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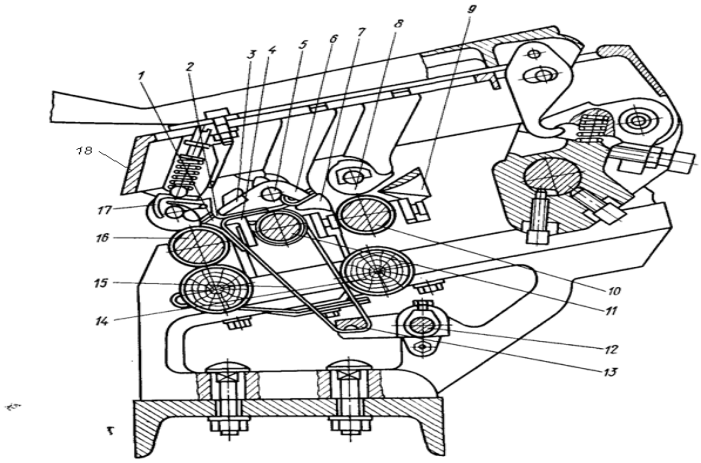
Investigation Of The Influence Of Pressing Rolls In Extending Mechanisms On The Number Of Yarn Breaks In The Technological Process Of Yarn Spinning.

S.Kh. Bobojonov DSc., Associate Professor,
Tashkent Textile and Light Industry Institute,
J.K. Gafurov DSc., Professor,
Jizzakh Polytechnic Institute,
J.I. Oripov PhD., senior teacher,
B.B. Muminov Assistant,
Fergana Polytechnic Institute.

Abstract. In this article, the effect of the pressing rollers in the stretching mechanisms on yarn breaks during yarn spinning is studied. The mechanical properties of the pressing rollers and how their loading affects the strength and quality of the thread have been studied. In the course of the research, practical recommendations were developed to reduce thread breaks and optimize stretching mechanisms.
Key words: Yarn spinning, stretching mechanism, pressing roller, yarn breaks, mechanical load, elastic coating, technological efficiency, monitoring system, optimal performance, textile technology, roller wear, quality control, roller coating, number of breaks , loading effect.

Corrosion of the pressing rollers in the stretching mechanisms of the spinning machine has a significant effect on the production efficiency. In this study, the factors related to the wear of the press rollers as a result of mechanical loading are studied.

Stretching device - two stretching straight areas - three parts from stretching cylinders 2,5, 11 (Fig. 1) and pressing rollers 3, 7, 10, loads located on the rack 14, when needed It is used to give the load. The pressure rollers that control the quality of the passing product have rubbers with an elastic coating, which are compressed by special springs.



1, 6, 8, 13 — cleaner; 2, 5, 11 — reef cylinder; 3, 7, 10 pressing roller; 4, 9, 12 — cuff; 14 — loading lever

Figure 1. RK-1500-02 loading lever of the stretching device.

After each stretching pair (stretching cylinder and pressing roller) compactors 4, 9, 12 are installed.

Tensioned wipers 1, 6, 8, 13, are installed to clean the fluff stuck to the extension pairs.

Bushing of the press roller - the supply and output bushings have an elastic coating, only the middle one (part II) does not have an elastic coating. The thrust shafts in all parts rotate in oscillating bearings. The RK-1500-02 load gauge provides a floating adjustable load on the press rollers. Each press roller is provided with a constant load and a three-stage adjustable load. Stages of loading the press rollers (Fig. 2):

R = 20; 25; 30 kgs; Ra=10; 15; 20 kgs; R_3=15; 20; 25 kgs.

