Aug. 3, 1948. C. F. RUBEL 2,446,245

SEWING MACHINE

Filed March 10, 1945 7 Sheets-Sheet 1

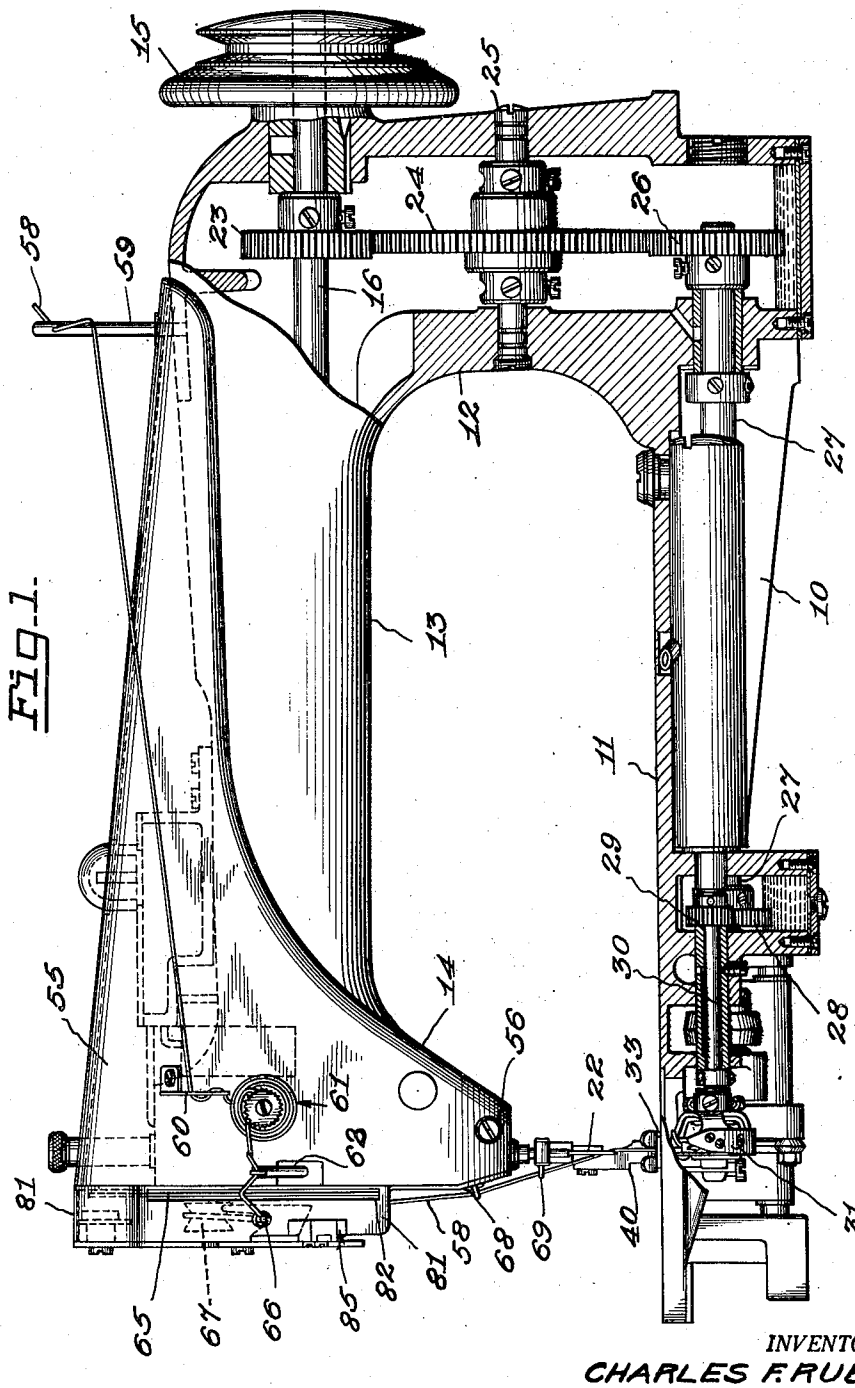


Fig-1.

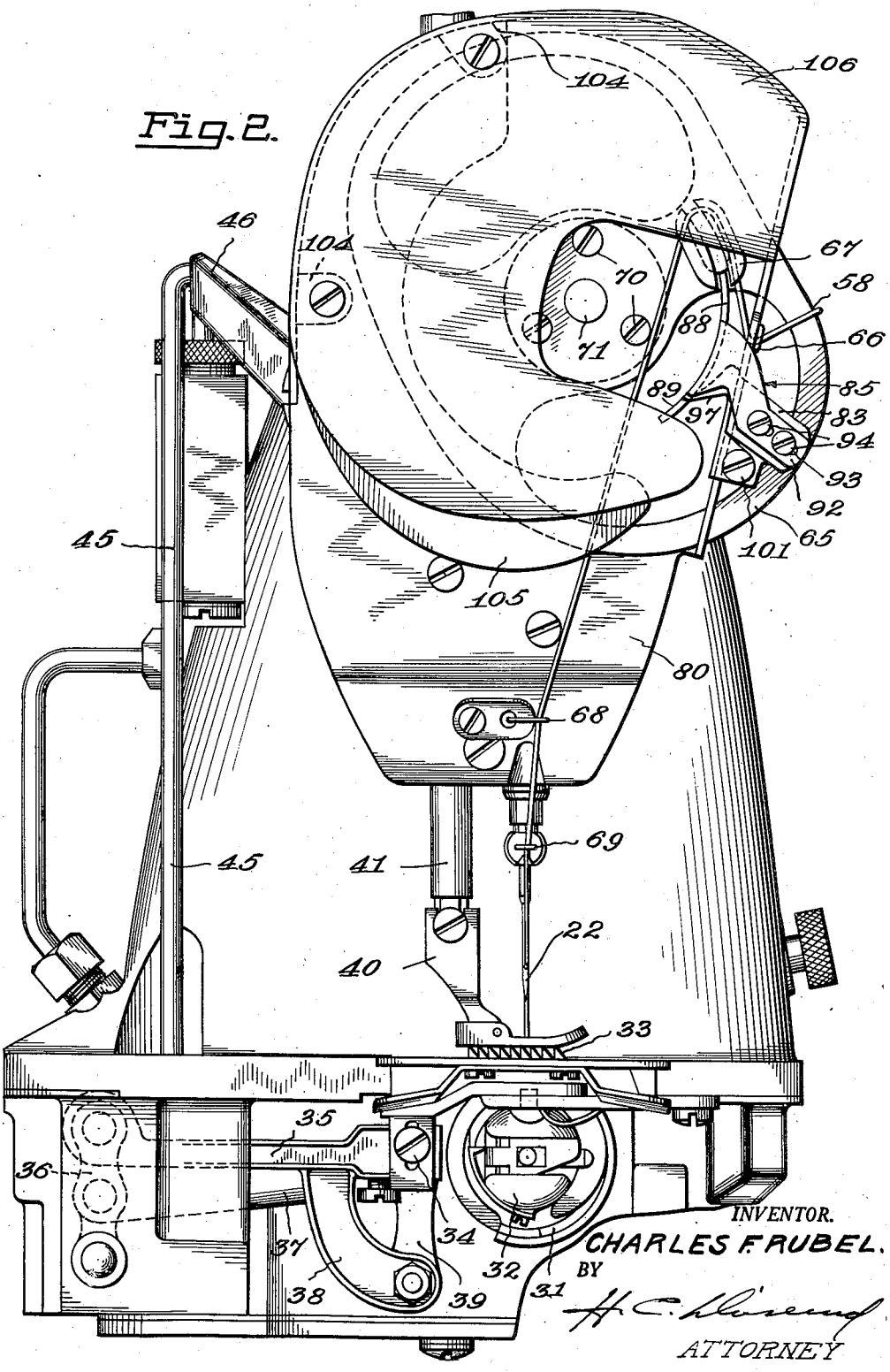
INVENTOR.
CHARLES F. RUBEL.
BY
H. C. Rheinemann
ATTORNEY

