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THREAD TENSIONING MEANS FOR SEWING MACHINE BOBBIN CASE

Original Filed Sept. 13, 1951

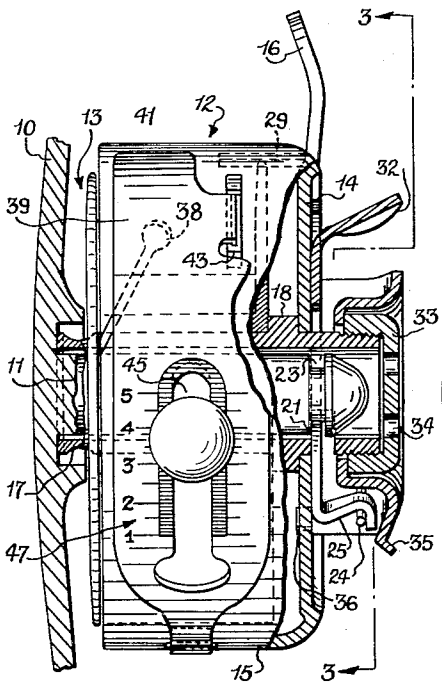


Fig. 1

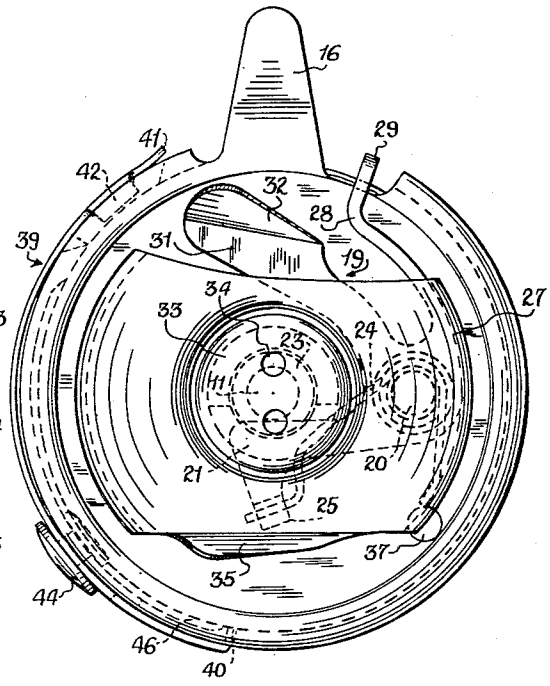


Fig. 2

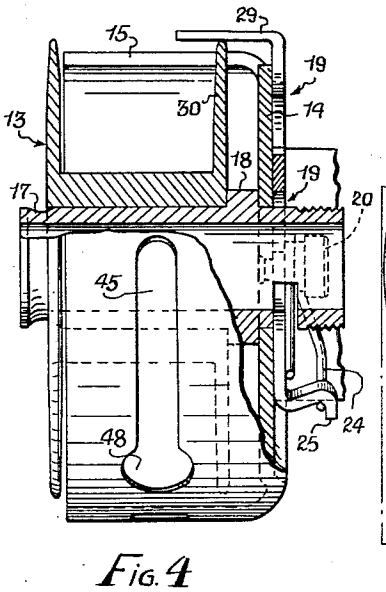


Fig. 4

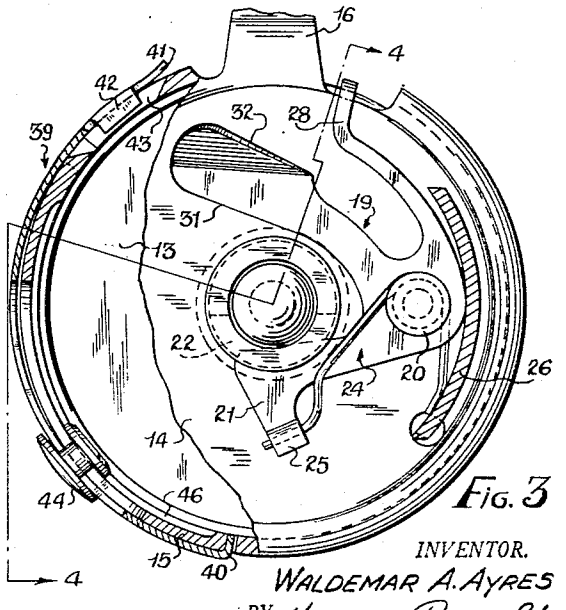


Fig. 3

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THREAD TENSIONING MEANS FOR SEWING MACHINE BOBBIN CASE

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Original application September 13, 1951, Serial No. 246,437, now Patent No. 2,728,315, dated December 27, 1955. Divided and this application October 28, 1955, Serial No. 543,539

8 Claims. (Cl. 112—229)

This invention relates to a thread tensioning means for sewing machine bobbin cases.

