

Feb. 24, 1931.

H. M. STEPHENSON

1,794,255

SEWING MACHINE

Filed Sept. 12, 1927

3 Sheets-Sheet 1

Fig. 1.

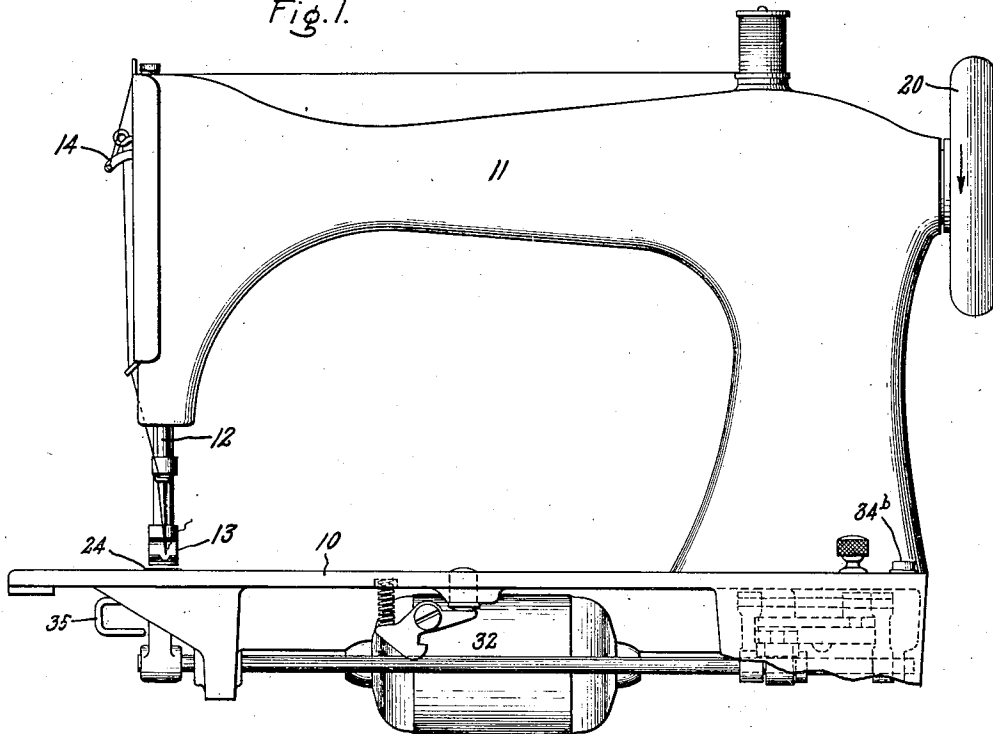
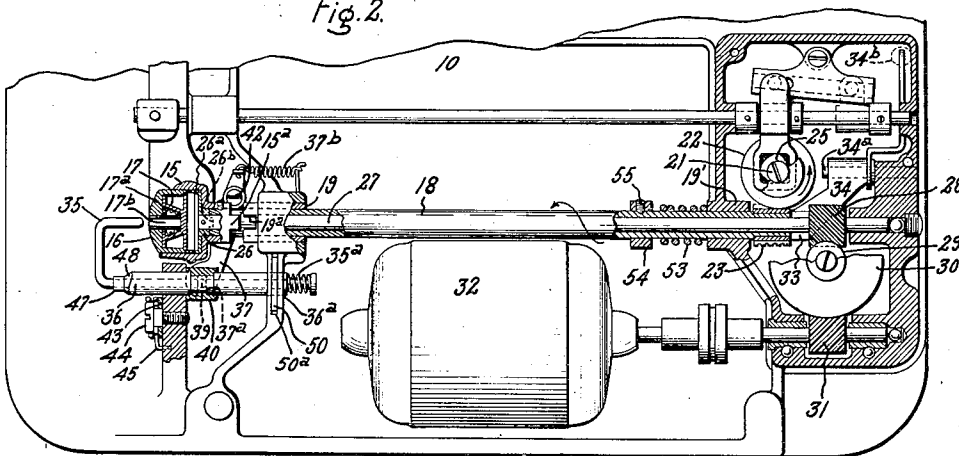


Fig. 2.



Inventor:
Hugh M. Stephenson,
by *Myron S. Smith*
His Attorney

Feb. 24, 1931.

H. M. STEPHENSON

1,794,255

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Fig. 6.

