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SHUTTLE FOR SEWING-MACHINES

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FIG. 1

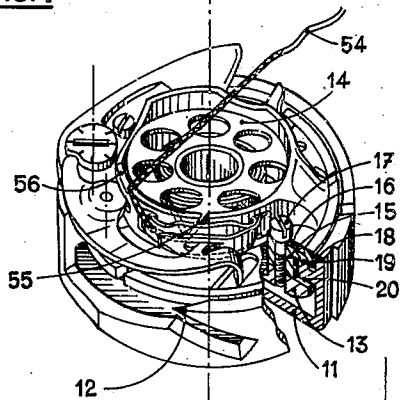


FIG. 2

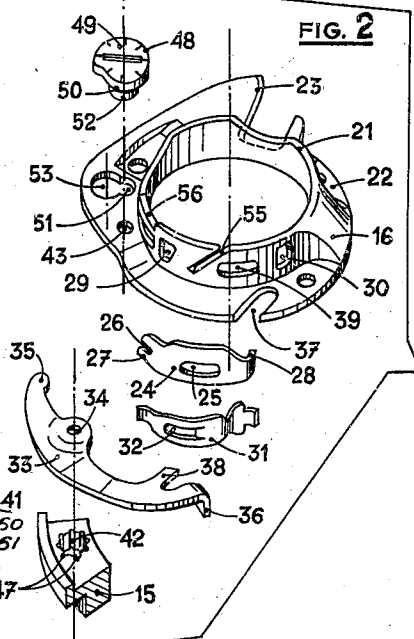


FIG. 4

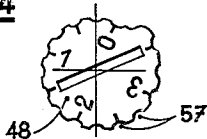
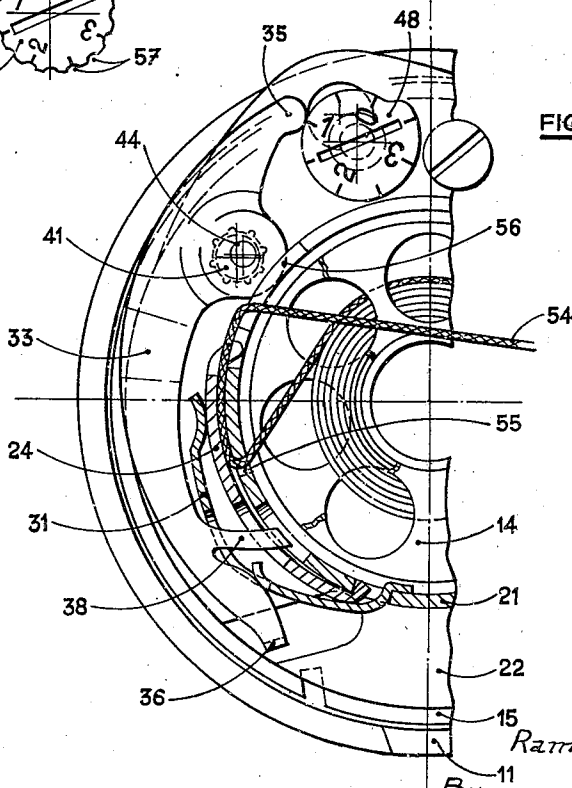


FIG. 3



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SHUTTLE FOR SEWING MACHINES

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7 Claims. (Cl. 112-233)

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This invention is directed to a shuttle for a sewing machine provided with a device for tensioning of the thread enabling the modification of the traction to be exerted on the thread during the unwinding.

In the known shuttles of this type, the tensioning device generally comprises an adjustable element cooperating with a visual indicator enabling the marking of its position. The displacement of this adjustable element effects through the intermediary of transmission elements, a modification of the pressure of an elastic element acting on the thread in a manner to modify the value of the traction to be exerted on it during its unwinding.

