July 15, 1958 E. J. HERBST 2,843,336

THREAD TENSION DEVICE FOR SEWING MACHINES

Filed Oct. 5, 1955 2 Sheets-Sheet 1

Fig. 1.

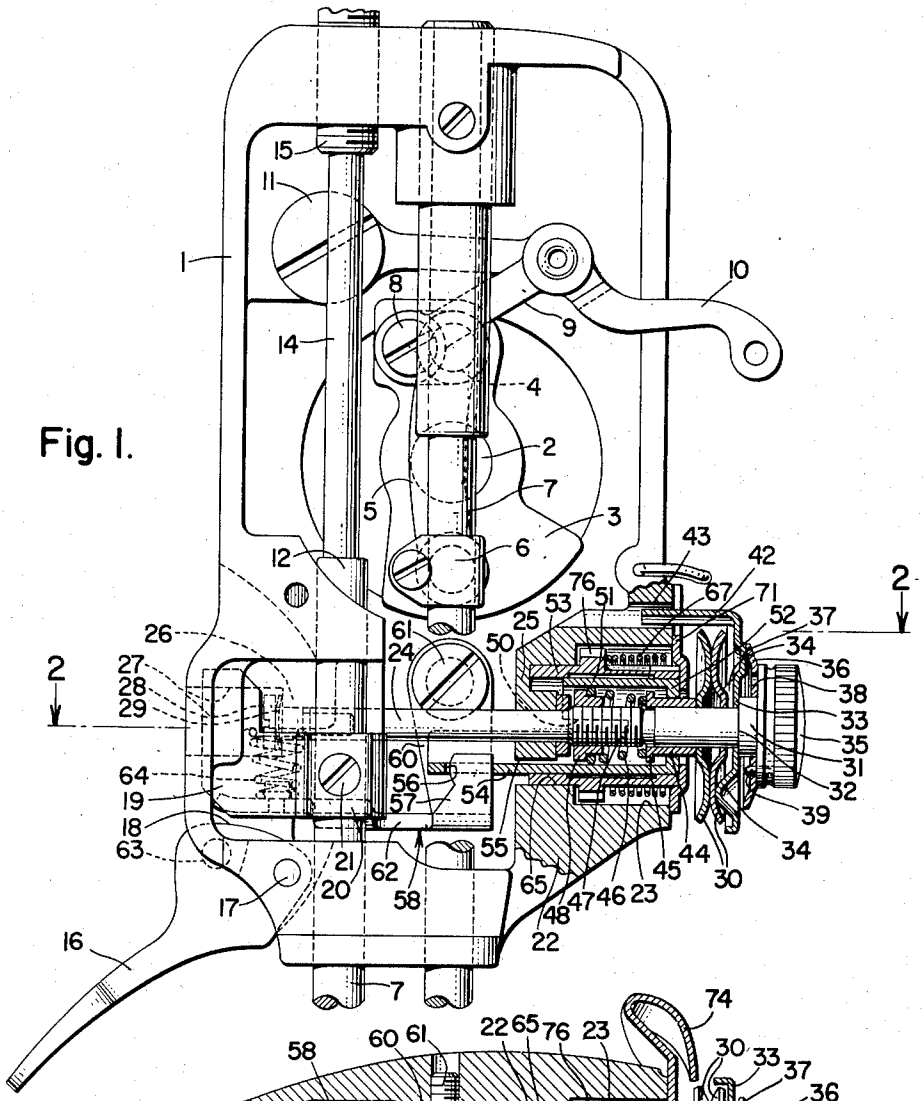
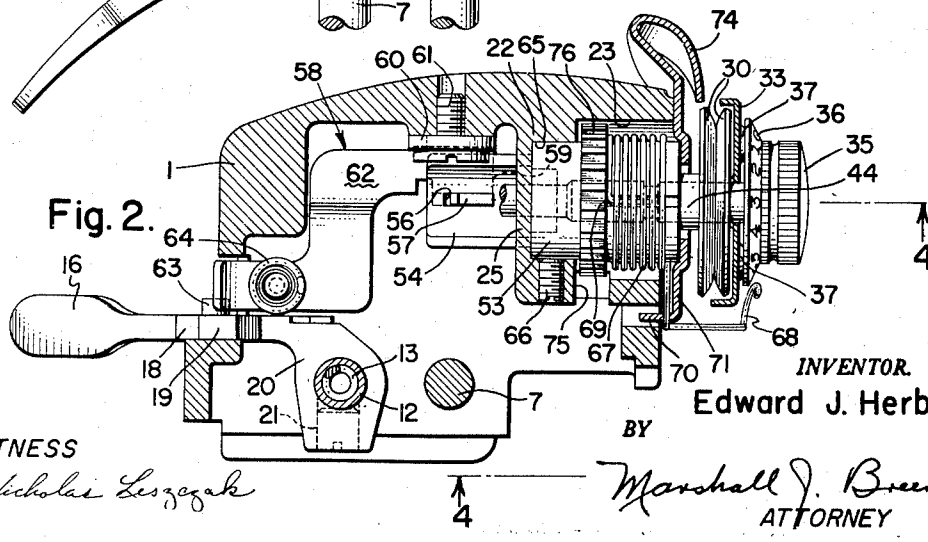