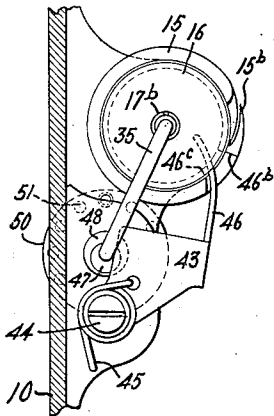
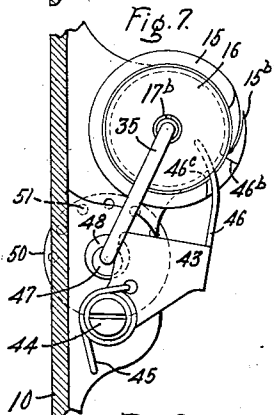
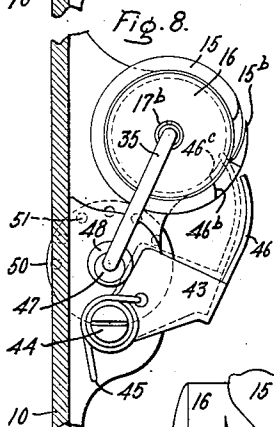


Fig. 9.

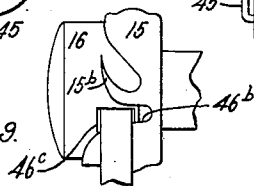


Fig. 3.

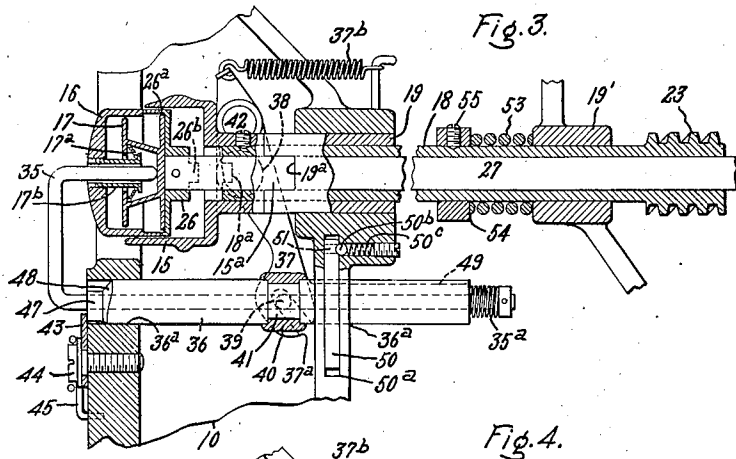


Fig. 4.

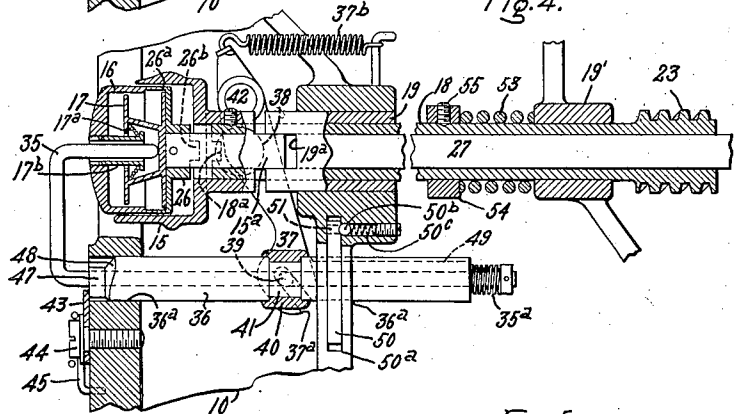
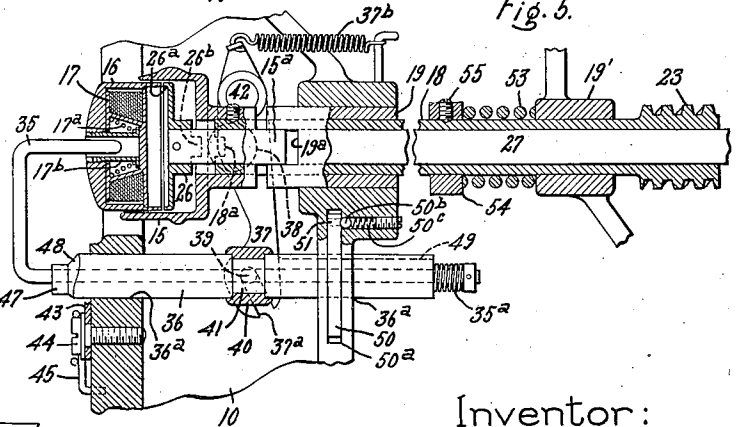


Fig. 5.



Inventor:
Hugh M. Stephenson,
by *Alexander S. Lunt*
His Attorney

Feb. 24, 1931.