Aug. 3, 1948. C. F. RUBEL 2,446,245

SEWING MACHINE

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Fig. 2.



INVENTOR.
CHARLES F. RUBEL.
BY
H. C. Rinaud
ATTORNEY

Aug. 3, 1948. C. F. RUBEL 2,446,245

SEWING MACHINE

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Fig. 3.

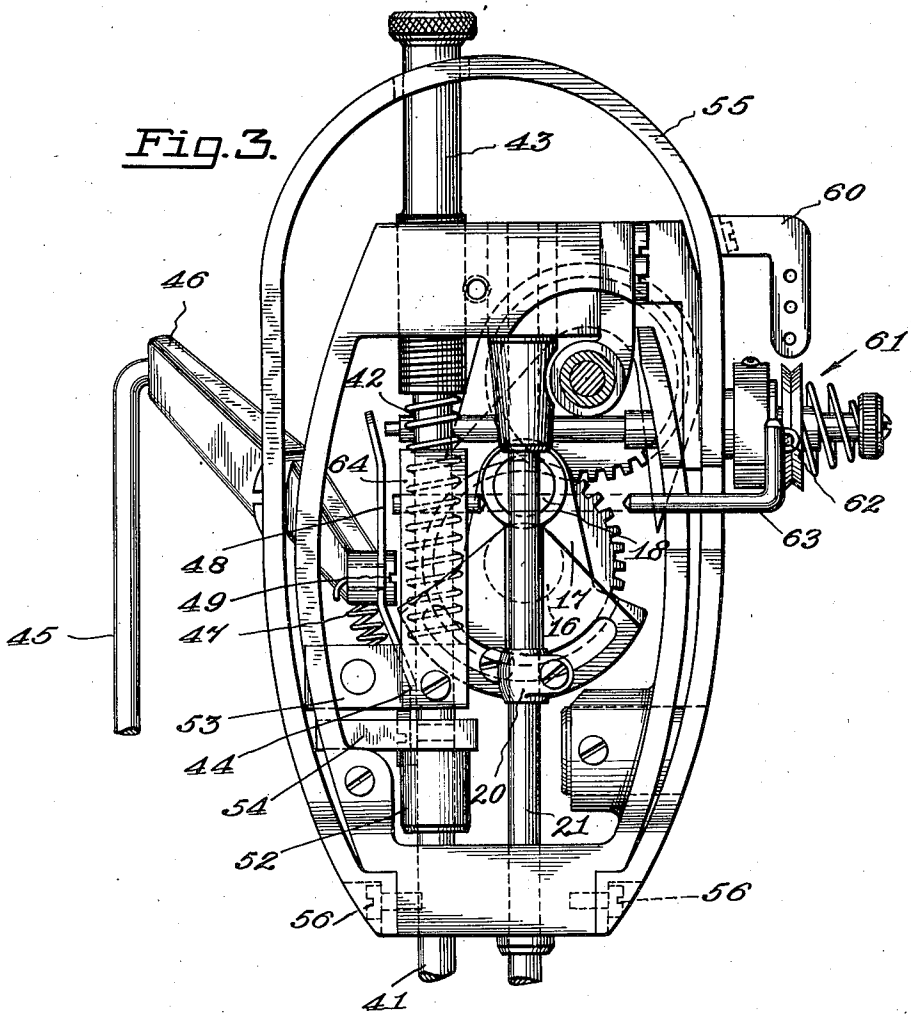


Fig. 7.

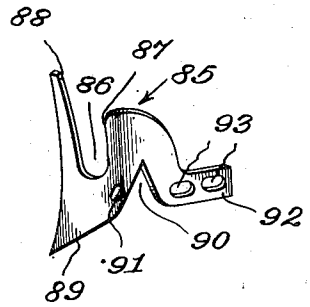
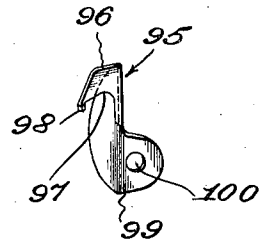


Fig. 8.



