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The Effect of the Intermediate Surface in the Territory of the Seed on the Extension of the Spirited Spirits from the Gin Machine

Mamasharipov Abdunabi Abdumajitovich[1], Yuldashev Abdusamat Halimovich[2], Muminov Ulugbek Muminalevich[1]

[1]Department of “Metrology, Standardization and Product Quality Management”, Andijan Machine-Building Institute, Andijan, Uzbekistan
[2]Department of “Automotive Engineering”, Andijan Machine-Building Institute, Andijan, Uzbekistan

Email address:
abdunabi.mamasharipov@gmail.com (Mamasharipov Abdunabi Abdumajitovich),
abdusamad76@mail.ru (Yuldashev Abdusamat Halimovich), mirzoulugbek1980@gmail.com (Muminov Ulugbek Muminalevich)

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Abstract: The article discusses the seeds that move in the area of the gin equipment seed comb and the factors that affect their release into the working chamber. In the zone of the working chamber, the seeds, which are completely separated from the fiber, go out through an intermediate hole along the grate. The amount of seed going out is affected by the coefficient of return to the raw material roller K_V, which again returns to the working chamber as a result of compression of the fully separated seeds in the intermediate slit. The seed return coefficient K_V, in turn, depends on the surface area formed by the chmgit comb with the chisel. In today's fiber separation machines, the coefficient of return of fully separated seeds to the working chamber is in the range of K_V = 3-4, 30-35% of fully separated seeds leave the working chamber, and 65-70% of the seeds return to the working chamber. According to the results of experiments, the effect of the amount of fully separated seeds on the amount of seed leaving the working chamber and the change in the coefficient of return of seeds to the working chamber K_V was studied. was able to reduce to.

Keywords: Fiber Separator, Working Camera, Seed Comb, Return Coefficient, Хом Ашё Валиги, Kolosnik

1. Introduction

Improving the technological process of separation of cotton fiber in foreign countries with developed cotton ginning industry in our country [1-5], improving the quality of products by creating new working bodies for existing machines [6, 7], increasing machine productivity and electricity for the product Extensive research has been and is being conducted to reduce consumption [8-10]. One of the current problems in this area is the development of scientific bases to increase the efficiency of the technological process of separation of cotton fiber, the widespread introduction of modern automated equipment and technologies, maintaining the quality of cotton products, creating modern resource-saving technologies. In order to increase the working efficiency of the fiber separation machine and maintain the product quality, it is important to remove the fully separated fibers from the working chamber as soon as possible.

It has not et been fully investigated whether the fibers in the arali genus are completely separated from the working chamber. Currently, there are several opinions on this issue. Some researchers believe that when the seed roller meets the raw material roller, a hole in the outer shell formed by the new cotton raw material entering the raw material roller will result in the seeds being separated from the hole. starting from the point where the cylinder meets the raw material roller, the saw is said to occur between the points where the contact of the raw material roller from the cylinder is disconnected, i.e., where it meets the grate grille [11, 12].

In addition, several scientists have suggested that the seeds on the surface of the gutter re-enter the working chamber under the influence of saws [13, 14].

2. Methods

The exit of the seed from the working chamber, where the fiber is completely separated, depends on the distance between the saws to the zone of the seed comb, ie the surface of the downward movement area. The surface area of the seeds moving downwards is determined using the following formula.

$$F = hbn \quad (1)$$

here: h is the distance the saws protrude from the surface of the grate, 47-52 mm;
b - the distance between the saw discs, 17,0 mm;
n - the number of gaps in the saw cylinder, 129.

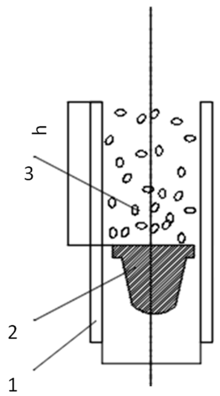

Figure 1. *Scheme of the movement of seeds to the seed comb zone.*

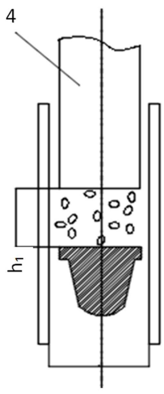

Figure 2. *Scheme of the transferring seeds to the working chamber area.*

Figure 1 shows the scheme of movement of seeds down to the zone of the seed comb, the surface area of movement of seeds F_1 is determined as follows:

$$F_1 = h_1 bn = 5 \times 1{,}7 \times 129 = 1096{,}5\ sm^2$$

Figure 2 shows the process of cutting the seeds from the slit between the seed comb and the chisel, the surface area of the seeds leaving the working chamber F_2 is as follows:

$$F_2 = h_2 bn = 2 \times 1{,}7 \times 129 = 438{,}6\ sm^2$$

Hence, the surface area of the area where the seeds leave the working chamber is $F_2 = 438{,}6\ sm^2$, and the surface area of the area where the fibers are completely separated from the seeds moving down between the saws is $F_1 = 1096{,}5\ sm^2$. This means that the F_2 surface is 2.5 times smaller than the F_1 surface, which has a negative effect on the way the fibers are completely separated from the working chamber.