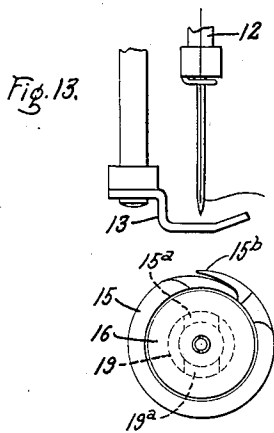
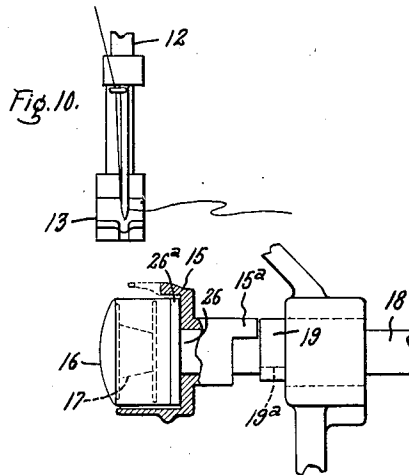
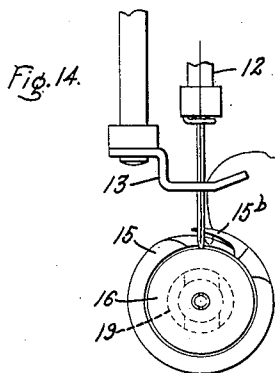
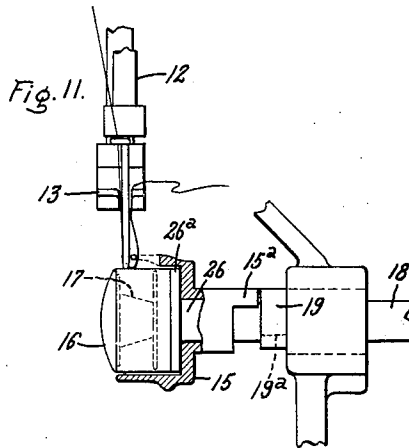
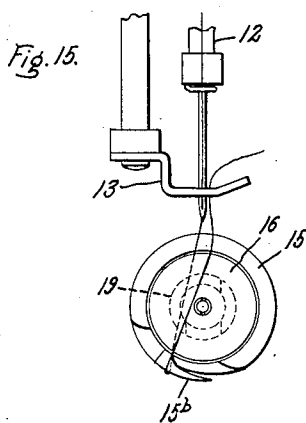
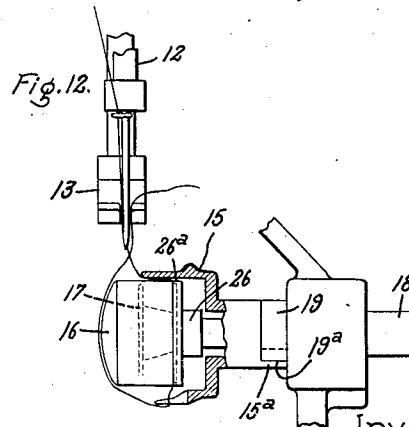
H. M. STEPHENSON

1,794,255

SEWING MACHINE

Filed Sept. 12, 1927

3 Sheets-Sheet 3



Inventor:
Hugh M. Stephenson,
by *Wm. S. L...*
His Attorney

UNITED STATES PATENT OFFICE

HUGH M. STEPHENSON, OF FORT WAYNE, INDIANA, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

SEWING MACHINE

Application filed September 12, 1927. Serial No. 219,151.

My invention relates to sewing machines and more particularly to bobbin winders therefor.

During the operation of sewing machines it is frequently necessary to rewind the bobbins which supply thread to the stitch forming mechanism. In order to rewind the bobbins in sewing machines as heretofore constructed it has been necessary to remove the bobbin from the machine, place it on a bobbin winding spindle, and disconnect the stitch forming mechanism from its actuating means. In removing the bobbin from the machine it has been necessary to remove from under the presser foot and otherwise disarrange the material being sewn, and unless an extra spool of thread of the color and size being used in the machine was at hand it was also necessary to unthread the needle, take-up and tension system. Before the sewing operation could be continued the operator of the machine must have replaced the bobbin in the machine, have rethreaded the needle, the take-up and tension system, and have rearranged the material being sewn under the presser-foot to continue where the last stitch had been formed previously. It will thus be seen that rewinding the bobbins in these machines has been a considerable annoyance to the user of the machines, and it has greatly interrupted the continuity of operation of the machines as the bobbins must be rewound frequently on account of their comparatively small thread capacity.

An object of my invention is to provide a bobbin winder for sewing machines of such construction that the bobbin of the machine can be rewound without removing the same from the machine or unthreading the needle, take-up or tension system.

