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EXPERIMENTAL REVIEW OF THE RUBBER PAD OF THE NEW DESIGN OF THE SEWING MACHINE

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Annotation. The scientific research illustrates that the results of experimental studies to determine the loading of the recommended design of the compound paws with a rubber shock absorber of the mechanism for moving materials in a sewing machine. Based on the analysis of the obtained oscillograms and the constructed graphical dependencies, the best parameters of the shock absorber and the compound paws of the sewing machine are recommended.

Keywords: sewing machine, movement mechanism, paw, composite, rubber, rigidity, tension, oscillation, rotation frequency, main shaft, stitches, pitch, thickness, spring, quality, parameter.

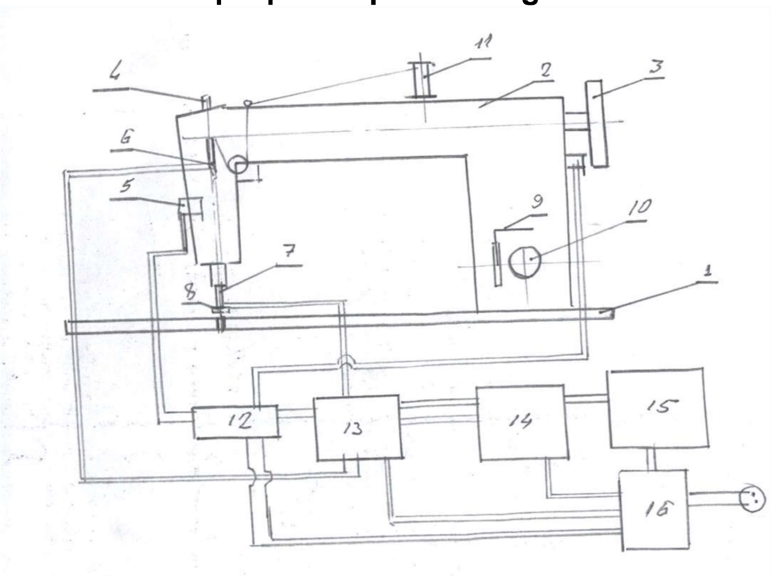
Introduction. During the operation of the machine, the presser paws, with the help of a spring, creates the pressure necessary for the normal advancement of the material [1]. The clamping force can be adjusted in the range from 20N to 50N [2]. The value of the clamping force is selected from the following considerations: on the one hand, constant contact of the paws with the material in the process of its advancement and the adhesive force of the rail with the material must be ensured, sufficient to overcome all other forces that impede the advancement of the material (friction between the layers of material, friction between the paws and material, product inertia forces, thread tension, etc.); on the other hand, increasing the pressure of the paws above the allowable one can lead to damage to the material by the needle (especially products made from bulky yarn), to the destruction of the material or the appearance of marks from the teeth of the rack [3].

Incorrect selection of the presser paws pressure to the material or incorrect calculation of the spring can lead to a violation of the adhesion of the material to the teeth of the rack and to a change in the stitch length at different speeds of the machine. With an increase in the speed of the main shaft, the so-called hanging (jump) of the paws is observed. The essence of this phenomenon is that when the gear rack is raised, the paws receives and bounces off the material [4]. The magnitude of the jump and its duration depend on the characteristics of the spring and on the impact. The presser paws, which received the initial impulse, does not have time to return to its original position in time before the end of the material advance. In this case, the material remains not clamped the adhesion force of the toothed rack with the fabric decreases; the phenomenon is reflected in the stitch length.

To solve this problem, an experimental installation was developed on the basis of a YAMATA sewing machine of a conventional design with the ability to install standard and proposed paws designs on it.

Materials and methods. The general view and block diagram of the experimental setup are shown in fig.1.

a - General view of the experimental setup of the sewing machine with the proposed paws design



b - Structural scheme of the experimental setup for measuring the load on the paws of the sewing machine.

