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PROBLEMS OF FIBER REMOVAL PROCESSES FROM SAW TEETH IN FIBER SEPARATION

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Abstract

The analysis of foreign experiments on increasing the efficiency of the processes of separation of sawdust fiber and removal of cotton fiber from sawdust teeth has been seen

The efficiency of extracting bundles of fibers from saw teeth has a direct effect on the shape of the tooth profile, the angular parameters of its elements, and the absolute linear dimensions. These theoretical problems were examined experimentally in the scientific works of E.V. Volovik, I.T. Maksudov, and F.A. Saadi [1,2].

However, the influence of its geometrical parameters on the effectiveness of the extraction of fiber bundles from the saw tooth has not been sufficiently studied, and the timeliness of the fiber extraction process plays an important role. Experimental tests were conducted in order to study the influence of saw teeth on the efficiency of fiber mass extraction, on the geometric parameters of the saw [3].

In this case, the selected saw consists of teeth with different pitches (from 2÷5mm) and the front edge of the tooth is selected at different angles (from 200 to 500). In addition, the teeth are separated relative to each other, and the height of the saw teeth in the new geometry is reduced by one tooth, under pressure relative to the upper blade 2 [4] The study of the extraction of fiber from the saw tooth was carried out in a special device equipped with a nozzle tube with a diameter of 11 mm. Air transfer to the nozzle is carried out using a fan and through a pipe. The thin system and speed of the air coming out of the nozzle were adjusted by changing the static pressure. The pressure in the chamber was determined using a U-shaped water manometer.

Separation of cotton from fiber was carried out as in previous experiments, the limit of fiber extraction from saws of various options was evaluated according to the minimum speed of the air system flow, the lower limit of the minimum values, that is, the limit of rejection of the fiber from the tooth, was not taken into account.

In each experiment, high pressure in the chamber (2452.5 Pa) with the help of an air flow control valve, i.e., at a speed that leads to an increase in the flow of the air system, did not lead to the occurrence of negative conditions in the extraction of fibers from the saw teeth.

The pressure in the chamber was then reduced (during the fiber separation process) until the complete fiber reached the breaking point of the output element (verified by observing the complete fiber withdrawal).

According to the results of experimental investigations, with the increase of the tooth height, the extraction of fiber in the air system becomes more difficult without changing the slope of the working edge, and it becomes easier when the slope of the front edge of the tooth increases and the steps of the teeth on the saw are reduced (when there are more than 280 teeth). This shows that there is less resistance to fiber pull-out at the tooth bend, and this is confirmed by the calculations.

The speed of removing the fiber mass from the saw tooth is significantly influenced by the location of the air spray nozzle in relation to the saw cylinder;

- Moisture content of raw cotton in the process of separating fiber and seed from cotton;
- The quality of the working surfaces of the saw teeth and the condition of the teeth.

The works of P.NTyutin, M.G.Khamov, E.M.Abdulrazokov, R.G.Makhkamov are devoted to the development and testing of methods of cleaning saws and colosniks in the equipment of fiber separation machines [5.6].

Cleaning the teeth of saws in cotton factories and bringing them to the required size, polishing the teeth in a bath filled with metal sand, sharpening the edges of the blades, does not meet the requirements of GOST, in the process of use, their roughness gradually acquires its standard value, but the teeth are often damaged and the saws are quickly replaced.

After grinding the saw teeth, the air speed should be 55-60 m/s, and the corresponding static pressure in the air chamber should be 1970.5 Pa. The results of the experiments are presented in Table 1. 1.

1. 1- Table. The main parameters of air extraction of fibers from saws with different geometries.

Construction options of the saw	**static pressure in the chamber, Pa**	**The speed of the air coming out of the nozzle is m/s**
The number of saw teeth;		
200	1900.0	55.0
240	1900.0	55.0
320	1822.0	54.0
360	1822.0	54.0
420	1800.0	53.7
500	1600.0	50.6
The angle β of inclination of the front edge of the tooth, degrees		
20	1950.0	55.9
25	1900.0	55.0
30	1900.0	55.0
35	1863.0	54.6
40	1836.0	54.2
50	1550.0	49.8
Low-High, Left-Right Reversible Tooth Saw Polished Standard Saw (Grade 9)	1700.0	52.0
	1900.0	55.0
	735	35.0

However, taking into account that the teeth are not treated with sufficient care and maturity, the actual speed of the air coming out of the nozzle in the conditions of cotton factories is set at 65-75 m/s. This speed is provided by the fan, the static pressure in the air chamber is 2950-3450 Pa, the power consumption is 2.2 kW. According to the indicators in the table, the power used for fiber extraction corresponds to 1.2 kW.

Therefore, the determined energy costs will be 1kWh higher for the actual saw teeth compared to the calculated value.

The pressure of 735 Pa is enough to extract the fiber from the saw teeth prepared by processing the curvature of the saw tooth (hummingbird), the air coming out of the nozzle is at a speed of 15 m/s, the energy costs for extracting the fiber are reduced by five times, as a result, a reserve for saving electricity is created. . In addition to energy costs, the speed of fiber mass removal from saw teeth is influenced by the characteristics of tooth sizes and, to a lesser extent, microgeometry (quality of tooth surfaces).

It is necessary to take into account these cases in the theoretical consideration of the extraction of fiber mass from saw teeth directly in the process of extracting fibers from teeth using air and brush drums.

In this case, the fiber output is in two phases, the first phase is in the l1 part, that is, the fiber output is under the nozzle blade and moving their ends in the direction of the saw rotation, and in the second phase, the fiber output itself, taking into account the lightness and ductility of the fibers, and the tendency to transverse bending, the length of the first phase is less than the fiber length. does.

Mechanical removal of fiber mass from saw teeth using a brush drum is more reliable than the aerodynamic method. Saws with reduced steps are removed in this way, that is, with the help of drums, and it is observed that their long and stable operation increases the efficiency due to the reduction of brush fibers in the drum hitting the saws.

When we compare it with the American fiber separation machines, it can be seen that they also face the same problem. As a result of the impact of the brush drum brushes with the saw cylinder, rapid erosion is observed and it is necessary to replace it. From this point of view, the "brush drum-saw cylinder" system requires improvement.

In scientific sources, it is noted that the fiber separation system using air consumes relatively little energy. However, when the situation in cotton ginning enterprises is studied, it can be seen that enterprises use 1 30 kW/h energy-consuming VTs 10 fan for 2 or 3 saw batteries.

This situation shows that the recommendations in theoretical works are not sufficiently effective in practice, in fact, 8-10 kW of electricity and 1-1.2 mz of air are spent per 1 ton of fiber to separate the cotton fiber from the saw teeth. [7]. This is a very large amount, and it is necessary to take measures to reduce these indicators using all scientific and practical experience.

Summary

The need to develop a resource-efficient fiber stripping device was justified by further studying and analyzing the processes of ginning and fiber extraction from saw teeth in order to extract cotton fiber from saw teeth and reduce energy consumption.

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