Another object of my invention is to provide a bobbin winder which will automatically stop the winding of thread on the bobbin when a predetermined amount of thread is wound thereon.

Another object of my invention is to provide a thread carrying device for a sewing machine including a bobbin case and a bobbin in which the thread is tensioned during the sewing operation by maintaining the

bobbin in frictional engagement with the bobbin case.

Further objects and advantages of my invention will become apparent as the description proceeds.

My invention will be more fully set forth in the following description referring to the accompanying drawing, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

In the drawing, Fig. 1 is a side elevation of a sewing machine embodying my invention; Fig. 2 is a bottom plan view of the machine shown in Fig. 1 partly in section; Fig. 3 is an enlarged sectional view of the loop-taker and related parts adapted to wind the bobbin of the machine in the position to which they are moved for locking the loop-taker; Fig. 4 is a view similar to Fig. 3 showing the parts of the mechanism in the position which they occupy at the beginning of the winding operation; Fig. 5 is a view similar to Fig. 3 showing the parts of the mechanism in the position which they occupy after the bobbin has been wound and before the actuating means has been reconnected to the stitch forming mechanism; Figs. 6, 7 and 8 are side elevations of the structure shown in Figs. 3, 4 and 5 respectively showing the follower engaging the thread on the bobbin and the latch actuated thereby; Fig. 9 is a fragmentary bottom plan view of the machine showing the relation of the follower to the loop-taker; Figs. 10, 11 and 12 are views illustrating the action of the loop-taker in passing the thread loop from the needle around the bobbin case and the bobbin; Figs. 13, 14 and 15 are side elevations of the structure shown in Figs. 10, 11 and 12 respectively.

Referring to the drawing, the sewing machine in connection with which I have shown my invention comprises a cloth plate 10 having an overhanging arm 11 for supporting a needle bar 12, presser-foot 13 and take-up 14 of the usual form. The machine also includes a loop-taker 15 arranged beneath the cloth plate 10 in operative relation to the needle and having a bobbin case 16 and a

bobbin 17 therein. The loop-taker 15 is secured to a hollow shaft 18 which is supported in bearings 19 and 19' extending from the cloth plate 10 and which is connected to the flywheel 20, the needle bar 12, and take-up 14 by suitable shafts and gearing extending through the arm 11 of the machine including a vertical shaft 21 having a gear 22 engaging a gear 23 on the hollow shaft 18. The ratio of the gearing between the hollow shaft 18 and the needle-bar actuating shaft is two to one so that the loop-taker 15 makes one revolution upon each stroke of the needle-bar 12. The material is fed under the presser-foot during the operation of the machine by a feed-dog 24 which is actuated by a mechanism described and claimed in my United States application Serial No. 197,584, filed June 9, 1927, having a cam 25 secured to the vertical shaft 21.

In accordance with my invention thread is wound on the bobbin 17 without removing it from the machine by providing a rotatable member 26 within the loop-taker 15 which is connected to the sewing machine driving means and a mechanism for moving the bobbin 17 into frictional engagement with the rotatable member in such time relation to the movement of the loop-taker as to clamp the thread being passed thereby around the bobbin from the needle between the bobbin and the rotatable member, at the same time disconnecting and locking to a standstill the stitch forming mechanism from the driving motor, thus avoiding excessive vibration of the machine and disarrangement of the material being sewn during the winding operation. This construction provides for continuously rotating the bobbin until the desired amount of thread is wound thereon. When thread is wound on the bobbin without removing it from the machine the bobbin is below the cloth plate so that the operator can not determine when the proper amount of thread has been wound on the bobbin. I overcome this difficulty by providing a mechanism for automatically releasing the bobbin from frictional engagement with the rotatable member 26 upon the winding of a predetermined amount of thread on the bobbin, and I have made the mechanism adjustable to release the bobbin from the rotatable member in response to winding different amounts of thread on the bobbin depending upon the adjustment of the mechanism so that any desired amount of thread can be wound on the bobbin without removing it from the machine.

In the present embodiment of my invention the rotatable member 26 (Figs. 2, 3, 4 and 5) is provided with a flange 26a and is secured to an actuating shaft 27 arranged within the hollow shaft 18 and connected by gears 28, 29, 30 and 31 to the actuating means which in this instance is an electric motor 32. The driving connection between the actu-

