

Results of Preliminary Studies of the Modernized Direct Fiber Cleaner

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ABSTRACT: The article presents the results of work on the modernization of a direct-flow fiber cleaner and preliminary study of it in the production conditions of a cotton gin plant.

KEY WORDS: direct-flow fiber cleaners, development, scheme, modernization, contamination, cleaning effect.

I. INTRODUCTION

Of the domestic designs, due to the simplicity of the device and the high efficiency of work, fiber cleaning machines of direct-flow action, with the supply of fiber to the working body immediately after ginning in a loosened state, individual single and multi-stage, are widespread.

After the transition of cotton gin plants to larger and more productive gins of the DP-130 type, the fiber cleaners developed for them began to work unreliably (after 1-2 work shifts, the gaps between the saw cylinders and grate bars are broken and naturally they are re-adjusted).

On fiber cleaners for gins DP-130 there are the following disadvantages: 1) there is a decrease in the stiffness of the saw cylinder.

2) The weight of the saw cylinder reaches 500kg.

3) The saw cylinder is very poorly balanced.

All this leads to:

1) Vibration of the fiber cleaning saw cylinder.

2) Violation of the gaps between the saw cylinders and grate.

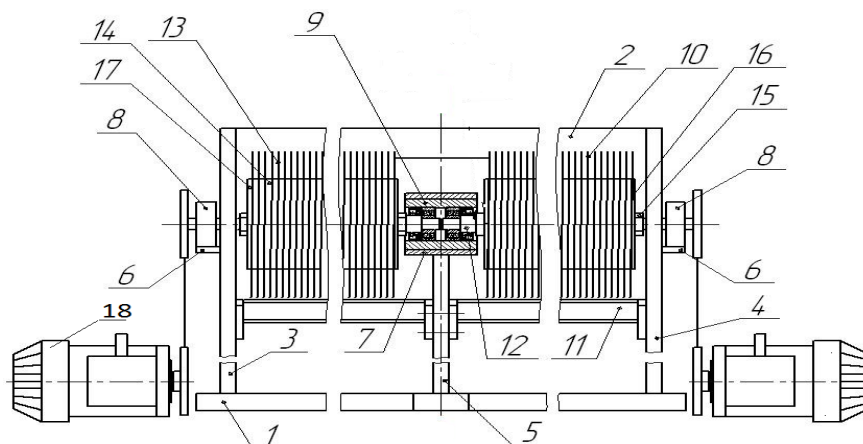
3) Reducing the cleaning effect of the fiber.

4) An increase in the mass of fiber in the waste after the fiber cleaner.

5) Failure of bearing assemblies earlier than service life.

6) An increase in the bottom of the fiber in the grate.

Based on the results of the work carried out, the design of a new fiber cleaner was developed at "Pakhtasanoatilmiymarkazi" JSC (fig. 1), and tests were made and tested at the cotton-ginning plant in the Andijan region.



1 frame; 2-fiber cleaner body; 3-4- extreme walls; 5- middle wall partition; 6 and 7 supports; 8 and 9 bearing housings; 10-saw cylinder; 11 grates; 12-saw shafts; 13-saws; 14-groove gasket; 15-tightening nuts; 16-oblique washer; 17-key; 18-electric motor

Figure 1. Schematic diagram of the new design of the fiber cleaner.

The developed saw fiber cleaner [1] consists of: frame 1, on which the fiber cleaner body 2 is attached, saw cylinders 10 with bearing housings 8 and 9, grates 11 installed along the body length with a vertical transverse partition wall 5 installed in the middle of the fiber cleaner, on which bearing housings 8 and 9, the ends of the saw cylinders 10 are separately mounted on the bearings, each of which has its own drive motor 18.

According to the test results, the following results were obtained [2], which are shown in chart 1.

Chart 1

Fiber quality indicators after 5DP-130 gins and 1VPU fiber cleaners and an experimental straight-through fiber cleaner

Technological equipment	Waste fiber,%	Mass fraction of flaws and trash in fiber,%	Cleaning effect, %
Fiber cleaner 1VPU	32,4	4,5	30,0
Experimental co-current fiber cleaner	30,5	4,2	36,0

Studying the technological process of the developed fiber cleaner installed at the cotton ginning plant, the author has developed a scheme (Fig. 2), in which one sidewall of the fiber cleaner installed from the side of the gin is made without a louver.

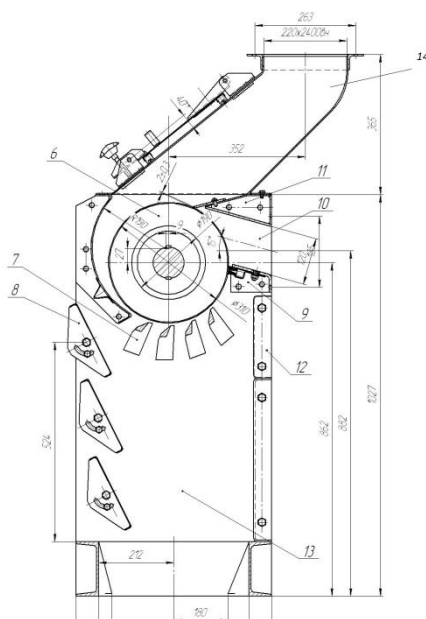


Figure 2. Schematic diagram of the modernized design of the fiber cleaner.

In the production conditions of the cotton ginning plant, the necessary units were made, with the help of which changes were made in the design of the fiber cleaner, which is shown in fig. 3.



Figure 3. General view of the fiber cleaner, modernized and installed at the plant

After commissioning and adjustment of the aerodynamic regime, preliminary experiments were carried out in the processing of cotton of the Sulton selection, the first industrial grade in the 2019-2020 season. The preliminary indicators of the processed cotton are as follows, weediness 4.6%, moisture 8.6%. The results of preliminary experiments are shown in table 2.

Chart 2

Results of preliminary experiments with 1VPU fiber cleaners and an upgraded straight-through fiber cleaner

Technological equipment	Fiber content in the beetle	Mass fraction of flaws and trash in fiber, %		Cleaning effect, %
		After the gin	After the fiber cleaner	
Fiber cleaner 1VPU	22,4	3,9	2,73	30,0
Upgraded straight-through fiber cleaner	7,9	3,9	2,33	40,2

From the data in charts 1 and 2 it can be seen that such a modernization of the fiber cleaner increases its cleaning effect in comparison with the performance indicators of the design itself and in comparison with the existing fiber cleaner.

Scientific and experimental work will be continued in the direction of substantiating the main parameters of the modernized fiber cleaner.

Conclusion

Research work to improve the performance characteristics of direct current fiber cleaning transmissions has been analyzed, specific aspects of constructions have been considered, and ways to create circuits have been identified.

The design of fiber cleaning conveyors has been improved and the design features have been analyzed through scientific research. At the same time, it was recommended to use a new mechanism for direct flow fiber cleaning envelopes in cotton gins.



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