SEWING MACHINE HAVING NEEDLE THREAD TENSIONING DEVICE

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F. GEGAUF

INVENTOR
FRITZ GEGAUF

BY
McGraw & Toren
ATTORNEYS
ABSTRACT OF THE DISCLOSURE

A sewing machine includes an arm head portion overlying a sewing base and which carries a tensioning device arranged on the arm head portion above the reciprocating needle in a position to permit easy passing of the thread through the tensioning device and adjustment of the tensioning in a simple manner. The location of the tensioning device is in the line of view of an operator and at a location so that there is no interference with the operator's view of the sewing field on the supporting base of the machine.

The internal construction of the tensioning device is shown in sectional and plan views and its orientation on the sewing machine is indicated. The tensioning device comprises a relatively small-sized unit which includes tensioning disks which are biased together under the force of a spring, the setting of which may be varied by a control knob which is visible and operable from the front of the device on the sewing machine. The sewing thread is passed from a thread giver downwardly around a mounting shaft for the tensioning disks so that it will be looped between the tensioning disks during the operation of the machine. The mechanism for the regulation of pressure on the tensioning disks between which the needle thread is passed and the spring regulator for engaging the thread and taking up any slack therein are built into the device. A knob for effecting proper tensioning control provides an adjustment of a tensioning nut which is mounted on a threaded end portion of the disk shaft. The nut is restrained against rotation with the disk shaft by a projecting cam which is formed as an extension of a collar or housing member which surrounds the disk shaft so that the nut will advance along the disk shaft when it is rotated by the knob. The nut bears against a coiled tension regulating spring which causes the collar to bear against the disk plates with a selected amount of pressure in accordance with the setting of the control knob. The collar is provided with a recess in the end face to accommodate the tension regulating spring.

A further feature which is illustrated and described is the arrangement of a coiled thread regulating spring which is carried in an axially extending recess in an appropriate end face of the collar which is carried on the disk shaft. The spring member includes an end loop portion which extends around the periphery of the tensioning disks so that when a thread is engaged between the disks, the thread will normally pick up this loop end of the spring and the spring will provide some tensioning effect on the thread to take up any slack therein.

SUMMARY OF THE INVENTION

The known thread tensioning devices which are employed with sewing machines and which employ tensioning disks are arranged on the side of the arm head facing the operator at a location below the lowest position of the thread giver. Such devices have great structural height and therefore they interfere with the clear view of the operator of the material being sewn. This structural height is due to the fact that the tensioning devices are constructed in a manner such that the thread regulator is arranged behind the tensioning disk and the tensioning device for the production of pressure on the needle thread is arranged before these disks. In order to accommodate the thread tensioning device on the machine, the sewing machine housing usually possesses an eye for the uptake of the holder part of the tensioning device so that the structural height is additionally increased. In order to avoid the disadvantages of tensioning devices which obstruct the view of the needle, it has been proposed to separate the thread tensioning device and the thread regulator and to arrange only the regulator below the thread giver. The tensioning device for the needle would then be arranged either at the front of the machine or at the greatest possible distance above the regulator or at the back of the sewing machine arm or even on the rear end thereof. All of these expedients lead to poorer sewing results due to the fact that the thread must be guided over excessively long and varied guiding paths and especially because of the long thread path which is required from the tensioning device to the needle. Such a long guide path is highly disadvantageous especially with respect to synthetic threads because of their plastic deformation.

In accordance with the present invention there is provided a construction in which the thread tensioning device and the regulator are arranged so that they can be attached below the lowermost position of the thread giver without disturbing the field of vision. For this purpose the device according to the invention is characterized in a thread tensioning device in which the mechanism for producing the pressure on the needle thread and the regulator for the thread are built one into the other. The construction is such that the thread tensioning disks and the regulator disk project from the sewing machine head at a location at which the field of sewing will remain unobstructed from the operator's view.

An object of the invention is to provide a sewing machine having an arm head which overlies a lower sewing base and which carries the sewing needle with a thread regulating and tensioning device mounted on the head directly below the thread giver so that the thread may be easily passed between the tensioning disks of the device and which includes means for regulating the tension on the thread and for effecting the automatic release of the tension through the operating mechanism of the sewing machine.