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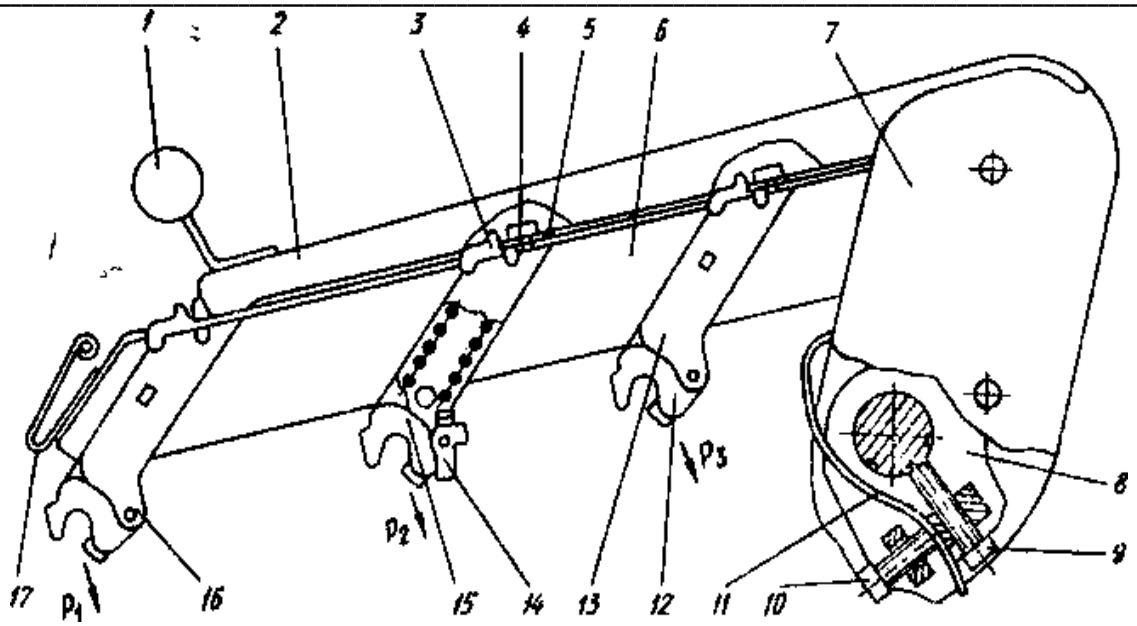

Figure 2. Section of the loading arm.

1- holder; 2 — loader; 3 — an eccentric that increases or decreases the load: 4 — a screw; 5 - puck; 6 — the body of the loading rod; 7 — bracket; 8 — adjusting washer; 9 — stopper screw; 10 - height adjusting screw; 11 — smooth spring; 2 — holder of the pressing roller; 13 — node loading line III; 14 — the fixator of the cells: 15 — the load node of the II line; 16 — node loading line I; 17-wiper spring.

The extension cylinders in each section are loaded by the pressure rollers on the lifting arm. The thrust rollers in all parts are located in oscillating bearings. The supply and output rollers have an elastic coating, and the rollers in the middle part are provided with a metal bushing with a smooth surface.

The extension device stops at the top due to the mechanism located on the axis of the extension device. Compressed springs provide the necessary load from the stretching process. In this case, the pendulum-shaped device located on the handle adjusts the pressing force. Control of the output product is carried out by the lower and upper belts in the distance between the output and other parts. A spacer is installed between each pair of stretchers of the stretcher; The tensioning rib between the belt and the supporting pairs ensures the uniform wear of the elastic coating by reciprocating the movement relative to the axis of the cylinders. Its movement is carried out by a mechanism located at the back of the extension device. In the first part, the tension between the stretching cylinders, stretching rollers and the upper and lower belts is carried out by tensioning wipers at the top and bottom. The body of the loading arm 11 (Fig. 1) is fixed with the help of the screw 14 in relation to the axis 12 by means of the stopper screw 13. The loading lever 4 is placed in the case so that it rotates around the hinge 9. The loading and return movement of the lever is provided by the ser 7, which is fastened to the hinge 9 through the puller 6. The fist 8 and the screw 10, which secures it, control the position of the lever in terms of height. A saddle 2 placed in the form of a hinge is fixed in the body of the lever. Spring 3 provides the necessary load on the press roller. The pressure of the spring is adjusted with screw 5. The position of the seat next to the lever is adjustable for the desired position.

The coil compactors are placed on a metal plate that is reciprocating in advance to the cylinder at the back of the extension device. The movement of the mechanism is obtained from the worm 1 located in the second part (Fig. 2). The worm is driven by the worm wheel, which is driven by gear 3. The transmission of the gear wheel 3 passes through the hole and is fastened to the bolt in part II. The gear wheel engages internally with the gear screw 4. The pin 5 of the support is fixed to the toothed venus by the seal 6. And the gasket is fastened to the tail part of the compressor of the III part. A finger 7 is fastened to the second part of the compactor, and the return movement of the advance is transmitted from the third part of the compactor to the second part of the compactor. Before the first part, an unfastened free compactor is placed.

We developed an experimental device to determine the sliding of the shaft on the surface of the cylinder. A number of experiments were conducted to study the effect of a pair of belts in the proposed stretching device.

ISSN NO: 2770-4491
November 2024

With the above in mind, we have developed a device and methods for conducting experiments on the stretching device of a spinning machine.

The scheme and overview of the experimental equipment is presented in Fig. 1.

The device consists of cylinders of the extension device with three separate gears. The possibility of the device working in this way is that during the stretching process, it is possible to adjust the frequency of rotation of the cylinder without changing the number of teeth of the gear wheels of each cylinder with the help of sensors installed directly on the stretching device.

One of the main achievements of the device is that the values of all adjustable parameters during the operation of the stretching device are adjusted by computer, and the obtained results help to analyze.

Conversion of the obtained results into a decimal code is carried out using the LTR-150 converter.

