Dec. 11, 1945. C. R. BACKLIN 2,390,681

THREAD TAKE-UP DEVICES

Filed Nov. 5, 1941 3 Sheets-Sheet 1

Fig. 1

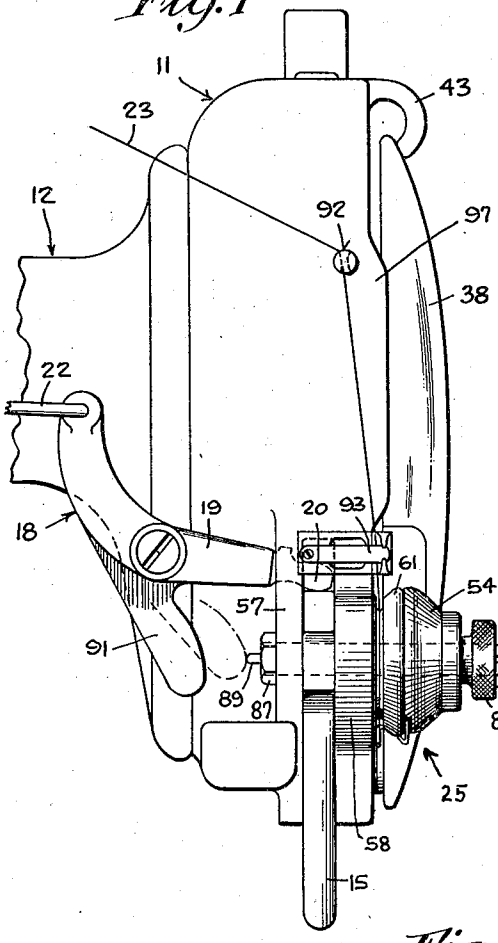


Fig. 2

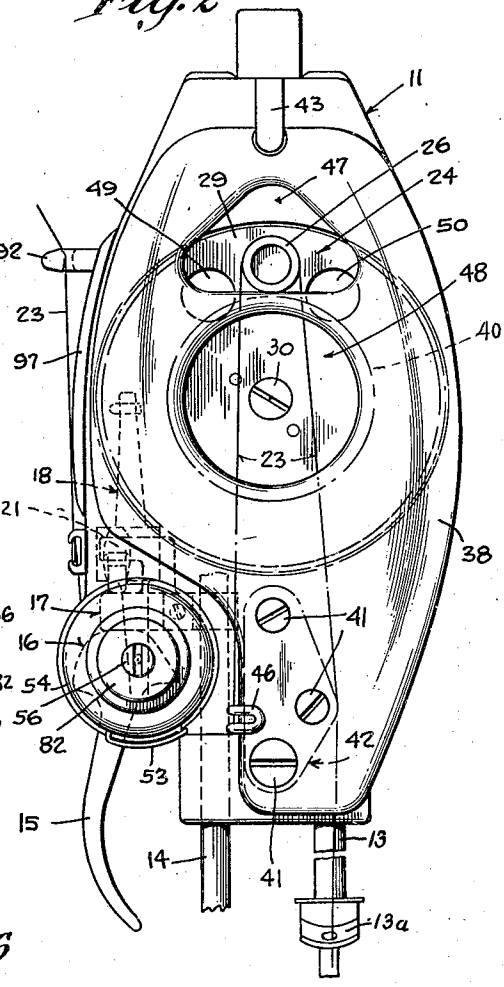
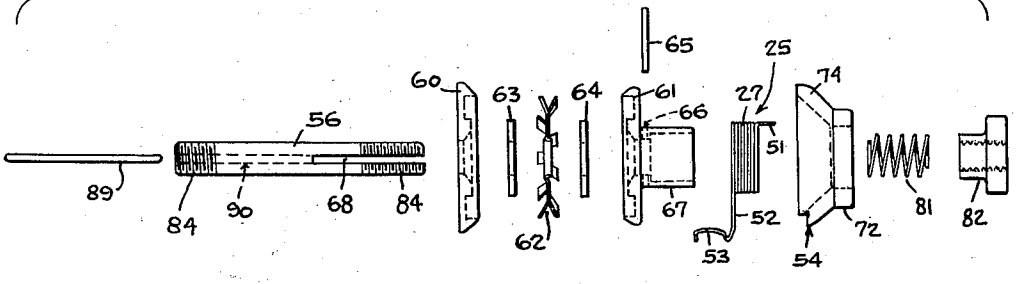


