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PROBLEMS ARISING IN THE PROCESS OF GINNING RAW COTTON AND WAYS TO OVERCOME THEM

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The article provides basic information on the problems that arise in the process of ginning raw cotton and ways to overcome them. The article also examines the process in the ginning zone to reduce the forces acting on the cotton fiber in order to maintain the quality of the cotton fiber and to reduce the clogging between the columns.

INTRODUCTION

Cotton fiber is the main product of ginners, and its quality depends mainly on the condition of production machines and production technology. Failure to meet the requirements for production machines can lead to fiber damage and breakage, fiber shrinkage, mechanical damage, as well as reduced strength, increased fiber defects, and increased fiber fluff [1].

The gin machine is considered to be the main equipment of ginneries, and the surfaces of its working bodies have a very negative impact on the quality of the fiber.

In the process of separating the fiber from the seeds, the raw cotton is in contact with the saw cylinder, the grate and the seed comb. The interaction of the raw cotton with the saw blades and the sharp edges of the columns in the work area can damage the fibers. At the same time, the surfaces of the working bodies are rapidly eroded, and as a result, the working life of the chimneys is 4-6 months.

RESEARCH MATERIALS

It is known that the crazy working part has a high specific pressure (above 4.9 kN / m2) and a relative velocity of 12 m / s.

Columns are made of gray cast iron grade SCH15, and due to the difficult working conditions, they not only wear out quickly, but also damage the processed fiber. Erosion of the chimneys causes them to increase the cracks in the working part, and as a result, the technological process of ginning is disrupted.

After three months of operation, 70-80% of the cracks in the grate will exceed the allowable limit. Therefore, the working life of the columns is limited and they are replaced. On the other hand, the technological process of manufacturing existing columns does not allow to ensure the required level of accuracy.

Modern construction of the grate and the technology of assembling the grate grate allow to estimate not only the degree of accuracy of the gap between the grate, but also the requirements for the relative position of the grate on the grate.

Making steel columns allows you to reduce the percentage of unusable columns to zero. In this case, the columns can be obtained by rolling or stamping. It is also possible to adjust the columns that do not meet the requirements of the form.

However, cast iron columns are still being made. This is mainly due to the idea that sparks are generated when steel is connected to the columns, and this spark causes the cotton to burn.

However, E. Normatov E. [2] proved in his dissertation that a fire caused by a spark caused by touching an saw blade would not occur.

Experiments with special methods have shown that the saw has been studied even in difficult conditions when connecting with various steel specimens. The fluff ignited 3 minutes later under the influence of a set of sparks.

It is known that lint is more prone to burning than cotton. In the study, steel samples with different carbon content had approximately the same spark-forming rate, except that the sparks differed in the number of stars and the amount of scattering.

In practice, the presence of a fiber in a spark plug with a set of sparks is expected at a fraction of a second, and therefore steel cannot cause a fire.

The main reason for the burning of cotton may be that the cotton is stuck between the cracks in the grate. This is because the product does not move, and the friction of the saw

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with the grate on the fiber mass leads to a sharp rise in temperature in the connection zone. That's why it's important to study this phenomenon.

RESULTS AND DISCUSSIONS

There are two types of insanity that can occur, as described in the sections above:

1 - The saw blade is placed in the middle of the gap between the cranks in the grate;

2 - The location of the gap between the saw blades on one side or the other;

Studies [3] show that most colonists are eaten when they are touched by a saw. Sawless untouched colossuses are almost non-existent. Damage to the fiber during the operation of the saw is mainly expected between the saw tooth and the sharp edge of the grate. In addition, tilting the saw from the plane can cause it to touch one of the columns. In this case, too, the fiber is damaged by the saw. The following diagram shows the forces acting on the fiber when the saw is not in the center of the gap between the columns.

In order to maintain the quality of cotton fiber, the radius of the edges of the column should be in the range of 0.2-0.3 mm [4]. However, the radius of the working edges of cast iron columns is the same when working 3 shifts in 1 ÷ 1.5 months. This means that cotton fibers are expected to be damaged by the edges of the columns during this period.

It is known that fiber damage is affected by the angle of coverage of the working edge of the column by the fiber. The coverage angle is 75^0 when the saws are located in the center of the gap between the columns. When you touch the column, it is 90^0.

According to research [5], during normal operation of the saw, each tooth of the saw cylinder is subjected to a force of 40-45 N, and this force is distributed evenly over the two adjacent columns as a result of which the saw is located in the center of the columns.