Fig.1. General view and block scheme of the experimental setup

Sewing machine "YAMATA" 1-stitch sewing machine, 2-sewing machine, 3-drive pulley with Hall sensor, 4-paws bar, 5-needle position control sensor, 6-strain sensor for thread tension control, 7-sewing needle, 8-presser paws with a strain gauge load control on the paws, 9-controller for changing the direction of the stitch pitch, 10-controller for the stitch pitch, 11-thread spool, 12-tensometric amplifier UT-4 and 13-amplifier 8-ANCH.14-Digital Converter LTR-154, 15-computer, 16- Power supply with voltage stabilizer. The block scheme of the experimental paws and strain gauge [5, 6] sensor is shown in Fig.3. A distinctive feature of this measuring system is that for the first time in practice, the load acting on the paws is measured in the dynamics of the sewing machine. To measure the load on the paws and the process of interaction of the rack mechanism of the sewing machine in the process of flashing the material in different modes, a measuring system was developed consisting of a paws of the proposed design with a strain gauge installed on it, which allows measuring the load in the operating modes of the sewing machine. The load measuring device works as follows. On the stand of the paws 2 of the sewing machine mounted on the guide bushings 1, the rod 2 is fixed with the help of a bolt 4. The design of the proposed paws is changed in accordance with the requirements for conducting experimental studies and the requirements for measuring the dynamic parameters of the paws with a rack mechanism. Paws 7 having in the lower part of glued rubber 8 a certain thickness and properties of rubber, which can be changed, at the request of factorial experiments on the rubber surface from the side of the rack mechanism, a metal plate 9 0.3 mm thick is glued, made of sheet metal with a chromium composition in the form of a paws. When flashing the plastic material 9, the paws 7 interact with the rail 12 installed on the plate 13 of the sewing machine, which ensures the normal movement of the sewn materials.

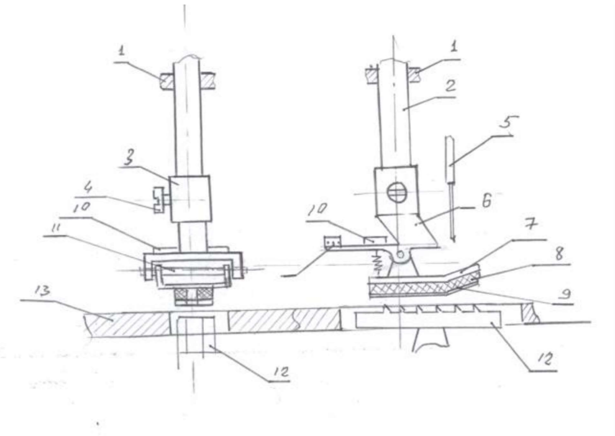


Fig.2. Scheme of the paws installed on the stand with strain gauge sensors for controlling the load on the paws

The paws 7 it is mounted on a specially made bracket 6, which is a dry element, both for the paws 7 and is an elastic element for gluing strain gauges 10 from the upper and lower parts of the surface of the plate 9. The support points of the paws 9 are moved apart more than the length of the strain gauges and are installed on the axis of rotation 11. When loaded with a spring, the supports cause the plates to bend, which ensures changes in the resistance of the strain gauges. Figure 3 shows a general view of composite paws with a rubber shock absorber with a load change sensor.

a-general view b-paws with load change sensor

Fig.3. General view of the compound paws

For a comparative analysis of the results obtained, a sensor for controlling the rotational speed of the main shaft of the sewing machine in the form of a Hall sensor was also installed on the head of the sewing machine [7, 8]. To determine the beginning of the movement of the rack and pinion mechanism and the moment the beginning of the firmware process, a Hall sensor is installed, which determines the position of the needle in relation to the paws.

The load on the paws was recorded using the installed sensor [9, 10] on the paws.

Results of experiments and their analysis. The results obtained were recorded on oscillograms in the form of diagram records. The oscillograms also reflect the frequency of signal recording with an accuracy of up to 200 MHz In the time interval of 0.001 sec, this ensured high measurement accuracy with respect to the measured parameter.

Figure 4 shows an approximate recording of the oscillogram of the piercing of a material using a standard paws design without a damping element installed in the lower part of the paws. Also on the oscillogram are the main shaft rotation frequency curve 1, curve 2 - the position of the needle in relation to the needle bar, Curve 3 - the torque on the main shaft.

