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To Study Circling Of The Seed Roller At Ginning Process With Practical Method

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ABSTRACT

In the article, sticky speeder has proposed to the beyond of roll box as the improving the work effectiveness of gin stand. Proposed score has been practiced at the 30 saw gin stand. The effectiveness of the speeder to the production of the seed roller and the fiber's quality indicator which is before and after the practice, research results at the laboratory have been shown in the article.

KEYWORDS

The cotton, gin stand, seed, fiber, saw, gridiron, roll box, seed roller, speed, quality, efficiency, pressure, density, strength.

INTRODUCTION

In the world, as the main process of primary processing of cotton, special attention is paid to the process of separating fiber from seed, the development of its technique and technology, as well as improving the quality and reducing the cost of production through the widespread introduction of modern, resource-saving technology and ginning technology. In this direction, in particular, scientific foundations are being developed to

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increase the efficiency of the cotton ginning process, to preserve the initial quality indicators of fiber and seeds during processing, and to reduce the energy consumption of the process. Along with this, the issues of creating small-sized, simple, not material-intensive and energy-saving structures that contribute to the development of modern, flexible technologies for separating fiber from seed are of particular importance.

In fulfilling this requirement, the development and implementation of a highly efficient technology for separating fiber from seed, which contributes to maintaining the quality of fiber and seed, as well as reducing energy costs, is one of the main and important tasks of the cotton ginning industry.

It has been established that an increase in the productivity of gin stand leads to an increase in the density of the seed roll, and an increase in productivity with an increase in density occurs up to a certain value, after which the productivity decreases [1]. This is due to a decrease in the speed of the seed roll under the action of friction forces in the transverse direction, and it has been proven that at a density of 550 ÷ 600 kg / m3 the process completely stops. This situation negatively affects the ginning process, which leads to a decrease in productivity and a deterioration in fiber quality [2]. To prevent this drawback, it is necessary to study the ginning process and develop other methods for accelerating the seed roll. In the studies carried out in this direction to date, the task of improving the roll box of the gin stand by the development of effective methods for activating the seed roll in the process of gin stand has not been sufficiently studied.

In scientific research, a number of tasks were considered to substantiate the ginning mode, the seed box, the saw cylinder, the parameters of the grate, the seed comb and the fiber removal process, and to improve the designs of the working bodies of the gin stand. The dynamic research on fiber separation, substantiation of technological, kinematic and dynamic parameters of the working bodies of saw gin stands, with the preservation of the natural properties of fiber and seeds at high machine productivity, is not fully considered. Therefore, the improvement of the working elements of the saw gin stand (saw cylinder, seed roller accelerator, roll box) and the development of methods for calculating operating modes is the most important scientific problem of the industry.

A system of automatic control and management of the technological process of feeding gin stands with cotton has been developed and implemented at a cotton ginning enterprise, which ensures the preservation of the natural properties of cotton and its products [3-6].

In [7], the differential equations of movement along the concave profile of the grate, consisting of three broken lines, are integrated on Maple 9.5 under initialconditions, using separate functions, and graphs of the dependence of movement and speed over time are presented. The graphs show the patterns ofchange in displacement and speed at different angles, friction coefficient ofseeds along grate with a broken line of a concave profile.

In [8], studied the principles of movements in the horizontal part of thenewly constructed roll box, which is created by the authors, of thecotton particles. During the movement,

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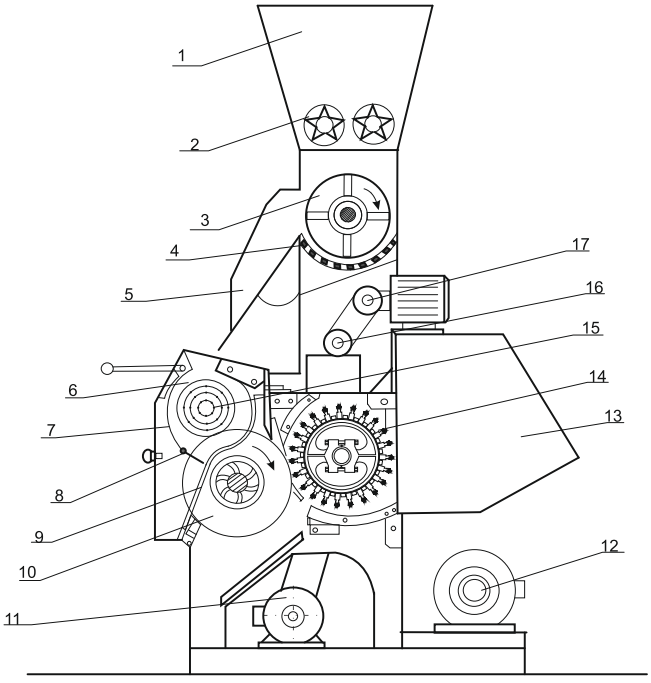
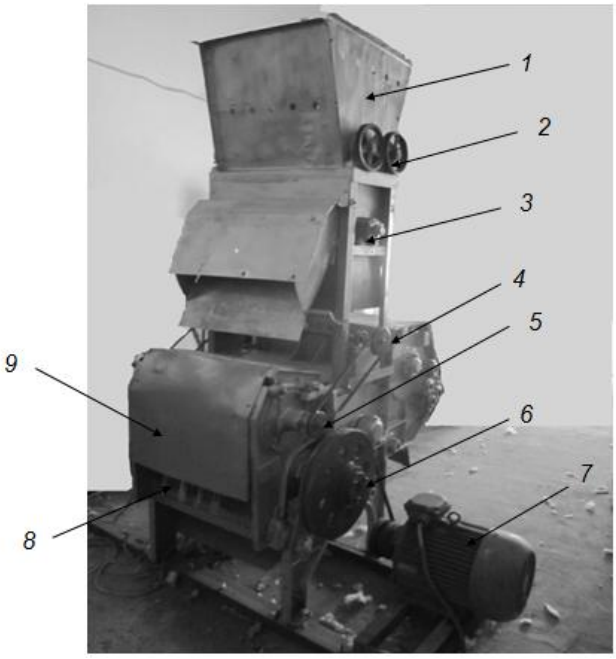
the cotton particles get affected bypressing to various surface and forceful turbulent and horizontal movementsof the surface. Some foreign mixtures and additional unnecessary objects getseparated by the turbulence of the various surfaces and movement of the paneled stripes. Ginning efficiency and the quality of the cotton will be improvedas the defects of the cotton particles are removed. “Cotton particle + net surface” movement principle of the Cartesian coordinate system was examinedbased on the rows of Cartesian coordinate system, by dividing all sides of thesystem by m weight and has the following second ordered multiple genderdifferential formula.

