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METHODS FOR IMPROVING THE TECHNOLOGY OF PREPARING THE FEEDING TAPE

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Annotation: The article presents the results of an experimental study of the drawing device of the draw frame for uniform stretching and reduction of unevenness, connection with ensuring the parallelization of the fibers, the tension force between the first and second pairs of rollers and cylinders

Keywords: unevenness, parallelism, tape, linear density, grooved, cylinders

The draw frame is the last step in the spinning process, where a significant improvement in quality is possible. Weight fluctuations not eliminated on the draw frame are fully revealed in the yarn.

In order to pull the product, it is necessary to apply a force sufficient to overcome the forces of cohesion and friction between the fibers in order to move them relative to each other.

The quality of textiles depends to a large extent on the uniformity and purity of the yarn, the quality of which depends on its preparation. The spinning machine is loaded with the same amount of inertial forces relative to the center of rotation of the shafts with a decrease in uniform elongation and notes of the spindles relative to their centers of rotation of the tensioning tool and mechanism. $M \cdot u_1$ и $M \cdot u_2$ upper roll pulling force , belt driving force, friction force between belt and shaft, belt N between shafts, normal pressure force and bearing reaction force R

Equations are given for reducing unevenness as a result of belt elongation through each shaft and the dependence of the belt tension forces at a flat speed on the angular velocities and intermediate angles of the shafts.

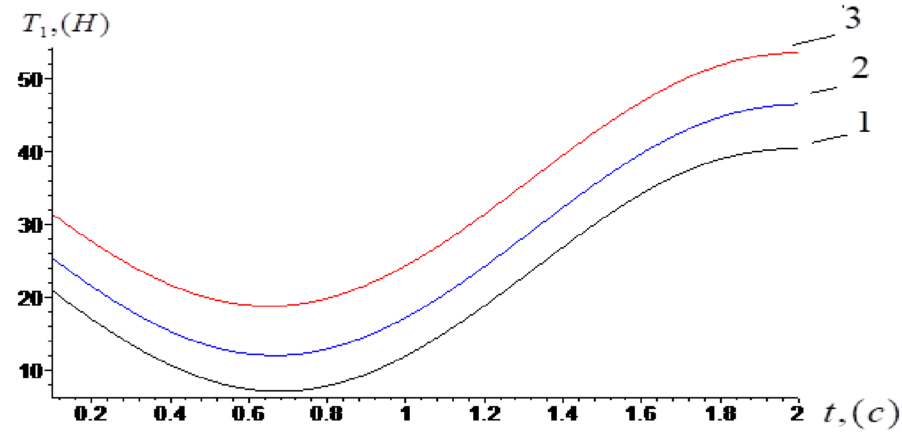

Figure 1. The graph shows the angular velocity of the tension force between the 1st pair of rollers and the cylinder at various values and depending on time

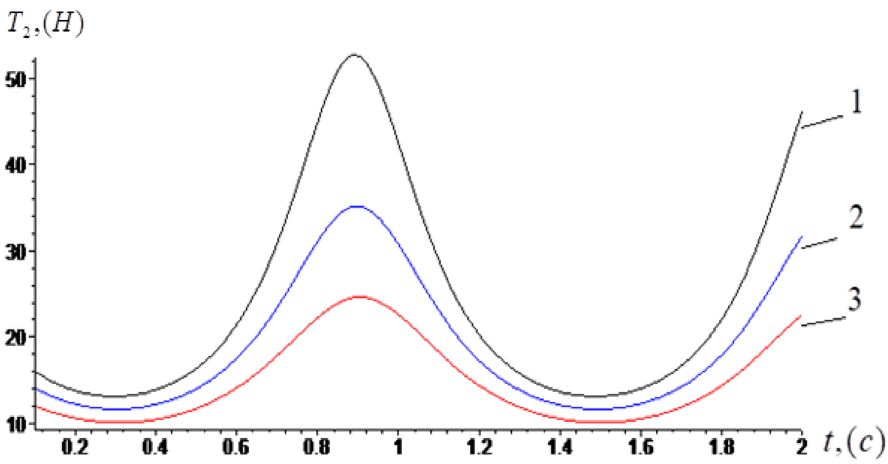

Figure 2. The graph shows the angular velocity of the tension force between the 2nd pair of rollers and the cylinder at various values and depending on time

Theoretical analysis of the range of variation in the strength of the tape as a result of the movement of the tape along the transverse surface $dT-$ в.

