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# Device for testing plush cloths for the strength of fixing the plush thread in the ground

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**ABSTRACT.** The plush surface is formed thanks to elongated plush broaches knitted together with ground threads, as a result of which the plush broaches have a fairly strong anchorage in the ground. When processing yarn of high linear density, the plush layer of knitwear can be quite stable, able to maintain a high bulk for a long time during operation, providing increased heat-shielding properties of the product. The design of the device for determining the strength of fixing a plush thread in the ground, which makes it possible to bring tests closer to real operating conditions was developed and results was given in the article.

**KEY WORDS:** plush surface, knitwear, device, determining the strength, fixing a plush thread.

## I. INTRODUCTION

Plated plush knitwear has recently found wide application for the manufacture of knitwear with high heat-shielding properties. Unlike all types of knitwear, plated plush knitwear has a structure that creates increased volume. The plush surface is formed thanks to elongated plush broaches knitted together with ground threads, as a result of which the plush broaches have a fairly strong anchorage in the ground. When processing yarn of high linear density, the plush layer of knitwear can be quite stable, able to maintain a high bulk for a long time during operation, providing increased heat-shielding properties of the product.

During the operation of plush knitwear, the loss of presentation occurs due to damage to their pile surface. Since the plush broach has an elongated shape and lags behind the surface, under actual wear conditions, the destruction of knitwear occurs due to the impact of external forces on the broach [1, 2].

One of the main indicators that determine the quality of plush knitwear is the strength of the plush thread in the ground, which depends on the method of its fixing, the type of raw material, the linear density of the thread, the loop modulus, and other factors [3-6].

## II. LITERATURE REVIEW

To determine the strength of the plush thread in the ground, in [7] prof. MM. Mukimov and R. Kovarzha, when determining the strength of fixing a plush thread, a dynamometer of the T-4 brand (Germany) was used. The scheme of the working part of the dynamometer is shown in fig. one.

A hook 2 is fixed in the upper clamp 1 of the dynamometer, and plates 5 are fixed in the lower clamp 6. Plush knitwear 3 is put on a curved thin plate 4, and together with it is fixed between the plates 5.

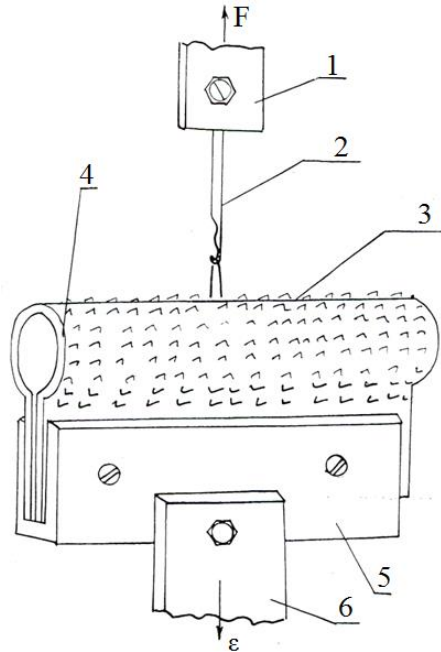


Fig. 1. Scheme of the working part of the dynamometer

The necessary condition was observed - the tension of the knitwear worn on the curved plate should be the same in all cases.

The experiment was carried out with three different options, differing from each other in the number of loops under load. In the first variant, the strength of fixing the push thread in the ground in the areas of two push loops was determined; in the second - in the area of four loops; in the third option - in the area of six loops.

The curves obtained as a result of these experiments are shown in Figs. 2. The first curve I shows the amount of force applied to pull the thread from two push loops (Fig. 2).

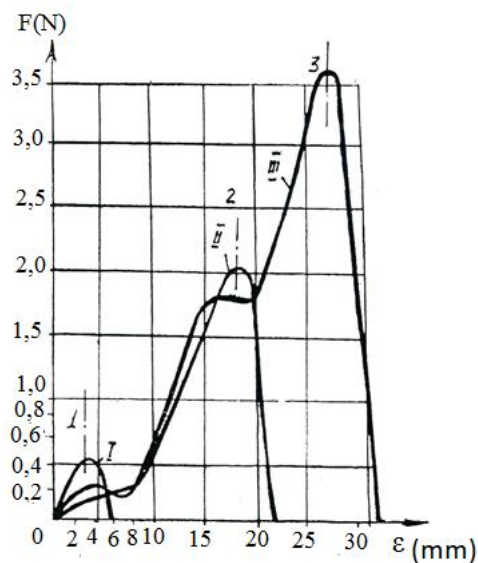


Fig. 2. Graph of the dependence of the magnitude of the deformation on the applied load

Curve II shows that the amount of force increases in steps, the first value of the curve is the amount of force required to pull the plush thread from the first two loops 3, 4, and the second value of the curve is to pull the plush thread from the next two loops 2, 5 (Fig. 3.II ).

