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# **Development of Constructions of the Cleaning Drum to Provide the Conservation of the Natural Properties of Cotton and Seeds**

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**ABSTRACT:** This article is devoted to the development of a new cotton scrubber working unit, the justification of the working parameters and movement modes of the drum and roll cleaner, which make it possible to preserve as much as possible the natural properties of raw cotton.

**KEYWORDS:** peg drum, feeder, cleaner, strings, damage, monotony, bell, shaking, blowing, shell.

## **I. INTRODUCTION**

The solution to one of the problems of the production of raw cotton, in particular, its medium-staple varieties, depends on the acceleration of scientific and technological progress, an increase in the pace and efficiency of economic development, an increase in the capacity of cotton factories as a result of the creation of new complexes, the improvement of the working bodies of processing machines with increased productivity and high quality of manufactured products. "The most important strategic task is a deep technical re-equipment of processing industries, equipping them with modern equipment and technology, creating a complete full technological cycle for the production of high-quality competitive consumer goods" [1].

Much attention must be paid to the production and processing of raw cotton, which is a particularly valuable technical product of the textile industry. Improving the quality of the cotton fiber produced, production productivity is possible due to the use of highly efficient machines, modernization of the currently operating purifier body.

## **II. RELATED WORK**

The main disadvantage of ginning machines is the low efficiency of the impact of working bodies on the processed material and the multiple processing of raw cotton. The main working body of cotton ginning machines for cleaning from fine litter is a peel drum. At present, cotton ginning plants most effectively use drum cotton cleaners, screw cleaners, separator cleaners, feeders, etc. Extraction of small trash impurities from raw cotton is carried out by cleaners consisting of peg drums or peg augers interacting with nets or grate. Small trash impurities, the size of which is less than 8 mm, penetrate deeply into the fibers and their removal is associated with great difficulties.

At the same time, the existing drum-type cotton cleaners monotonously affect the processed material, damage the fiber and cotton seeds, reducing its natural qualities, and also have a low cleaning effect. To eliminate these disadvantages, it becomes necessary to identify the reasons for the low effectiveness of the impact of working bodies on the processed material and to develop new methods and working bodies for processing raw cotton, which have the property of an effective impact of working bodies on raw cotton while preserving its natural qualities. The cleaning effect, damage to seeds and other indicators of cleaning raw cotton are influenced by the length of the working parts of the cleaner, on which the overall dimensions of the machine also depend. From the analysis of research on raw cotton cleaners, it follows that most of the research is aimed at developing and modernizing the working elements of cleaning machines based on technology by optimization methods. There are practically no dynamic studies that determine the basis for calculating reliability, strength, durability, etc.. [2].



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## III. LITERATURE SURVEY

The main direction in the development of cotton ginning equipment is the intensification of the technological process by activating the working bodies. Therefore, the modernization of the tuning drum meets modern requirements. The reserve in improving the cleaners of fine litter of raw cotton is the selection and substantiation of the operating parameters and modes of movement of the working bodies, taking into account all the main characteristics and specific features of work on the basis of dynamic research of machines. Problematic issues in improving the design of the working bodies of cotton cleaners is the intensification of the interaction of working bodies and cotton by reducing the monotony of processing and reducing the frequency of cleaning.

The purpose of existing designs of raw cotton cleaners is to remove large and small trash impurities. In the cotton ginning industry, the mechanical method of cleaning cotton is widespread, in which the mechanical effect on the cotton and thereby loosen the bonds between cotton and litter at the same time, to some extent, inevitably damaging the cotton fiber and seeds.

## IV. METHODOLOGY

Despite the aforementioned disadvantages, the ginning industry is fully equipped with purifiers for mechanical impact on cotton, because such purifiers make it possible to obtain a relatively high efficiency of the purification processes. In recent years, a number of scientific research works have been carried out, which are entirely aimed at reducing damage to fibers and seeds during technological processing. They mainly consider those parts of cleaning machines where the volatiles are more exposed to shock. The results show that the damage to the fibers decreases due to a decrease in the frequency of processing, because the previous operating modes are preserved: the speed of the process, the direction of movement of the working bodies, and the shock-shaking effects on the fibers remain the same. For the existing cleaning processes, the main disadvantage is structural damage to cotton fiber and seeds during the interaction of working bodies: saw drums; on the grid or on the grate. The multiplicity of processing and the monotonous effect of the working body on the processed material impair the cleaning process. For the existing cleaning processes, the main disadvantage is structural damage to cotton fiber and seeds during the interaction of working bodies: saw drums; on the grid or on the grate. The multiplicity of processing and the monotonous effect of the working body on the processed material impairs the cleaning process. An analysis of the designs of domestic and foreign raw cotton cleaners showed that an important factor in the cleaning efficiency is the method of erecting the working bodies of the cleaners on cotton: shaking on a grid or grate, blowing with air, dynamic action of pegs, strips, etc. A review of raw cotton cleaners from small trash impurities indicates that an increase in the cleaning effect was achieved either by increasing the number of striking organs or by increasing the number of drums. Nonetheless, cotton fiber still turns out to be debris above existing norms.