Fig. 6



INVENTOR
Clarence R. Backlin
BY Fryer and Mack
ATTORNEYS

Dec. 11, 1945. C. R. BACKLIN 2,390,681

THREAD TAKE-UP DEVICES

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Fig. 3

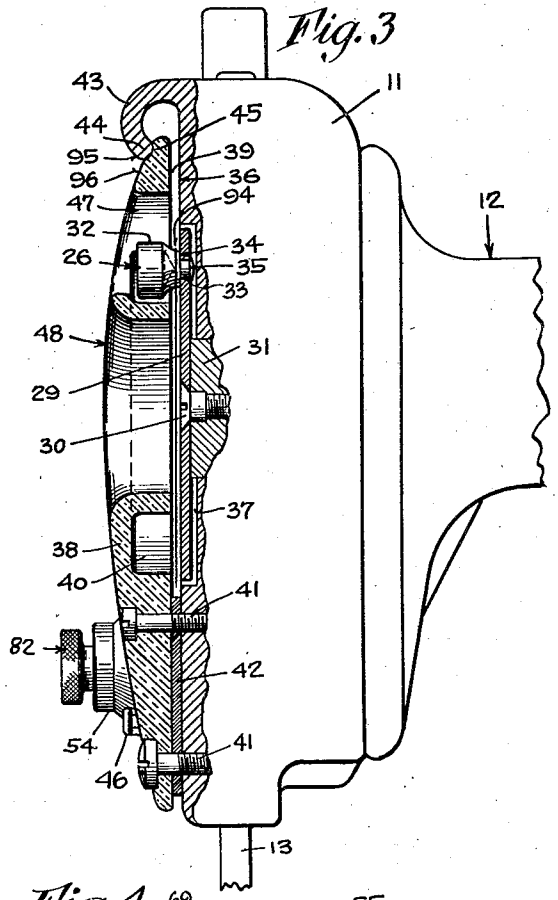


Fig. 4

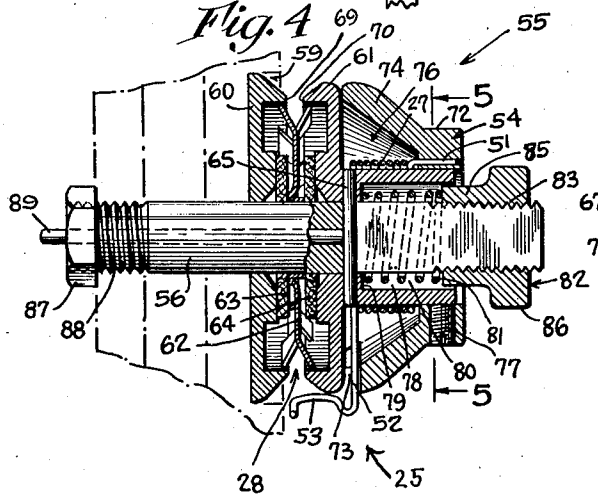
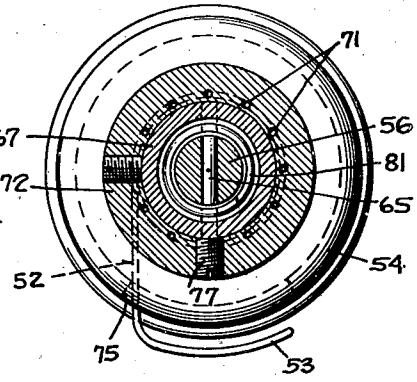