Fig. 2.



WITNESS

Nicholas Leszczak

INVENTOR.

Edward J. Herbst

BY

Marshall J. Breen

ATTORNEY

July 15, 1958 E. J. HERBST 2,843,336

THREAD TENSION DEVICE FOR SEWING MACHINES

Filed Oct. 5, 1955 2 Sheets-Sheet 2

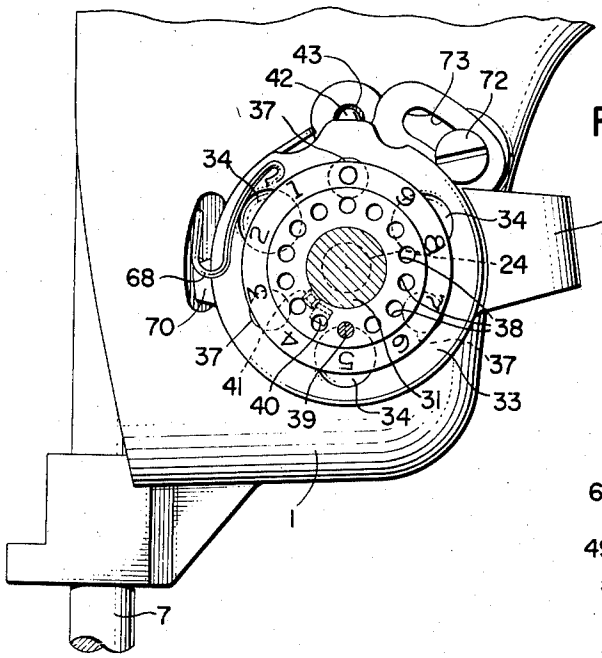


Fig. 3.

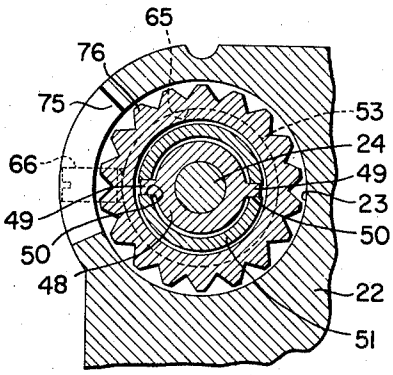


Fig. 5.

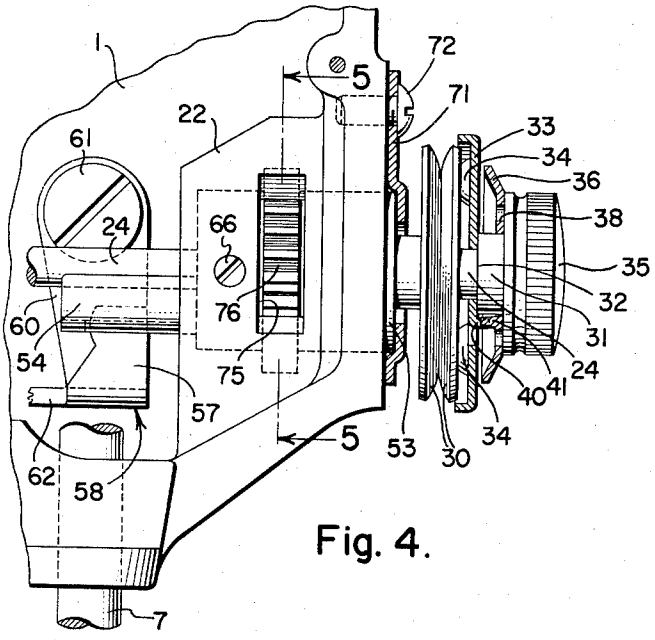


Fig. 4.

