

THE ANALYSIS OF VARIABILITIES OF THE CONTROLLER PLATE OF THE SHUTTLE THREAD TENSIONER IN A SEWING MACHINE**S.DJ. Mukhamedjanova, A.Djuraev, N.M.Safarov, M.A.Mansurova,
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Abstract. *The paper presents the scheme and principles of operation of the recommended shuttle thread regulator plate. The results of theoretical studies of the oscillations of the plate from the changes in the tension of the shuttle thread are given.*

Key words. *Sewing machine, hook, tension regulator, plate, beam of equal resistance, oscillation, rigidity, mass, dissipation, frequency, amplitude, thread.*

In known shuttle sewing machines shuttle device consists of six main structural parts: housing, bobbin holder, brackets (guide half-rings), bobbin cap and bobbin. Depending on the type of motion and location of the plane of motion of the body distinguish the following types of shuttles: oscillating, oscillating, uniformly rotating with a horizontal axis of rotation, uniformly rotating with a vertical axis of rotation, etc. The leading structural part of all shuttle devices is the housing, which is fixed on the shuttle shaft of the machine. In the oscillating and oscillating types of shuttle devices return - rotary movement makes bobbin holder. This part of the shuttle device design has a pointed nose, which captures the needle loop. The bobbin cap is stationary when turning the body of the shuttle device. In machines with oscillating shuttle it is kept from rotating by a rod in the bobbin cap, which is included in the groove of the overhead bracket. In rotating horizontal shuttle devices bobbin cap and bobbin holder are held from rotation by a set pin. Rotation of the bobbin case when the machine is working is inadmissible, as it can lead to the breakage of the needle. The bobbin holder holds the bobbin case. On machines with a rotating hook, the needle loop goes freely around the bobbin case. The bobbin cap holds the bobbin by adjusting the pressure of the leaf spring, and it can be used to change the shuttle thread tension [1].

The known regulator of shuttle thread tension bobbin cap sewing machine consists of an arc-shaped plate spring, has two holes, the first for fixing the screw to the side surface of the bobbin cap and the second for the adjusting screw. In this case, the width of the lamellar spring along the entire length is made equal [2].

The disadvantage of the known design of the regulator of tension of the shuttle thread bobbin cap is the impossibility of providing thread tension because of the change in the pressure force of the lamellar spring along its length in the contact zones with the thread passed between the plate and the side surface. In addition, when the machine between the leaf spring and the body of the bobbin case periodically accumulates thread lint, which can lead to jamming and thread breakage.

In the device containing a tension regulator shuttle thread, fixed on the cylindrical body of the bobbin cap, in pressing to the oval slot of the wall of the tension spring is made a groove for placing in it the thread when installing the bobbin in the cap. The disadvantage of this design is an increase in the amount of thread pile at the slot and frequent thread breakage.

In the design in the brake regulator of thread tension, the plate element is made with protrusions, and is made of foil, 0.05 mm thick, and the height of the protrusions is 0.08÷0.12 mm [3].

The disadvantage of the known design is the limited used (only for obtaining zigzag stitches), as well as the complexity and low reliability of the design.

Effective design of the shuttle thread tension regulator plate. We have improved the design of the shuttle thread tension regulator plate spring, which provides uniformity of thread tension in the zone of its adjustment.

The essence of the design is that the regulator of shuttle thread tension bobbin cap sewing machine consists of an arc-shaped lamellar spring, the width of which is made decreasing from the axis of the hole for the adjusting screw to its cantilever part (in the form of a beam of equal resistance), with a decrease in width is 18% (see Fig. 1).

Shuttle thread tension regulator bobbin cap sewing machine is an arc-shaped plate spring 1, the width of which is made increasing from "a" axis of the hole 2 for the tension screw (not shown in Fig.) to "c" cantilever part of it. In this case, the plate 1 is represented as a beam of equal resistance [6]. The degree of reduction in the width of the plate 1 from "a" to "c" is 18% (in serial shuttle machines $a = 4.5$ mm, the length of the plate $l = 22.5$ mm, in the recommended design $c = 3.7$ mm).

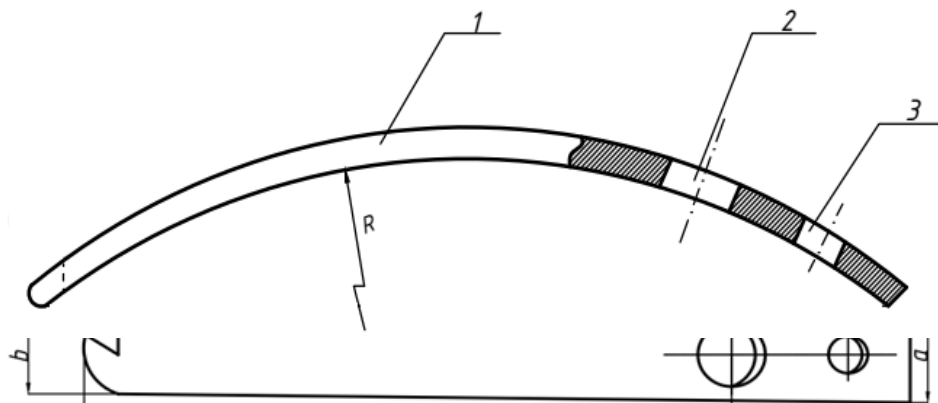


Fig.1 Shuttle thread tension regulator of the bobbin threader.
sewing machine bobbin cap

The arc-shaped plate spring 1 has two holes 2 and 3, of which 3 is for rigid screw fixing of the plate 1 to the side surface of the bobbin cap (not shown in Fig.) and hole 2 for the adjusting screw (not shown in Fig.).

The design works as follows. The bobbin thread having a different linear plane to pass through the silk between the side surface of the bobbin cap (not shown in Fig.) and arc-shaped plate spring 1. In this case, due to the change in friction between the thread and the plate, as well as the side surface of the bobbin case, the tension of the thread changes. Depending on the area of the thread passage, this tension will vary due to the different shoulder (distance) from the axis of the hole 2 to the point where the thread is located and, accordingly, the pressure force from the lamellar spring 1.

Execution of arc-shaped plate spring (thread tension regulator) 1 with decreasing width leads to equalization of thread tension regardless of the zone of its location. In this case, the pressure of the spring 1 due to its deformation will be the same in each of its sections, which provides uniformity of pressure on the thread, thus insignificant changes in tension shuttle

thread. This eliminates the accumulation of lint between the spring and the bobbin case. Increase the reliability of the spring regulator of the shuttle thread tension. When sewing different layers and densities of materials selected the required tension of the shuttle thread with the help of an adjusting screw, while the plate 1 with equal force presses the thread to the side surface of the bobbin case.

The design provides uniformity of shuttle thread tension along the entire length of the plate arc-shaped spring in contact with the side surface of the bobbin case, eliminates the accumulation of thread lint between the plate spring and the body of the bobbin case.

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