INVENTOR.
CHARLES F. RUBEL
BY
H. C. Lorenz
ATTORNEY

Aug. 3, 1948. C. F. RUBEL 2,446,245

SEWING MACHINE

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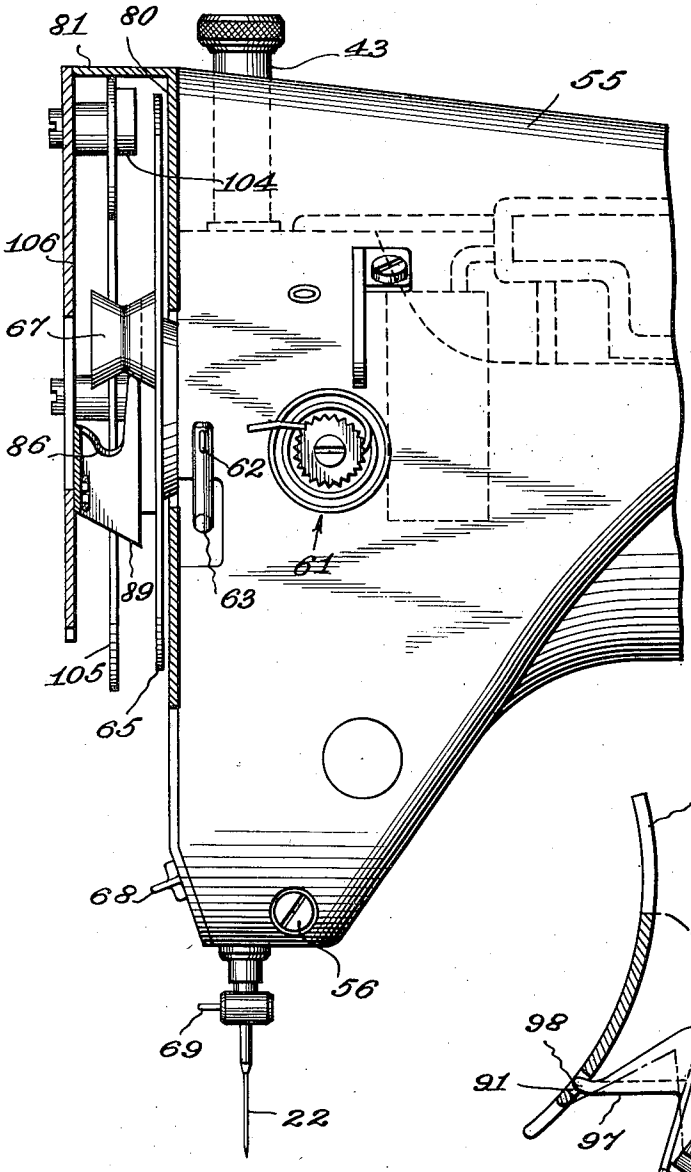


Fig 4.

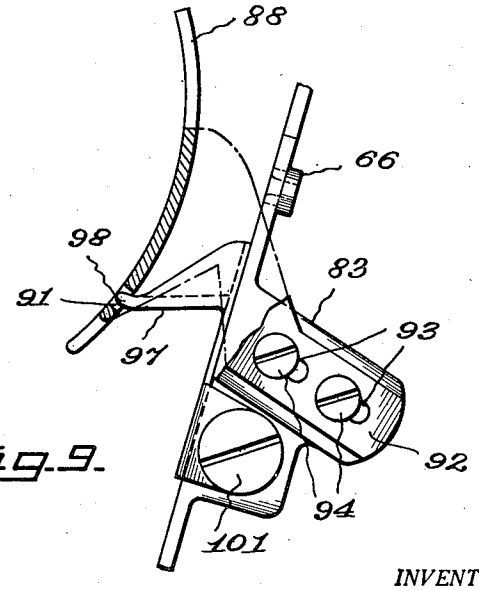


Fig 9.

INVENTOR.
CHARLES F. RUBEL.
BY
H. C. Diserens
ATTORNEY

Aug. 3, 1948. C. F. RUBEL 2,446,245

SEWING MACHINE

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Fig. 5.