This application is a division of my copending application Serial No. 246,437, filed September 13, 1951 for Sewing Machine now Patent No. 2,728,315, issued December 27, 1955.

Modern sewing machines of the lock stitch type conventionally employ a rotary shuttle or hook disposed beneath the bed of the machine for cooperation with the needle when the latter penetrates the material and passes through the needle opening in the bed. In such machines the rotary shuttle carries a thread bobbin which supplies the thread for interengagement with the thread carried by the needle, which bobbin is enclosed in a bobbin case removably supported upon the center pin or stud of the shuttle and retained in place by a latching means.

Bobbin cases of the type mentioned above also conventionally employ a thread tensioning means for applying a frictional force or tension upon the thread coming from the bobbin. Where a latching means, as mentioned above, is utilized upon the bobbin case, the tensioning means ordinarily is provided upon the side wall of the case. This has resulted in numerous difficulties with respect to providing adequate adjustability of the tension, the conventional means being the use of a screw threaded into the side wall of the case for effecting such adjustment. Since the side wall of the case is, however, relatively thin, very little adjustment is provided and the threads of the screw are quite delicate and hence are easily stripped. Moreover, the adjustment of such a tension means requires the use of a screwdriver or similar tool and the degree of tension is not readily determinable except by trial and error.

An object of the invention is the provision of an improved thread tensioning means for a bobbin case which is of simple and inexpensive construction, yet is such that the tension may be easily adjusted without the need of tools.

A further object of the invention is the provision of an improved thread tensioning means as defined above and which includes means for readily indicating the frictional force or tension upon the thread for any adjusted position of the tensioning means.

Further and additional objects and advantages inherent herein but not specified will become apparent during the detailed description of an embodiment of the invention which is to follow and which embodiment is illustrated in the accompanying drawing forming a part of this specification and wherein,

Fig. 1 is a view, principally in side elevation, but with certain parts broken away and others shown in section, illustrating the presently preferred embodiment of the improved bobbin case provided with a thread bobbin and latched in place upon a rotary shuttle, only a portion of the latter being shown;

Fig. 2 is a front elevational view of the bobbin case shown in Fig. 1;

Fig. 3 is a view taken substantially on the line 3—3 of Fig. 1 with certain parts removed and other shown in section and with the latching means illustrated in the position in which the case is unlatched from the shuttle; and

Fig. 4 is a view, partially in side elevation and partially in section, the view being taken substantially on the line 4—4 of Fig. 3 and showing the case detached from the shuttle and the manner in which the bobbin is retained in the case when the latching means is moved to thus detach the case.

In Fig. 1 of the drawings, **10** designates a conventional rotary shuttle for a sewing machine which is constructed in a well known manner and connected for rotation by the mechanism of the machine. Since this construction is well known in the art, the details thereof are not here illustrated or described. For the present purpose it is sufficient to note that the shuttle **10** has a forwardly extending center pin or stem **11**, integral with or rigidly connected to the shuttle, the former being here illustrated. This pin or stem **11** provides the support for a bobbin case **12** and for a thread bobbin **13** which is enclosed within the case. As here illustrated, the bobbin case **12** is formed of metal and is generally cup shaped with a substantially planar face **14**, which is raised slightly adjacent the periphery and is united with a substantially cylindrical side wall **15**. A portion of the side wall **15** is struck up therefrom in the form of an integral finger **16** which is adapted to engage a stationary part of the machine and thereby retain the bobbin case stationary during operation of the machine as is well known in the art.

The planar face **14** of the bobbin case has a central opening in which a tubular member or sleeve **17** is positioned. This member has an integral shoulder **18** thereon engaged with and secured to the inner surface of the bobbin face by brazing, welding or the like. The tubular or hollow member **17** extends axially in both directions, from the shoulder **18**, the portion extending to the left, as seen in Fig. 1 being adapted to fit within the central opening of the thread bobbin **13** and provide a journal therefor, the inner end of this portion of the sleeve or member **17** being received in an annular recess in the shuttle **10** about the center pin or stem **11**. The clearance between the pin or stem **11** and the tubular member **17** is greatly exaggerated in the drawings to facilitate identification of the parts and because the scale of the drawing is several times that of the actual mechanism.