Fig. 5



INVENTOR
Clarence R. Backlin
BY Fryer and Mock
ATTORNEYS

Dec. 11, 1945. C. R. BACKLIN 2,390,681

THREAD TAKE-UP DEVICES

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Fig. 7

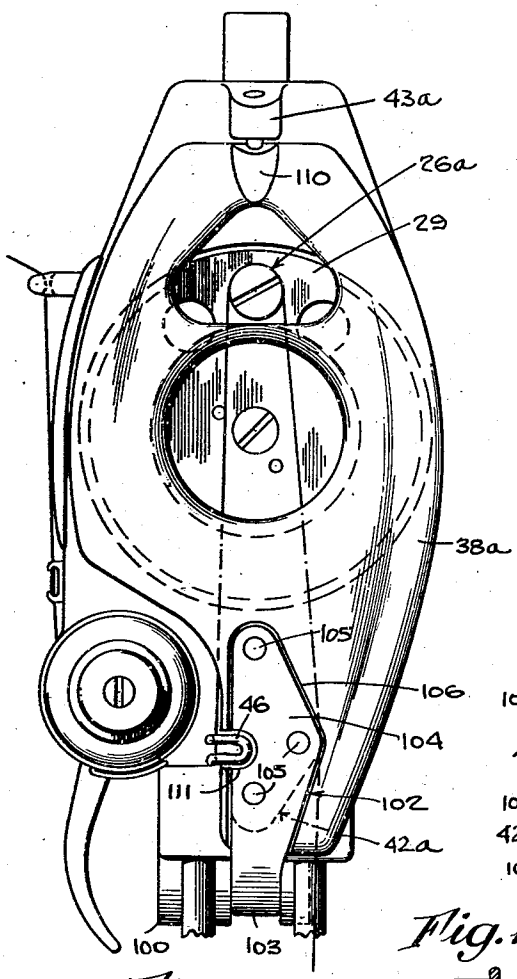


Fig. 8

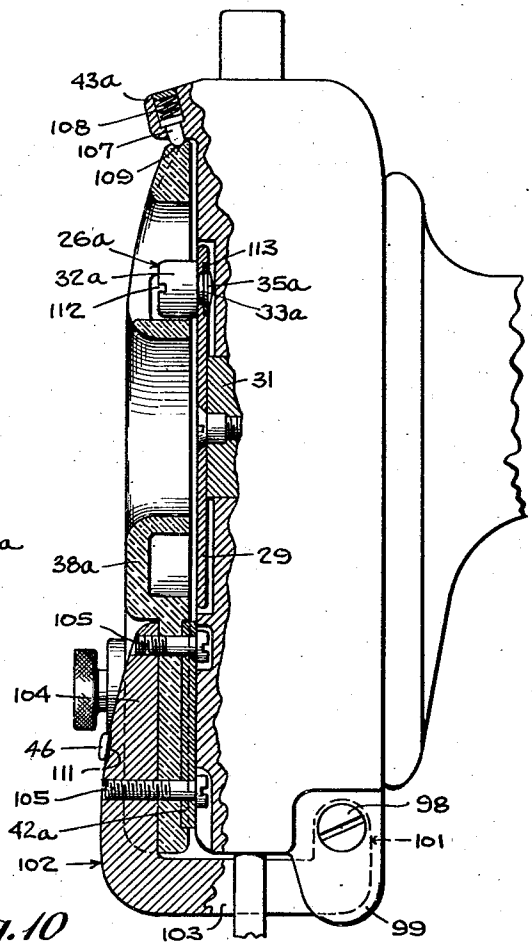


Fig. 9

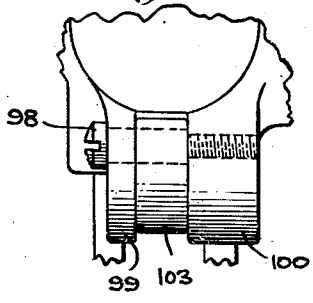


Fig. 10

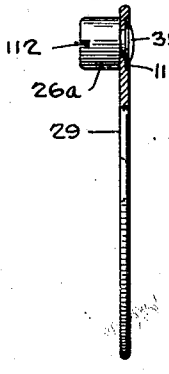
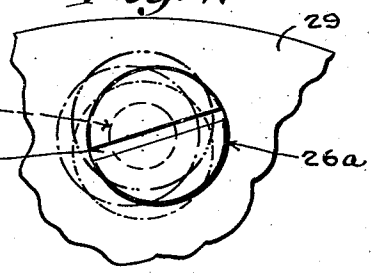


Fig. 11



INVENTOR
Clarence R. Backlin
BY Fryer and Mack
ATTORNEYS

Patented Dec. 11, 1945 2,390,681

UNITED STATES PATENT OFFICE

2,390,681

THREAD TAKE-UP DEVICE

Clarence Robert Backlin, Floral Park North, N. Y., assignor to Willcox & Gibbs Sewing Machine Company, New York, N. Y., a corporation of New York

Application November 5, 1941, Serial No. 417,895

5 Claims. (Cl. 112—248)

This invention relates to sewing machines, and particularly to improved thread control means therefor.

It is an object of the invention to provide a thread control means operable in an especially effective manner for controlling thread during the stitching operation, and which is compact, readily adjustable and susceptible of having thread easily associated therewith.

A feature of the invention resides in the provision in the thread control means of a take-up mechanism including a take-up guard serving not only as a shield or guard for a movable take-up element but also being so designed and so associated with the movable take-up element that it functions in maintaining thread to be controlled in proper association with the latter element.