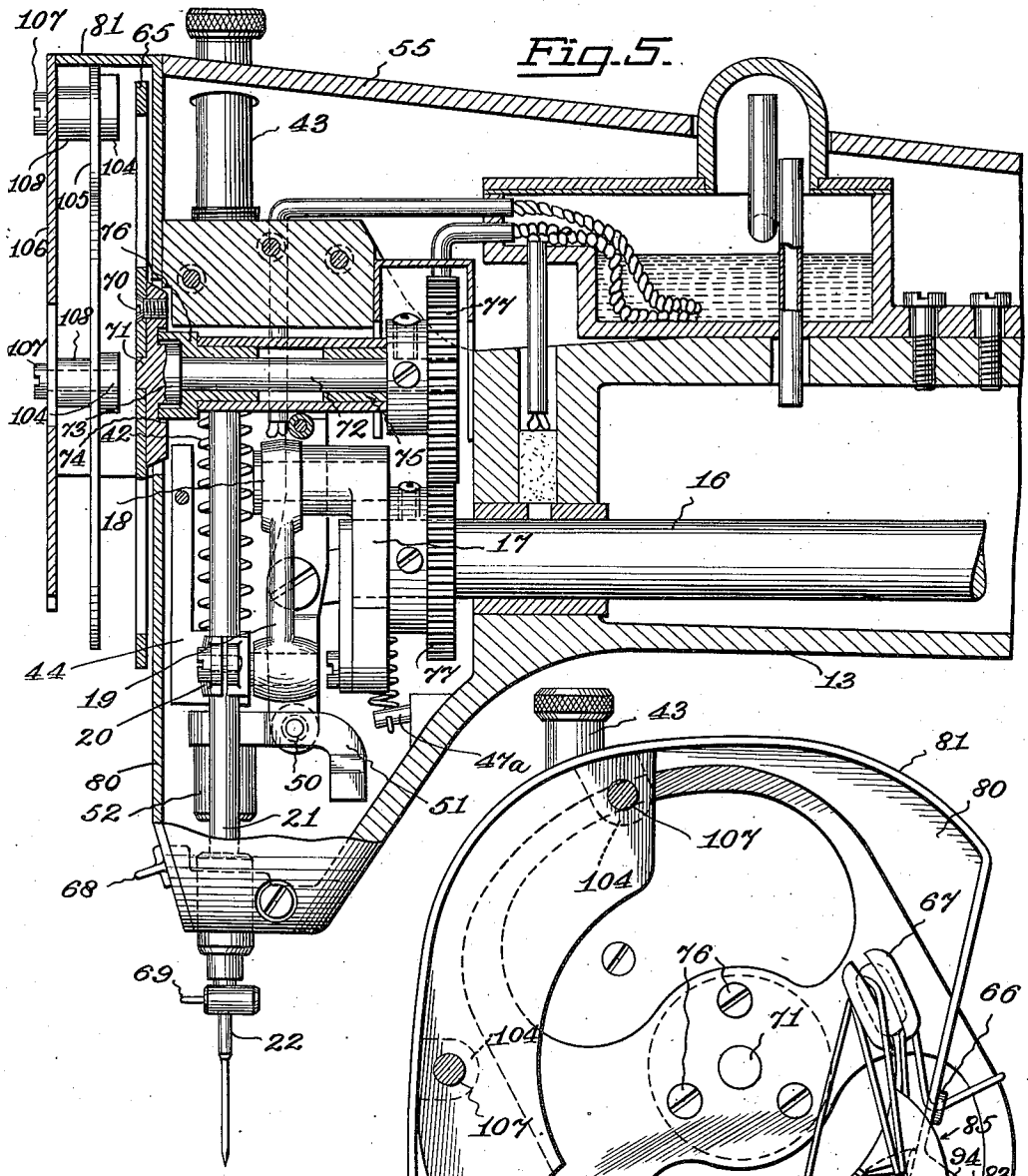


Fig. 6.

INVENTOR.
CHARLES F. RUBEL.
BY
H. C. Wiseman
ATTORNEY

Aug. 3, 1948. C. F. RUBEL 2,446,245

SEWING MACHINE

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Fig. 17.

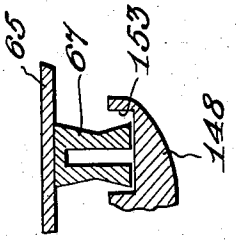
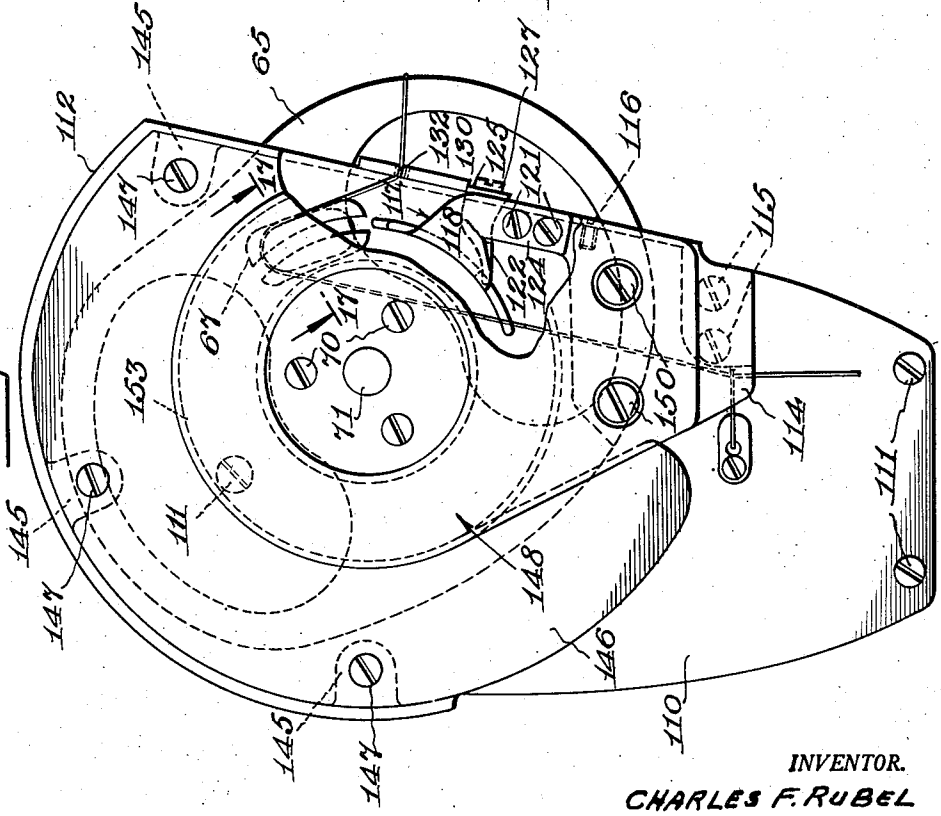


Fig. 11.

Fig. 10



INVENTOR.
CHARLES F. RUBEL
BY
H. C. Wiseman
ATTORNEY

Aug. 3, 1948. C. F. RUBEL 2,446,245

SEWING MACHINE

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Fig. 12.

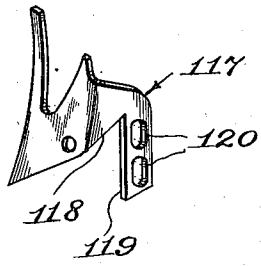


Fig. 13.

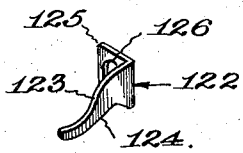


Fig. 14.

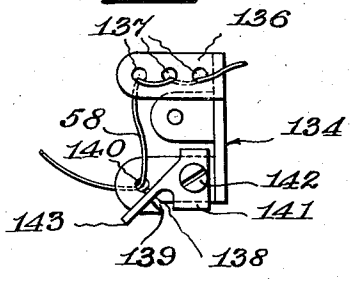


Fig. 15.