Previous studies have shown [15] that seeds that do not leave the seed comb zone, K_V - seed return coefficient, when the efficiency of the fiber separation machine is 9 ÷ 10 kg saw / hour, in the range K_V=3 ÷ 4, determined using the following formula.

$$K_V = \frac{q_B}{q_O}$$

where: q_B -the amount of seeds returned to the working chamber from the seed comb zone;
q_O- the total amount of seeds that came out of the working chamber.

3. Results

It was found that as the machine productivity increases and the saw spacing decreases, the seed rotation coefficient K_V increases, and as the distance between the seed comb and the rake decreases, the seed comb decreases.

This means that the return of the seeds from the seed comb zone to the working chamber can be achieved by reducing the coefficient of return of the seed K_V, in order to quickly remove the fully separated seeds from the working chamber. This can be done by increasing the distance between the seed comb and the grate in the zone of the working chamber seed comb. Although this can be done by increasing the distance between the seed comb and the coil used in the fiber separation machine in the enterprises, it is observed that the fineness of the seeds leaving the working chamber exceeds the established norms. Faster removal of fiber-separated seeds from the working chamber can be achieved by improving the design of the seed comb used today. To do this, you need to improve the design of the seed comb and make it into a groove through which additional seeds will come out.

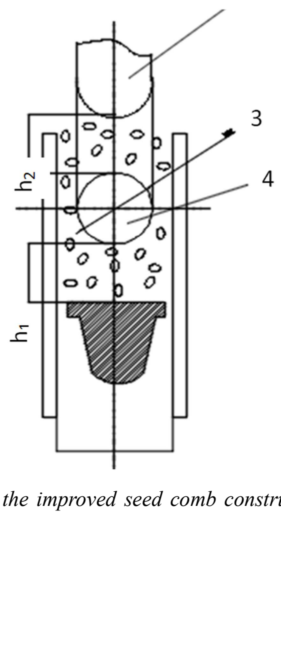

Figure 3. *Scheme of the improved seed comb construction with additional slots.*

Figure 4. *View of improved seed comb construction with additional slots.*

In the Figures 3 and 4 shows an improved seed comb scheme. As can be seen from the diagram, the seeds are completely separated from the fiber by the distance h_1 between the column and the seed comb and the distance h_2 from which the additional seed emerges. Increase the area of the area where the fiber is completely separated from the seed comb of the new design by 2 times the area leaving the working chamber, ie $h_1 + h_2$.

$$h_t = h_1 + h_2 = 438.6 + 438.6 = 877.2\ s\text{м}^2$$

It is possible to increase the surface area of the seeds, which are completely separated from the working chamber, from 438.6 $s\text{м}^2$ to 877.2 $s\text{м}^2$, leaving the zone of the seed comb.

Experiments were carried out at the Sofigishloq ginnery under the new design.

