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Considering the movement of the material in the sewing machine, facilitate smooth movement under the foot

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Abstract: The paper analyses existing constructions of presser foot node of material handling mechanism of a sewing machine. A new effective design of presser foot node with an additional elastic element in the form of a conic spring is presented.

Keywords: material movement, presser foot, thread winding, bobbin, bobbin case, bobbin winders, vertical hook, spools of thread, ring, frame, flywheel, latch mechanism.

Introduction

The problems of the quality of garments, the ratio of quality and price are among the most acute problems at the enterprises of the light industry. Increasing competition requires garment enterprises to move to a new technological level. At most domestic sewing enterprises, there is an acute issue of replacing an outdated sewing machine park, while new sewing equipment must meet modern quality, productivity, and labor protection requirements. An important task is to reduce the level of noise and vibration activity.

The mechanism for transporting the materials of the sewing machine [1-6] is designed for periodic discrete movement of the materials to be sewn by a given stitch length. The stitch length is determined by the distance between the centers of the holes formed in the fabric to be sewn by two successive needle punctures.

The movement of materials is carried out periodically according to the cycle-gram of the sewing machine. All the mechanisms for transporting the fabric can be divided according to the method of moving the materials to be ground [1] into: mechanisms in which the movement is carried out due to the impact on the materials of a toothed rack or roller; mechanisms in which the movement of materials is carried out by a special device (carriage, cassettes, hoops, etc.) with materials clamped in it.

The invention relates to sewing production, and in particular to the construction of the presser foot of sewing machines.

In sewing machines, in order for the conveyor bar to move the materials to be sewn, a sufficient frictional force must be created between it and the materials. This force is provided by the pressure of the presser foot. The purpose of the presser foot is also to hold the fabric to be sewn at the level of the throat plate when the needle and thread take-up move up. In addition, the presser foot must provide a certain amount of compression to the materials being sewn. This greatly facilitates the tightening of the stitches by the thread take-up and provides in compressed materials the appearance of such elastic forces that create sufficient tension in the stitches after the presser foot stops acting on the materials ([1], Garbaruk VN Calculation and design of the main mechanisms of shuttle sewing machines. L. , "Mechanical Engineering", 1977, 232 p.).

In the known construction of the 22-A class sewing machine, the presser foot is attached by a knurled screw to a movable vertical bar. The foot consists of a sole and a holder connected by a hinge. The pin of the foot can move parallel to the needle bar in guides mounted in the machine head. A bracket is mounted on the rod, which has a guide protrusion that moves when the foot is lifted in the longitudinal slot of the machine head. This prevents spontaneous rotation of the rod around its axis. When lifting the foot

by hand, you need to turn a special cam by the appendix. In the car 22-A class. the pressure of the foot on the materials to be sewn is created by a coil spring put on the rod. In some sewing machines, for example, in a machine of 97 cl ([2], Marakushev E.A., Oblezov A.I., Safronova I.V.Multi-needle sewing machine M-12. M., Gizlegprom, 1964. 70 p.) , instead of a cylindrical spring, a flat spring is used. Such a spring has no particular advantages over a cylindrical spring.

The presser foot should pivotally attach to the bar for better material clamping to the bar and throat plate. This also facilitates its transition through the transverse seams and thickenings of the materials being sewn. The hinge of the foot should be no more than c = 5mm from the back edge of its base. Otherwise, when the foot is turned, the back edge will slow down the top layer of the materials to be sewn when they are moved by the rail, which will lead to its unwanted fit.

When switching to processing materials of a different thickness, the foot relative to the rod has to be moved in height. For this, a groove is made in the foot for the fastening screw ([1], Garbaruk V. N calculation and design of the main mechanisms of shuttle sewing machines. L., "Mechanical Engineering", 1977, 232 p.).

The main disadvantage of the existing designs of the presser foot of the 22-class and 97-class sewing machines, it is that the presser feet do not provide uniform pressure on the materials being sewn. This reduces the quality of the stitching. It should be noted that during the operation of the sewing machine, the presser foot oscillates vertically with the bar on which it is attached. This is due to the fact that the foot and the rod, pressed by the spring, represent an elastic system, which is during the operation of the machine in the forced vibration mode ([3], Komissarov A.I., Lopandin I.V. Features of the interaction of the sewing machine rail with the fabric and the foot - " Proceedings of universities. Technology of light industry", 1966, No. 6, p.105-111). The source of the forced vibrations is the feed bar, which, during the operation of the machine, raises the presser foot over the throat plate, and then lowers it again. If the amplitude of these vibrations is commensurate with the total thickness of the materials being sewn, then the mode of uniform (step) movement of the material is violated, the process of stitching is disrupted.