ating shaft 27 and the stitch forming mechanism comprises a projection 26b on the rotatable member 26 which is retained in engagement with a notch 18a in the hollow shaft 18 by a block 33 between the gears 23 and 28. The block 33 is removably supported between the gears by a lever 34 pivoted at 34a on the cloth plate and connected to a button 34b projecting above the cloth plate so that depressing the button raises the block above the gears. Raising the block above the gears permits the gear 23 to be moved toward the gear 28 which moves the hollow shaft 18 away from the rotatable member 26 far enough to disengage the projection 26b from the notch 18a in the hollow shaft 18 so that the rotatable member can be driven by the motor 32 independently of the hollow shaft 18 and the stitch forming mechanism connected thereto. The vertical shaft 21 is geared to the shaft to which the flywheel 20 is connected so that during the operation of the machine the gear 22 and the flywheel 20 rotate as indicated by the arrows in the drawing (Figs. 1 and 2). By this arrangement after the block 33 is raised turning of the flywheel forward by hand causes the gear 23 to be moved toward the gear 28 which disengages the notch 18a from the projection 26b, and thereby disconnects the driving motor from the stitch forming mechanism. It will thus be seen that the driving motor actuates the sewing machine through the actuating shaft 27, rotatable member 26, and the hollow shaft 18 so that when the notch 18a in the hollow shaft is moved out of engagement with the projection 26b on the rotatable member 26 by depressing the button 34b and turning the flywheel 20 forward, that the shaft 27 can be rotated by the motor 32 within the hollow shaft 18 without driving the loop-taker 15 or actuating any of the remainder of the stitch forming mechanism.

The thread from the needle is secured to the bobbin 17 at the beginning of the winding operation by the movement of the bobbin into frictional engagement with the rotatable member 26 so as to clamp the thread from the needle between them. It is therefore necessary to provide a bobbin support such that the bobbin and the rotatable member can be brought into engagement with each other. I do this by using a cup-shaped bobbin case 16 (Figs. 3, 4 and 5) which is retained within the loop-taker in any suitable manner so as not to interfere with the passing of the thread loop from the needle around the same and which opens toward the rotatable member 26. The bobbin 17 is yieldably retained in the bobbin case 16 by a spring 17a inside of the bobbin and engaging a flange on the tubular adjusting screw 17b which is threaded to the bobbin case. In this construction the bobbin thread is tensioned during the sewing operation by the friction of the bob-

bin against the bobbin case so that after the bobbin is wound it is not necessary to place the thread under a tension spring as in the ordinary construction. Moreover, when the bobbin is wound and released from the rotatable member 26 the spring 17a retracts the bobbin within the bobbin case. The movement of the bobbin into frictional engagement with the rotatable member 26 so as to clamp the thread being passed around the bobbin case by the loop-taker 15 between the bobbin and the rotatable member is timed by providing a projection 15a on the loop-taker 15 which it will be seen in Figs. 10 to 15 is on the radius from the axis of the shaft 27 to the tip of the hook 15b of the loop-taker and providing the bearing 19 with a notch 19a arranged at the lowermost part of the bearing. By this arrangement when the button 34b on the cloth plate 10 is depressed and the fly-wheel 20 is turned forwardly the hollow shaft 18 and the loop-taker 15 will be rotated until the projection 15a is brought into alignment with the notch 19a. During this movement of the loop-taker the needle will have moved down so as to bring the thread therein into engagement with the hook 15b on the loop-taker as shown in Figs. 11 and 14 and will be rotated one-half revolution to the position shown in Figs. 12 and 15 in which position the thread from the needle will pass inside the loop-taker and around the bobbin case and the bobbin and the free end of the thread will extend from the bobbin case over the hook 15b, around the bobbin case, and through the opening in the throat-plate (not shown). In this position of the loop-taker the hollow shaft 18 will be moved by the gear 22 on the shaft 27 toward the gear 28, disengaging the projection 26b from the notch 18a in the hollow shaft and bringing the projection 15a into engagement with the notch 19a in the bearing so that the actuating shaft 27 will be disconnected from the stitch forming mechanism and the loop-taker will be locked in the position shown in Figs. 12 and 15 with the thread passing from the needle around the bobbin case and the bobbin.

