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NEW SAW BLADE FOR CLEANING COTTON FIBER

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Abstract. The article presents designs, tasks, essence, principle of operation of the saw blade, which will be improved to increase the efficiency of cleaning the cotton fiber cleaner. The advantages and disadvantages of existing saw blades of cotton fiber cleaners have been studied.

Key words: cotton fiber, fiber-cleaner, saw disk, saw cylinder, grate bar, shock wave, airstream.

INTRODUCTION. In the process of interaction with the working members of the cleaning machines, significant damage and shortening of the fiber is possible. The main reasons for fiber breakage are high stresses that arise in the fiber under mechanical stress. In this regard, when designing high-speed cleaning machines, a very important aspect is the correct determination of the velocity and design parameters of the working members of the cleaner in order to prevent plastic deformation of the fiber when interacting with the working elements of the cleaner. Previously, the analysis of the stresses arising at the place of interaction of

the fiber with the working members of the cleaners was considered in [1-4], however, for our task, these issues require additional study.

Under dynamic loading of a body, perturbations propagate with a certain final velocity in the form of stress waves. At some point in time, on one side of the surface, the medium is disturbed, here there are displacements of its particles, on the other side of the surface, the medium is at rest - there is no movement of particles [5].

MAIN BODY. The new saw blade of fiber-cleaner belongs to the textile

industry and can be used in cotton factories.

Known fiber-cleaners for cleaning fibers [6], containing a saw cylinder with saws [7].

The disadvantage of this analogue is the low cleaning effect and significant loss of fibers by their leaving to waste after cleaning.

The closest analogue is a saw blade, i.e. an element for cleaning the fiber from weeds, consisting of a saw cylinder and a grate. The purpose of the saw blade, i.e. the cleaning element is the capture of fibers by the teeth of the saw blade and wiping them with a blow against the trash removal surfaces (grates), where litter is released. Technological requirements for the cleaning element, i.e. the saw blade is the maximum separation of trash impurities from the fiber with the least fibrous waste, prevention of fiber damage, regulation of the release of trash and fibrous waste.

The task of the perfect saw blade of a fiber-cleaner is to increase the cleaning effect of the machine by creating an aerodynamic air flow that affects the flight path of the fiber bundle captured by tooth of the saw blade, to enhance the release of trash from the grate zone.

The task is solved by increasing the air flow from the side of the saw cylinder, which consists of saw blades with petals stamped from the body of the saw blade (of various types). The petals create, in addition to the existing air flow resulting from the friction of the air against the saw blade walls, an increase in the air flow with the stamped petals. In addition, the plane of the petal is inclined relative to the surface of the saw blade, and the direction of its base can be directed along or at an angle to the radial line of the saw blade.

The air flow facilitates the transportation of the fiber, its capture by teeth of the saw, the transfer of a strand of fiber from one saw cylinder to another, and the output from the machine to the fiber outlet; in addition, it returns the fiber that has fallen out with the waste through the openings of the grates of the waste chamber. The more air is sucked in through the grates, the less fibrous waste and vice versa, therefore, when developing new or modernized fiber cleaning devices, it is necessary to know the amount of air sucked through the grates, at which the best technological indicators are achieved [8].

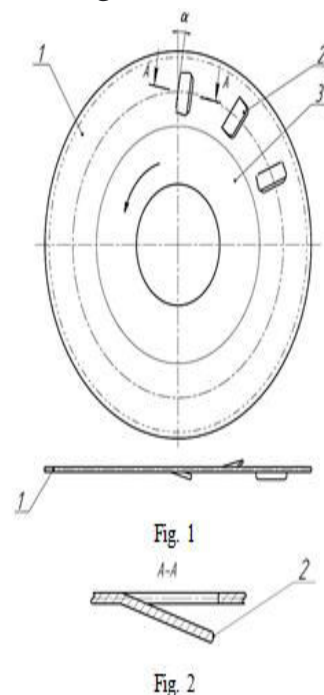
The essence of the perfect saw blade of a fiber cleaner is to implement a full blow of the fiber bundle against the edge of the grate,

which increases the shaking out of the debris from the fiber bundle. A full blow is carried out by increasing the air flow created by the stamped petals. The air flow is generated by the rotation of the saws of the saw cylinder by the flow coming from the fiber feed to the fiber-cleaner. In addition, the centrifugal force acting on the strand of fibers also contributes to its deviation from the surface of the saw cylinder, bringing it closer to the edge of the grate. Additional air flow is generated from the petals, formed by cutting them from the body of the saw blade, giving them a certain tilt to the surface of the saw blade and the direction of the base of the petals along the radial line of the saw blade or at an angle to them. Such petals, rotating together with the saw, form an air flow towards the periphery of the saw blades, contributing to the full deflection of the strand of fibers from the surface of the saw cylinder and effective cleaning of the fibers from weeds. In addition, such an enhanced air flow excludes the suction of air and separated weeds from under the grate (from the waste chamber).

As you can see, due to the more complete machinability on the edge of the grate of the fiber bundle, the elimination of the return of trash impurities into the fiber cleaning zone, as well as the promotion of complete removal after cleaning the

fibers attached to tooth of the saw, an increase in the cleaning effect of the machine is achieved.

The new saw blade of the fiber-cleaner is illustrated by drawings, where: Fig. 1 shows the saw blade 1 in front and top view, having stamped petals 2 on both sides of the saw blade. The petals around the saw blade are stamped through one from different sides. Figure 2 shows a section A-A of the stamped petal 2 according to Figure 1. The embossed petal is rectangular.



The device works as follows. When the saw cylinder rotates, its surface creates an air flow that rotates with the saw cylinder. This air flow, when it meets the air flow that goes along the technological chain of cotton processing from the gin branch pipe, are connected (the previous

machine from the fiber cleaner) and they go together to the surface of the grate, where they help to clean the fiber from weed impurities and remove the latter through the grate into the waste chamber. In addition, these two air streams eject (suck) the air stream formed between the saws, which will also participate in fiber cleaning. However, the pressure of the air flow is not sufficient to completely remove the debris into the waste chamber, so they partially return to the cleaning zone.

To eliminate such shortcomings on the saw blade, Fig. 1, petals 2, which are indicated in Fig. 2, are cut and bent from each side of it by stamping. The disc rotating, with the help of stamped petals, creates an additional air flow, increases the flow rate previously formed by saw blades without petals. This air flow prevents debris from returning to the cleaning area due to its increased velocity. In addition, the increased air flow rate contributes to the complete descent of the cleaned fibers from tooth of the saw.

The tilt of the petals is directed in the opposite direction from the rotation of the saw blade. The petals are stamped on the plane of the disc between the circular surface of the interstitial spacers 3 (Fig. 1) and the peripheral plane of the disc. The

direction of the bending line of the petal can coincide with the radial line of the saw blade or make an angle α with the radial line, which provides the necessary direction of the generated air flow.

CONCLUSION. The new saw blade of fiber-cleaner belongs to the textile industry and can be used in cotton factories. By increasing the cleaning effect of the fiber-cleaner, the economic effect will be higher, reducing the loss of fiber to waste. The task is solved by increasing the air flow from the side of the saw cylinder, which consists of saw blades with petals stamped from the body of the saw blade.

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