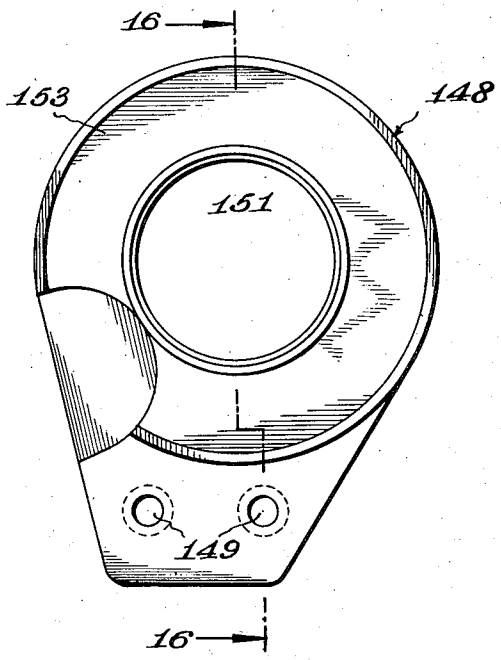
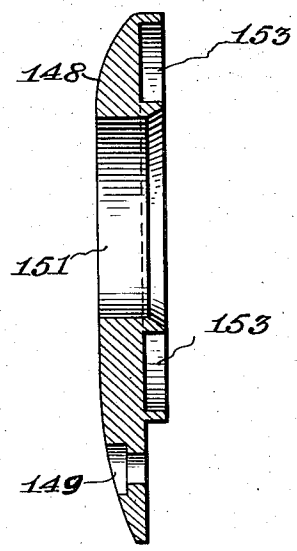


Fig. 16.



INVENTOR.
CHARLES F. RUBEL
BY
H. C. Kliesrud
ATTORNEY

Patented Aug. 3, 1948 2,446,245

UNITED STATES PATENT OFFICE

2,446,245

SEWING MACHINE

Charles F. Rubel, Chicago, Ill., assignor to Union Special Machine Company, Chicago, Ill., a corporation of Illinois

Application March 10, 1945, Serial No. 581,980

8 Claims. (Cl. 112—248)

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This invention relates to an improved sewing machine and more particularly to improved devices for manipulating and controlling the needle thread of such a machine under varying circumstances during normal operation of the machine. In one of its specific aspects the instant invention pertains to devices associated with rotary take-ups for sewing machines for preventing continuous winding or entanglement of needle thread about a thread engaging element or elements by forcing the thread away from such element or elements, in the event of thread breakage or preliminary entanglement, and effecting severance of the thread at a point removed from the thread engaging element or elements.

One of the important objects of the invention is the provision of simple, adjustable and effective means, in association with rotary take-up means, for handling and controlling the needle thread under varying circumstances encountered during normal operation of a sewing machine.

Another object of the invention is the provision of devices of the character indicated which are inexpensive to manufacture, trouble-free in operation, and which may be readily assembled and adjusted in required position.

A further object of the invention is the provision of means for forcing needle thread from a rotary take-up device, in the event of thread breakage or entanglement, and for severing such thread at a point removed from the take-up device. This means is so arranged that the element employed to sever the thread may be readily replaced or removed for sharpening purposes, as required, without disturbing the adjustment of the associated parts.

A still further object of the invention is the provision of rotary take-up means secured to a driving shaft and so constructed and arranged that in the event of thread breakage, free ends of the thread are prevented from becoming entangled with the driving shaft.

The above enumerated objects are attained by various improved features embodied in the machine. The present invention constitutes an improvement over Charles F. Rubel Patent No. 2,440,615, entitled "Sewing machine," granted April 27, 1948, wherein I have disclosed means adapted to force needle thread, in the event of breakage, outwardly beyond a rotary take-up member. A similar means is embodied in the present invention. This means, however, is so constructed and arranged as to be readily and adjustably mounted on the machine and accomplish its intended function in a positive and

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trouble-free manner. An element in the nature of, or provided with, a knife blade having a sharp cutting edge is mounted in predetermined relation to the above mentioned means in such a manner that the thread, upon being forced away from the rotary take-up member, is disposed in a position to be expeditiously severed by the cutting edge of the knife blade, as will be more clearly set forth in the detailed description that follows.

The foregoing objects, as well as other objects, features and advantages of the invention, will be apparent to persons skilled in the art from the following detailed description of illustrative embodiments of the invention taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a view partly in front elevation and partly in longitudinal section through a sewing machine embodying the invention;

Figure 2 is an end view of the machine as seen from the left in Figure 1;

Figure 3 is an elevational view of the needle head portion of the machine, taken from the same end as Figure 2, but with the cover plates and various other parts removed;

Figure 4 is a view of the needle head of the machine, largely in front elevation but partly in section and having portions broken away for clearer illustration of certain features;

Figure 5 is a longitudinal sectional view through a portion of the overhanging arm of the machine including the needle head;

Figure 6 is an end elevation of the upper portion of the needle head with parts broken away, the thread take-up and severing devices being shown with the needle thread in entangled relation;

Figure 7 is a perspective view of a thread positioning and removing member;

Figure 8 is a perspective view of a thread severing member;

Figure 9 is an enlarged view, in end elevation, of the members shown in Figures 7 and 8 operatively mounted on a part of the needle head, portions being broken away for clearer illustration;

Figure 10 is a view in elevation of devices adapted to be carried at the free end of the needle head in a machine embodying modifications of the invention, with parts broken away for better illustration;

Figure 11 is a side elevation of the devices shown in Figure 10 as viewed from the right thereof;

Figure 12 is a perspective view of the thread positioning and removing member shown in Figures 10 and 11;

Figure 13 is a perspective view of the thread severing member shown in Figures 10 and 11;

Figure 14 is an elevation of a thread guiding device shown in Figure 11 and as viewed from the right thereof;

Figure 15 is a view in elevation of a combined outer cover plate and thread guide taken along line 15—15 of Figure 11;

Figure 16 is a view taken along line 16—16 of Figure 15; and

Figure 17 is a cross-sectional view taken along line 17—17 of Figure 10.

Reference is now had to the drawings wherein like reference numerals designate corresponding parts throughout the several views. The invention has been shown by way of illustration as applied to a sewing machine generally of the type disclosed in the Christensen et al. Patent No. 2,113,572 granted April 12, 1938, and in my above mentioned Patent No. 2,440,615. The main frame of this machine comprises a base portion 10 provided with a work supporting surface 11 and carrying at one end an upwardly extending hollow standard 12 from the upper end of which an overhanging hollow arm 13 projects over the work support. Overhanging arm 13 carries a needle head 14 at its free end. The machine is operated from a combined handwheel and pulley 15 which receives power by means of a belt (not shown) from any suitable source, such as an electric transmitter, and transmits the power to the interior of the machine by means of a shaft 16 to which the pulley is secured. Shaft 16 extends through the overhanging arm into needle head 14 and within the needle head has secured thereto a crank arm 17 carrying a crank pin 18 which is connected by a link 19 with a collar 20 adjustably secured to a needle bar 21 (Figures 3 and 5). A needle 22 is carried at the lower end of the needle bar and the eye of the needle is adapted to be reciprocated between a point well above the work support, as shown in Figure 1, and a point below the work support upon each complete revolution of shaft 16.