The bobbin is moved into engagement with the rotatable member 26 so as to clamp the thread passing around the bobbin case between them by a mechanism including a plunger rod 35 which is moved through the tubular adjusting screw 17b into engagement with the bobbin 16 in response to movement of the loop-taker 15 to its locked position. This mechanism comprises a shaft 36 supported in bearings 36a extending from the cloth plate and having an axial opening therein through which the plunger rod 35 extends. The plunger rod is supported in the shaft 36 by a spring 35a stronger than the spring 17a in the bobbin so that when the shaft is moved from the position shown in Fig. 2 to that shown in Figs. 3 and 4 the bobbin 17 will be yieldably urged against the rotatable member 26. The shaft 36 is moved in this way in response to the movement of the loop-taker to its locked position by a lever 37 having a roller 38 thereon engaging the loop-taker and a slot 37a therein engaging a pin 39 on a collar 40 loosely fitted on a reduced portion 41 of the shaft. The lever is pivoted at 42 on the cloth plate 10 and is provided with a spring 37b connected to the bearing 19 for retaining the roller in engagement with the loop-taker, which is strong enough to move the shaft 36 with the plunger rod therein in its bearings but not strong enough to slide the hollow shaft 18 on the actuating shaft 27 so that the spring will not move the loop-taker out of its locked position when the shaft is free to move after the bobbin is wound. When the loop-taker 15 is moved into its locked position with the projection 15a in engagement with the notch 19a in the bearing 19 (shown in Fig. 3) the lever 37 slides the shaft 36 longitudinally until the end of the shaft is within the bearing so that a latch 43, which is pivoted on the bearing 36a at 44, is urged toward the shaft 36 by a spring 45 and moves over the end of the shaft retaining it in this position with the plunger rod 35 retained in engagement with the bobbin by the spring 35a. The actuating shaft can then drive the bobbin independently of the stitch forming mechanism and the thread from the needle which is clamped between the bobbin and the rotatable member 26 will follow over the flange of the bobbin 17 (Fig. 12) and be wound thereon.

As the bobbin is entirely inaccessible to the user of the machine during the winding operation I have provided an arrangement for releasing the latch 43 from the end of the shaft 36 in response to winding a predetermined amount of thread on the bobbin which consists of a follower arm 46, extending from the latch 43 through openings 46b and 46c in the loop-taker 15 and the bobbin case 16 respectively and bearing on the thread being wound on the bobbin. In the position of the shaft 36, shown in Figs. 3 to 8 inclusive, when the latch 43 is moved by the follower from the position shown in Fig. 6 to the position shown in dotted lines in Fig. 8 the edge of the latch passes over the end of the shaft 36 and releases it so that it is moved by the spring 37b from the position shown in Fig. 4 to that shown in Fig. 5 in which position the roller 38 engages the loop-taker. The shaft 36 is provided with a tapered portion 48 so that upon release by the latch the tapered surface 48 raises the latch to the surface of the shaft and raises the follower 46 out of the loop-taker (as shown in full lines in Fig. 8) so that it will not interfere with the operation thereof when the stitch forming mechanism is again reconnected to the actuating shaft and at the same time stops the winding of thread

on the bobbin by releasing it from the rotatable member.

The operator of the machine may wish to do only a small amount of sewing with the kind or color of thread which is being wound on the bobbin so that it is desirable to provide an adjustment for changing the amount of thread desired to be wound on the bobbin before stopping the winding operation. I do this by forming an eccentric cam 47 on the shaft 36 at the end thereof which engages the latch 43. During the winding of thread on the bobbin the latch 43 rests on the portion of plunger rod 35 projecting beyond the end of the shaft 36 and as the latch moves about its pivotal support 44 when the thread raises the follower it is apparent that the movement of the follower about the pivotal support 44 required to release the latch from the end of the shaft 36 depends upon the position of rotatable adjustment of the cam 47 relative thereto. However, in all positions of rotatable adjustment of the shaft 36 the follower will pass over the tapered surface 48 thereon, after moving over the surface of the cam 47, and raise the follower out of engagement with the loop-taker. It is clear that by rotatable adjustment of the shaft 36 to such position that the portion of the cam 47 nearest the axis of the shaft is adjacent the latch 43 the amount of thread required to be wound on the bobbin to raise the follower 46 and the latch 43 over the edge of the cam 47 will be comparatively small. On the other hand when the cam is adjusted to a position in which the portion farthest from the axis of the shaft 36 is adjacent the latch 43 it will be apparent that it will require the winding of a substantially full bobbin to raise the latch above the edge of the cam 47 to release the shaft 36 and raise the follower 46 out of the loop-taker. The adjustment of the mechanism to vary the amount of thread required to be wound on the bobbin to disengage it from the rotatable member 26 is facilitated by providing an adjusting disk 50 extending slightly above the cloth-plate 10 of the machine and suitably marked to indicate the amount of thread which will be wound on the bobbin for any given setting, the disk being arranged on the shaft 36 in a slot 50a in the cloth-plate and engaging a groove 49 in the shaft. The disk is retained in the position of adjustment by a ball 50b which is urged by a spring 50c towards openings 51 drilled in the disk.