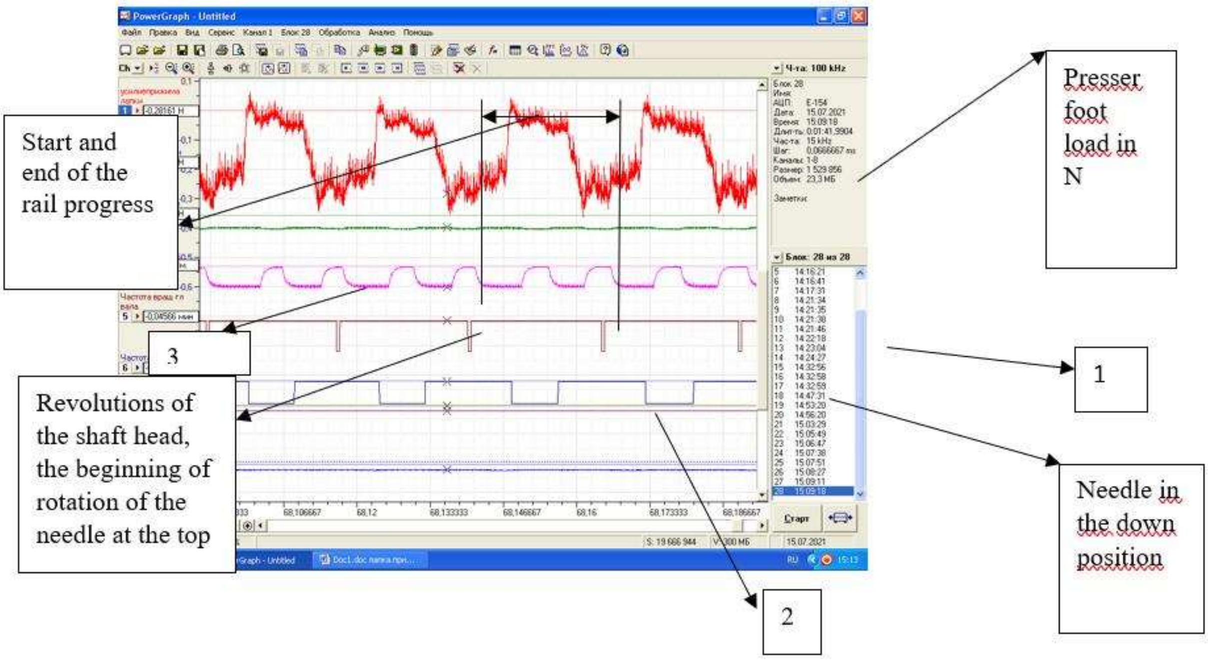


Fig.4. An oscillogram of the recording, changes in the pressing force of the paws to the rack mechanism of the sewing machine installed on it with a conventional standard paws

This record was made for a conventional paws design without damping elements. On figure 5 shows an oscillogram recording the change in the pressing force of the paws with an elastic element installed on it under the same conditions.

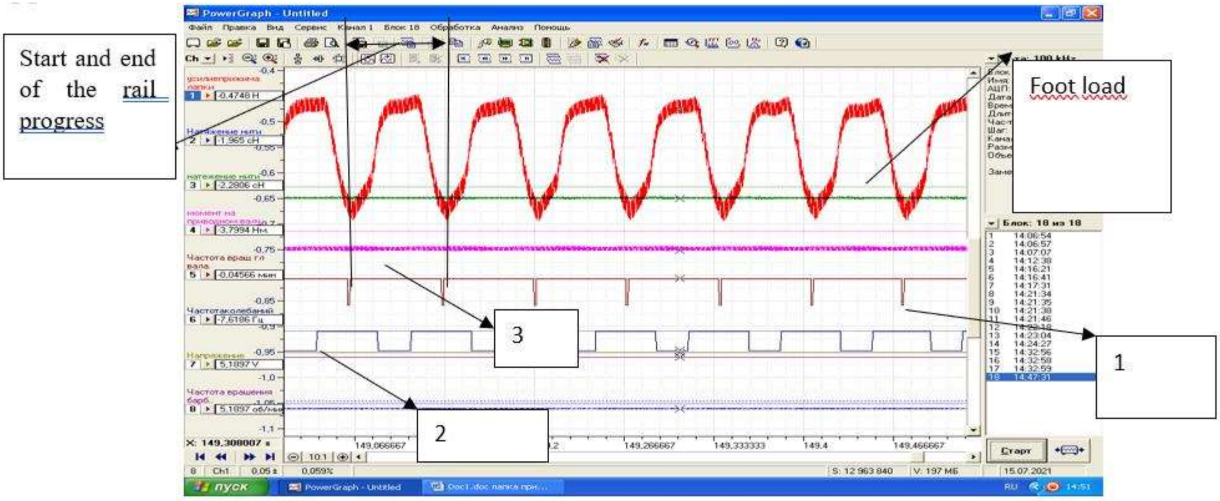
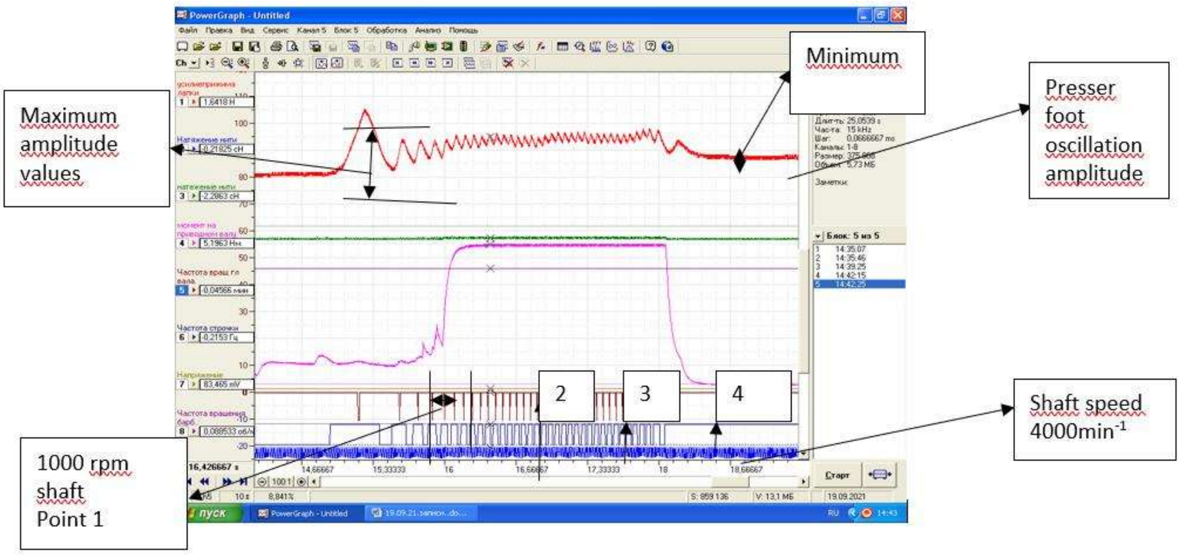