The portion of the hollow sleeve or member **17** extending forwardly, or to the right of the shoulder **18** as viewed in Fig. 1, projects beyond the outer surface of the face **14** of the bobbin case and is threaded for a purpose hereinafter described.

The face **14** of the bobbin case is provided with a latch member, generally designated **19**, which is here shown as a three armed lever pivotally supported on the outer surface of the face **14** by a shouldered rivet or stud **20**. One arm **21** of this lever **19** provides a latch portion which is adapted to pass through a slot or opening **22** in the tubular member **17** and engage in an annular groove **23** of the pin or stem **11** as shown in Figs. 1 and 2. The latch member or lever **19** is normally urged to this position by a spring means **24** which is here shown as formed from spring wire with one end engaged under an integral projection **25** of the latch portion **21** and with the other end resting against the inner surface of the side wall **26** of a cover member **27**, see Figs. 2 and 3. The intermediate portion of the spring **24** is coiled or looped about the stud **20**.

A second arm **28** of the latching member or lever **19** extends over the face **14** of the bobbin case and has an angularly extending portion **29** directed rearwardly of

the case adjacent the integral finger 16 and in a region where a portion of the side wall 15 has been removed so that this projection or portion 29 normally extends adjacent a flange 30 of the thread bobbin but held spaced therefrom due to the biasing action of the spring means 24. However, when the latch member or lever 19 is rocked against the biasing action of the spring means 24, that is, counterclockwise as viewed in Figs. 2 and 3, the portion 29 of the arm 28 moves into engagement with the flange 30 of the bobbin 13 while the arm 21 of the lever 19 is moved from engagement with respect to the groove 23 of the pin 11. Consequently, the bobbin case 12 is unlatched from engagement with the shuttle and the bobbin 13 is held within the case so that the bobbin does not fall from the case while the latter is being withdrawn from or placed upon the pin 11 of the shuttle. To facilitate this movement of the lever 19, it is provided with a third arm 31 intermediate the arms 21 and 28 and having an integral outwardly extending portion 32 for convenient engagement by a finger or thumb of the operator, it being evident that the operator has only to press upon the projection 32 in a counterclockwise direction, as viewed in Figs. 2 and 3, to achieve the aforementioned unlatching of the bobbin case and simultaneous engagement of the arm 28 with the bobbin.

An important feature resides in the provision of flexibility or resilience of the arm 28, which in the present construction is effected by forming this arm of lesser cross section than that of the other arms of the lever 19, the entire lever being preferably stamped from a single piece of metal. This provision of resilience or flexibility in the arm 28 is to insure positive release of the bobbin case from the shuttle pin 11 even though the bobbin 13 be oversize or some other cause results in the projecting portion 29 of arm 28 engaging the flange 30 before the latch portion 21 has moved entirely out of the groove 23. In the event of such a contingency, the arm 28 simply yields relative to the remainder of the lever 19 so that the portion 21 can still be moved to a position in which it is completely out of the groove 23. The proportions of the parts and the dimensions of the lever are such that this relative movement between the arms does not exceed the elastic limit of the lever so that even repeated flexing of the arm 28 does not result in damage thereto. Moreover, the force required to effect such relative movement between the arms is not such as to require the use of tools.

The aforementioned cover member 27, providing an abutment for the free end of spring 24, is secured to the face 14 of the shuttle case by a cover retaining cap 33 which is internally threaded for cooperation with the threads on the outer end of the tubular member 17, see Fig. 1, the cap 33 being provided with spaced apertures 34 or other suitable means for engagement by a tool for manipulating the cap. The portion of the cover member 27 opposite arm 31 of the lever 19 is preferably provided with an integral outwardly extending portion 35 for engagement by a finger or thumb of the operator when the latch member is being utilized, it being evident that the operator will place a thumb on either the portion 32 or 35 and a finger on the other of these portions to effect the aforementioned rocking of the lever. Suitable means, such as an integral tongue 36 fitting in an opening 37 of the face 14 is provided to prevent arcuate displacement of the cover member 27.