## V. EXPERIMENTAL RESULTS

Therefore, ginneries are forced to purify raw cotton from small trash impurities many times in drying and refining shops. However, by reducing the clogging of the fiber, as if to the norm, the machines severely damage the fibers and seeds. So, the existing working bodies of cotton processing machines do not effectively affect the processed material, which makes it necessary to increase the processing frequency. In order to improve the efficiency of cleaning cotton, a new working body has been developed that actively affects the fibrous material. It is known that one of the main working organs in the cleaners is the peg drums, which drag cotton along the net or on the grate, loosening it and emitting fine litter from it. They have a low cleaning effect. Since in the process of operation, the drum splitting does not provide the necessary shock-impulse pulling forces. In addition, evenly radially installed pegs lead to monotonicity of their impact on the tap. We know that trash impurities lie on the surface of the pit and at different depths chaotically, the monotony of shock effects from the pegs does not provide optimal conditions for litter release. To eliminate the monotony of the impact of working bodies on the processed material, we have developed an active body of the feeder-cleaner [3]. In the developed peg drum of the cleaner [2], the pegs of each row are installed at different angles to the corresponding row of the radial plane with the formation of the ends of the pegs of each row of a sinusoid. In fig. 1.7. Depicts a developed raw cotton cleaner drum with inclined splitters. The essence of the developed working body is illustrated in Fig. 1a-view from the end of the drum; b-two adjacent rows of tuners along the length of the drum; c - the options for the placement of the pegs of the relative radial plane and the forces acting on the cotton are shown. The peel drum of the cleaner contains a cylindrical shell 1 with pegs 2 installed at an angle to the radial plane corresponding to a

given row with the formation of the ends of the pegs of a sinusoid 3, while pegs 2 of adjacent rows are located at different angles, while the sinusoids of 3 adjacent rows are displaced, for example, by a quarter period.

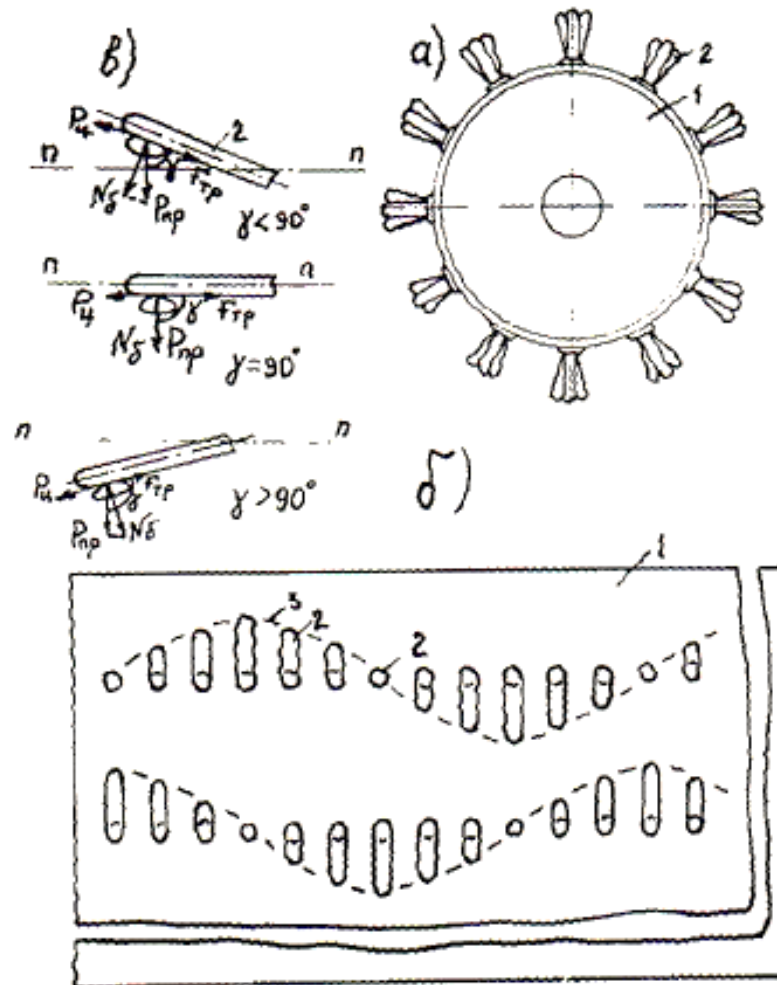


Fig. 1. Tilted cotton peeler head drum

The working body of the cleaner works as follows: the loosening drum 1 picks up the raw cotton and drags it along the mesh surface at variable speed. Since the pegs 2 of each row are set at an angle to the corresponding radial plane, the pulling force has a different value. Installation of pegs 2 at different angles of the drum allows you to eliminate the monotony of the impact on the fly or the particles of raw cotton by creating conditions for organized shock effects of each splitting drum and particles of raw cotton. At the same time, there is an intensive rupture of the binding forces and the release of trash impurities from the fibrous mass, which ultimately leads to an increase in the cleaning effect [4].

Figure 1-shows the interaction of the splitting and volatilization of raw cotton. The scheme has the following designations:  $P_{np}$  - pulling force;  $P_{tp}$ - friction force;  $P_{ii}$ - centrifugal force of the fly;  $N$  is the reaction from the splitter to the tapping. The diagram shows that with a change in the angle, the pulling force will have a different value.

### VI. CONCLUSION AND FUTURE WORK

The proposed working body, the pick drum of the feeder, allows to provide better cotton supply and to reduce the bottoming in the feed rollers, should contribute to the stability of the supply of cotton to the dusty drum of the gin and increase the cleaning effect of the machine and significantly increase the efficiency of loosening and cleaning



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cotton from trash. According to the research results, a new design of a peeling drum of a raw cotton cleaner has been developed, which allows to significantly increase the efficiency of loosening and cleaning fibrous material from weeds [5].

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