Figure 5. Oscillogram of the recording, changes in the pressing force of the paws to the rack mechanism of the sewing machine with the paws installed on it with an elastic element

A comparative analysis of the obtained research results shows that the nature of the presser paws oscillations differ significantly from each other, both in magnitude and in the pattern of vertical movement. To study the influence of the frequency of rotation, the main shaft of the sewing machine on its operation, in particular on the frequency, amplitude of oscillations of the presser paws of the sewing machine, we conducted experimental studies, during which we determined the patterns of change in the amplitude of oscillations of the paws from such parameters as the load on the paws, rubber thickness, stitch pitch, material and speed of the main shaft of the sewing machine. On fig. 6 shows an oscillogram recording the change in the amplitude of vibrations of the paws with an increase in the speed of rotation of the main shaft of the sewing machine.



1 - shaft speed 1000 rpm, point 2 - shaft speed 2000 rpm, point 3 - shaft speed 3000 rpm, point 4 shaft speed 4000 rpm.

Figure6. Oscillogram recording, changes in the amplitude of the fluctuation of the paws from the frequency of rotation of the shaft

The shaft speed changes from 0 to 4000 rpm for a certain period of time and oscillation amplitude. The analysis of the obtained oscillograms shows that, the nature of the change in amplitude, as the speed of the firmware increases, the amplitude of the fluctuations of the paws decreases. The above results were obtained after decoding the oscillograms.

Table 1 shows the main results of the measurements carried out on the sewing machine, in which the vibration amplitude of the paws was measured for various rubber harnesses and on the rotational speed of the main shaft of the sewing machine [11, 12].

Table 1

With a stitching step of 1 mm and with a load of 40N, the thickness of the elastic band is 2 mm

Shaft speed rpm.	1000	2000	3000	4000
Oscillation amplitude Without rubber	2mm	1,75	1,50	1,25
Rubber hardness				
75 MP	1,75	1,0	0,80	0,5
60 MP	1,75	1,0	0,85	0,5
50 MP	1,85	1,1	0,9	0,5
40 MP	1,90	1,2	1,0	0,5