The sewing thread, not shown, carried by the bobbin 13 is brought from the interior of the bobbin case to the exterior thereof through an opening 38 in the side wall of the case, which opening comprises a diagonal slot ending in a circular hole intermediate the sides of the side wall, see Fig. 1. A tensioning means for the thread thus brought exteriorly of the case is provided by a resilient tensioning member 39 which is arcuate with a radius of curvature different from that of the side wall 15. The tensioning member 39 preferably is formed of relatively thin metal and has a radius of curvature slightly less than that of the side wall 15 so that when placed thereabout the tensioning member 39 has a portion spaced from the surface of the side wall. This tensioning member extends about a portion only of the periphery of the side wall and has one end secured thereto with the other end substantially free so as to allow passage from therebeneath of the thread from the bobbin and to exert a frictional force or tension on the thread.

In the present construction, the tensioning member 39 has an integral lug or tongue 40 adjacent one end which is received in a suitable slot in the side wall 15 of the bobbin case thus preventing circumferential shifting of the tensioning member. The other end of the tensioning member has a relatively broad lip portion 41 extending beyond the opening 38 for the thread so that the latter may pass from beneath the lip to its point of utilization. Adjacent the lip 41 and at one side thereof, the tensioning member 39 has a second integral lug or tongue 42 bent at an angle thereto and received in a slot 43 of the side wall 15 thus preventing displacement of the tensioning member laterally relative to the side wall.

The tensioning member 39 is secured to the side wall 15 and the tension exerted by the member 39 is adjusted by means of a sliding means or member 44 which passes through aligned elongated slots 45 in the tensioning member 39 and the side wall 15. This sliding means is here shown as a double headed stud, the inner head of which is of smaller diameter than the outer and is disposed in a milled groove 46 on the inner surface of the side wall 15, adjacent the slot 45. The outer head of the member 44 bears against the outer surface of the tensioning member 39 and the distance between the heads of the members 44, is such that as the latter is slid through the aligned slots 45, upwardly as shown in the drawings, the curvature of the member 39 is altered so that the lip portion 41 exerts increased frictional force upon the thread, thus increasing the tension thereon. In order that the amount of frictional force or tension thus applied to the thread may be readily determined, suitable calibrations and/or indicia 47 are provided adjacent the slots 45 for cooperation with the member 44 and the latter may be provided with an indicium or mark for cooperation with such calibrations.

As will be seen from Fig. 4, the slot in the side wall 15 terminates at its lower end in an enlarged opening 48. A similar opening is provided at the end of the slot in the tensioning member 39. These openings are slightly larger than the diameter of the inner head of the member 44 and are out of alignment when the lug or tongue 40 is received in the cooperating slot so that the sliding member 44 and the tensioning member 39 cannot be accidentally disengaged from each other or from the side wall 15.

In attaching the tensioning member 39 to the side wall 15, the lug or tongue 42 is inserted in the slot 43. Then, while the enlarged opening at the end of the slot in the tensioning member is aligned with the enlarged opening 48 in the side wall 15, the member 44 is inserted therein. At this time the lug 40 will be resting upon a portion of the side wall 15 spaced from the cooperating slot in a counterclockwise direction, as viewed in the drawings, a slight pressure being exerted upon the tensioning member so that the inner head of the member 44 can be disposed inwardly of the inner surface of side wall 15. The tensioning member 39 and sliding member 44 are then slid clockwise, as viewed in the drawings, until the lug 40 drops into the slot therefor at which time the enlarged openings such as 48 will no longer be in alignment, this movement of the tensioning member being permitted by virtue of the slot 43 being longer than the peripheral extent of the lug 42. The parts thus assembled cannot accidentally become disengaged, it being impossible for the member 44 to drop out of the slots 45 due

to the fact that the enlarged heads thereon cannot pass therethrough and the enlarged openings such as 48 are prevented from slipping into alignment by the lug 40. The tension exerted by the member 39, however, is readily adjusted by sliding movement of the member 44 upwardly in the narrow portions of the slots 45 which is effected without the need of any tools.

It is believed that the operation of the device will now be readily apparent from the detailed description of the construction thereof. The use of the device, however, may be briefly summarized as follows:

Let it be assumed that the bobbin case 12 has the latch and tensioning means assembled thereon as shown in Fig. 2 and which is the form in which it would be supplied to the user. A bobbin 13 having sewing thread of the proper size and color thereon is then placed upon the tubular member 17 as shown in Fig. 4 and the end of the thread is brought through the opening 38 and led therefrom and from beneath the lip 41 intermediate the upper end of the latter and the lug 42. The tension to be exerted upon the thread is then adjusted to a predetermined value by moving the slidable means or member 44 to a position adjacent that indicium or calibration 47 indicative of the desired tension thus deflecting or altering the curvature of the member 39 so that the lip portion 41 bears with a predetermined force upon the thread therebeneath, the outer end of the lip 41 being reverse curved slightly, see Figs. 2 and 3, to facilitate proper engagement of the inner surface of the lip with the thread. This operation of tension adjustment is simply effected by the operator's thumb engaging the member 44 and sliding the latter to the proper position.