When the loop-taker is moved to its initial locked position (Fig. 3) by movement of the flywheel 20 the projection 15a thereon is tightly seated in the notch 19a in the bearing 19 and the roller 38 on the lever 37 is in engagement with the loop-taker 15. As the spring 37b is not strong enough to move the loop-taker and the hollow shaft 18 against the friction of the mechanism, if the latch

43 were released from the end of the shaft 36 with the loop-taker in the position shown in Fig. 3, the bobbin would not be released from the rotatable member 26 because the lever 37 would be prevented from moving under the action of the spring 37b by the roller 38 coming in contact with the loop-taker. To overcome this, I arrange a spring 53 on the hollow shaft 18 between the bearing 19 and a collar 54 which is secured to the shaft 18 by a set screw 55. The collar 54 is adjusted on the shaft 18 so that the spring 53 exerts force against the movement of the shaft 18 toward the gear 28 for about one-third of its movement from the position in which the hollow shaft is in engagement with the rotatable member to the position in which the projection 15a on the loop-taker is seated in the recess 19a in the bearing. Consequently, when the flywheel 20 of the machine is released, after the mechanism is turned thereby to the position shown in Fig. 3, the spring 53 moves the hollow shaft 18 and the loop-taker a short distance toward the bobbin case (as shown in Fig. 4) without unlocking the loop-taker or reengaging the rotatable member 26 with the hollow shaft 18. This moves the loop-taker far enough away from the roller 38 to permit the spring 37b, after the latch is released by winding thread on the bobbin, to swing the lever 37 about its pivotal support far enough to disengage the plunger rod 35 from the bobbin and allow it to move out of engagement with the rotatable member 26 and into its operative position within the bobbin case, as shown in Fig. 5, before the roller comes in contact with the loop-taker.

The bobbin is not in view of the operator of the machine during the winding of thread thereon so that he has no way of knowing when the bobbin will be released by the follower. If releasing of the bobbin from the rotatable member reconnected the stitch forming mechanism to the driving means it would occur before the operator could stop the driving motor and would disturb the material under the presser-foot or tangle the thread in the machine. For this reason the spring 37b is made strong enough to move the shaft 36 with the plunger rod 35 in its bearings but not strong enough to move the loop-taker 15 and the shaft 18 toward the rotatable member so that release of the shaft 36 by the latch 43 disengages the bobbin from the rotatable member and stops the winding of thread on the bobbin without bringing the projection 26b on the rotatable member 26 into engagement with the notch 18a in the hollow shaft 18 and reconnecting the driving motor to the stitch forming mechanism. However, the stitch forming mechanism can be readily reconnected to the driving motor by turning the flywheel 20 backward by hand which will cause the gear 22 to be moved away from the gear 28 far enough to allow the block

to drop between them and retain the notch 18a in the hollow shaft 18 in engagement with the projection 26b on the rotatable member 26.

5 In the operation of the sewing machine of the foregoing described construction, when it becomes necessary to wind thread on the bobbin it can be done without removing the bobbin from the machine or disarranging the material being sewn. After threading the machine for use with a new kind or color of thread it is necessary to raise the needle above the presser-foot, as shown in Figs. 1, 10 and 13, and pull enough thread through the needle so that a loop can be passed from the needle around the bobbin case and the bobbin by the loop-taker 15, as shown in Figs. 12 and 15, which ordinarily requires about three or four inches of thread. The flywheel 20 is then turned by hand until the needle is moved to its lowermost position, shown in Figs. 11 and 14 (through the material to be sewn if any is in the machine at this time) in which position the hook 15b on the loop-taker 15 engages the thread loop formed by the needle extending through the hole in the cloth-plate. When the needle is moved from its uppermost position, shown in Fig. 10, to its lowermost position, shown in Fig. 11, the loop-taker 15 is turned one revolution, as the loop-taker shaft 18 is geared to the needle bar actuating shaft in the arm of the machine in the ratio of two to one. After the needle reaches this lowermost position the button 34b on the cloth-plate 10 is depressed which raises the block 33 from its position between the gears 24 and 28, and the flywheel 20 is turned until the mechanism is locked. This takes place by the gear 22, which is secured to the vertical shaft 21 connected to the flywheel 20, turning the loop-taker until the projection 15a is aligned with the notch 19 and moving the gear 23 with the shaft 18 toward the gear 28 so that the projection 15a is seated in the notch 19a in the bearing 19, as shown in Fig. 3. In moving to this position the loop-taker passes a thread loop around the bobbin case 17 and bobbin 16, as shown in Figs. 12 and 15, and clamps the thread between the rotatable member 26 and the bobbin. The thread is clamped in this way by the loop-taker engaging the roller 38 on the lever 37 and moving the shaft 36 to the position shown in Fig. 3, with the latch in engagement with the end of the shaft, the follower 46 in engagement with the bobbin, and the plunger rod 35 yieldably urging the bobbin against the rotatable member 26. The bobbin 17 is moved within the flange 26a of the rotatable member 26 in bringing them into engagement with each other, so that the thread loop passing from the needle between the bobbin case 16 and the flange of the rotatable member 26 is drawn over the flange of the bobbin 16