Another feature of the invention resides in the provision in the thread control means of a movable take-up element and take-up guard combination of the immediately foregoing character in which the guard is provided with means enabling ready access to the thread in association with the take-up element, for example, in the event the thread should become broken or adversely wrapped about the take-up element.

Another feature of the invention resides in the provision of a take-up guard and movable take-up combination in which the movable take-up includes a movable take-up element having a free end, and in which the guard forms one wall of a thread compartment, is resiliently distortable to permit thread being introduced in the compartment and into association with the take-up element and is provided with means for maintaining the thread against slipping off the free end of the take-up element.

Other features of the invention reside in the provision in the take-up means of an adjustably mounted movable take-up element including a main thread-engaging section which is eccentric relative to the mounting section thereof, and in the provision of a guard plate for the movable take-up element, mounted for pivotal movement from an operative thread-confining and take-up shielding position to an open position remote from the take-up element.

Other objects, features and advantages will hereinafter appear.

In the drawings:

Figure 1 is a rear side view of the head portion of a sewing machine embodying the present invention, certain conventional parts being omitted for clarity of illustration.

Fig. 2 is an end view of the sewing machine as shown in Fig. 1.

Fig. 3 is a front view, partially in section, of the sewing machine as shown in Fig. 1.

Fig. 4 is a fragmentary sectional view, showing a unitary portion of the thread control means.

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 4.

Fig. 6 is an exploded view of the unitary portion of the thread control means shown in Fig. 4.

Fig. 7 is a view similar to Fig. 2, but showing a modified form of the invention.

Fig. 8 is a view similar to Fig. 3, but showing the modified form of Fig. 7.

Fig. 9 is a fragmentary view of the hinge connection embodied in the form shown in Figs. 7 and 8.

Fig. 10 is a side view of the take-up plate and take-up element as embodied in Figs. 7 and 8.

Fig. 11 is an enlarged fragmentary view looking toward the face of the take-up plate and take-up element of Fig. 10.

Before describing the present improvements and mode of operation thereof in detail it should be understood that the invention is not limited to the details of construction and arrangement of parts shown in the accompanying drawings, which are merely illustrative of the present preferred embodiments, since the invention is capable of other embodiments, and the phraseology employed is for the purpose of description and not of limitation.

Referring more particularly to the drawings there is shown for the purpose of illustrating a preferred embodiment of the present invention, a head 11 of a sewing machine frame 12 having associated therewith in any well-known manner a needle bar 13 and a presser foot bar 14. Details of the stitching mechanism, such as the needle, presser foot, feed dog and loop-taking mechanism have not been illustrated because the construction thereof may be of any suitable form and, per se, forms no part of the present invention.

As is usual, the presser foot bar 14 may be mounted for longitudinal movement from a lowered operative position to a raised inoperative position and normally maintained in a lowered operative position by means of any suitable spring, not shown. A hand lever 15 having a cam surface 16 operable on a laterally extending lifting arm 17 on the presser foot bar may be provided for raising the latter element against the action of its pressure spring.

In addition, a second lever 18 suitably mounted

for pivotal movement on the sewing machine frame and provided with an arm 19 having a finger 20 thereon overlying the lifting arm 17 and underlying an upwardly offset portion 21 on the same arm 17 may be and, as shown, is provided for raising the presser foot bar. Any suitable connection, as through a link 22, may be provided for connecting the lever 18 to an operating means such, for example, as a conventional foot treadle, not shown.

For taking up and controlling a needel thread 23 during the stitching operations, there is provided a main take-up mechanism 24 of the present invention. The machine also has a cooperable secondary take-up mechanism 25 and tension device which are not specifically claimed herein. As is conventional the main take-up mechanism may include a main movable thread-engaging take-up element 26 positively operated through a cycle of movement, while the secondary take-up mechanism may include a resilient take-up element 27 located intermediate a thread tension means 28 and the main take-up element. The function of these elements in controlling the needel thread is well understood in the sewing machine art, particularly as applied to sewing machines of the lock stitch type.

As shown, the main take-up mechanism 24 is of the class known in the art as a rotary take up and includes, in addition to the thread-engaging element 26, a take-up plate 29 secured, as by a screw 30, to the end of a usual rotating top shaft 31 mounted in the sewing machine frame and rotatable therewith. The take-up element 26, which is connected to the take-up plate at a point offset radially from the rotative center thereof, thus is movable in a rotary path with the shaft 31 as a center.