With the bobbin in place in the case and the thread led from beneath the lip 41, and with the tension on the thread adjusted, the case is then ready to be placed in cooperation with the shuttle. Since the shuttle is normally disposed at a location which requires turning of the case to either a horizontal or vertical position, and which might result in the bobbin falling from the case, the operator will now engage the projections 32 and 35, moving the former towards the latter so that the arm 28 is moved to bring the projection 29 into engagement with the flange 30 and move the latch portion 21 to a position in which it may be passed over the end of the pin 11 to the shuttle. With the latching means held in this position, the bobbin case may be inverted or otherwise turned without fear of the bobbin falling therefrom, thus facilitating positioning of the bobbin case with the tubular member 17 sleeved upon the pin 11 as shown in Fig. 1. The latch means 19 may then be released so that the spring 24 moves the portion 21 into the groove 23 and moves the arm 28 to free the projection 29 thereon from the flange 30 of the bobbin. The case is then latched to the shuttle and is ready for use in sewing operations. In the event the operator has released the latching member 19 before the portion 21 has cleared the end of pin 11, the bobbin case may nevertheless be readily properly positioned without again operating the lever 19 by simply exerting axial thrust upon the case in a direction toward the shuttle 10. When this is done the outer end of the pin 11 engages the latch portion 21 of the lever 19 and cams the latter outwardly against the force of the spring 24 as the bobbin case is moved to the left, as viewed in Fig. 1, the latch portion 21 thereafter snapping home in the groove 23 under the force of the spring 24 when the parts have reached the positions as shown in Fig. 1.

The bobbin case and bobbin may readily be removed from the shuttle by reverse operations. That is to say, by simply moving the portion 32 of the lever 19 toward the portion 35 of the cover, the latch portion 21 is moved from engagement in the groove 23 so that the bobbin case may be moved axially from the pin 11. In the event the bobbin 13 is oversize, or for any other reason the projection 29 engages the flange 30 of the bobbin before the portion 21 of the lever is freed from the groove 23, the bobbin case may nevertheless be unlatched by continued pressure on the portion 32. This causes the arm 28 and/or the projection 29 to yield or flex relative to the portion 21 so that the latter may be moved to the necessary extent to effect unlatching even though further rocking of the arm 29 is prevented.

Although the tensioning means has been shown as having integral tongue or lugs cooperating with slots in the side wall of the bobbin case to prevent improper movements of the tensioning member, a similar result could be achieved by riveting or otherwise securing the lower end of the tensioning means to the side wall of the bobbin case. Furthermore, while the slide member or means 44 is shown as having round heads, the heads may be rectangular or otherwise shaped as may be desired. Likewise, in some instances the radius of curvature of the tensioning means may be greater than the radius of the side wall.

Although a preferred embodiment of the invention has been illustrated and described herein, it will be understood that the invention is susceptible of various modifications and adaptations within the scope of the appended claims.

Having thus described my invention, I claim:

1. In combination with a bobbin case for a sewing machine, which case is adapted to receive a thread bobbin and has a substantially cylindrical side wall provided with an opening therethrough for passage of thread from the bobbin exteriorly of the case, an arcuate resilient thread tension member having a radius of curvature different from that of the said side wall and extending about a portion of the external periphery of the latter and directly connected thereto, means on said tension member adapted to engage the thread from the bobbin externally of said side wall and cooperate with the latter to exert therewith a direct frictional tensioning force on the thread, the said tension member and the adjacent portion of the side wall of the bobbin case having aligned longitudinal slots therethrough in a location where the tension member is spaced from the side wall, and means slidably positioned in said slots and engaging the inner surface of the said side wall and the outer surface of the tension member to alter the radius of curvature of said tension member and thereby vary the frictional force on said thread.