The difference in the forces of pulling the plush thread from the first two loops 3, 4 and the next two loops 2, 5 indicates that pulling the plush thread from loops 2, 5 is more difficult than from loops 3, 4 (Fig. 3. III ). This is explained by the fact that with an increase in the number of loops under load, the number of points of fixing the plush thread in the ground increases, as well as the surface contact of the plush thread with the ground.

Consequently, it increases the strength of the plush thread in the ground. This is also confirmed by the third curve III , which shows the amount of force required to pull the plush thread through six loops, here also the force increases in steps; the first value is the amount of force required to pull the plush thread from the first two loops 4, 5; the second value of the curve for pulling the plush thread from the next two loops is 3, 6, and the maximum value of the force for pulling the last two loops is 2, 7 (Fig. 2.3.).

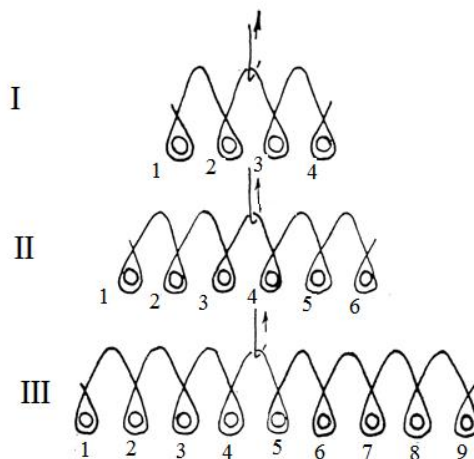


Fig. 3. Change in load from the number of loops

The disadvantage of this device is that this device allows you to determine the strength of the plush thread in the ground only under static conditions and does not allow testing in conditions close to natural, i.e. when the plush fabric is in motion.

The purpose of creating a new device is to increase the objectivity of the test results by bringing the test conditions closer to the operating conditions of the sheets.

Data on the magnitude of the strength of the plush thread in the ground are of great theoretical and practical interest. They make it possible to judge the behavior of knitwear in real conditions of operation of products, which in turn makes it possible to reasonably approach the development of a new device, as well as to solve some issues related to determining the strength of fixing a plush thread in the ground. This information is necessary to create objective methods for assessing the quality of knitwear and clothing from it, and to design new types of plush fabrics with desired performance properties.

Until now, the strength of the plush thread in the ground was determined as follows, in the plush knitwear of the plated weave, the strength of the fixation of the plush thread is greater in comparison with the plush knitwear of the lined and weft weaves. There was no quantitative assessment of the strength of fixing a plush thread in the ground, while a quantitative assessment of the strength of fixing a plush thread in the ground expands the area of use of plush knitwear and reduces the consumption of raw materials during its workings [8-11].

### III. RESULTS AND DISCUSSION

The design of the device for determining the strength of fixing a plush thread in the ground, which makes it possible to bring tests closer to real operating conditions, was developed by scientists from the Department of Technology of Textile Fabrics of the Tashkent Institute of Textile and Light Industry. On fig. 4 shows a general view of the device, in fig. 5 clamp for fixing the sample with curved frames.

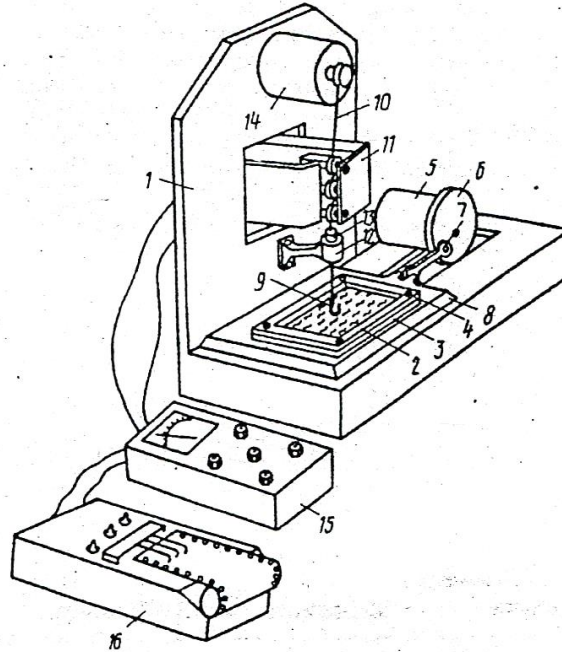


Fig. 4. General view of the device

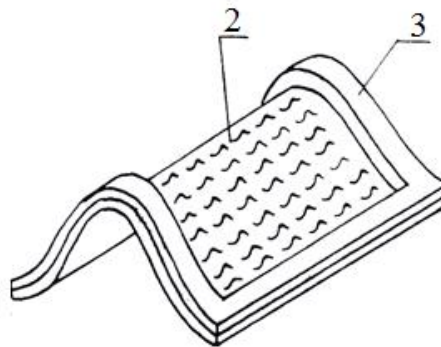


Fig. 5. Sample clamp with curved frames

The device contains a clamp mounted on the body 1 for fixing samples of plush fabric, consisting of the upper 2 and lower 3 frames, fastened with bolts, and a mechanism for its reciprocating movement, consisting of an electric motor 5, a crank 6 mounted on its shaft, a connecting rod 7 and a slider 8, a hook 9 for capturing a plush broach, by means of a flexible rod 10, connected by a force meter 11, a sensor 12 of the movements of the hook, including a rod 13 rigidly and coaxially fixed on the flexible rod 10, placed in a guide installed on the body 1, and a mechanism for moving the hook 9, including an electric motor 14, on the shaft of which the end of the flexible rod 10 is fixed. The plane of movement of the clamp for the sample is perpendicular to the direction of movement of the hook 9. The force meter 11 and the sensor 12 of the movement of the hook 9 are electrically connected through an amplifier 15 to a three-channel self-recording device 16 (Fig. 4).