These devices for regulating the pressure of the elastic element do not always give entire satisfaction because while they do permit modification in a certain manner of the pressure of the elastic element, they comprise no elements permitting the calibration of this pressure. In other words, the scale of the visual indicator cannot give an indication on the real value of the elastic pressure, but gives only points of reference. In fact, the elastic elements of a given series have manufacturing differences of a kind that a desired pressure is obtained by placing the visual indicator in different positions according to the characteristics of the elastic element mounted on the shuttle.

The present invention has for its object a shuttle for sewing machines of the above mentioned type and which tends to eliminate the disadvantages mentioned, because the tensioning device has an adjustable element provided in the chain of elements connecting the adjustable operating element to the elastic element, the adjusting element being disposed in a manner to permit a correction of the pressure of the elastic element for a given position of the indicator and of the calibration of this pressure to the desired value for the zero of the indicator.

The attached drawings illustrate schematically and as a matter of example, a form of construction of the object of this invention.

Fig. 1 is a perspective view partly in section; Fig. 2 is a perspective view of all the individual parts constituting the regulating device;

Fig. 3 is a plan-view on an increased scale of a part of the shuttle with the regulating device mounted in place;

Fig. 4 is a plan view of an alternative form of construction of one of the parts of the regulating device.

The shuttle shown is of the rotative type ar-

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anged about a horizontal axis, performing two revolutions for each single stitch. It consists chiefly of a movable part 11 of generally cylindrical shape provided with a hook 12 and of a part maintained in a stationary position, this part being composed of the following three pieces: a cup-shaped piece 13 supporting a bobbin-reel 14, a ring 15 and a collar 16. These three pieces are assembled by means of two screws 17. The movable part 11 is provided with a cylindrical rim 18 and two collar-surfaces 19 and 20 serving as guiding surfaces for the part maintained in a stationary position. The collar 16 is provided with a cylindrical crown 21 and a flange 22 equipped with a retaining finger 23, this finger being intended to thrust against a stop forming part of a stationary piece of the sewing-machine.

The regulating device of the tension of the shuttle-thread comprises the following parts:

A rigid pressure-plate 24 of the same shape as the outer surface of the cylindrical crown 21. This pressure-plate is provided with a hole 25, a slot 26, the two ends 27 and 28 being bent back in order to become engaged in the two openings 29 and 30 of the crown 21.

A pressure spring 31 provided with an opening 32 and having one extremity bent back in such a manner as to be held in place by the hole 30 of the crown 21.

A lever 33 is provided with a cylindrical hole 34. One end of this lever is curved to form a fingershape cam follower 35. The other end of this lever is bent downwards as shown at 36 and engages with a slot 37 provided in the flange 22. Because of this bent-down part 36 of the lever, the loop of the needle-thread which forms around the shuttle, cannot become hooked to this lever. Furthermore, the lever 33 is provided with a tongue 38, which penetrates the openings 25 and 32 and engages with a slot 39 provided in the crown 21, thus assuring the respective positions in the vertical direction of the three pieces 24, 31 and 33.

An eccentric regulating device 40, formed of a cylindrical body 41, housed in a bore 42 in the ring 15 and projecting through a corresponding hole 43 provided in the flange 22, carries an eccentric pivot 44 which engages with the hole 34 of the lever 33. This latter turns freely on the pivot 44. The cylindrical body 41 is provided with a slot 45 suitable for inserting a screwdriver and for holding a spring 46, the latter having a U-shape and being made of piano-wire. This spring is intended for becoming engaged with

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one or the other of a series of slots 47 cut in the wall of the hole 42 and being destined to fix in one or the other position the eccentric regulating device 40.

In assembling the spring 46 in the slot 45 of the cylinder 41 and in the bore 42, the cylinder 41 is first inserted in the bore 42 of the ring 15. The cylinder 41 is then rotated until the slot 45 is aligned with a pair of diametrically disposed grooves 47. While the parts are in this position the spring 46 is inserted in the slot 45 and grooves 47, with its median portion 60 lying in slot 45 and its branches 61 lying in the grooves 47. The branches 61 are so spaced that the spring will press slightly in the grooves 47.