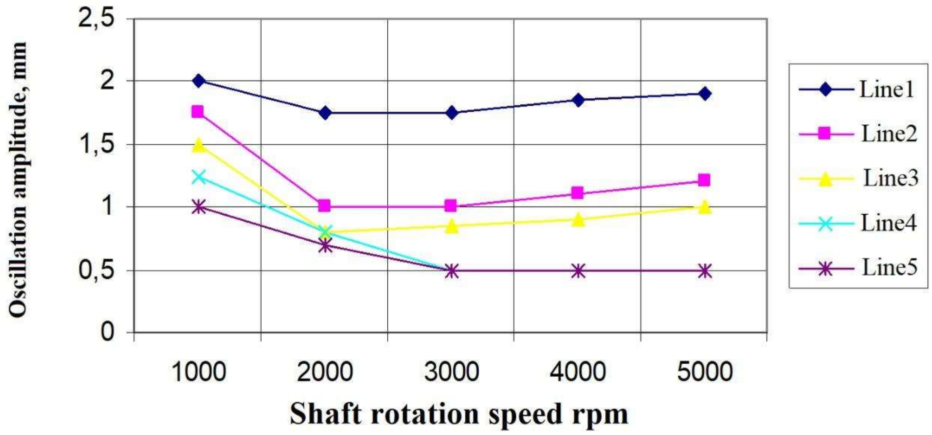


Figure 7. Dependences of the change in the amplitude of oscillations of the paws on the speed of the shaft

1 row for paws without rubber, for other cases, rubber thickness 2mm. 2- Row for rubber 40 MP. 3-row for rubber 50MP. 4-row for rubber 60 MP, 5-row for rubber 75 MP. Paws load 40 N.

As noted above, comparing the results, the patterns of change in the loading of the compound presser paws with the existing design (see Fig. 4. and Fig. 5) in sufficient stitches, the amplitude of loading decreases. In this case, high-frequency load fluctuations are actually eliminated due to the rubber shock absorber.

It should be noted that when using the recommended design of the presser paws with a rubber shock absorber, the amplitude of plate oscillations is significantly reduced (see Fig. 6). This leads to an increase in the uniformity of the grinding of materials even with a large thickness from the data in table 1. It follows that with an increase in the frequency of rotation of the main shaft, the amplitude of vibrations of the paws without a rubber shock absorber decreases from $2{,}0 \cdot 10^{-3}\, m$ until $1{,}25 \cdot 10^{-3}\, m$ under $n = (1000 \div 4000) rpm$. When using a shock absorber made of rubber with a hardness of 75 MP, the vibration amplitude of the lower plate decreases from $1{,}75 \cdot 10^{-3}\, m$ until $0{,}5 \cdot 10^{-3}\, m$. with an increase in the hardness of the rubber, the amplitude of the fluctuations of the paws decreases accordingly (see Fig. 7). The most acceptable value of rubber hardness for the shock absorber of the paws is the brand of rubber 1338 (hardness 50 ÷ 60 MP), at which the amplitude of vibrations of the lower plate of the paws is in the aisles $0{,}5 \cdot 10^{-3}\, m$, under $n = 4000 rpm$

Conclusion. On the basis of experimental studies, the patterns of loading and vibrations of the compound paws of the sewing machine transportation mechanism were obtained, the impudent parameters of the paws and the rubber shock absorber were determined, which ensure a decrease in the amplitude of vibrations of the paws. Based on the analysis of the obtained patterns of fluctuations of the compound paws and the constructed graphical dependencies, the rubber brand 1338 is recommended as a shock absorber of the paws with a hardness of (50-60) MP.

References

1. A.S. Ermakov equipment for sewing enterprises, M., prof. arr. Publishing house 2002, 432 p., p. 242.
2. Tadzhibaev Z. Sh. Equipment for sewing enterprises [Text] / Z. Sh. Tadzhibaev, S. Sh. Tashpulatov. -Toshkent: “Voris-nashriyot”, 2007. -160 p.
3. Mansurova D.S. Kinematics and dynamics of four-link lever mechanisms with elastic connections of the working bodies of sewing machines. Monograph. Khudzhent, 2008, 152 p.
4. Mansurova M.A. “Improvement of the technology for obtaining double-thread chain stitches with extended characteristics and working bodies of sewing machines” Dr. diss. Tashkent, 2017, p.236.
5. Manly R. Analysis and processing of vibration records, Engineering, M., 1974, 368s.
6. Safronova I.V. Technical methods and measuring instruments in the clothing industry. M. “Light and food industry”, 1983, 229 p.
7. Ponomarov S.D., Biderman V.L., Licherev K.K. and other Calculations for strength in mechanical engineering. M.: Mashgiz, 1959. -1118 p.
8. Baubekov S.D., Dzhuraev A. Dynamics of machines and mechanisms // Textbook, ed. Evero, Taraz, Kazakhstan 2014. P.200.
9. Nemets I. Practical application of strain gauges, energy, 1970, 144s.
10. Raevsky N.P. Sensors of mechanical parameters of machines. M. ed., 1999, 226 p.
11. Grigoriev E.T. Calculation and design of rubber shock absorbers. - M.: 1990.- 153 p.
12. Poturaev V.N., Dyrda V.I. Rubber parts of machines. – M.: Mashinostroenie. 1977. -216 p.

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