TENSIONING DEVICE FOR A SEWING MACHINE

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INVENTOR

Fritz Gegauf

F. GEGAUF

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FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

FIG. 6

FIG. 7

Prior Art

Inventor

Fritz Gegauf

By

McGraw and Town

Attorneys
TENSIONING DEVICE FOR A SEWING MACHINE

Fritz Gegauf, Stockhorn, Thurgau, Switzerland, assignor to Fritz Gegauf Aktiengesellschaft, Bernina-Nahmaschinen-Fabrik, Stockhorn, Switzerland
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This invention relates to sewing machines, and, more particularly, to an improved thread tensioning device for sewing machines.

The present invention is particularly directed to a sewing machine having a thread tensioning device of the type including spring biased thread tensioning disks adjacent to each other upon a thread tension pin, with the thread passing between these disks.

In most known types of sewing machines, the thread tensioning device is located on the arm head of the machine beneath the spool. With an arrangement of this type, the tensioning device projects a considerable distance out of the arm head and thus blocks, to a certain extent, a clear view of the needle and the work. In tensioning devices of this type, the thread passing from the bobbin over the back of the arm into the tensioning device, and the thread coming from the spool, extend almost parallel to one another. Thus, they loop around the thread tensioning bolt or pin of the tensioning device to contact the latter through an arc of nearly 180°, hereinafter referred to as the “looping arc.” An arrangement of this type has been used primarily because the large looping arc prevents the thread working out of the tensioning device during sewing.

However, tensioning devices projecting from the arm head have the disadvantage that they block, to a large extent, the view of the needle and the work. In order to provide the operator a clear view of the needle and the work, more recent thread tensioning arrangements are mounted in the horizontal part of the sewing machine arm. However, in tensioning devices of this latter type, the thread loops around the thread tension pin through an angle of less than 90°. Thus, the thread running in and out of the tensioning device passes through on only one side, namely the upper side, of the tension pin. The adjacent tensioning disks thus tilt to such an extent that the tensioning surfaces thereof form an outwardly diverging wedge-shape gap. During sewing, the thread tends to move to the widest part of this gap, and thus tends to slip out of the tensioning device.

In order to prevent this happening, tensioning devices of this latter type have required the use of a pre-tensioning means positioned in advance of the thread tensioning device so as to provide contact pressure on the pin of the tensioning device at the side where the thread passes into the device. Since it is necessary to be able to make the finest possible adjustment of the thread tension, it is undesirable that the thread entering the tensioning device be braked by a pre-tensioning member. If the thread is thus braked by a pre-tensioning member, it is difficult, if not impossible, to effect adjustment of the thread tension by means of the tensioning device, so that the tensioning device becomes, in effect, useless.

An object of the present invention is to provide a thread tensioning device having thread tensioning disks adjacent to each other on the thread tensioning pin, and through which the thread passes in contact with the pin through an arc of less than 90°, but in which working of the thread out from between the disks is prevented.

Another object of the invention is to provide an improved thread tensioning device for sewing machines and by means of which a thread passing between tensioning disks through an arc of less than 90° may be prevented from working out from between the tensioning disks.

A further object of the invention is to provide a thread tensioning device of the spring pressed disk type in which the spring pressure is applied to the disks only at that side of the mounting pin along which the thread passes, whereby, when the thread is engaged between the tensioning disks, the latter assume a wedge-shaped position in which the gap therebetween narrows or converges outwardly from the mounting pin.

Yet another object of the invention is to provide a thread tensioning device of the tension disk type in which pressure is applied to the tensioning disks by a guide sleeve having a pressure cam and fixed against radial displacement.

Yet another object of the invention is to provide a thread tensioning device of the tension disk type in which pressure is applied to the disks by means of a guide sleeve having a bevelled or sloping surface whereby to apply pressure to the disks on only one side of the pin.

To the attainment of the foregoing objects, the present invention is directed to a thread tensioning device for a sewing machine, having two or more adjacent tensioning disks arranged upon the tension pin, and in which the contact or looping arc on the tension pin, of the thread passing through the tensioning device, is less than 90°, and including means for effecting a one-sided pressure on the thread tensioning disks. This one-sided or eccentric pressure on the thread tensioning disk is applied on that side of the thread passage through which the thread passes, and thus prevents the thread slipping out of the tensioning device during operation of the sewing machine.

For an understanding of the principles of the invention, reference is made to the following description of typical embodiments thereof as illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is a front elevation view of a sewing machine having a thread tension device embodying the invention;
FIG. 2 is a transverse sectional view through the threading slot of the sewing machine arm;
FIG. 3 is a partial longitudinal sectional view through the upper part of the sewing machine arm and illustrating the thread tensioning device of the present invention;
FIG. 4 is an enlarged partial longitudinal sectional view illustrating the thread tensioning device of the present invention with a thread passing therethrough;
FIG. 5 is a view, similar to FIG. 4, but illustrating a prior art arrangement, for comparison purposes;
FIG. 6 is a longitudinal sectional view through a pressure member having a sloping or bevelled surface for engaging a thread tensioning disk; and
FIG. 7 is a perspective view of a guide sleeve type of pressure member having a cam, for engaging an offset or one-sided pressure on the thread tensioning disk.