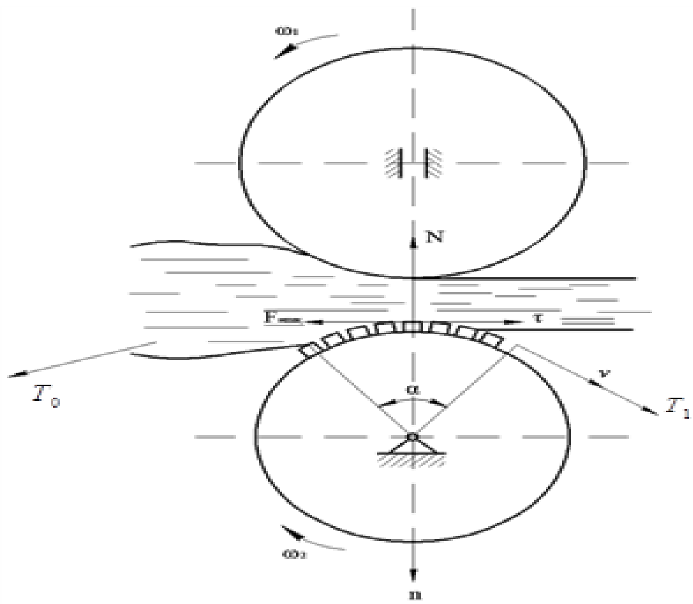

Figure3. Tape cutting scheme

The angular velocities of the successive shafts in the belt transmission are conditionally expressed. This is affected by the friction force and the normal reaction force when the belt is conveyed with the teeth of the engagement surface between the variable angular velocity and the radius of the shaft surface.

The belt speed moves in the same direction as the shafts. We believe that Amonton's law is suitable for the lengthening of the tape. For this case, we construct a differential equation for the movement of the tape.

$$\frac{f}{\mu_0}\cdot\frac{dT}{dS}-F_{иш}=\vartheta\cdot\frac{d\vartheta}{dS} \quad (1), \qquad \frac{f}{\mu_0}\cdot\frac{T}{R}-N=\frac{\vartheta^2}{R} \quad (2), \qquad \vartheta=C\cdot f \ (3), \qquad F_{иш}=k\cdot N \quad (4),$$

$f=1+\alpha\cdot T\cdot$ (5) Where $f=\frac{dl}{dl_0}=\frac{\mu}{\mu_0}=\frac{C}{\vartheta}$ a value characterizing the deformation of the tape;

$\alpha=\frac{\Delta l}{l\cdot T\cdot\mu_0}$ - tape elongation ; μ_0- preliminary tex tape;

$\vartheta-$ belt speed; к – coefficient of friction between roller and belt; C – constant factor. Inserting Equations (5) into equation (3) we find the speed of the rollers when pulling the tape

$$\vartheta=C\cdot f=C\cdot(1+\alpha\cdot T) \ \Rightarrow \ \frac{d\vartheta}{dS}=C\cdot\alpha\cdot\frac{dT}{dS} \qquad (6)$$

From equation (2), we determine the normal clamping force affecting the tape

$$N=\frac{f}{\mu_0}\cdot\frac{T}{R}+\frac{\vartheta^2}{R}=\frac{(1+\alpha\cdot T)\cdot T}{\mu\cdot R}+\frac{\vartheta^2}{R}$$

By inserting equations (2), (5) and (6) into equation (1), we determine the tension force of the tape between the rollers.

$$\frac{1+\alpha\cdot T}{\mu_0}\cdot\frac{dT}{dS}-\kappa\cdot\frac{1+\alpha\cdot T}{\mu_0}\cdot\frac{T}{R}+k\cdot\frac{(1+\alpha\cdot T)^2\cdot C^2}{R}=C\cdot(1+\alpha\cdot T)\cdot C\cdot\alpha\cdot\frac{dT}{dS}$$

$$\frac{dT}{dS}-T\cdot\frac{k}{R}-\frac{k\cdot C^2}{R\cdot(\frac{1}{\mu_0}-C^2\cdot\alpha)}$$

Entering values

$$B=\frac{k}{R},\ C_1=\frac{k\cdot C^2}{R\cdot(\frac{1}{\mu_0}-C^2\cdot\alpha)}.$$

Conclusion: To quickly stretch and reduce unevenness, due to the parallelization of income, the tension force between the first and second pairs of rollers and cylinders, the issues of calculating unevenness were analyzed at the existing values of the following: the stress force is equal to the coefficient of elongation of the tape angular velocity linear density, speed and coefficient of friction of the tape with the roller. The correct selection of the angular velocities of the shafts allows, according to the equation obtained for the tension of the tape, to ensure the uniformity of the tape, straightening and parallelization of the ends of the fibers, predicting a decrease in product unevenness

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