



RESEARCH ON IMPROVING THE WORKING BODIES OF THE MACHINE FOR CLEANING COTTON FROM WASTE

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ABSTRACT

The article provides information on improving the working bodies of the machine for cleaning raw cotton from large and small trash impurities. Combined cotton cleaner (CCC) containing areas for cleaning from fine trash with pegs with nets under them, zones for cleaning coarse debris with serrated cylinders, grates, lapping brushes, hoppers for debris removal, characterized in that pegs are made with different diameters of pegs, and the diameter of the cylinder heads of each subsequent zone is 20% larger than the diameter of the cylinder heads of the previous zone. The cleaner according to figure 1, characterized in that the grates are made multifaceted, and the grates in the first zone of large cleaning made six-sided, in the second zone seven-sided and in the third zone eight-sided.

KEYWORDS: *raw cotton, cotton cleaner, trash, pegs, cylinder.*

INTRODUCTION

In the world, research work is carried out for the cotton ginning industry aimed at the development of innovative techniques and technologies that provide for the effective use of modern achievements of science and technology, and the modernization of

existing ones [1,2]. In this industry, including the development of efficient, resource-saving designs of working bodies, grates of cotton cleaners from large trash is of great importance [3,4].

In our republic, special attention is paid to the creation of high-performance technological



machines and equipment, their control systems for technological processes of primary processing of cotton. The Action Strategy for the Further Development of the Republic of Uzbekistan for 2017-2021 provides for "... increasing the competitiveness of the national economy, Reducing energy and material costs in the economy, widespread introduction of energy-saving technologies into production ...". When performing this task, it is important, among other things, to create effective designs of grates for cleaning cotton from coarse trash and introduce them into production in order to obtain products of a given quality according to the initial quality indicators of raw cotton [5-8].

At the present stage of development of the cotton ginning industry, it is important to intensify the cleaning of raw cotton, develop more advanced designs, find new, effective methods for cleaning raw cotton from small and large trash impurities, as well as the choice of rational modes of movement of the working bodies of cotton cleaners [9,10].

The process of cleaning raw cotton from weeds and impurities is determined by the nature of its contamination and the effectiveness of the working bodies of the cleaners. The purifiers are divided into machines for separating large weed impurities from raw cotton (cotton stalks, boll, flap, etc.) and machines for separating small weed impurities (leaf particles, bracts, flowers, dust, etc.). The efficiency of removing weeds from raw cotton largely depends on the quality features inherent in a given selective cotton variety, industrial variety and moisture content of cotton, fiber length, the residence time of weeds in raw cotton, the nature of trash adhesion and many other indicators [11,12].

MAIN PART

The closest in technical essence to the claimed is selected as a prototype cotton purifier combined brand CCC intended for cleaning raw cotton medium fiber and fine fiber varieties from coarse and fine trash in the ginning industry [13]. The disadvantage of the known design of the combined cotton cleaner (CCC) is that it catches small trash impurities and merges with large trash in

which there are volatiles of raw cotton. In addition, the CCC purifier does not have a sufficiently high efficiency of cleaning raw cotton, both fine and coarse trash.

The purpose of the study is to remove small and large trash impurities separately and increase the cleaning effect. The task is solved by improving the design of the elements of the zones of small and large cleaning [14,15].

The essence of the design lies in the fact that a combined cotton cleaner containing a cotton cleaner from small debris pegs and a grid under them, alternating with them a cotton cleaner from coarse debris containing serrated cylinders and with a grate under them and a stationary brush, while the diameters of the pegs of each subsequent cylinder 10% more than the diameters of the heads of the previous cylinder, the grates of the large trash cleaner are made multifaceted, and the grates of the first zone of large cleaning are made hexagonal, the second zone is seven-sided and the third zone is octagonal. At the beginning of cleaning, the raw cotton will be less loosened, and therefore it is important to effectively open the cotton by making the splits of the first cylinder with the smallest diameter. In the final cleaning zone, the cotton will be more loosened, and therefore, for efficient transportation, the diameter of the cylinder heads is made the largest. Accordingly, in the first zone for cleaning cotton from coarse trash, the grates are made hexagonal, which allows the cotton to be loosened into separate bats, and in the third zone, the grates are made octahedral. At the same time, the inhibition of cotton fly worms during their interaction with octahedral grates is maximally reduced. Combined cotton cleaner allows efficient separation of trash, while small and large trash impurities are removed separately through appropriate screw conveyors [16,17].