A regulating cam 48 is provided which is formed of an upper plate 49, an intermediate cylindrical part 50 of reduced diameter intended for turning in a hole 51 of reduced diameter provided in the flange 22, and a shoulder 52 which may be introduced through the large opening 53 and which is intended to retain the cam against axial movement in the hole 51. The upper plate is provided with a screw-driver slot and the shape of its circumference is a curve with increasing diameters. It is provided with marks which may be completed with marking-numbers (viz. Fig. 3). When cam 48 is assembled with the intermediate part 50 in the small hole 51 and the parts 49 and 52 on opposite sides of the flange 22, the pressure of the cam follower on the cam 48 will retain said cam in the small hole 51.

The Figures 1 and 3 indicate how the different elements of the regulating device for regulating the tension of the shuttle-thread are assembled. The lever 33, pivoting around the eccentric pivot 44, bears against the contour of the regulating cam 48 by means of its cam followers 35 and compresses with its other end the pressure spring 31 which in turn acts upon the rigid pressure-plate 24.

The shuttle-thread 54, coming off the bobbin-reel 14 and being engaged in the oblique slot 55 cut into the cylindrical crown 21, glides on the outer wall of this crown, passes into the slot 26 of the pressure-plate 24 and into another slot 56 provided on the upper rim of the crown and is then directed towards the needle-hole of the sewing-machine. In passing over and across the shuttle, the shuttle-thread 54 contributes towards keeping in place the bobbin-reel 14.

The pressure-plate 24 bears against the length of thread between the oblique slot 55 and the slot 26. The tension applied to the shuttle-thread results from the friction which it encounters over the distance between the two slots and it is a function of the pressure applied upon plate 24 by the spring 31. In turn, this pressure is a function of the position which is imposed upon the lever 33 by the regulating cam 48.

When assembling the regulating device, the regulating cam is placed in the 0-position, viz. that the mark 0 is brought face to face with the finger 35. The pressure spring 31, engaging with one of its ends in the opening 30, acts upon the lever and tends to maintain its finger 35 against the regulating-cam. The regulating cam 48 being placed in an angular position corresponding to zero on its scale, the eccentric 40 is then angularly displaced until it occupies an angular position at which the lever 33 effects a deformation of the spring 31 just sufficient for the free end of the spring 31 to contact with the back of the rigid pressure plate 24 without, however,

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exerting a pressure on the latter. For this cam position, the shuttle-thread suffers a minimum of friction over its course through the regulating device and as a result thereof, its tension is very weak. If the cam is turned in a clockwise direction such as to reach successively one of the positions 1, 2 and 3, the lever compresses in an increasing manner the pressure spring 31, thus compressing more and more the shuttle-thread between the pressure-plate 24 and the crown 21. As a result thereof, the friction to which the thread is submitted over its passage through the pressure device increases also, having as a result that the tension of the shuttle-thread becomes a function of the angular position of the cam 48.

Due to the rigidity of the pressure-plate and due to the fact that it has the same curvature as the outer surface of the crown, the thread is compressed between two surfaces parallel over a certain length. As a result thereof, the friction to which it is submitted for a given position of the cam 48 remains practically constant over a period of time. This arrangement represents therefore a great advantage over the devices known till now and in which the thread is compressed against a rigid surface by means of a spring which bears against it generally on a point only and in which the friction varies greatly over a period of time, these variations being due to the irregular thickness of the thread. The visual indicating device described and which is provided with marks simplifies the use of the sewing-machine due to the fact, that it enables the user to set the regulating device to its most favorable position for each kind of thread and for each kind of needle-work and gives the user the possibility to reset this same and most favorable regulation-position each time the same thread for the same needle-work is again used.

The regulating device as well as the visual indicator being located on the upper face of the flange 22, they are accessible from the exterior of the sewing-machine across the opening which permits of placing the bobbin-reel into the shuttle. The regulation of the tension of the shuttle-thread and the control of this tension by means of the marks of the regulating cam constituting the visual indicator are therefore possible without necessitating the dismantling of the shuttle.