A further object of the invention is to provide a thread tensioning device of simple and compact construction with a coiled spring for regulating the engaging force on a pair of tensioning members for the thread arranged in a recess of one end face of a collar or housing member and a spring having a torsion arm portion engageable with the thread for taking up any thread slack which is disposed in a recess in the opposite end face of the housing.

A further object of the invention is to provide a thread tensioning device for a sewing machine which is simple in design, rugged in construction and economical to manufacture.

BRIEF DESCRIPTION OF THE DRAWING VIEWS

In the drawings:

FIG. 1 is an end elevational view of a sewing machine having a tensioning device constructed in accordance with the invention;

FIG. 2 is a partial side elevational view of the sewing machine of FIG. 1;

FIG. 3 is an enlarged axial sectional view of the thread tensioning mechanism;

FIG. 4 is a section taken on the line 4-4 of FIG. 3; and
FIG. 5 is a top plan view of the tensioning device alone.

DETAILED DESCRIPTION

Referring to the drawings in particular, the invention embodied therein comprises a sewing machine generally designated 1 which includes an arm head portion 2 which overlies a sewing table 50 of a base portion 52. In accordance with the invention, a thread tensioning and regulating device generally designated 54 is mounted on the arm head 2 below the lowestmost position of a thread giver 3. A regulating disk or knob 4 for the tensioning device is located as indicated so that it will be readily visible to the eye 10 of an operator without interfering with the operator's complete view of the table 50 and the material being sewn thereon. The broken lines 8 and 9 in FIG. 1 indicate the normal range of view of an operator and shows how this view would not be obstructed by the location or construction of the regulating or tensioning device 54. A needle bar 5 with a needle holder 6 and a needle 7 is arranged in a known manner within the arm head portion 2 to extend downwardly in a position to overlie this sewing table 50.

The arm head 2 has a housing which is provided with an opening to accommodate the thread tensioning device. The tensioning device includes a housing or collar member 11 which is secured in the opening against rotation by a pin 14 which permits axial displacement by an amount which may be regulated by the frictional drag of a set screw 15. The collar 11 is provided with a central bore in which is slidably located a tensioning bolt or disk shaft 12. A regulating disk or knob control 4 is secured to the bolt by means of an adjustable screw 13. After adjustment of the screw 13, it is covered from view by means of a flexible plate member 56.

The thread tensioning bolt 12 is provided with an extension portion or threaded end 16 on which is arranged a tensioning nut 17 which is located on the interior of the housing of the arm head 2. The nut 17 is provided with an opening or slot through which extends a projection or cam portion 18 of the collar 11 so that the nut is prevented from rotating in respect to the tensioning bolt 12. The interior end face of the collar 11 immediately surrounding the cam projecting portion 18 is provided with an annular recess 20 which accommodates one end of a coil spring 21 which bears at its opposite end against the nut 17.

The regulating disk 4 covers tensioning disks 22 and 23 which are carried on the tensioning bolt 12 on each side of an intermediate disk 24. The disk 23 abuts against a collar portion or abutment 12a of the bolt 12. The tensioning bolt 12 carries between its threaded end 16 and the main portion a widened stop ring 25 which will abut against the collar 11 to limit axial movement of the tensioning bolt member 12 within the collar. The front or exterior end of the collar 11 is provided with an annular recess or depression 26 which accommodates a regulator spring 27 which has a diameter which is located within the diameter of the tensioning spring 24. One end of the regulator spring is bent radially outwardly and then around the periphery of the tensioning disks 22 and 23. The collar 11 is provided with a recess 44 to accommodate the bent end 28 of the regulator spring 27. The opposite end 29 of the spring is inserted into a bore 30 which is defined in the collar 11. A regulator ring 31 is arranged around the spring 27 in the same recess of the collar 11 and it carries a ratchet 32 on which the end 28 of the spring 27 engages. The ring 31 becomes wedged in the depression 26 by inherent tension. Ring 31 has a setting lug 33 accessible from the outside of the tensioning device 54. This lug can be moved in a recess 34 of the collar 11 below the lowestmost position of a thread giver 3. A regulating disk or knob 4 for the tensioning device is located as indicated so that it will be readily visible to the eye 10 of an operator without interfering with the operator's complete view of the table 50 and the material being sewn thereon. The broken lines 8 and 9 in FIG. 1 indicate the normal range of view of an operator and shows how this view would not be obstructed by the location or construction of the regulating or tensioning device 54. A needle bar 5 with a needle holder 6 and a needle 7 is arranged in a known manner within the arm head portion 2 to extend downwardly in a position to overlie this sewing table 50.