As best seen in FIG. 1 of the drawings, a sewing machine is illustrated as having a base plate 1 on which is mounted the arm 2 of the sewing machine. The horizontal part of arm 2 is covered with a cover 3, and the front side of the arm head is provided with a closure plate 4 from which there projects a switch operator 5 for a built-in light. The sewing machine is driven, in a known manner, through a pulley arranged coaxially of a hand wheel 6.
Adjacent the front of the sewing machine, a slot 7 is formed through which the thread passes from the bobbin, and out of which there projects a lever 8. A needle holder 10, with the needle 11 clamped therein, extends downwardly from the arm head of the machine. On the rear of the machine are arranged a bobbin holder 12, having bobbin spindles 13 and 14. A bobbin 15 is illustrated as mounted on the spindle 14, and the thread 16 is drawn from this bobbin.

Referring particularly to FIGS. 1, 2 and 3, a guide eye 17 is located on the rear of the machine adjacent a transverse slot 18 formed in cover 3 of the arm 2. A thread tensioning device is positioned within the slot 18, and thread guides 19 and 20, for guiding the thread to and from the tensioning device, are arranged at opposite ends of slot 18.

A bearing or support bracket 21 is positioned on the lower side of cover 3, and is secured thereto by means of screws which are not shown in the drawings. Bracket 21 serves to mount a tension pin 22 which has one end secured to an upright arm of bracket 21 by means of washers or the like 23 and 24 and a nut 25. The other end of pin 22 extends through an aperture 26 in another upright arm of bracket 21. Tension pin or bolt 22 has an axial bore extending therein from its forward end, and this bore includes a tension release pin 28. Pin 22 is further formed with a diametrically extending slot 29 which has a substantial external axiality of pin 22.

A lock washer or the like 30 is anchored to pin 22 and serves as a seat for a tensioning disk 31. A second tensioning disk 32 bears against the disk 31, and disks 31 and 32 are anchored against radial displacement by means of a pin or spindle 34 extending through the forward upright arm bracket 21. A pressure member 33, constructed in accordance with the invention, is slidably mounted on pin 22 with its forward end bearing against disk 31, and this pressure member 33, which is in the nature of a guide sleeve, has a pin 35 extending therethrough and through the slot 20. Release or starting pin 28 is engageable with pin 35 and movable in the direction of the arrow in order to release the thread tension.

As best seen in FIGS. 3, 4 and 6, pressure member or guide sleeve 33 is forced with a forward sloping or beveled surface 36 which makes a relatively small acute angle with a diametrical plane through the member 33. Sloping surface 36 has a point contact with tensioning disk 32, this point contact being above the tension pin 22. Below tension pin 22, the forward surface of member 33 is in contact with the disk 32, requiring the member 33 to exert only a one-sided or eccentric pressure against the disk 32.

A thread tensioning spring 38 embraces pin 22 and has one end engaged with pressure member 33 and the other end engaged with a nut 37. Nut 37 adjusts the tension of spring 38, and such adjustment is effected by means of a manually operable disk 39 having a peripheral portion extending out of cover 3. Disk 39 is coupled to nut 37 in such a manner that nut 37 and disk 39 are fixed against relative rotation but are axially movable relative to each other. Thus, when disk 39 is turned, nut 37, which engages thread 41 of tension pin 42, is adjusted axially of the tension pin.

The arrangement of the invention operates in the following manner. The machine is threaded by passing thread 16 through guide eye 17, guide 19, between tensioning disks 31 and 32, and through guide 20, and then through the bore of thread supply lever 8 and finally through the eye of needle 11. Thread 16 loops around tension pin 22 through an arc of less than 90°. After the foot of the machine has been lowered, pressure member 33 produces a pressure on thread tensioning disks 31 and 32 in the area above tension pin 22. This causes the tensioning areas of disks 31 and 32 to assume a wedge-shaped position with respect to each other, with the wedge broadening or diverging inwardly toward tensioning pin 22. Consequently, tension pin 16 is always located on tension pin 22 since it moves with increasing resistance as it tends to move outwardly between the tensioning surfaces of disks 31 and 32. This condition is shown in FIG. 4 and it should be noted that the thread cannot work out of the tensioning device during operation of the machine.

This is in contrast to the prior art arrangements, such as shown in FIG. 5, which illustrates a simple tensioning device of the conventional type. The tensioning disks 31 and 32 assume an outwardly opening wedge-shaped position when tension pin 16 is inserted therein. Consequently, when the sewing machine is in operation, as tension pin 16 moves outwardly through the tensioning disks 31 and 32, it moves in the direction in which it meets with the least resistance and thus comes completely out of the tensioning device.