Secured to shaft 16 within standard 12 of the frame is a gear 23 which meshes with an idler gear 24 rotatable upon a stationary shaft 25 in the standard. Gear 24 also meshes with a gear 26 that is secured to one end of a shaft 27 which is disposed longitudinally of the base of the machine. Shaft 27 carries a second gear 28 intermediate its ends, this gear meshing with a gear 29 secured to one end of a shaft 30 that carries the rotary component 31 of a rotary hook at its other end. The rotary hook may be of any desired construction and, as shown in Figure 2, includes a stationary component 32 within, and in bearing engagement with, the rotary component 31. Gears 23, 24 and 26 are so selected as to rotate shaft 27 at the same angular speed as shaft 16. Gearing 28 and 29 is such as to impart two revolutions to shaft 30 for each revolution of shaft 27.

The work that is sewn by the machine is fed in proper relation to the stitch forming devices comprised by needle 22 and the rotary hook by any appropriate means. By way of illustration, the work feeding means may include a feed dog 33 adjustably mounted by a screw 34 on one end of a feed bar 35, which is pivotally supported at its opposite end by a rocker member 36. Member 36 is oscillated by means of a pitman 37 connected to an eccentric (not shown) carried by shaft 27 to impart the feeding and return movements to the feed dog. Lifting and lowering movements

are imparted to the feed dog by means of a curved arm 38 depending from the feed bar 35 and having attached to its free end a link 39 that is connected with an eccentric or crank pin (not shown) at the outer end of shaft 27. Additional details as to the construction and operation of the work feeding devices and also of the stitch forming devices may be had by reference to the above mentioned Christensen et al. patent or to the patent to George Sauer et al. No. 2,035,508 granted March 31, 1936.

A presser foot 40 is secured to the lower end of a presser bar 41 for cooperation with the feed dog in advancing the work along work supporting surface 11. Presser bar 41 is normally and yieldingly urged downwardly by means of a compression spring 42 (Figure 3), concentric with presser bar 41 and acting between the lower end of an adjustable screw threaded sleeve 43 and a surface on a block 44 secured to the presser bar. The presser bar may be readily lifted to release the work by suitable devices, including a link 45 operable by a foot treadle or the like (not shown). This link is connected with the outer end of a lever 46 pivotally mounted on and extending into the needle head portion of the machine. A spring 47 is connected between the inner end of lever 46 and a fixed pin 47a on the needle head and normally urges the lever in a clockwise direction, as viewed in Figure 3. A flat link 48 is attached by a screw 49 to the inner end of lever 46 and is connected at its lower end at 50 (Figure 5) with an extension 51 projecting laterally from the upper end of a sleeve 52 slidably mounted on presser bar 41. Due to the action of spring 47 the sleeve 52 is normally held in the position indicated in Figures 3 and 5 with a clearance between the same and the bottom of block 44. Upon the actuation of lever 46 by link 45 in a counterclockwise direction, however, sleeve 52 will be raised into abutting engagement with block 44 and will lift the block and the presser bar against the action of spring 42. Rotation of presser bar 41 and of the sleeve 52 is prevented by cooperation of laterally projecting portions 53 of the block 44 and 54 of the sleeve 52 with a slot in the needle head (Figure 3). A cover member 55 is disposed over a portion of overhanging arm 13 and needle head 14 to enclose various parts and to present a neater appearance. This cover member may be secured to the frame in any desired manner, as by means of screws 56 (Figures 3 and 4).

Needle thread 58 supplied from any convenient source is threaded through openings in a guide pin 59 carried at the top of the main frame (Figure 1) and is then passed through openings in a guide 60 projecting laterally of the overhanging arm at or near the needle head. From guide 60 the thread is passed around a thread tensioning device generally denoted by numeral 61 and described in detail in my said pending application. From the thread tensioning device the thread is passed through an eyelet 62 carried by a thread guide 63 (Figure 3) which is inserted in an opening provided in an upwardly extending portion 64 of block 44. As the pressor foot is raised and lowered in response to variations in the thickness of the work being sewn, rod 63 will be likewise raised and lowered to yield or take up extra thread as required in proper stitch formation. From rod 63 the thread is led across the outer edge of a double-lobed cam member 65 forming part of the thread take-up. The thread is then passed through an eyelet 66 into the interior of

the take-up mechanism and thence over a slotted take-up element 67 projecting laterally of cam member 65 and carried through an orbital path upon rotation of said cam. From the take-up element 67 the thread is passed downwardly through a fixed guide 68, thence through a guide 69 carried by and reciprocable with needle bar 21, and finally through the eye of the needle.

Cam member 65 is secured by means of screws 70 to the outer face of a disc-like flange 71 which, as is best shown in Figure 5, may be either integral with or otherwise suitably secured to a shaft 72 and is provided with a hub portion 73 and an annular groove or recess 74 surrounding the hub portion. Shaft 72 is rotatably mounted in a pair of bearing sleeves 75 and 76, one end of the latter being enlarged to receive hub 73 and extending into annular groove 74. By virtue of the arrangement just described, any loose end of the needle thread, in the event the thread becomes broken, is prevented from becoming entangled and wound around shaft 72.

The operation of the thread take-up device, including cam member 65 and slotted take-up element 67, is the same as for the corresponding parts of the take-up described in detail in Charles F. Rubel patent 2,400,602, entitled "Sewing machine" and granted May 21, 1946, and as more fully set forth in the Rubel et al. patent 2,398,667, entitled "Sewing machine" and granted April 16, 1946. For further details as to the take-up action of the devices described, reference may be had to the foregoing patents.

A plate 80 serves as a closure for the free end of the needle head and is provided with a laterally or axially extending flange 81 which is slotted at 82 (Figure 1) to permit cam member 65 to project therethrough during operation. Slot 82 is provided in a straight or flattened portion of the flange 81 at the front of the machine. The outer end of the flattened portion of the flange is formed with a bracket portion 83 extending in a plane parallel with plate 80.

