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A Device for Measuring Seed Sizes of Raw Cotton and the Calculated Values of Microradios Edges of The Teeth of Circular Saws

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ABSTRACT:In this article are shown the results of experimental research on the measurement of seed sizes of raw cotton filler in the interaction of microgeometry of saw teeth to ensure the efficiency of the fiber separation process in the "tooth-saw-roller-filler-fire bar" system. A new design of the device for determining the geometric parameters of seeds was developed and histograms of seed size distribution for various selective sorts were received

KEY WORDS: fiber separation, cotton, filler, raw roller, fire bar, tooth of saw, microgeometry of tooth, feeder.

I.INTRODUCTION

One of the main problems of economic development in the program of the Republic of Uzbekistan is the improvement of technology and technology of the cotton industry, the leading technological link of which is the process of fiber separation, performed by the saw cylinder Assembly. The process of fiber separation and seeds is carried out directly by means of a saw and a grate. The working condition of these working bodies depends on the clogging of raw cotton, humidity, content of organic abrasive elements. As a result, with an increase in the content of these elements, an increase in the wear of the working teeth of the saw, the ribs of the grate begins, which leads to a decrease in their service life, a large consumption of expensive tool steels and the purchase of export raw materials of round disk materials for the manufacture of saws. The solution of these problems is devoted to the selected scientific and technical task – improving the design of the saw cylinder fiber separation machines, which improves the productivity of machines and improve the quality of fibers and seeds, increase the service life of saws, improve the efficiency of the fiber separation process [1].

II. SIGNIFICANCE OF THE SYSTEM

At the same time, the implementation of targeted research on the development of highly efficient designs of the working bodies of the main technological machine of cotton mills - saw fiber machines, the creation of methods for calculating the parameters and modes of movement that allow to achieve a significant increase in the productivity of machines at high humidity of raw cotton to obtain high-quality cotton fiber, is considered one of the urgent tasks of the industry.

III. LITERATURE SURVEY

Determining the size of the seeds was carried out according to the methodology we have developed for the upland varieties of cotton. Separation of the volatiles from the fibrous cover corresponded to the technological requirement for the raw roller and the process of separation of fiber and seeds. It is known that the process of separating the fiber and seeds is followed by a scheme (Fig.1). Raw cotton enters the chamber, which on the one hand is equipped with metal grates. Between the grate are circular saws that roll the fibers and drag them into the gaps between the grate.

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When rotating, the discs tear the fibers from the seeds. The air supplied by the fan through the nozzle blows the fibers from the discs. Then they are removed from the machine by the air flow through the fiber. Weed impurities and immature seeds under the action of centrifugal force are discharged into the chamber and removed. The purified seeds from the machine through the seed removal enter the screw conveyor for further purification.
When excessive debris fibers require additional clearing on cisticola with drums and grate bars. Next, the fiber is pressed into bales weighing 150-200 kg at a density of compressed fiber in a pile of 0.5–0.7 g/sm3.
On the seeds after ginning's remain short fibers (fluff and down), withdrawn re-seed treatment in a number of techniques for special machines called down separators, or linters. The mass of these fibers is 5-8 % of the raw mass[2].

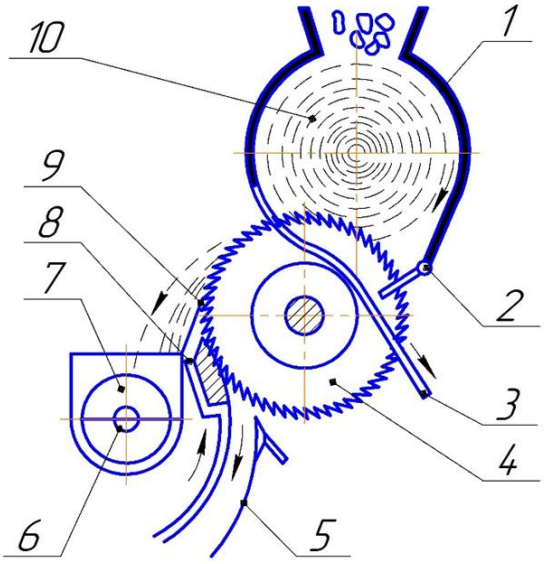

Fig. 1. Scheme for obtaining bare seeds in the process of fibber ginning.

1-working chamber, 2-comb, 3-grate, 4-disc saw, 5-capricorn, 6-tray, 7-screw, 8-nozzle, 9-fixed knife, 10-raw roller.

IV. METHODOLOGY

The bare seeds were selected from three points, at the moment of the fall of the seeds into the screw conveyor (Fig.1) and their dimensions were measured on a special device (Fig.2).