INVENTOR.
Edward J. Herbst

WITNESS
Nicholas Leogeak

BY
Marshall J. Breen
ATTORNEY

United States Patent Office 2,843,336
Patented July 15, 1958

2,843,336

THREAD TENSION DEVICE FOR SEWING MACHINES

Edward J. Herbst, South Plainfield, N. J., assignor to The Singer Manufacturing Company, Elizabeth, N. J., a corporation of New Jersey

Application October 5, 1955, Serial No. 538,565

7 Claims. (Cl. 242—150)

The present invention relates to thread tension devices for sewing machines and has for a primary object to provide a new and improved construction of a tension device of the concealed type such as disclosed and claimed in the U. S. patent of Marsac, No. 2,518,703, April 15, 1950.

In particular it is an object of this invention to provide means in a tension device for facilitating adjustment of the check spring.

It is a further object of this invention to provide a concealed thread tension device that incorporates improvements over the prior device. In a tension device such as disclosed in the Marsac patent, the tension discs are spring biased together by a tensioned stud and the tension is released by operation of the presser lifter mechanism through a connection that pushes on the tensioned stud to move it out of operative engagement with the discs. It has been noted that when the tension release mechanism it itself released to restore the parts to their normal operative position, there is a certain amount of binding and friction that will on occasion prevent the parts from moving into exactly the same position they occupied before the tension was released. Thus, immediately after the tension release mechanism is operated, the setting of the tension device is incorrect and, although it soon will correct itself as the sewing machine is operated, the initial stitches will be imperfect. Accordingly, it is an object of this invention to provide a tension device that will assume exactly the same setting instantly after operation of the tension release mechanism as before.

Having in mind the above and other objects that will be evident from an understanding of this disclosure, the invention comprises the devices, combinations and arrangements of parts as illustrated in the presently preferred embodiment of the invention which is hereinafter set forth in such detail as to enable those skilled in the art readily to understand the function, operation, construction and advantages of it when read in conjunction with the accompanying drawings in which:

Fig. 1 is a head end elevation view of the bracket arm of a sewing machine in which there has been embodied a tension device in accordance with the present invention, the tension device being shown in section to illustrate more clearly the construction thereof.

Fig. 2 is a horizontal section view taken substantially on the line 2—2 of Fig. 1 and illustrating the tension device and the tension release mechanism in elevation.

Fig. 3 is a fragmentary detail view in front elevation, the adjusting knob rod in section, of the tension device illustrated in Fig. 1 as mounted in the head of a sewing machine.

Fig. 4 is a fragmentary vertical section view taken substantially on the line 4—4 of Fig. 2.

Fig. 5 is a detail section view taken substantially on the line 5—5 of Fig. 4.

With reference to the drawings, a tension device constructed in accordance with the present invention is incorporated in the head 1 of a conventional sewing machine. The main shaft 2 of the machine extends into the head 1 and carries a counterbalanced crank 3 including a crank pin 4 that is connected by a link 5 and a clamp 6 to a needle-bar 7 which is journaled in the head for endwise reciprocation in the head. The crank pin 4 carries an offset crank pin 8 that is connected by a link 9 to an intermediate portion of a take-up arm 10 that is pivoted on the screw 11. Also mounted in the head 1 for vertical sliding movement is a hollow presser bar 12 that is spring biased downwardly by an internal spring 13 (Fig. 2), the compression of the spring being adjusted by a rod 14 that telescopes into the presser bar 12 and an adjusting screw 15 threaded through the top of the head 1. A presser-lifter lever 16 is pivoted by a pin 17 to the head 1 and has a cam surface 18 that underlies an arm 19 of the usual guide collar 20 secured to the presser bar 12 by a set screw 21.

At the front of the head 1 there is an internal boss 22 in which is formed a cylindrical hole 23. A horizontal shaft or rod 24 is arranged from front-to-back in the head 1 and extends centrally through the hole 23. As shown in Fig. 1 the rod 24 is journaled in the wall 25 defining the end of the hole 23 and at the rear of the head 1 in an internal boss 26. A hole 27 is formed inwardly into the boss 26, the bearing aperture for the rod 24 in the boss 26 opening into the hole 27. To prevent longitudinal movement of the rod 24, while permitting rotation thereof, a set screw 28 is threaded into and tightened against the internally threaded end of the rod 24, and a spring washer 29 is disposed between the end-wall of the hole 27 and the head of the screw 28.