As a result, the force that compresses the fibers to the edges of the columns is 20–22.5N.

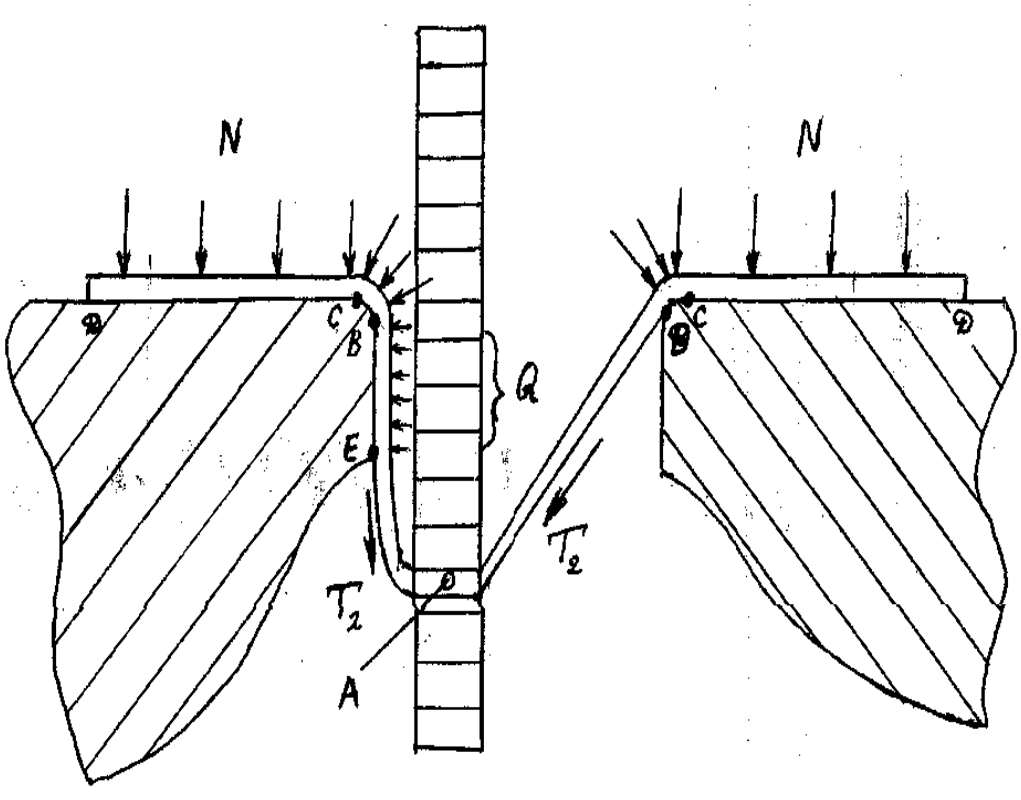

Figure 2. Diagram of the distribution of forces acting on the saw blade and the fiber when the saw is placed closer to the saw blades.

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When the saw is not located in the center of the gap between the saw blades, the fiber is subjected to a greater force by the saw blade closer to the saw blade (Figure 2).

This means that the force acting on the fiber at the edge of the grate varies from 20 N (in the center of the saw) to 45 N (when the saw touches the grate).

Studies [6] have shown that when fibers are subjected to a pressure of 2000 N / cm2, their tensile strength decreases by 5-10 times. Experiments have shown that when the radius of the edge of the column is 0.1 mm, the fiber is damaged, because in this case the pressure in the joint is greater than the allowable pressure (8200 N / cm2). If the radius is 0.2 mm, the decay of the fibers occurs from 40 N when the load exceeds 25 N and the radius is 0.3 mm.

The remaining radii do not cause the fiber to break. However, increasing the amount of radius of the edge of the column by more than 0.3 mm leads to an increase in various defects in the fiber [7].

Therefore, the probability of damage to the fibers when the saw is located in the center is very low, even when the radius of the edge of the saw is 0.3 mm or even 0.2 mm.

Thus, ensuring that the saws are located in the center of the gap between the columns will break the fibers to maintain their length.

CONCLUSIONS

The consumption of gin colonies prevents the technological process of separating cotton fiber from seeds from the required level.

It is advisable to increase the service life of the gin columns mainly through the use of wear-resistant, interchangeable plates on the working part of the gin columns.

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