Experimental part. A 30 saw gin stand was designed and manufactured for experimental research. When working with a 30 and 130 saw gin stand, their performance per saw is the same. With this in mind, the experiments were carried out on a 30 saw gin stand. In addition, it is easy to modify and install element structures on a 30 saw gin stand [9,10].

The principle of operation of a 30 saw gin stand designed for experiments [11, 12]. When the 30 saw gin stand is working (Fig. 1), cotton is loaded into hopper 1. From hopper 1, raw cotton is fed to the peeling drum 3 with the help of feed rollers 2, with which, loosening, the cotton hits the mesh surface and is cleaned of fine debris, and then is fed into the roll box. In the roll box, the raw cotton is caught by the teeth of the saw cylinder, forming a seed roller. Fibers meshed with saw teeth pass between grates 8 are separated from the seeds, the cleaned seeds fall out under gravity to the bottom. Fibers adhered to the teeth of the cylinder saws are removed by the 11 brush drum.

The device is equipped with a 3 kW motor for rotating the brush drum. A 5.5 kW motor was installed to rotate the saw cylinder.





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1-hopper, 2-feed rollers, 3-pick drum, 4-mesh surface, 5-tray, 6-roll box, 7-apron, 8-seed comb, 9-grates, 10-saw cylinder, 11-motor (for rotating the brush drum), 12-motor (to rotate the saw cylinder), 14-brush drum

Diagram of a 30 saw gin stand

1-hopper, 2-feed rollers, 3-head drum, 4-shaft mounted on reverse side of the roll box, 5-devices installed on the sides, 7-engine (to rotate the saw cylinder), 8-grates, 9-apron.

30 saw gin stand

Figure 1.

The speed of rotation of the accelerator installed in the roll box was adopted at 150-250 rpm based on the study of research by foreign scientists and a number of scientists in our country. Were chosen different speeds of the accelerator 5, installed on the side of the roll box, and the length of the pegs. In addition, taking into account the position of the tuning pegs in relation to the saw cylinder, tuning pegs of various lengths were manufactured and tested. A special 0.75 kW engine was installed to rotate the side accelerators of the roll box. The rotational movement is carried out using the shaft 4 located behind the roll box. The speed of rotation of the accelerator installed on the sides of the roll box and the seed roller was determined by a tachometer. During the study, the optimal length of the lateral accelerator tuners was determined. The speed of rotation of the accelerators installed in the roll box was chosen in the range of 150-250 rpm on the basis of previous studies.

Analysis of the results obtained. Experiments on this device were carried out in 3 different versions. In the first variant, the length of the tuning pegs installed on the side accelerator of the roll box is made equal to h1-15 mm, h2-10 mm. In the second version, the length of the tuning pegs was from h1-30 mm, h2-15 mm. In the third version, convex blades are installed on the sides of the roll box.