In order to avoid the regulating cam 48 from becoming displaced involuntarily by the vibrations of the sewing-machine, the circumference of this cam may be provided with a series of notches 57 engaging with the finger 35 of the regulating lever (Fig. 4).

Finally, the device described has the advantage over all known devices, of enabling a calibration of the pressure of the elastic element and, therefore, an adjustment of the tension to be exerted on the thread during its unwinding.

In fact, in modifying the position of the adjusting eccentric 40, there is the possibility of modifying the pressure of the elastic element for a given position of the adjustable operating cam 48. There is, therefore, the possibility of compensating and eliminating the variation which may exist between two elastic elements of the same series. Thus, there is the possibility of calibrating the tensioning device in the factory in a manner that for all shuttles the unwinding of the thread will take place with a given tension exerted on it when the visual indicator is placed in a given position. In this manner, what-

ever type of shuttle be used, the operator will always obtain the same tension of the lower thread by the same position of the visual indicator element.

In the compression-device acting in an elastic manner upon the thread, the rigid pressure-plate may be replaced by an elastic piece. This latter may constitute the spring which determines the elastic tension acting upon the thread.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. A sewing machine shuttle comprising a casing for receiving a bobbin, and a thread tensioning device on said casing including a spring pressed thread engaging member, two adjusting devices cooperating for varying the pressure exerted by the spring, and visual indicating means associated with one of said adjusting devices.

2. A sewing machine shuttle comprising a casing for receiving a bobbin, and a thread tensioning device on said casing including a spring pressed thread engaging member, two adjusting devices cooperating for varying the pressure exerted by the spring, visual indicating means associated with one of said adjusting devices, and resilient retaining means associated with the other adjusting device.

3. A sewing machine shuttle comprising a casing for receiving a bobbin, and a thread tensioning device on said casing including a spring pressed thread engaging member, and means for adjusting the pressure exerted by said spring including a lever having three load bearing points, one of said load bearing points being associated with said spring pressed member, and adjustable supports cooperating with the other two of said load bearing points of the lever, one of said adjustable supports having visual indicating means associated therewith.

4. A sewing machine shuttle comprising a casing for receiving a bobbin, and a thread tensioning device on said casing including a spring pressed thread engaging member, and means for adjusting the pressure exerted by said spring including a lever having three load bearing points, one of said load bearing points being associated with said spring pressed member, and adjustable supports cooperating with the other two of said load bearing points of the lever, one of said adjustable supports having visual indicating means

associated therewith, said adjustable supports including eccentric cams.

5. A sewing machine shuttle comprising a casing for receiving a bobbin, and a thread tensioning device on said casing including a spring pressed thread engaging member, and means for adjusting the pressure exerted by said spring including a lever having three load bearing points, one of said load bearing points being associated with said spring pressed member, and adjustable supports cooperating with the other two of said load bearing points of the lever, one of said adjustable supports having visual indicating means associated therewith, said adjustable supports including eccentric cams, and the indicating means being formed on the respective cam and having at least one reference mark thereon for indicating the angular position of the cam.

6. A sewing machine shuttle comprising a casing for receiving a bobbin, and a thread tensioning device on said casing including a spring pressed thread engaging member, two adjusting devices cooperating for varying the pressure exerted by the spring, and visual indicating means associated with one of said adjusting devices, said spring pressed thread engaging member including a rigid thread engaging shoe.

7. In a shuttle for a sewing machine provided with a thread tensioning device comprising a control element with a visual position indicator, a thread engaging member, a spring for pressing said thread engaging member against a thread, transmission means interposed between said control element and said spring to transmit to said spring variations in the control element to vary the pressure exerted by the spring on the thread engaging member, and means associated with said transmission means to vary the pressure exerted by the spring on the thread engaging member for any given position of said control element.

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