The arrangement described in FIGS. 1 through 4 and 6 can, of course, be modified. For example, the guide sleeve or pressure means can be provided with a cam, as shown in FIG. 7, with this cam being so located as to provide a one-sided or offset pressure to the pressure disks 31 and 32. Alternatively, the pressure spring, such as 38, can be oriented or designed in such a manner that it applies pressure 31 and 32 only on the side thereof located above tension pin 22.

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A thread tensioning device for a sewing machine comprising, in combination, a thread tensioning pin; at least a pair of cooperating thread tensioning disks on said pin; means operable to feed the thread between said disks and transversely over said pin, with the looping arc of the thread over said pin, when passing between said disks, being less than 90°; and means operable to apply pressure to said disks solely at a zone eccentric to said pin and to the side thereof over which the thread passes.

2. A thread tensioning device for a sewing machine comprising, in combination, a thread tensioning pin; at least a pair of cooperating thread tensioning disks on said pin; means operable to feed the thread between said disks and transversely over said pin, with the looping arc of the thread over said pin as it passes between said disks being less than 90°; and spring biasing means operable to apply pressure to said disks solely at a zone eccentric to said pin and to the side thereof over which the thread passes.

3. A thread tensioning device for a sewing machine comprising, in combination, a thread tensioning pin; at least a pair of cooperating thread tensioning disks on said pin; means operable to feed the thread between said disks and transversely over said pin, with the looping arc of the thread passing over said pin between said disks being less than 90°; and pressure applying member slidably mounted on said pin and having pressure engagement with said disks solely at a zone eccentric to said pin and to that side thereof over which the thread passes.

4. A thread tensioning device for a sewing machine comprising, in combination, a thread tensioning pin; at least a pair of cooperating thread tensioning disks on said pin; means operable to feed the thread between said disks and transversely over said pin, with the looping arc of the thread passing over said pin between said disks being less than 90°; and a pressure applying member telescoped on said pin and having an end portion engaging said disks solely at a zone eccentric to said pin and to the side thereof over which said thread passes.

5. A thread tensioning device for a sewing machine comprising, in combination, a thread tensioning pin; at least a pair of cooperating thread tensioning disks on said pin; means operable to feed the thread between said disks
and transversely over said pin, with the looping arc of the thread passing over said pin between said disks being less than 90°; a pressure applying sleeve telescoped on said pin and having an end portion engaging said disks solely at a zone eccentric to said pin and to the side thereof over which said threads pass and spring means engaging said sleeve and biasing the latter to engage said disks.

6. A thread tensioning device for a sewing machine comprising, in combination, a thread tensioning pin; at least a pair of cooperating thread tensioning disks on said pin; means operable to feed the thread between said disks and transversely over said pin, with the looping arc of the thread passing over said pin between said disks being less than 90°; a pressure applying sleeve telescoped on said pin and having an end portion engaging said disks solely at a zone eccentric to said pin and to the side thereof over which said threads pass; and means restraining rotation of said sleeve relative to said pin and said disks.

7. A thread tensioning device for a sewing machine comprising, in combination, a thread tensioning pin; at least a pair of cooperating thread tensioning disks on said pin; means operable to feed the thread between said disks and transversely over said pin, with the looping arc of the thread passing over said pin between said disks being less than 90°; a sleeve telescoped over said pin, and having a projecting abutment on one end operable to engage and apply pressure to said disks solely at a zone eccentric of said pin and to said side thereof over which said threads pass; and spring means biasing said sleeve toward said disks.

8. A thread tensioning device for a sewing machine comprising, in combination, a thread tensioning pin; at least a pair of cooperating thread tensioning disks on said pin; means operable to feed the thread between said disks and transversely over said pin, with the looping arc of the thread passing over said pin between said disks being less than 90°; a sleeve telescoped over said pin, said sleeve having an end adjacent said disks disposed in a plane at an acute angle to a diametrical plane of said pin whereby to apply pressure to said disks solely at a zone eccentrically of said pin and to that side thereof over which said thread passes; and spring means biasing said sleeve to engage said disks.

9. A thread tensioning device for a sewing machine comprising, in combination, a thread tensioning pin; at least a pair of cooperating thread tensioning disks on said pin; means operable to feed the thread between said disks and transversely over said pin, with the looping arc of the thread passing over said pin between said disks being less than 90°; and means operable to bias said disks to converge toward each other in a direction outwardly from said pin, such direction being substantially aligned with the bisecting radius of the arc of contact of the thread with said pin.

10. A thread tensioning device for a sewing machine comprising, in combination, a thread tensioning pin; at least a pair of cooperating thread tensioning disks on said pin; means operable to feed the thread between said disks and transversely over said pin, with the looping arc of the thread passing over said pin between said disks being less than 90°; and spring biased camming pressure means operable to bias said disks to converge toward each other in a direction outwardly from said pin, such direction being substantially aligned with the bisecting radius of the arc of contact of the thread with said pin.

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JORDAN FRANKLIN, Primary Examiner.
J. R. BOLER, Assistant Examiner.