According to the present invention the take-up element 26, which may be in the form of a pin, projects outwardly from the outer face of the take-up plate and terminates in an enlarged free end 32. As shown, the inner end 33 of the pin may be of reduced size, extending through a hole in the take-up plate and fixed to the latter by a shoulder portion 34 and a pressed over or riveted portion 35.

Also, as shown, the end wall 36 of the sewing machine frame may be recessed at 37 to receive the take-up plate so that the outer faces of the latter and the end wall will be flush or substantially flush with each other.

Of particular importance there is associated with the take-up plate 29 and take-up element 26, a guard plate 38 which not only serves to shield the moving parts of the main take-up mechanism but also serves together with the end wall 36 and the take-up plate 29 to provide a thread compartment 39, and is formed with a groove in the inner face thereof providing a raceway 40 for receiving the enlarged end 32 of the take-up element.

Advantageously the guard plate may be secured to the sewing machine, as by screws 41, passing through the lower portion of the guard plate and into the end wall 36 below the recess 37. As shown, a spacer element 42 may be inserted betwen the end wall and the lower portion of the guard plate to space the later outwardly relative to the take-up plate and thus provide the thread compartment 39. Also, and as shown, a liplike extension is formed on the sewing machine frame at one side of the guard plate 38 to provide a guard 97 to prevent slack thread from adversely being thrown out of the thread compartment and away from the take-up mechanism.

Serving as a guard-plate-steadying means and as a thread-confining means adjacent the upper portion of the guard plate, is a finger 43 of substantially hook shape which extends outwardly from and, as shown, may be integral with the sewing machine frame. The free end 44 of the finger preferably is rounded and fits in a complementary dimple 45 in the guard plate. With this construction the guard plate, which advantageously is of resiliently bendable material, may be deflected inwardly at the upper free end portion thereof to move the same away from the normally engaging end of the finger 43 but upon the release of the bending pressure will return automatically to the position as shown. A suitable plastic material, preferably transparent to permit visual inspection of the thread compartment, may advantageously be utilized in the construction of the guard plate.

Preferably, and in order that a most effective action of the main take-up mechanism 24 may be achieved, a suitable thread guide 46 is interposed between the resilient take-up element 27 and the main movable take-up element 26 and so positioned relative to the path of the latter and to another suitable and usual guide 13*a* provided on the needle bar 13 that the thread 23 when passed over the main movable take-up element, as shown, forms a close inverted V-shape.

Of importance, to enable ready access to the thread in the compartment 39 should it become broken or adversely wrapped around the take-up element 26 apertures 47 and 48 are advantageously provided in the guard plate. As shown, one of these apertures 48 is located centrally of the circular raceway and opposite the rotative center of the take-up plate 29, and the other aperture 47 is located above the first-described aperture to intersect the raceway 40 and make possible direct access to the take-up element 26 when the latter is in the position shown in Figs. 2 and 3.

To balance the take-up plate 29, holes 49 and 50 may be formed therein as shown, the size being determined after assembly with the take-up element 26.

The resilient take-up element 27 of the secondary take-up mechanism 25, see particularly in Figs. 4, 5 and 6, is in the form of a helically coiled spring having a connecting end portion 51 disposed to extend in a direction longitudinally of the coil and another end portion 52 extending laterally from the coil and terminating in a thread-engaging-hooklike section 53.

Of importance the secondary take-up mechanism 25 is so constructed that a single adjusting member 54 is adapted to control not only the amount of take up effected by the resilient element 27 but also the spring loading of this element.

Also, of importance this secondary take-up mechanism 25 and the thread-tension means 28 are associated in an especially compact and easily adjustable thread-control unit 55.

This control unit 55 advantageously is mounted on the sewing machine frame by a stud 56 passing through matching bores in spaced webs 57 and 58 which may be formed integral with the frame. Also, and as shown, this same stud 56 may serve as the pivot for the presser bar lifting hand lever 15 which is mounted for arcuate movement thereon intermediate the spaced webs 57 and 58.