In the path of the needle thread between the eyelet 66 and the fixed guide 68 there is provided a stationary member 85 constituting a combined thread positioning and removing device. As is best shown in Figure 7, member 85 is formed with a relatively deep recess 86, the center line of which is preferably substantially in line with eyelet 66. Surfaces 87 and 88 serve at certain points in the cycle to guide the thread into recess 86. The inclined lower edge 89 of member 85 is rounded to reduce friction as it forces or cams the needle thread into a notched region 90, in the event of thread breakage. This camming action is similar to that described in detail in my earlier mentioned patent No. 2,440,615, in the event of thread breakage. Member 85 is provided with an opening 91 and is formed with an arm 92 that is provided with a pair of slots 93 for adjustably attaching the member to bracket 83 by means of screws 94.

A member 95 (Figure 8) is also attached to bracket 83 and cooperates with member 85 in a manner that will now be explained. The member 95 includes a knife blade portion 96 having a sharp cutting edge 97 and formed with a teat 98 at its end adapted to be disposed in opening 91 (see Figure 9). An arm 99 having an opening 100 is formed preferably integral with knife blade 96 and is adjustably secured to bracket 83 by a screw 101. It will be observed from an examination of Figures 2 and 9 that member 95 is so constructed and arranged as to have knife blade 96 disposed

closely adjacent the under-surface of member 85 with cutting edge 97 extending across notched portion 90. Knife blade 96 and arm 99 are bent at right angles from the main body of the member 95 which is arranged to fit against the inner surface of the flattened portion of flange 81. Should the needle thread become broken in the course of operating the machine, the inclined, lower edge 89 of member 85 will engage the thread as shown in Figure 6 and force or cam the thread outwardly and upwardly in the direction of notched portion 90. Due to the configuration and relative positions of members 85 and 95, the thread so cammed is drawn across and severed by cutting edge 97 of knife blade 96, as will be apparent from an examination of the drawings. This severing action may not occur until the thread has become wrapped around the element 67 several times and is pulled with sufficient force by the latter, but the wrapping of more than a few turns is definitely prevented.

It will be noted that member 85 may be readily mounted on and removed from the machine and may be readily adjusted radially with respect to shaft 72. Moreover, the construction herein described and illustrated permits of the ready removal and replacement of member 95 when cutting edge 97 becomes dull or for any other reason.

Flange 81 of plate 80 carries a pair of inwardly projecting lugs 104 which support a pair of partial closures 105 and 106 that are secured to the lugs by screws 107 and maintained in spaced relation by spacer sleeves 108. The relationship between the various elements of the take-up and the enclosure for the same is such that the threading of the take-up may be readily carried out even though the take-up is largely concealed. The manner of manipulating the needle thread, either in first threading the machine or in the event of thread breakage, is similar to that more fully discussed in my earlier mentioned Patent No. 2,440,615. The enclosure of the take-up devices is somewhat more nearly complete in accordance with the present invention, however.

Certain devices, constituting additions to and modifications of parts earlier described herein, are illustrated in Figures 10–17, inclusive. Referring more particularly to Figures 10 and 11, wherein these devices are depicted in one relative assembled position, there is shown a plate 110, corresponding to plate 80 described above, which serves as a closure for the free end of the needle head of the machine and is adapted to be secured thereto by means of screws 111. Plate 110 is provided with a laterally extending flange 112 that is slotted at 113 (Figure 11) along a flattened portion thereof at the front of the machine to permit cam member 65 to extend therethrough during operation. A bracket 114 is attached to plate 110 and the flattened portion of flange 112 by means of screws 115 and 116, respectively. A combined thread positioning and removing member 117, that is generally similar to stationary member 85, earlier described, includes a notch 118, corresponding to notch 90 of member 85, one side of which is formed by an edge of an arm 119, having a pair of elongated slots 120 for adjustably attaching member 117 to bracket 114 by the use of screws 121. Both the length and width of each slot 120 are greater than the diameter of the shank of screws 121, whereby member 117 may be adjustably positioned toward or away from element 67, as viewed in Figure 10, and toward or away from the axis of rotation of cam member 65. It will be noted that this ar-

rangement also permits the member 117 to be tilted about either of the screws 121 as allowed by the other screw 121 and its corresponding slot.

A thread severing member 122, similar to member 95, includes a knife blade 123 having a cutting edge 124 and a bent-over portion 125, apertured at 126 for the reception of a screw 127 to permit attachment to the front face of the flattened portion of flange 112. Aperture 126 is preferably circular and is somewhat greater in diameter than the shank of screw 127 allowing for adjustment of member 122 with respect to flange 112 and member 117. As will be apparent from an inspection of the drawings, members 117 and 122 are independently removable from the machine frame and are relatively adjustable thereon. Members 117 and 122, moreover, function in the same manner as members 85 and 95, respectively, in operation.

A plate 130 is affixed to the flattened portion of flange 112 by screws 131, and is provided with a horizontal slot 132 extending from its left edge, as viewed in Figure 11, and communicating with a circular opening 133. This slot arrangement serves as a quick threading device for the needle thread and may be used in place of eyelet 66 shown in Figures 1 and 2.

To further simplify the threading of the machine, a device, generally denoted by numeral 134 (Figures 11 and 14), may be used in place of eyelet 62 that is carried by thread guide 63 (Figure 4). This device is attached to plate 110 by a screw 135 and is formed with a horizontal extension 136 having a plurality of openings 137 through which the thread 58 is passed after the thread leaves tensioning device 61 (Figure 4). An arm 138 is provided with a diagonal slot 139, extending from the lower edge thereof and communicating with an opening 140. A bracket 141 is attached to arm 138 by a screw 142 and carries a finger 143 that extends across slot 139 and forwardly of arm 138, as viewed in Figure 14. The needle thread may be readily inserted between finger 143 and arm 138 and moved upwardly through slot 139 and into opening 140 in the course of threading the machine. Finger 143 prevents the thread from becoming accidentally disengaged from device 134 during operation.