In order to determine the parameters, a tensometric sensor for determining the torque in the first cylinder, a sensor for determining the frequency of revolutions of the cylinder, a pneumatic sensor for determining the strength of the belt in the sliding area, an adjuster for adjusting the frequency of rotations of the engine in the cylinder transmission, and sensors for determining the stretching force in the product stretching zone are installed in the device.

The research and methods for each experiment conducted are detailed in the next section.

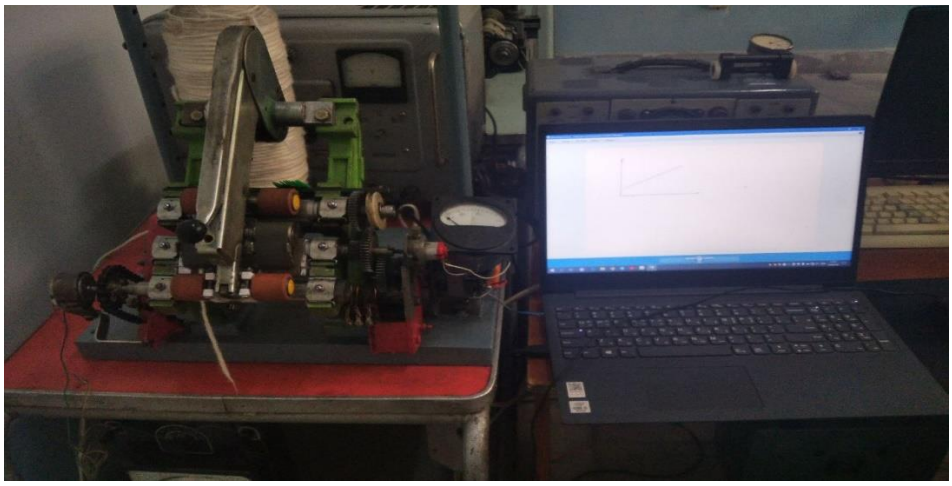

Figure 3. A device for determining the force in the friction zone.

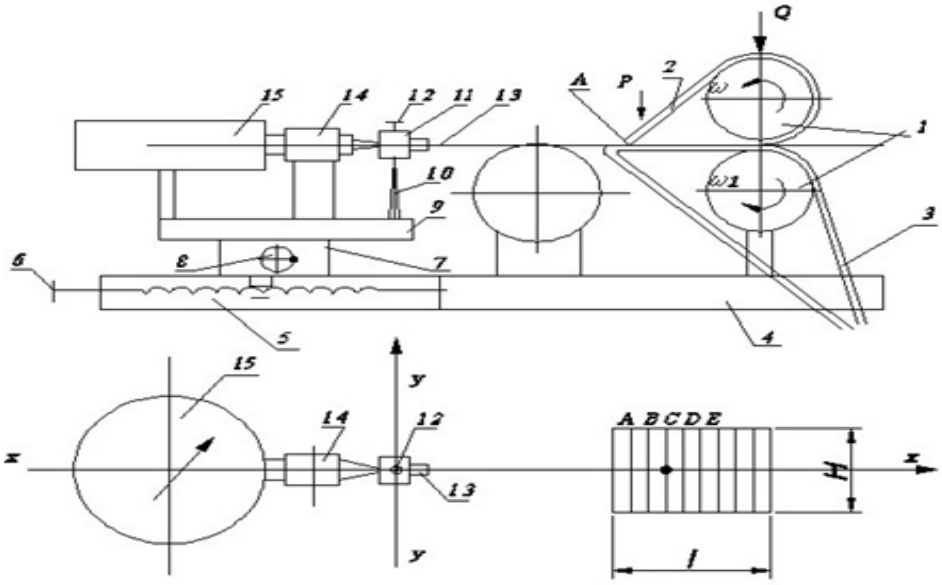

Figure 4. Scheme of the equipment for determining the force in the friction zone of the stretching pair.

Figure 4 shows the diagram of the equipment for determining the force in the friction zone of the stretching pair.

The device consists of a pressing roller and a cylinder 1 mounted on a frame 4 and a support that transmits their movement. The rib consists of upper 2 and lower 3 belts on the cylinder and pressing rollers

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November 2024

and a thread 13 passing between them, one end of which is a clamp 11 and a screw 12. In addition, the mechanism 5 is placed in the frame 4, in which there is a device for determining the forces in the direction of thread stretching, and its position can be changed with a screw 6. In the upper part, the second mechanism 7 is installed, which is equipped with a device for determining the stretching forces in the perpendicular direction, and its movement is carried out with the help of a screw 8. The use of such additional elements expands the range of detection in terms of the width of the tapes and the length of the thread.