Mounted on the stud and fitting partially in a recess 59 in the outer face of the web 58 is

one tension plate 60 of the thread-tension means 28. Opposed to the tension plate 60 and also mounted on the stud is a second-tension plate 61 which, through an intermediate-tension wheel 62 and compressible washers 63 and 64, cooperates with the first tension plate in controlling the tension on the thread. Rotation of the second-tension plate 61 on the stud is prevented by a locking pin 65 which passes through a transversely extending hole 66 in a hublike extension 67 of the second plate and through a slot 68 extending longitudinally of the stud. It will be readily appreciated that if the second plate 61 is lightly pressed towards the first plate, the washers 63 and 64, which preferably are of felt or the like, will exert a relatively light gripping action retarding the rotation of the tension wheel on the stud, while if the second plate is urged toward the first plate with greater pressure the washers will exert a greater retarding action on the tension wheel. Supplemental to or alternative to the retarding action of the washers in frictionally gripping the tension wheel, tension may be applied to the thread by friction exerted directly on the thread by the opposed marginal portions 69 and 70 of the tension plates as the thread passes therebetween to and from the wheel 62.

Of particular importance, in associating the secondary take-up mechanism 25 with the stud, the coiled spring constituting the resilient take-up element is located on the hublike extension with the connecting end portion 51 secured in a selected one of a plurality of arcuately disposed holes 71 in the hub portion 72 of the adjusting member, and with the other end portion 52 extending outwardly through an arcuately extending slot 73 in an outer flangelike portion 74 of the adjusting member. The resilient take-up element 27 is so adjusted and associated with the adjusting member 54 that the laterally extending portion 52 thereof is yieldingly urged in such a way as to normally abut against the end wall 75 of the slot. This end wall 75, therefore, serves as a stop to limit the retracting or take-up motion of the thread-engaging section 53.

It is to be noted that the flangelike portion 74, the hublike extension 67, and the outer marginal face of the tension plate, together define a substantially closed annular chamber 76 in which the main body of the take-up spring 27 is confined and shielded, and that the hub portion 72 is mounted for rotative adjustment on the extension. A set screw 77 in the hub portion and engageable with the extension 67 serves to lock the adjusting member relative to the latter.

Also of importance, the hublike extension 67 is provided with an enlarged bore 78 open at its outer end and terminating at its other end in an annular shoulder 79 to provide in effect a sleevelike projection on the second-tension plate 61. Located in an annular chamber 80 defined by the sleevelike projection and the stud, and abutting the annular shoulder 79, is a resilient element, as shown in the form of a coiled spring 81, for yieldingly urging the second-tension plate 61 toward the first-tension plate 60. A manually operable spring controlling member 82 having internal threads 83 cooperable with threads 84 on the outer end of the stud and formed with a portion 85 adapted to fit into the annular chamber 80 is provided for adjustably controlling the loading of the spring 81 and thus adjustably controlling the tension of the thread tension means. Advantageously, and as shown, a turning head 86 located outside of the annular chamber 80, is provided on the controlling member.

Completing the association of the control unit 55 with the sewing machine frame is a holding nut 87 screwed on a threaded portion 88 on the inner end of the stud and up against the web 57.

For enabling an automatic release of the thread-tension means 28 upon a raising of the presser foot bar 14 there is a tension release pin 89 located in a bore 90 extending longitudinally of the stud from its inner end to communicate with the slot 68 which is aligned therewith. One end of the release pin 89 abuts the locking pin 65 in the slot 68 and the other end projects beyond the inner end of the stud. It will be readily understood that longitudinal movement of the release pin in a direction towards the spring 81 will retract the tension plate 61 relative to the tension plate 60 thus releasing the tension on the thread.

An advantageous means for effecting this releasing movement of the pin 89 is provided by a tension-releasing finger 91 on the presser foot lifting lever 18 and so disposed relative to the projecting end of the release pin 89 that, while it is normally spaced from the latter, movement of the lever 18 to lift the presser foot bar will concurrently move the finger to engage the release pin and urge it in a tension-releasing direction. Also, because of the relation of the cam surface 16 on the hand lever 15 with the lifting arm 17, it will be readily appreciated that a presser foot bar lifting motion of the hand lever 15 likewise will cause the tension-releasing finger 91 to move the pin 89 in a tension-releasing direction against the pressure of the tension spring 81.

Of importance, when it is desired to alter the amount of take-up effected by the resilient take-up element 27 it is merely necessary to back off the set screw 77 on the adjusting member 54 and turn the latter arcuately on the hublike extension 67 of the nonrotating tension plate 61 to adjust the position of the take-up limiting wall 75 of the slot.

Also, and of particular importance, when it is desired to alter the spring loading of the resilient take-up element, it is merely necessary to insert the connecting end portion 51 thereof in a different one of the arcuately disposed holes 71 in the same adjusting member 54. In this manner the spring force normally maintaining the laterally extending portion 52 against the take-up limiting end wall may be increased or decreased depending on whether the connecting portion is moved clockwise or counterclockwise of the adjusting member as viewed in Fig. 5.