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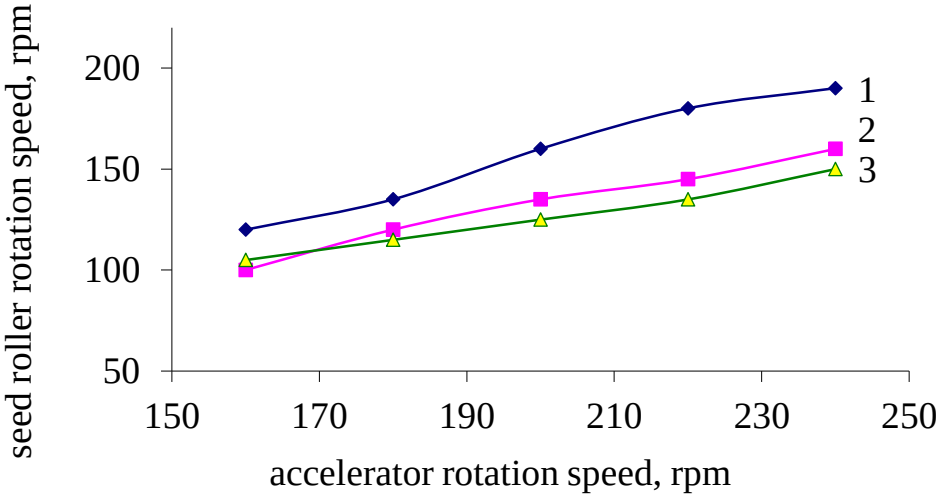
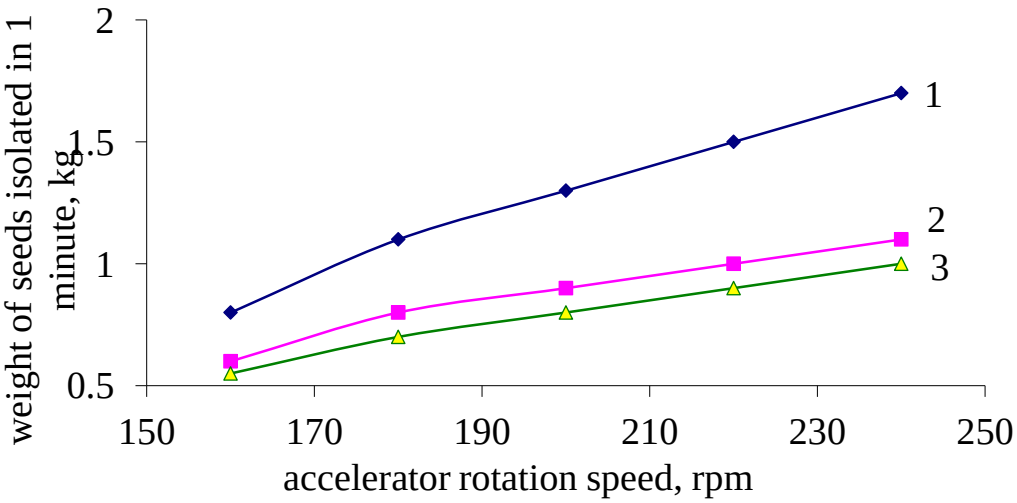


a)



b)

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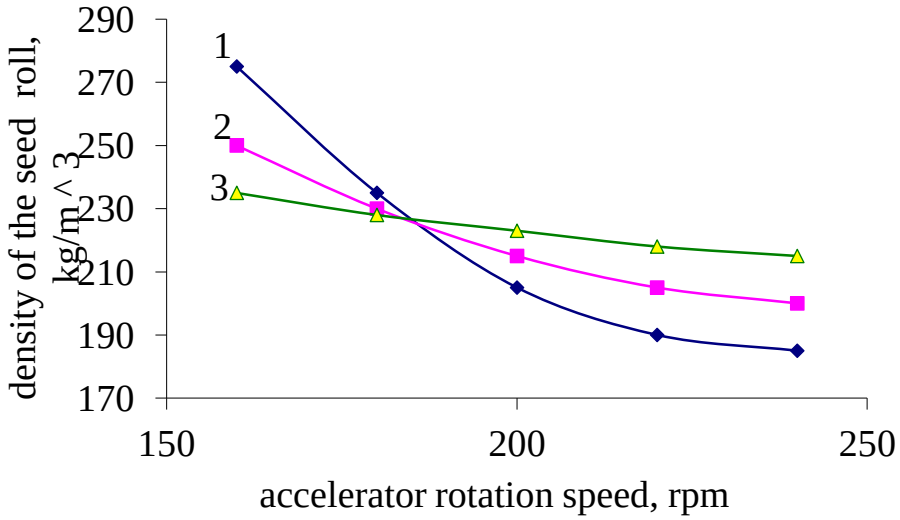

c)

1 - the length of the accelerator pegs h_1 = 15 mm, h_2 = 10 mm;

2 - the length of the accelerator pegs h_1 = 10 mm, h_2 = 5 mm;

3 - accelerator with convex blades

Figure 2. Effect of the accelerator speed on the speed of the seed roller (a), the yield of seeds (b) and the density of the seed roller (c)

In fig. 2 presents the results of a study of the effect of the speed of the accelerator on the speed of the seed roller, the yield of seeds and the density of the seed roller, which show the possibility of using lateral discs to change the speed of the seed roller.

CONCLUSIONS

As a result of the experiments, the effect of accelerators on the rotation speed of the seed roller, on the exit of bare seeds from the roll box and the density of the seed roller was established. After the experiment, the short fiber index decreased by 1.5%. In addition, by increasing the speed of the seed roll, the relative breaking strength was improved by 0.4 g / teks and the elongation at break by 0.2%. After ginning, the sum of defects and trash in the fiber decreased by 0.5%.

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