The rod 24 extends from the head 1 and mounted upon the free end thereof externally of the head are a pair of opposed tension discs 30 between which the thread is designed to pass. Outwardly of the tension discs 30, the rod 24 is provided with a portion 31 of enlarged diameter to define a shoulder 32. A guard plate 33 is mounted upon the rod 24. The inner face of the guard plate 33 is provided with three ball-shaped contact lugs 34 (Fig. 3) that engage the outer one of the tension discs 30. At its extreme outer end, the rod 24 is provided with a knob 35, and mounted upon the enlarged portion 31 of the rod is an indicia plate 36. The guard plate 33 is also provided with three ball-shaped contact lugs 37 on its outer face, which lugs are designed to engage the indicia plate 36. The indicia plate 36 is provided with apertures 38 through a selected one of which a stud 39 on the knob 35 extends to lock the plate 36 to the knob for rotation. Adjustment can be made by separating the indicia plate 36 from the knob 35 to remove the stud 39 from one of the apertures 38 in which it is positioned so that they can be relatively rotated and the stud seated in a different one of the apertures 38. Rotation of the knob 35 is limited to one full revolution by a stop lug 40 on the guard plate 33 (Fig. 3) that is disposed in the path of a lug 41 on the indicia plate 36, the guard plate 33 being held against rotation by an arm 42 that extends into an aperture 43 in the head 1 above the hole 23.

Within the hole 23, a sleeve 44 is mounted for sliding movement on the rod 24, the sleeve 44 being disposed to engage the inner one of the tension discs 30 to urge the same outwardly into operative engagement with the outer one of the tension discs. The sleeve 44 has a flange 45 against which abuts one end of a compression spring 46 that encircles the rod 24. The rod 24 is provided with a threaded portion 47 upon which is threaded a nut 48. The other end of the spring 46 abuts against the nut 48 which is permitted to move axially of the rod 24 but is held against rotation by a pair of ears 49 (Fig. 5) that extend into slots 50 in a barrel 51. Thus, as the rod 24 is

rotated by means of the knob 35, the nut will be advanced or retracted correspondingly to increase or decrease the compression of the spring 46 and thereby vary the tension between the discs 30.

The barrel 51 surrounds the nut 48, spring 46 and the inner portion of the sleeve 44. At its outer end, the barrel 51 has an inwardly directed flange 52 that overhangs the flange 45 on the sleeve 44. The barrel 51 is slidably mounted in a hollow supporting member in the form of a cylinder 53 which is in turn rotatably mounted in the hole 23. To hold the barrel 51 against rotation, the lower portion is elongated to define an arcuate-shaped extension 54 that projects inwardly through a circular slot 55 in the wall 25 defining the end of the hole 23 into the interior of the head 1. To effect throw-out of the tension device, it is necessary to retract the barrel 51 and to accomplish this there is an aperture 56 in the extension 54 through which projects the free end of a vertical arm 57 of a lever 58. The lever 58 also includes a horizontal arm 59 (Fig. 2) that carries the arm 57 and is integral with the lower end of a vertical pivot arm 60 pivoted in the head 1 by a pivot screw 61, and a rearwardly extending horizontal lever arm 62 that is formed to extend to a position overlying the lateral stud 63 on the presser-lifter lever 16. Thus, when the presser-lifter lever 16 is raised to lift the presser mechanism, the stud 63 will engage the free end of the lever arm 62 to pivot the lever 58 clockwise (Fig. 1) about the pivot pin 61, and to pull the barrel 51 into the head 1. As the barrel 51 is pulled initially, there is a lost-motion movement as the flange 52 moves into contact with the sleeve 44. Thereafter, as the barrel 51 is pulled, the sleeve 44 will be slid along the rod 24 against the action of the spring 46 and out of operative engagement with the tension discs 30, thereby releasing the same. A spring 64, acting between the boss 26 and the arm 62, biases the lever 58 in the opposite direction to restore the tension discs to their normal operative relation when the presser-lifter lever 16 is lowered.

With the above construction, the force of the spring 46 is transmitted to the tension discs 30 through only a relatively short distance by the way of the sleeve 44 which has a substantial bearing surface with the rod 24, and at the same time, the barrel 51 has a substantial bearing surface to guide its sliding action, thus reducing the possibility of binding between the parts that would prevent free sliding movement. At the same time, to insure that the compression between the discs 30 will be the same after being thrown out by operation of the presser-lifter lever 16 as it was before being thrown out, there is provided lost motion between the flange 52 of the barrel 51 and the contacted flange 45 on the sleeve 44. Thus, the force of the spring 46 is transmitted through the sleeve 44 to the tension discs 30 independently of the tension throw-out mechanism so that, by virtue of the lost-motion connection, the sleeve 44 will be free to slide under the action of the spring 46 should the barrel 51 not return immediately to its original position after being thrown out.