Such adjustments of the resilient take-up element 27 to cause the same to take up or control a greater or a lesser extent of slack thread and to effect a stronger and quicker or a weaker and slower spring action, depending upon the character of the work, the strain desired on the thread and the speed of the sewing machine, as will be well understood in the art, are highly important and desirable. With the present invention the particularly advantageous and compact control unit 55 is provided which not only embodies a thread-tension means and a resilient take-up means but also includes mechanism by which these means may be easily and readily adjusted.

In associating the needle thread 23 with the several cooperating thread control means hereinabove described, it may be drawn from any suitable supply, not shown, and passed through a conventional thread guide 92 to a conventional

tension clip and guide 93 and to the control unit 55. There it is passed around the tension wheel 62 in the usual manner, and then over the aligned hooklike thread-engaging section 53 of the secondary take-up mechanism 25. From the secondary take-up mechanism the thread passes through the guide 46 and thence up through the thread compartment over the main movable take-up element 26 and down to the needle.

It is to be particularly noted that the thread may be most easily associated with the main take-up element in the thread compartment by merely holding the same in a simple loop and sliding it under the rounded end of the confining finger 43 and over the upper edge of the guard plate into the thread compartment where it loops automatically over the main take-up element in a groove 94 defined between the enlarged end 32 and the take-up plate 29. Because of the resiliently bendable nature of the guard plate and because the engaged portions of the confining finger and the guard plate merge inwardly toward each other to provide camlike surfaces 95 and 96 for the thread, the thread will of its own action, when urged between the camlike surfaces, press the upper portion of the guard plate inwardly away from the confining finger so that it may pass therebetween.

Also it should be particularly noted that when once located in the thread compartment and over the movable take-up element the thread is confined against movement out of the compartment over the upper end of the guard by the confining finger 43, against movement over the lower end of the guard by the spacer element 42, and against adverse movement off the enlarged free end 32 of the take-up element through the employment of the free end receiving raceway 40 in the guard which thus locates the free end outside of the compartment 39 in which the thread moves.

If desired and as embodied in the modified form shown in Figs. 7, 8, 9, 10 and 11, a guard plate 38*a* may be associated with the main take-up mechanism, which, unlike the guard plate 38 shown in Figs. 1–3 is not secured directly to the sewing machine frame as by the screws 41, but is hingedly secured to the sewing machine frame so that it may be bodily swung outwardly away from the end wall 36 thereof and the take-up plate 29. Such an arrangement is advantageous in that it facilitates access to the take-up mechanism especially for purposes of cleaning, repair and getting at thread that may become adversely wound up thereon, and also for the purpose of threading.

In this modified construction the hinged connection, as shown in Figs. 7, 8 and 9, is provided by a pivot stud 98 passing through spaced depending ears 99 and 100 on the sewing machine frame and an upwardly extending ear 101 on a swing bracket 102 to which the guard plate 38*a* is secured. Advantageously this swing bracket is substantially L-shaped with an arm 103 adapted to extend outwardly beneath the sewing machine frame and an arm 104 adapted to extend upwardly when the bracket is in its normal or operative position as shown in Figs. 7 and 8.

The guard plate 38*a*, apart from the manner of its association with the sewing machine frame is essentially the same as the guard plate 38, being preferably formed of a suitable transparent and resiliently bendable plastic material and having a raceway 40 and apertures 47 and 48 provided therein.

For securing the guard plate 38*a* to the swing bracket arm 104 a plurality of screws 105 may be used, which same screws advantageously also serve to secure a spacer element 42*a* to the inner side of the guard plate to thus space the latter outwardly from the end wall 36 and, as in the case of the construction shown in Figs. 1–3, provide the thread compartment 39. As shown, the spacer element 42*a* and swing bracket 102 may be of metal. Also, and as shown, the outer face of the guard plate 38*a* may be formed with a recess 106 for receiving the arm 104 of the swing bracket.

Serving to normally maintain the guard plate 38*a* in its operative position there is provided in a confining extension 43*a* on the sewing machine frame, a round ended shouldered pin 107 backed by a spring 108 and adapted to engage in a dimple 109 formed in a projection 110 adjacent the upper end of the guard plate. The snap connection thus provided, it will be appreciated, is simple, effective and automatic.