Frames 2 and 3 can be curved (Fig. 5).

The device works as follows.

A sample of the plush fabric is fixed in the clamp between frames 2 and 3, the plush broach is put on the hook 9, the flexible rod 10 is threaded between the frames by the rollers of the force meter 11 so that the tension of the flexible rod 10 does not affect the plush loop, and then the end of the rod 10 is fixed at the output motor shaft 14.

The electric motor 14 is turned on, as a result of which the rod 10 winds on the motor shaft 14, the hook 9 moves up and pulls the plush thread out of the fabric, which in turn reciprocates under the action of a crank-slider mechanism.



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## IV. CONCLUSION AND RECOMENDATION

The load applied to pull out the plush thread by repeated exposure to the plush thread is determined using a force measuring device. The nature of the behavior of pulling the plush thread out of the ground, where the plush thread overcomes different sections of the loop in different ways, is depicted on the tape of the recorder, which makes it possible to judge the suitability of this knitted fabric for use.

Conducting tests on a plush knitted fabric of plated, lined and weft weaves, we obtained the following indicators of the strength of fixing a plush thread in the ground: plated plush knitted weave - 0.9 N, lined plush knitted weave - 0.48 N, weft plush knitted weave – 0.20 N. Obviously, the most durable fixation of the plush thread in the knitwear ground is in the plated weave, so the plush thread is tied into the ground loop together with the ground thread, and in the lined knitwear, the lining thread is suspended from the wrong side on the broaches of some loops, therefore, its the fastening is less strong, and in the weft plush knitwear, the weft thread is located between the warps of the loops and the broaches, which confirms its weak connection with the ground of the knitwear.

## REFERENCES

- [1] Kholikov K., Mukimov M. Ways to reduce the tension of the thread in the production of plush knitwear. // Problems of textiles. No. 1/2012. -pp. 16-21.
- [2] Kholikov K., Mukimov M. Ways to reduce the tension of the thread in the production of plush knitwear. International scientific -practical conference "Influence of industrial-innovation policy on the quality of education". TIGU. G. Taraz (Kazakhstan), March 28-29, 2012 -pp. 261-263.
- [3] Patent 490881 (USSR) Class. D 04 B 7/06. Flat turning machine. MM. Mukimov, S.A. Dalidovich. publ. 05.11.1975 Bull. No. 41.
- [4] A.S. 1689457 (USSR). Cl. D 04 B 15/10. Needle bed of a reverse machine. MM. Mukimov. Appl. 01.12.1989 No. 4763595/12. publ. 07.11.1991 Bull. No. 41.
- [5] UZ Patent FAP 00538. D 04 B 15/00, D 04 B 9/00. Flat turning machine. S.B. Baizhanova, E.S. Sarybaeva, G. Makhmudova, D. Ubaydullaeva, M.M. Mukimov. Appl. 01.12.89 No. 4763595/12. publ. 07.11.91 Bull. No. 41.
- [6] UZ Patent FAP 00339. D 04 B 15/38, D 04 B 9/00. Needle bed of a reverse machine. Juraev A.D., Mukimov M.M., Umarova M., Baizhanova S.B., Tulendieva O. Appl. 13.04.2007 publ. 31.01.2008 Bull. No. 1.
- [7] Mukimov M.M., Kovarzh R. Determination of the strength of fixing a plush thread in the soil of knitwear: Collection of scientific papers of the Liberec Engineering Institute (Czech Republic). 1984 No. 17, -p. 427-431.
- [8] Kholikov K.M., M.M. Mukimov. Study of the influence of the linear density of ground and plush yarns on the technological parameters and properties of plush knitwear. Materials of the international scientific and practical online conference "Social intelligence: theory, practice and trends". December 14-15, 2014. -pp. 170-172.
- [9] Kholikov K.M., Normuratov Sh. Dependence of qualitative indicators of plated plush knitwear on the linear density of yarn. Materials of the international scientific and practical online conference "Social intelligence: theory, practice and trends". December 14-15, 2014 -pp. 452-455.
- [10] Kholikov K.M. Parameters and physical and mechanical properties of the plated plush jersey. // Problems of textiles. No. 1/2015. -pp. 32-37.
- [11] Kholikov K.M. Study of the quality indicators of cotton-silk plush knitwear. Materials of the international scientific and technical conference "Youth and knowledge - a guarantee of success." December 17-18, 2014 Kursk. Russia.