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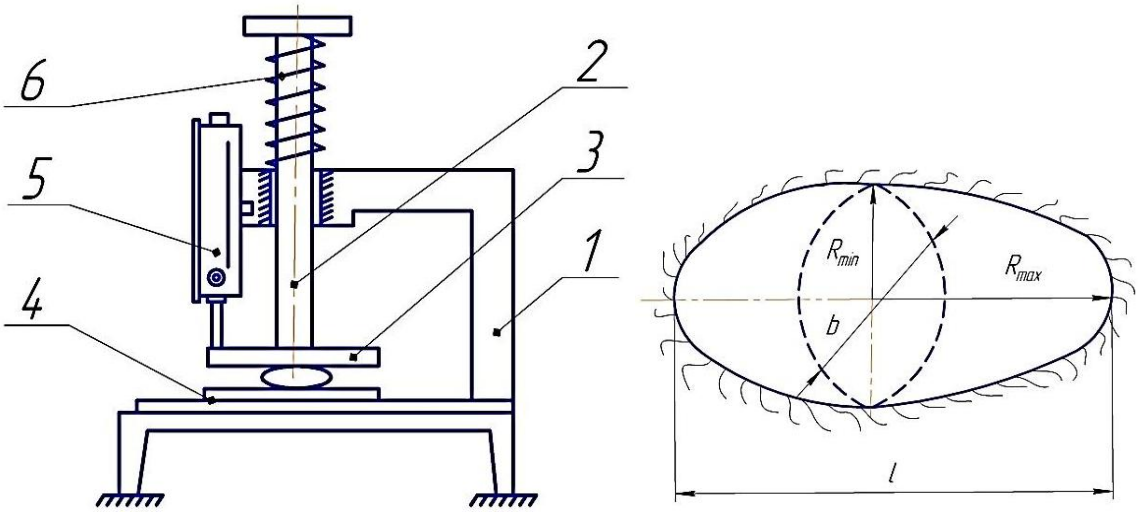


ab

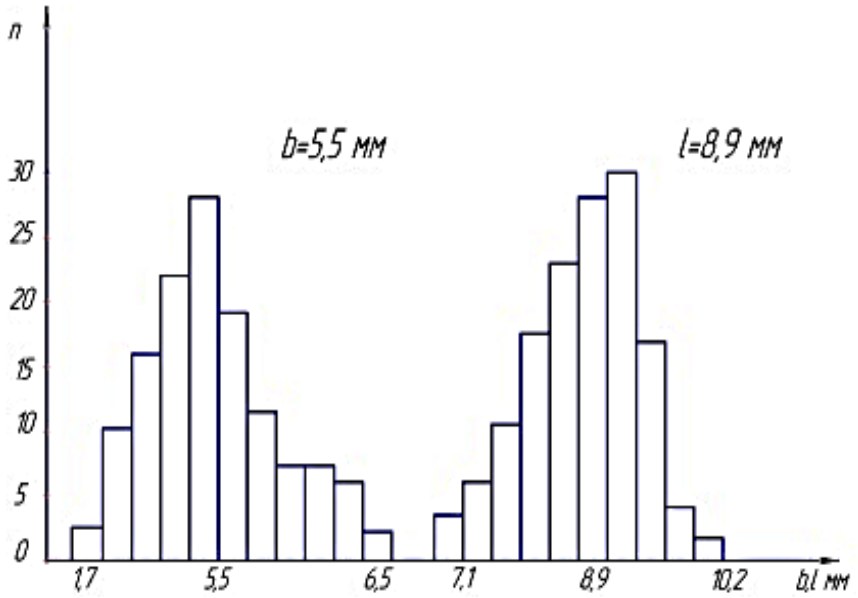
Fig.2. Device for measuring the size of raw cotton seeds.

a - diagram of the device for measuring the size of raw cotton seeds,
b - parameters of bare seeds.
1-body, 2-rod, 3-measuring platform, 4-plate, 5-indicator, 6-spring.

The device consists of a housing 1, rod 2, to which the measuring platform 3 is rigidly attached, the base plate 4, the indicator of the clock type 5, the division price of 0.01 mm and the spring 6. Seeds are placed on the base plate, an area of 1 cm2. Laying bare seeds from the fibers was placed on site 3 with tweezers. Measurements were first made on a large semimajor axis of seeds, then a small [3].

The measurement error from the deformation of the device element and its inaccuracy does not exceed 3-4%. Taking into account that the seeds have different maturity on the surface of the residual fiber, etc., 300 seeds of each breeding variety were chosen for measurement (Fig.3).