The design is illustrated by a drawing, where in fig. 1 is a general diagram of a combined cotton cleaner, in fig. 2 - splitting cylinders of the first, second, third zones for cleaning cotton from fine trash; in fig. 3-section A-A in fig. 1, fig. 4-section B-B in fig. 1, fig. 5 - section C-C in fig. 1.

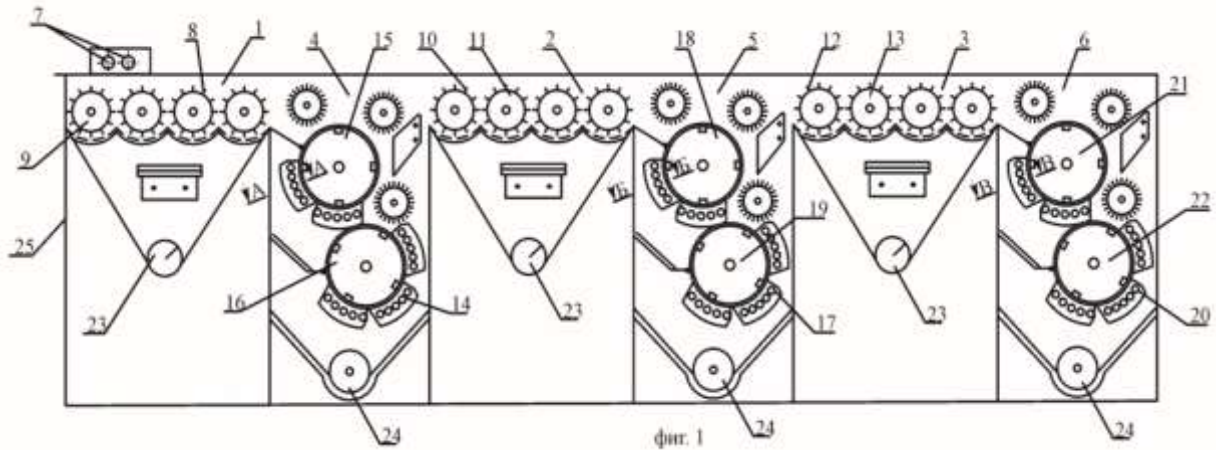


Fig. 1. General scheme of cotton cleaner combined

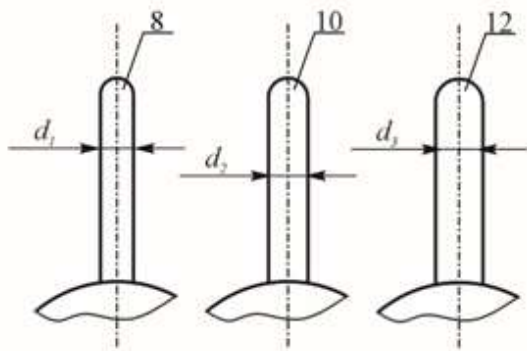


Fig. 2. Splitting cylinders of the first, second, third zones for cleaning cotton from fine trash