Another important advantage of the above construction is that the extreme exposed element of the tension device, which is the knob 35 on the rod 24, does not move axially when the tension is thrown out. Also, since the rod 24 is only rotatable, it can be more rigidly supported by the use of widely spaced bearings. Therefore, the sleeve 44 and barrel 51 which are slidable with respect to the rod 24, and guided thereby, will function better, and at the same time, will be less subject to damage during shipment or use.

The hole 23 has a reduced diameter inner portion 65 designed to fit the peripheral surface of the cylinder 53 to support the same, the cylinder being locked in the portion 65 of the hole by a set screw 66. The diameter of the remainder of the hole 23 is larger than the outer diameter of the cylinder 53 to provide an annular clearance space therebetween. A check spring 67 surrounds the cylinder 53 and has the free end 68 thereof disposed in the thread path between the tension discs 30 and the thread eye of the take-up lever 10 in the usual manner. The inner end of the check spring 67 is seated in a slot 69 (Fig. 2) in the periphery of the cylinder 53 to anchor the same, and a stop arm 70 on a guard plate 71 is provided to limit the motion of the free end of the spring. The guard plate 71 is secured to the head 1 for angular adjustment about the axis of the rod 24 by a set screw 72 extending through a slot 73. The guard plate 71 also includes a tongue 74 for directing thread between the tension discs 30, such as disclosed in the patent of Chason, No. 2,131,005.

To adjust the tension of the check spring 67, a slot 75 arranged normal to the axis of the cylinder 53 is provided in the open face of the boss 22. Opposite the slot 75, the periphery of the cylinder 53 is provided with means for facilitating engagement and rotation of the cylinder by an instrument, such as a screw driver, inserted through the slot 75, which means as illustrated in the drawings comprises a series of gear-like teeth 76. Thus, when the set screw 66 is backed off, the cylinder 53 is free to be rotated, thereby to adjust the check spring. When adjusted, the set screw 66 is screwed down to lock the cylinder 53 in its adjusted position.

Numerous alterations of the structure herein disclosed will suggest themselves to those skilled in the art. However, it is to be understood that the present disclosure relates to a preferred embodiment of my invention which is for purposes of illustration only and not to be construed as a limitation of the invention. All such modifications which do not depart from the spirit of the invention are intended to be included within the scope of the appended claims.

Having thus described the nature of the invention, what I claim herein is:

1. A thread tension device for a sewing machine with a frame having a tension device receiving hole therein, said tension device comprising a rod journaled in said frame and extending into said hole, means for securing said rod against axial movement, a head on said rod, a compression spring disposed within said hole and surrounding said rod, a slide member mounted for axial sliding movement on said rod between said spring and said head, opposed tension discs mounted on said rod between said slide member and said head whereby said spring will bias said slide member outwardly toward said head to resiliently compress the tension discs together between said slide member and said head, threads on said rod, a nut threaded on said rod at the end of said spring opposite from said member, means for securing said nut against rotation and providing for movement thereof axially of said rod whereby when said rod is rotated said nut will be adjusted axially to vary the compression of said spring, and a tension element operatively connected to said slide member for retracting said slide member from operative relation with said tension discs against the action of said spring.

2. A thread tension device for a sewing machine with a frame having a tension device receiving hole therein, said tension device comprising a rod journaled in said frame and extending into said hole, means for securing said rod against axial movement, a head on said rod, a compression spring disposed within said hole and surrounding said rod, a slide member mounted for axial sliding movement on said rod between said spring and said head, opposed tension discs mounted on said rod between said slide member and said head whereby said spring will bias said slide member outwardly toward said head to resiliently compress the tension discs together between said slide member and said head, threads on said rod, a nut threaded on said rod at the end of said spring opposite from said member, means for securing said nut against rotation and providing for movement thereof axially of said rod whereby when said rod is rotated said

nut will be adjusted axially to vary the compression of said spring, a tension element, and a lost-motion connection between said tension element and said slide member for retracting said slide member from operative relation with said tension discs against the action of said spring.