Bukhara – 6



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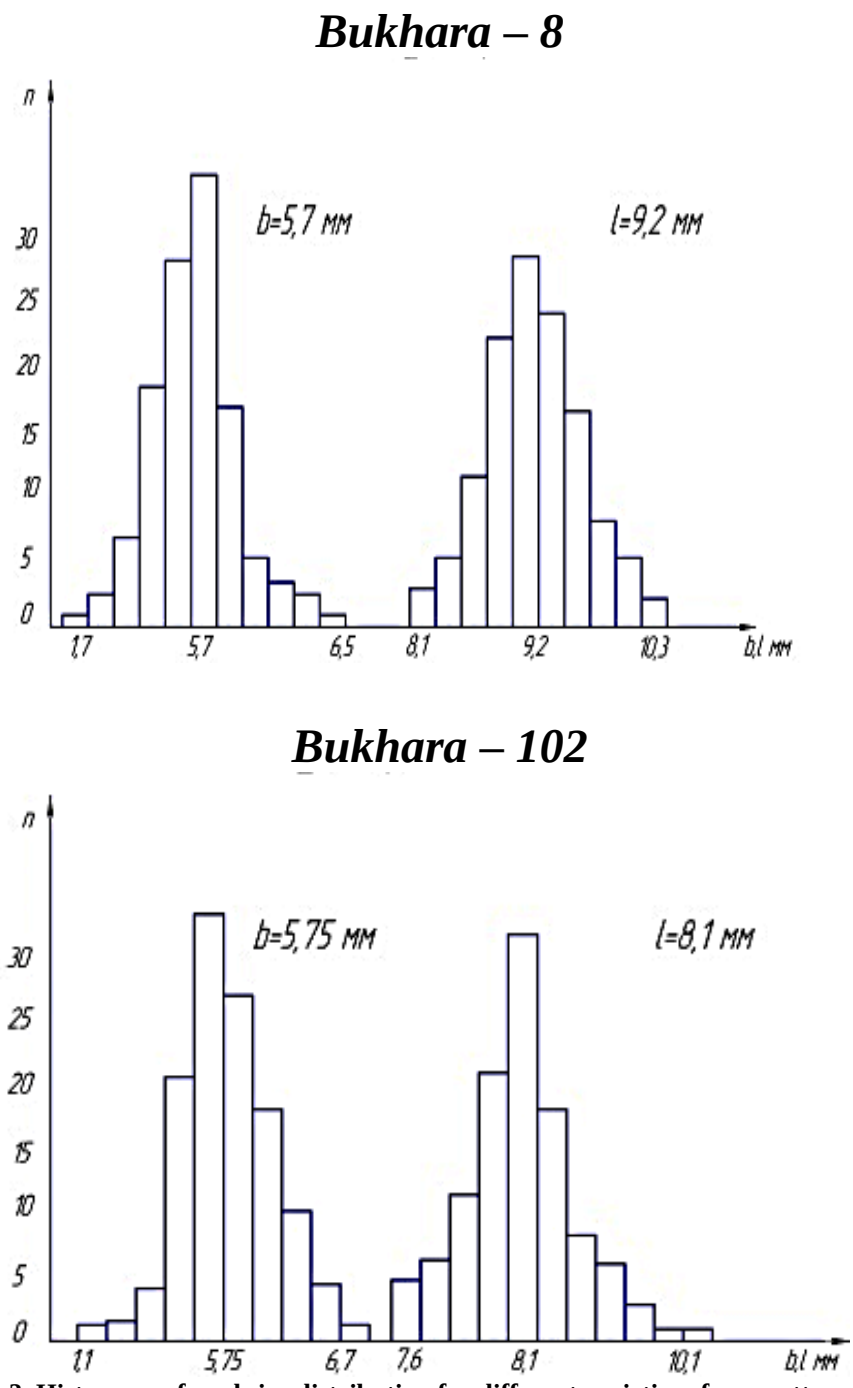

Fig. 3. Histogram of seed size distribution for different varieties of raw cotton.

V. EXPERIMENTAL RESULTS

The results show that the size of the seeds are subject to the normal distribution law. This is confirmed by checking the Kolmogorov A. N. In the calculations was taken to be the minimum of the radii, and the radius of the edge of a tooth of disk saws must be in range (mm):

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$$0.1 \leq \frac{2\rho_к}{\omega_{max}} \leq 0.7$$

where: $\rho_к$ -edge radius saw blade, ωmax-value of the deformation of the fibrous cover of the raw cushion;

We obtained measurements of $\rho_{кmax}$ and recommended the following values for the radius of the edge of the tooth blade saw for processing of raw cotton of different breeding varieties (table 1.1).

The calculated dimensions of the radius of the edge of the tooth blade circular saws.

Table 1.1

Variety of raw cotton	Size of seeds on the big half-axis, R_{cmax} mm	Size of seeds on a small axis, R_{cmin} mm	Criteria A. N. Kolmogorov		Recommended dimensions of the radius of the working edge of the saw blade
Bukhara-6	3.76	2.42	0.02 0.031	0.05 0.05	0.38÷0.81
Bukhara -8	3.94	2.58	0.022 0.046	0.05 0.05	0.37÷0.70
Bukhara -102	3.62	2.39	0.020 0.034	0.05 0.05	0.35÷0.68

Thus, the change in the radius of the tooth blade of circular saws depending on the size of the seed of the breeding variety of raw cotton helps to reduce the damage of seeds during saw fiber and seeds separation. The obtained dependences allow a reasonable approach to changing the parameters of the system "tooth saw - raw roller –fly-grate" in the processing of breeding varieties of medium-fiber raw cotton.

VI.CONCLUSION

The obtained parameters of cotton seeds allow the development of saw teeth parameters with optimal microgeometry, which helps to reduce defects in fiber and seed, improve the reliability and durability of the saw cylinder and the performance of fiber separation machines.

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