In another known design, the presser foot of the sewing machine containing the sole and the holder, interconnected with a retainer, in order to increase operational properties, the retainer is integral with the sole, and the holder has a recess corresponding to the shape of the retainer ([4], A.S. No. 506308 Bulletin No. 9, 1976).

The disadvantage of the known design of the presser foot is insufficient damping, both in the vertical and in the carbon movement of the foot under the cyclic action of the rail through the materials being sewn. In this case, not only the uniformity of material movement is disturbed, but also the folding of the material occurs.

The construction of the presser foot of the sewing machine contains a fence, a bracket and a retainer for attaching it to the presser foot. In order to expand technological capabilities, the bracket has a U-shape, the free ends of which are located in front of the foot, and a guide fixed at the ends of the bracket, and the retainer is made in the form of a lead screw and is installed on the free ends of the bracket parallel to the guide, and the limit fence is located on the guide and is connected to the lead screw ([5], AS No. 985175 Bulletin No. 48, 1982).

The disadvantage of this design is its complexity and limited use.

The design of the foot is taken as a prototype according to [1].

The objective of the invention is to increase the reliability of work by ensuring the uniformity of the pressure of the foot on the materials to be sewn, and on the rail.

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The problem is solved by improving the design of the presser foot of the sewing machine.

The essence of the design lies in the fact that the presser foot of the sewing machine consists of a sole and a holder, interconnected by a hinge, while the sole is made of hollow plate steel. A rubber cushion is installed in the hollow part of the sole, the thickness of which is made with increasing thickness from the forefoot to the heel. The articulated joint of the sole with the holder is equipped with a rubber sleeve installed between the toe and the holder. The sole is made with a slot for the passage of the needle. The design allows an increase in the reliability of the work of the presser foot, ensures uniform movement of the material due to the necessary shock-absorbing force using a plate foot with a rubber cushion and a rubber sleeve.

The design is illustrated by a drawing, where Fig. 1 is a 1-General view of the presser foot in section, Fig. 2 is a section A-A in Fig. 1, Fig. 3 is a view B in Fig. 1.

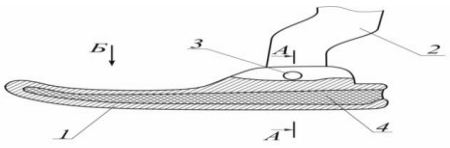
The presser foot of the sewing machine consists of a sole 1 made of plate steel, forming a hollow part in which a rubber pad is placed 4. The thickness of the hollow part and the rubber pad is made increasing from the forefoot to the heel of the sole 1. The sole 1 is hinged to the holder 2. In this case in the hinge between the pin 3 and the holder 2 there is a rubber bushing 5. The sole 1 is made with a slot 6 for the arrival of the needle (not shown in the figure).

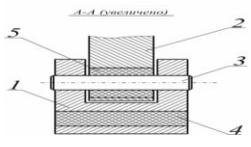
The design works as follows. In the process of sewing materials, the presser foot is in the working position, the sole 1 of which presses the materials to be sewn onto the rail (not shown in the figure). In this case, the needle passes through the slot of the sole 1 of the foot, stitching occurs, the slats are in the lower position. In the mode of moving the material, the rail rises and the material is pressed by the sole 1 of the foot, the rail moves the material one step, the materials to be sewn slide along the working surface of the pillow 1 of the foot due to less friction between them. At the same time, depending on the thickness and density of the materials to be sewn, due to the corresponding deformations of both the plate sole 1 and the rubber pad 4, and the rubber sleeve 5 and the pressure coil spring of the rod (not shown in the figure), the sole 1 presses the materials to be sewn to the rail with the required force over the entire contact area. In this case, the friction force between the sole and the materials, as well as between the materials and the rail, will be sufficient.

The thickness and density of the materials to be sewn do not affect the uniformity of the formation of stitches in the line due to cushioning (deformation of the rubber pad 4, both vertically and in angular directions due to the variable thickness of the pad 4). The rubber bushing 5 installed on the pin 3 and the holder 2 absorbs the shock loads of the sole 1 of the foot when it is lowered and raised. This will eliminate the appearance of creases in the materials.

The proposed design of the presser foot is actually self-adjusting to changes in the thickness and density of the materials being sewn, ensuring uniform pressure, thereby, and its reliability.

Fig.1





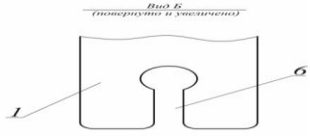


Fig.2 Fig.3

Sewing machine presser foot

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