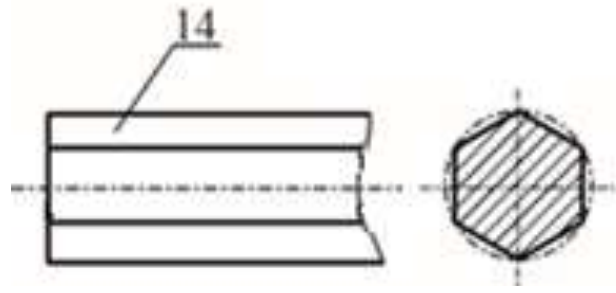


Fig. 3. Section A-A

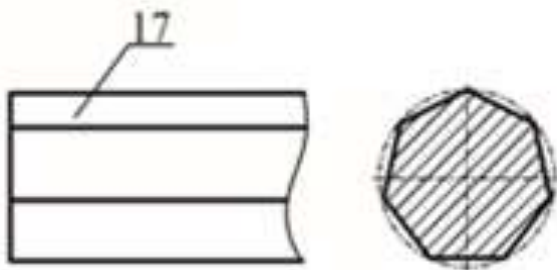


Fig. 4. Section B-B

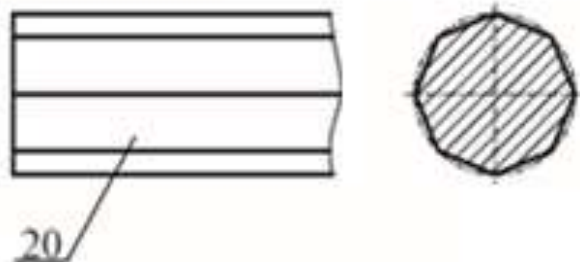


Fig. 5. Section C-C

Combined cotton cleaner contains 1,2,3 zones for cleaning cotton from fine trash and 4,5,6 zones for cleaning cotton from coarse trash. Above the first zone 1, the feed rollers 7 are installed. The pegs 8 of the cylinders 9 of the zone 1 are made with a diameter d_1 , the second zone 2 the pegs 10 of the cylinders 11 are made with a diameter of $d_2 = 1.2 d_1$, and in the third zone 3, the pegs 12 of the cylinders 13 are made with a diameter of $d_3 = 1.2 d_2$. In zone 4 the grates 14 under the serrated cylinders 15 and 16

are made hexagonal, in zone 5 the grates 17 under the serrated cylinders 18, 19 are made seven-sided and in zone 6 the grates 20 under the serrated cylinders 21, 22 are made octahedral. Small trash impurities are removed by the augers 23, and large trash impurities are removed through the augers 24. The working bodies are installed in the housing 25.

The cleaner works as follows. The raw cotton through the feed rollers 7 enters the first zone 1 to the peg cylinders 9, the pegs 8 of which are



made with the smallest diameters capture and pull the cotton effectively loosens it. At the same time, in zone 1, raw cotton is less loosened and therefore, due to their greater mutual cohesion, is transported without braking to zone 4. In this zone, grates 14 under the serrated cylinders 15 and 16 are hexagonal, when cotton interacts with them; multidirectional reaction forces occur with sufficient values, large trash is effectively separated. Further, in the 2nd, 5th, 3rd and 6th zones, cotton is cleared in a similar way. But, at the same time, in the course of cotton movement along these zones, the diameters d_2 , d_3 of pegs 10 and 12 will be larger than d_1 and have the ratio:

$$d_2=1.2 d_1; d_3=1.2 d_2.$$

Where, d_1 - pegs diameter 8 mm; d_2 - pegs diameter 10 mm; d_3 - pegs diameter 12 mm;

With an increase in the diameters of the pegs 10 and 12 in the corresponding zones, they allow not only the separation of trash from the cotton, but also its full-value transported without braking due to the larger contact area of the pegs 10 and 12 with the cotton bats. It is known [2] that with an increase in the number of grates of a cotton cleaner from coarse trash, the cleaning effect decreases. Moreover, with an increase in the number of grate faces, they approach the cylindrical surface. When making grates 14 hexahedral, their interaction with less loosened cotton, forces arise in a versatile direction, leading to additional loosening of cotton, thereby increasing the cleaning effect in zones 5 and 6, grates 17 and 20, made respectively seven and octahedral, also forces interactions with cotton in various ways. But, at the same time, the inhibition of cotton volatiles decreases, leading to their continuous transportation. The isolated small trash impurities in the 1st, 2nd and 3rd zones are removed by 23 augers, and the separated large trash impurities in the 4th, 5th and 6th zones are removed by 24 augers.

CONCLUSION

Combined cotton cleaner allows to increase the effect of cleaning raw cotton on fine and coarse trash up to (25-26)% relative to the CCC cleaner.

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