Flange 112 carries a plurality of inwardly projecting tapped lugs 145 to which a partial generally C-shaped, closure 146 (Figure 10) is attached by screws 147 and maintained in spaced relation to cam member 65. A combined protective outer cover and thread guiding plate or device 148 is provided with a pair of openings 149 for mounting to bracket 114 by means of studs 150, as illustrated in Figure 10. With device 148 so mounted, a preferably circular through opening 151 therein is coaxial with cam member 65. A cut-out 152 in device 148 permits of ready access to members 117 and 122, whereby the latter may be readily adjusted, removed or replaced without disturbing any other parts of the machine. The inner end of device 148 is additionally formed with a substantially annular groove or recess 153 into which the free end portion of slotted take-up element 67 projects. This groove serves as a raceway for the free end of element 67 in the course of its orbital movement upon rotation of cam member 65. Device 148 is disposed in spaced relation to partial closure 146 and slotted take-up element 67, and is so constructed and arranged with respect to the associated parts as to permit of ready manipulation of the needle thread in threading the machine. Moreover, by virtue of this construction, the thread is prevented from slipping or moving over and beyond the free end of slotted element 67 should the machine be made to turn in a reverse direction or for any other circumstance that might tend to effect accidental disengagement of the thread from slotted element 67.

It is believed that the objects, advantages, construction and operation of my present invention will be readily understood from the foregoing by persons skilled in the art. It is to be borne in mind, however, that various changes in the preferred form of the invention herein illustrated and described may be resorted to without departing from the spirit of the invention or the scope of the append claims.

I claim:

1. In a sewing machine, a reciprocatory needle bar having a thread carrying nnedle secured thereto, a rotary take-up for the needle thread comprising a rotary member, thread engaging means extending laterally from said member and movable in an orbital path upon rotation thereof, said means having a free end, a stationary member constructed and arranged to force outwardly beyond the free end of said means any thread that may become improperly engaged with the same due to breakage, and a stationary thread severing member associated wtih said last mentioned member in a manner to effect severance of thread so forced outwardly at a point beyond the free end of said means.

2. In a sewing machine a reciprocatory needle bar having a thread carrying needle secured thereto, a rotary take-up for the needle thread comprising a rotary member, thread engaging means extending laterally from said member and movable in an orbital path upon rotation thereof, said means having a free end, a member constructed and arranged to force outwardly beyond the free end of said means any thread that may become improperly engaged with the same due to breakage, and a thread severing member associated with said last mentioned member in a manner to effect severance of thread so forced outwardly at a point beyond the end of said means, said thread severing member having a cutting edge disposed in a plane substantially parallel to a plane containing the orbital path of said thread engaging means.

3. In a sewing machine, a reciprocatory needle bar having a thread carrying needle secured thereto, a rotary take-up for the needle thread comprising a rotary member, a slotted thread engaging element extending laterally from said member and carried through a circular path upon rotation thereof, said element having a free end, a stationary thread positioning member disposed in spaced relation to the rotary member and arranged to pass through the slot in said element and to force outwardly beyond the free end of said element any thread that may become improperly engaged therewith due to breakage, and a thread severing member associated with said thread positioning member in a manner to effect severance of thread so forced outwardly at a point beyond the free end of said element.

4. In a sewing machine, a reciprocatory needle bar having a thread carrying needle secured thereto, a rotary take-up for the needle thread comprising a rotary member, a slotted thread engaging element extending laterally from said member and carried through a circular path upon rotation thereof, said element having a free end,

a stationary thread positioning member disposed in spaced relation to the rotary member and arranged to pass through the slot in said element and to force outwardly beyond the free end of said element any thread that may become improperly engaged therewith due to breakage, and a thread severing member associated with said thread positioning member in a manner to effect severance of thread so forced outwardly at a point beyond the free end of said element, said thread severing member having a cutting edge disposed in a plane substantially parallel to a plane containing the circular path of said thread engaging element.

5. In a sewing machine, a reciprocatory needle bar having a thread carrying needle secured thereto, a rotary take-up for the needle thread comprising a rotary member, a slotted thread engaging element extending laterally from said member and carried through a circular path upon rotation thereof, said element having a free end, a thread positioning member disposed in spaced relation to the rotary member and arranged to pass through the slot in said element and to force outwardly beyond the free end of said element any thread that may become improperly engaged therewith due to breakage, said thread positioning member being adjustable along a path substantially normal to the axis of rotation of said rotary member, and a thread severing member associated with said thread positioning member in a manner to effect severance of thread so forced outwardly at a point beyond the free end of said element.

6. In a sewing machine, a reciprocatory needle bar having a thread carrying needle secured thereto, a rotary take-up for the needle thread comprising a rotary member, a slotted thread engaging element extending laterally from said member and carried through a circular path upon rotation thereof, said element having a free end, a thread positioning member disposed in spaced relation to the rotary member and arranged to pass through the slot in said element and to force outwardly beyond the free end of said element any thread that may become improperly engaged therewith due to breakage, said thread positioning member being adjustable along a path substantially normal to the axis of rotation of said rotary member, and a thread severing member associated with said thread positioning member in a manner to effect severance of thread so forced outwardly at a point beyond the free end of said element, said thread severing member having a cutting edge disposed in a plane substantially parallel to a plane containing the circular path of said thread engaging element.

7. In a sewing machine having a frame, a reciprocatory thread carrying needle, and a rotary member arranged to engage and impart a take-up action to the needle thread, said member having radially spaced, axially projecting thread engaging means about which the thread may become improperly wound, said means having a free end, means arranged to traverse the space between said projecting means and deflect the improperly wound thread toward and beyond the end of said means, and separate thread cutting means arranged to sever said thread when so deflected, said deflecting means and cutting means being fixed to the machine frame and being independently removable therefrom.

8. In a sewing machine having a frame, a reciprocatory thread carrying needle, and a rotary member arranged to engage and impart a take-up action to the needle thread, said member having radially spaced, axially projecting thread engaging means about which the thread may become improperly wound, said member being movable in an orbital path, said means having a free end, means arranged to traverse the space between said projecting means and deflect the improperly wound thread toward and beyond the end of said means, and separate thread cutting means having a cutting edge disposed in a plane substantially parallel to a plane containing the orbital path of said member said deflecting means and cutting means being fixed to the machine frame and being independently removable therefrom and relatively adjustable thereon.

CHARLES F. RUBEL.

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