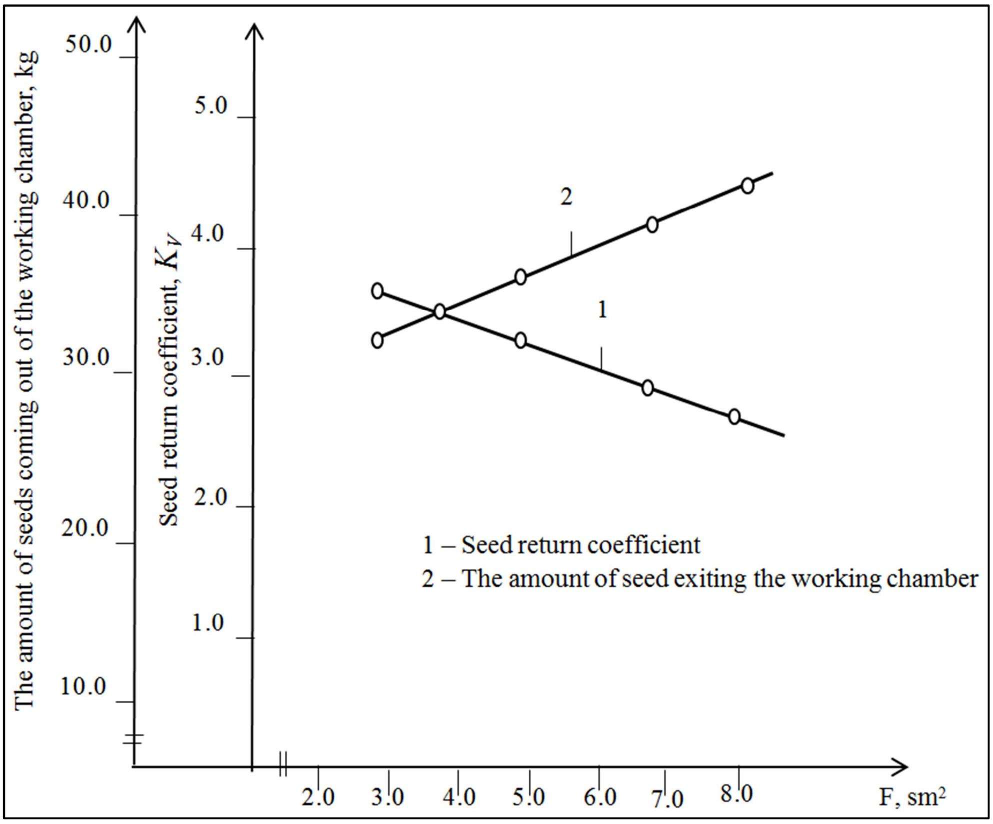

Figure 5. *Seed return coefficient K_V and the graph of the dependence of the amount of seed leaving the working chamber on the surface of the seed comb area.*

The experiments were performed in three repetitions on existing and proposed seed combs An-36 1st grade 2nd grade and 4th grade 1st grade cotton. Within 5 minutes after the fiber separation machine started operating normally in both variants, the separated seeds were weighed and the effect on the amount of seeds coming out of the working chamber as well as the total fineness of the seeds was determined. The results show that when using the existing comb, 34.6 kg of seeds were released from the working chamber in 5 minutes, and when using the proposed comb, 39.1 and 41.2 kg of seeds were released from the working chamber in 5 minutes [16].

After determining the amount of seed leaving the working chamber, the amount of seed leaving the working chamber outside the seed comb zone, i.e. the seed return coefficient K_V, was determined. So, $K_V = {}^{q_B}/_{q_O}$ from the formula, K_V = 3-4, q_O - 34.6 kg in the existing design, when the fiber in the proposed design is completely separated from the working chamber is 41.2 kg, when using a seed comb of the existing design q_O= 0.115 kg, the proposed in the construction of the seed comb, q_O= 0.137 kg.

When using the existing design, the return factor of the seed was K_V = 3.5, while using the proposed design, this figure is reduced to 2.9.

The results of the experiments show that the increase in the surface area of the working chamber, where the fiber is completely separated from the seed comb zone, increases the coefficient of return of the seed to the working chamber K_V, which in turn accelerates the removal of seeds from the working chamber. In the Figure 5, the amount of seed leaving the working chamber and the coefficient of return of the seed to K_V, the area of the seed exit area in the working chamber zone was 438.6 sm^2, while the coefficient of return of the seed was 3.5, the surface area of the seed exit was 877.2 sm^2. The return coefficient K_V from the zone of the seed comb to the working chamber decreases by 2.70, which in turn increases the amount of seeds leaving the working chamber from 34.6 kg to 40.2 kg.

4. Conclusion

At the cotton gin where the experiments were carried out, it can be seen that when using the new design seed comb, there is an increase in the number of seeds leaving the working chamber by 15-17% compared to the number of seeds leaving the seed comb of the existing design.

According to the change in the design of the seed comb, there is an increase the productivity of genie equipment for fiber from 10.1 kg/h in the existing design to 12.12 kg/ h in the case of switching to a rectangular design.

According to the proposed designs, the fiber content in the raw material increased from 2.50% to 3.9%, which, in turn, improved the adhesion of the fibers to the saw teeth, and the equipment productivity increased by 15- 17%.

As result of offered and use of the proposed design improved the quality indicators of products by reducing the amount of impurities and defects in the fiber to 0.6%, mechanical damage to the seeds to 1.5...2.0%.

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