The thread tensioning device 54 operates as follows: After the correct thread tension has been adjusted the screw 13 is loosened and the regulating disk is rotated until the lines 40 and 43 are opposite each other. The screw 13 is then tightened and the tensioning nut 17 is forced against the tensioning bolt 12. This causes the regulator spring 27 to be compressed against the regulating disk 4 by rotating the regulating disk 4 in one or the other direction, the tension of the needle thread 37 is either increased or decreased as desired. The rotation of the disk causes the movement of the tensioning nut along the threaded portion 16 so that the thread tension spring is either permitted to expand or retact to change the tension acting on the collar member and hence from the collar member through the disks 22 and 23 and 24. In this manner, the tension on the needle thread 27 is either increased or reduced accordingly.

When the thread giver 3 is moved into its highest position, the needle thread 37 will cause the bent-off portion 28 of the regulator spring 27 to move upwardly, that is, clockwise, as viewed in FIG. 4, into a tensioned position. In this tensioned position, the thread will bear against the stop 36. During the descent of the thread giver 3, the bent-off arm portion 28 of the regulator spring 27 will bear against the thread and take away any slack. As the needle enters the material to be sewn, the end 28 of the regulator spring will then place itself on the ratchet 32 until the loop formation is completed and the needle thread is pulled up again.

It should be appreciated that the tensioning device 54 may be made with a collar portion 11 comprising a plurality of separate parts. The guide cam 18 for the tensioning nut may be replaced by a pin, for example, if desired. The covering of the tensioning disk with the tension indication may be secured on the arm head 2 in a separate manner. Also the regulator spring 27 may lie either radially within the thread tensioning spring or radially outside thereof. With the construction set forth above, the tensioning device 54 requires only a minimum of lateral and elevational space so that there is no interference with the visioned field of the operator.

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

What is claimed is:

1. A needle thread tensioning device comprising a collar member having a central bore and including a tension disk end-face with an axially extending annular regulator spring recess defined therein and an opposite end face having a larger diameter axially extending tension spring recess defined therein located radially outwardly from said regulator spring recess for sliding and rotatable in the central bore of said collar member, at least two tension members carried by said shaft and having at least
portions which are displaceable together to engage the thread, a collar on said shaft engaging said tension members, a thread regulating coil spring located within the regulator spring recess and bearing at its inner end against the interior of the regulating spring recess and having an outer end adjacent said tension members and biased in a direction to engage the needle thread and take-up any slack therein, a tension coil spring located in the tension spring recess of said collar member and bearing against the inner end of the tension spring recess to urge said collar member against said tension members to apply tension on said members and to the needle thread, and a nut member on said shaft and bearing against the outer end of said tension coil spring.

2. A needle thread tensioning device, according to claim 1, including means for shifting said nut member along said shaft for varying the force on said tension coil spring and against said collar member and said tension members.

3. A needle thread tensioning device, according to claim 1, wherein said tension members comprise a pair of disks mounted on said shaft, said shaft having a threaded portion, said nut member being threaded onto the threaded portion of said disk shaft and being capable of being advanced therealong upon rotation of said shaft, means for holding said nut member against rotation with said shaft when said shaft is rotated, and a regulating knob carried on said shaft and exposed at the exterior thereof and being rotatable to adjust the position of said nut member to regulate the tensioning on said tension coil spring.

4. A needle thread tensioning device, according to claim 3, wherein said nut member includes a slot, said collar member having a portion extending through the slot of said nut member and constituting said means for holding said nut member against rotation with said shaft when said shaft is rotated.

5. A needle thread tensioning device, according to claim 4, wherein said collar member is made of a plastic material.

References Cited

UNITED STATES PATENTS

2,131,005 9/1938 Chason .................. 242—150
2,518,703 8/1950 Marsac .................. 242—150
2,701,694 2/1955 Hamlett ................. 112—254 XR
2,843,336 7/1958 Herbst .................. 242—150
2,955,775 10/1960 Johnson ................. 112—254 XR

FOREIGN PATENTS

1,219,825 12/1959 France.
723,852 8/1942 Germany.

MERVIN STEIN, Primary Examiner

GEORGE H. KRIZMANICH, Assistant Examiner

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