need for frequent maintenance. Clogging can be caused by:

Insufficient efficiency of filtration and purification systems

Incorrect air flow settings

Use of materials subject to rapid wear and corrosion.

Solutions to troubleshoot problems

- Upgrading filtration systems: Using more efficient filters and cleaning systems can significantly reduce the level of dust and small particles in the working chamber.
- Optimization of stirrer designs: The introduction of new design solutions and the use of modern materials help to improve the uniformity of mixing and seed distribution.
- Automation of processes: The implementation of automatic control and monitoring systems allows for prompt response to changes in the lint separation process and minimization of the human factor.

Conclusion

Technological features of modern linter machines include the use of advanced automatic control systems, effective filters and innovative designs of stirrers. The main problems are uneven separation of lint, high energy consumption and frequent clogging of working chambers. These problems can be solved by upgrading filtration systems, optimizing designs and automating processes, which will lead to an increase in the overall efficiency and cost effectiveness of production.

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