A plate 9 is installed on the moving mechanism 7, and the sensing element 10 and the thread tightening mechanism 11 are fixed to it. A strain gauge may also be glued to it. In the present case, a clock-type indicator 15 is installed on the bracket 14 to determine the tension of the string (view from above b).

Figure 5 shows the determination points for the width N of the tape and the length of the supply L.

The calibration of the device is carried out by placing a load on the sensing element on the other side of the thread. On the first side, it is carried out by hanging a load at a specified distance through a guide block in a bent position.

The indicators are recorded by the indicator and the transfer coefficient is determined in the table.

Carrying out experimental studies of the boundaries of the contact points on the surface of the pressing rollers using a scanner. We have seen how to create impact surfaces based on the received data.

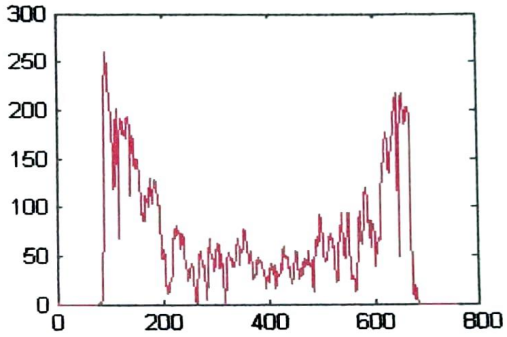

Figure 5. The function of the boundary surfaces of the contact surfaces of the pressed rollers is shown.

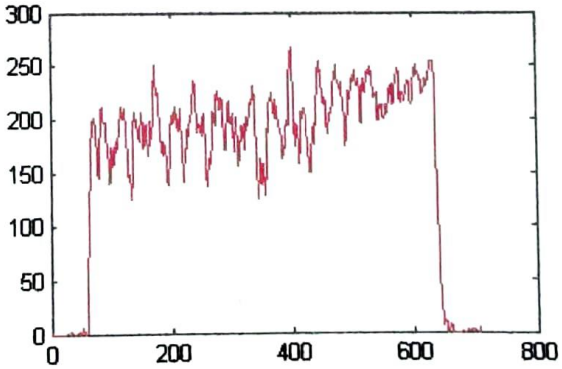

Figure 6. The function of the contact surfaces of the pressing rollers is shown.

1 pixel on the surface of the common contact points was determined by the method of integrating the function of the contact surfaces of the pressing rollers.

100 pressing rollers of the G-32 spinning machine, which served for 2 years, were selected for the study. Corrosion of the elastic coating of the press rollers was observed under a UIM microscope. Corrosion of the elastic coating of the press roller was determined in 14 intervals of the same thickness.

A graph is made with the results of the study, from which it can be seen that the wear of the elastic coating of the press roller is delayed until the appearance of the 1st "Saddle".

ISSN NO: 2770-4491
November 2024

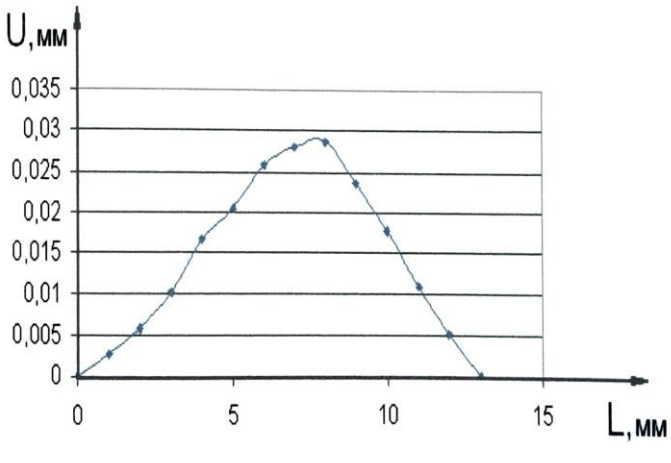

Figure 6. Distribution of the wear of the elastic coating of the pressing roller in the extension pairs.

The obtained results show that a guide device was developed to solve the problem of equal distribution of wear on the elastic surface of the pressing roller. In order to ensure uniform wear of the pressure roller's elastic coating and to prevent its wear, a quick warning reef informs the product movement of the advance return along the cylinder. Currently, there are various constructions of vadilka, the principles of their operation have not changed much and show the same process of operation.

The rule of action of the roller should be chosen in such a way that we can see that the coating of the pressing roller is evenly distributed along the width of the pile.

Conclusion.

The analysis of the force of the pressing rollers in the constructions of the stretching mechanisms used in spinning machines was presented. An experimental device was developed and used for conducting experiments in practice, the obtained results were compared with theoretical calculations and it was found that the differences correspond to the set requirements. The experimental device was designed according to the requirements of the present day and allowed to analyze the results using EXM. During the experiment, it was possible to develop recommendations based on the above-mentioned data and experimental results.

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