2. In combination with a bobbin case for a sewing machine, which case is adapted to receive a thread bobbin and has a substantially cylindrical side wall provided with an opening therethrough for passage of thread from the bobbin exteriorly of the case, an arcuate resilient thread tension member having a radius of curvature different from that of the said side wall and extending about a portion of the external periphery of the latter and directly connected thereto, means on said tension member adapted to engage the thread from the bobbin externally of said side wall and cooperate with the latter to exert therewith a direct frictional tensioning force on the thread, the said tension member and the adjacent portion of the side wall of the bobbin case having aligned longitudinal slots therethrough in a location where the tension member is spaced from the side wall, means slidably positioned in said slots and engaging the inner surface of said side wall and the outer surface of the tension member to alter the radius of curvature of said tension member and thereby vary the frictional force on said thread, and means adjacent said slidable means and cooperating with the latter for indicating the amount of frictional force applied to the thread for any given position of the slidable means along said slots.

3. In combination with a bobbin case for a sewing machine, which case is adapted to receive a thread bobbin and has a substantially cylindrical side wall provided with an opening therethrough for passage of thread from the bobbin exteriorly of the case, an arcuate resilient

thread tension member having a radius of curvature different from that of the said side wall and extending about a portion of the external periphery of the latter and having portions directly engaging said side wall, cooperating means on said tension member and side wall preventing displacement of the former circumferentially of the latter, means on said tension member adapted to engage the thread from the bobbin externally of said side wall and cooperate with the latter to exert therewith a direct frictional tensioning force on the thread, the said tension member and the adjacent portion of the side wall of the bobbin case having aligned longitudinal slots therethrough in a location where the tension member is spaced from the side wall, and means slidably positioned in said slots and engaging the inner surface of said side wall and the outer surface of the tension member to alter the radius of curvature of said tension member and thereby vary the frictional force on said thread.

4. The combination as defined in claim 3 wherein the said longitudinal slots in the side wall and said tension member terminate at one end in enlarged openings of sufficient size to permit passage therethrough of said sliding means when the said openings are aligned, the said openings being disposed out of alignment when the said tensioning member is operatively assembled on said side wall with the said cooperating means in engagement.

5. In combination with a bobbin case for a sewing machine, which case is adapted to receive a thread bobbin and has a substantially cylindrical side wall provided with an opening therethrough for passage of thread from the bobbin exteriorly of the case, an arcuate resilient thread tension member having a radius of curvature less than that of the said side wall and extending about a portion of the external periphery of the latter, means adjacent one end of said tension member cooperating with said side wall to prevent displacement of the former circumferentially of the latter, an integral portion of said tension member at the other end thereof adapted to engage the thread from the bobbin externally of said side wall and cooperate with the latter to exert therewith a direct frictional clamping force on the thread, the said tension member and the adjacent portion of the side wall of the bobbin case having aligned longitudinal slots therethrough in a location where the tension member is spaced from the side wall, and means slidably positioned in said slots and engaging the inner surface of said side wall and the outer surface of the tension member to alter the radius of curvature of said tension member and thereby vary the frictional force on said thread.

6. In combination with a bobbin case for a sewing machine, which case is adapted to receive a thread bobbin and has a substantially cylindrical side wall provided with an opening therethrough for passage of thread from the bobbin exteriorly of the case, an arcuate resilient thread tension member having a radius of curvature less than that of the said side wall and extending about a portion of the external periphery of the latter, an integral tongue on said tension member engaging in an opening of said side wall to prevent displacement of the tension member circumferentially of said side wall, an integral portion adjacent an end of said tension member adapted to engage the thread from the bobbin externally of said side wall and cooperate with the latter to exert therewith a direct frictional tensioning force on the thread, the said tension member and the adjacent portion of the side wall of the bobbin case having aligned longitudinal slots therethrough intermediate the ends of said tension member in a location where the latter is spaced from the side wall, and means slidably positioned in said slots and engaging the inner surface of said side wall and the outer surface of the tension member to alter the radius of curvature of said tension member and thereby vary the frictional force on said thread.

7. The combination as defined in claim 6 and further comprising calibrations on said tension member adjacent the longitudinal slot therein cooperating with said slidable means to indicate the frictional force upon the thread for any position of said slidable means.

8. In combination with the bobbin case for a sewing machine, a resilient thread tension member having an elongated slot therein terminated in an enlarged opening, a corresponding slot and opening in said bobbin case, a member adapted to slide in said slots and provided with spaced heads larger than the width of said slots and with at least one of the heads smaller than said openings so that the said one head of said headed member is insertable through said openings when they are aligned, and means preventing alignment of said openings after the said headed member has been slidably positioned in said slots, whereby the tension of said tension member may be adjusted by sliding of the headed member in said slots and the headed member cannot be accidentally displaced from the case.

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