In order that the thread guide 46, which is similar to the corresponding guide in the form shown in Figs. 1–6, may not interfere with the swinging of the guard plate between an upper operative to an outer and lowered position, aligned slots are formed in the arm 104 of the swing bracket, in the guard plate and in the spacer element to provide a thread guide clearance opening 111.

While as shown, the swing bracket 102 and guard plate 38*a* may be formed as two separate elements secured together, it will be appreciated that the guard plate and swing bracket may be made of a one-piece integral construction, as of metal.

Also, if desired and as embodied in the modified form shown in Figs. 7, 8, 9, 10 and 11, there may be provided a modified main take-up element 26*a* which is mounted in a way enabling ready adjustment thereof relative to the take-up plate 29 on which it is mounted to thus vary the extent of take-up on the thread.

Advantageously, and as shown best in Figs. 10 and 11, this adjustable mounting is effected by forming the take-up element with a main thread-engaging head 32*a* which is eccentric relative to the reduced mounting shank 33*a* thereof which extends through a matching hole in the take-up plate. Hence, when the take-up element is adjusted rotatably, the position of the thread-engaging head thereof will be varied with respect to the rotative center of the take-up plate 29 which is the same construction and is associated with the shaft 31 in the same manner as the take-up plate first described. In Fig. 11 several positions of adjustment are illustrated by dotted lines.

To facilitate this adjustment of the take-up element, a slot 112 adapted to receive a screw driver or other suitable tool, preferably is provided in the head 32*a*, and a spring washer 113 is inserted between a riveted over end 35*a* on the mounting shank and the take-up plate 29. Advantageously, and if desired, suitable markings may be provided on the take-up plate to indicate the adjustment effected.

In all other particulars the construction and operation of the modified form shown in Figs. 7, 8, 9, 10 and 11, is exactly the same as in the form shown in Figs. 1–6, it being understood that when the eccentrically adjustable take-up element is utilized, the raceway in the guard plate is made of sufficient width to permit adjustment of the take-up element.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

Having thus described the invention, what is claimed as new is:

1. In a sewing machine having a frame, the combination of thread-guiding means; a rotary take-up plate; a take-up element having a free end, carried by and projecting from said plate, for operating on thread from said guiding means; a normally stationary take-up guard carried by said frame, spaced from said plate to provide a thread compartment, and having a raceway for receiving said free end; and means on said frame for confining said thread against movement out of said compartment over the edge of said guard, said confining means and said guard being normally maintained in yielding engagement.

2. In a sewing machine, the combination of thread-guiding means; a rotary take-up plate; a take-up element having a free end, carried by and projecting from said plate, for operating on thread from said guiding means; a normally stationary take-up guard, spaced from said plate to provide a thread compartment, and having a raceway for receiving said free end; and means for confining said thread against movement out of said compartment over an edge of said guard, said confining means and said guard being maintained in yielding engagement whereby thread from said guide means may be slipped between the same and looped over said take-up element in said compartment.

3. In a sewing machine, the combination of a frame; a rotary take-up element having a free end and a path of movement, for operating on a thread; a normally stationary take-up guard plate of transparent resilient material, having a raceway formed therein for receiving said free end; means opposed to and spaced from said guard plate to define with the latter a thread compartment with the take-up element located and movable therein; thread guide means for locating said thread relative to said take-up element; and confining means on said frame and extending intermediate said opposed means and said guard plate at a location outside said path of movement, said resilient guard plate being yieldingly movable relative to said confining means to permit said thread from said guide means to be looped over an edge of said guard plate into said compartment and relative to said take-up element.

4. In a sewing machine, the combination of a frame; a rotary take-up plate; a take-up element having a free end, carried by and projecting from said plate, for operating on a thread; a guard plate opposed to said take-up element and take-up plate and spaced outwardly from the latter to provide a thread compartment, said guard plate having a raceway for receiving said free end; and a liplike extension formed on said frame and extending out from the latter at one side of said thread compartment and said guard plate for maintaining said thread against being thrown out of said compartment and away from operative association with said take-up element.

5. In a sewing machine, the combination of a rotatable take-up plate having a center of rotation; a take-up element having a main thread-engaging section with a free end and having a mounting section, said mounting section being mounted for rotative adjustment on said take-up plate at a point eccentric relative to the center of rotation and being eccentric relative to said thread-engaging section; and a normally stationary guard plate having a raceway opposed to said free end for receiving the same, adapted to maintain a thread relative to said main thread-engaging section, said raceway being of sufficient width to permit said adjustment of said take-up element.

CLARENCE ROBERT BACKLIN.