3. A thread tension device for sewing machines comprising a barrel, a rod mounted through the center of said barrel for rotary adjustment, a head on said rod exteriorly of said barrel, a slide member mounted on said rod for axial sliding movement relatively to said rod and barrel and extending into said barrel, opposed tension discs mounted on said rod between said head and said slide member, threads on said rod within said barrel, a nut threaded on said rod and arranged on the opposite side of said slide member from said head, means for holding said nut against rotation with said rod and providing for movement thereof axially of said rod, and resilient compression means disposed between said nut and said slide member for urging said slide member toward said head to compress said tension discs between said head and said slide member.

4. A thread tension device for sewing machines comprising a barrel, a rod mounted through the center of said barrel for rotary adjustment, a head on said rod exteriorly of said barrel, a slide member mounted on said rod for axial sliding movement relatively to said rod and barrel and extending into said barrel, opposed tension discs mounted on said rod between said head and said slide member, threads on said rod within said barrel, a nut threaded on said rod and arranged on the opposite side of said slide member from said head, means for holding said nut against rotation with said rod and providing for movement thereof axially of said rod, resilient compression means disposed between said nut and said slide member for urging said slide member toward said head to compress said tension discs between said head and said slide member, and means for retracting said slide member from operative engagement with said tension discs against the action of said spring, said means comprising an outwardly directed flange upon the inner end of said slide member within said barrel and an inwardly directed flange upon the outer end of said barrel, said flanges overhanging in a direction axially of said rod and normally spaced apart to provide a lost-motion connection therebetween.

5. A thread tension device for sewing machines comprising a hollow supporting member, a check spring surrounding said supporting member and having one end anchored in said supporting member, stop means for limiting the motion of the free end of said check spring, a barrel mounted for axial sliding movement in said supporting member, a rod extending through the center of said barrel and mounted for turning movement, a head on said rod exteriorly of said barrel, a slide member mounted on said rod for axial sliding movement relatively to said rod and barrel and extending into said barrel, opposed tension discs mounted on said rod between said head and said slide member, threads on said rod within said barrel, a nut threaded on said rod and arranged on the opposite side of said slide member from said head, means for holding said nut against turning

movement with said rod and providing for movement thereof axially of said rod, a compression spring disposed between said nut and said slide member for urging said slide member toward said head to compress said tension discs between said head and said slide member, and operative connections between said barrel and said slide member for retracting said slide member when said barrel is retracted thereby to move said slide member against the action of said spring out of operative engagement with said tension discs.

6. A thread tension device for a sewing machine having a frame, said thread tension device comprising a hollow cylinder mounted for rotation in said frame and having a portion of the periphery thereof exposed through an opening in said frame, releasable locking means for locking said cylinder against rotation in said frame, a barrel mounted for axial sliding movement in said cylinder, a rod extending through the center of said barrel and mounted for turning movement, a head on said rod exteriorly of said barrel, a slide member mounted on said rod for axial sliding movement relatively to said rod and barrel and extending into said barrel, operative connections between said barrel and said slide member coupling them together for axial movement when said barrel is retracted, opposed tension discs mounted on said rod between said head and said slide member, threads on said rod within said barrel, a nut threaded on said rod and arranged on the opposite side of said slide member from said head, means for holding said nut against turning movement with said rod and providing for movement thereof axially of said rod, a compression spring disposed between said nut and said slide member for urging said slide member toward said head to compress said tensions discs between said head and said slide member, a check spring encircling said supporting member and having one end anchored in said supporting member, stop means for limiting the motion of the free end of said check spring, and means on the portion of the periphery of said cylinder that is exposed through the opening in said frame to provide for rotating said cylinder when said locking means is released to adjust the tension of said check spring.

7. In a sewing machine, a frame having a tension device receiving hole and an opening laterally into said hole, a hollow cylinder mounted in said hole for rotation, and having a portion of the periphery thereof exposed through said opening, releasable locking means for securing said cylinder against rotation, a thread tension device mounted in said cylinder, a check spring encircling said cylinder and having one end anchored in said cylinder, stop means for limiting the motion of the free end of said spring, and means on the portion of the periphery of said cylinder that is exposed through the opening in said frame to provide for rotating said cylinder by means of an instrument inserted through said opening when said locking means is released to adjust the tension of said check spring.

References Cited in the file of this patent

UNITED STATES PATENTS

305,273	Bihl	Sept. 16, 1884
2,131,005	Chason	Sept. 20, 1938