so that upon rotation thereof by the actuating shaft 27 the thread from the needle is looped around the bobbin and as the rotation continues thread from the supply spool is wound through the needle, the take-up and tension system, between the flanges of the bobbin and under the follower 46, the loose end of the thread loop being drawn into the bobbin and wound thereon. In case the bobbin runs empty in the course of a sewing operation the thread will break on the stitch side of the loop immediately upon rotary movement of the bobbin spool inside the locked loop-taker, and the loose end will be wound inside the bobbin flanges as above described. The spring 53 is compressed between the collar 54 and the bearing 19' during the latter part of this movement of the loop-taker to its locked position so that upon release of the flywheel the spring 53 moves the loop-taker away from the roller 38 to the position shown in Fig. 4. After clamping the thread between the bobbin and the rotatable member the motor is started which drives the rotatable member and the bobbin until the thread wound on the bobbin raises the follower 46 far enough to disengage the latch 43 from the end of the shaft 36. The amount of thread required to be wound on the bobbin to release the latch 43 depends upon the adjustment of the cam 47 relative to the latch, and the position of the cam is adjusted by the disc 50 extending above the cloth-plate. When the follower 46 has raised the latch 43 far enough to bring it out of engagement with the end of the shaft 36, the spring 37b moves the shaft 36 by the lever 37 to the position shown in Fig. 5, bringing the roller 38 against the loop-taker 15 and disengaging the plunger rod 35 from the bobbin so that it is released from the rotatable member 26 and moved to its operative position within the bobbin case by the spring 17a. In moving the shaft 36 from the position shown in Fig. 3 to that shown in Fig. 5, latch 43 passes across the face of the cam 47 and over the tapered surface 48 formed on the shaft 36 so that the follower 46 is raised out of the opening 46a in the loop-taker so that it does not interfere with its operation after the stitch forming mechanism is reconnected to the driving motor.

When the winding of thread on the bobbin stops, the spinning of the supply spool on top of the arm also stops, and the loop-taker and plunger rod are in the position shown in Fig. 5. However, stopping the winding operation does not reconnect the loop-taker and the remainder of the stitch forming mechanism to the actuating shaft 27 as the spring 37b is not strong enough to overcome the friction in the mechanism. Consequently, by observing the supply spool the operator can determine when the bobbin winding operation is completed. When the bobbin is 130

wound and stops rotating a single taut thread extends from the spool through the take-up, tension, needle, the material being sewn, if any is in the machine, and the hole in the cloth-plate, to the bobbin. The flywheel 20 is now turned backward until the gear 22 moves the gear 23 far enough away from the gear 28 to permit the block 33 to drop between the gears 23 and 28. When the gear 23 is moved to this position by the gear 22 the loop-taker 15 will be moved far enough to disengage its projection from the notch 19a in the bearing 19 and to bring the projection 26a on the rotatable member 26 into engagement with the notch 18a in the hollow shaft 18 and thereby reconnect the driving motor 32 to the loop-taker 15 and the remainder of the stitch forming mechanism connected to the hollow shaft 18, and the sewing operation can be continued from the last stitch formed prior to the bobbin winding operation, the single thread forming a locked loop at the beginning of the new seam.

In view of the foregoing it will be clear that I have produced an improved sewing machine in which the bobbin can be rewound without removing it therefrom or disturbing the material being sewn, which simplifies the winding of thread on the bobbin, and which greatly lessens the time required to wind the bobbin.

Although I have shown my improved bobbin winding arrangement in connection with a rotary center bobbin sewing machine it is apparent that modifications of the form of my invention disclosed herein will occur to those skilled in the art. I desire it to be understood, therefore, that my invention is not limited to the particular arrangement shown and described and I intend in the appended claims to cover all modifications which do not depart from the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. In a sewing machine, means for forming stitches comprising a bobbin, means for continuously rotating said bobbin to wind thread thereon, and means for moving said bobbin and said means for rotating the same into engagement with each other to establish a driving connection between them so that thread can be wound on said bobbin without removal from the machine.

2. In a sewing machine, means for forming stitches comprising a bobbin and a needle, and means for rotating said bobbin to wind thread thereon so that it can be wound without removal from the machine comprising means cooperating with the stitch forming mechanism for securing the thread from said needle to said bobbin.

3. In a sewing machine, means for forming stitches comprising a bobbin case having a bobbin therein, means for continuously ro-

tating said bobbin to wind thread thereon, and means for moving said bobbin and said means for rotating the same into engagement with each other to establish a driving connection between them so that thread can be wound on said bobbin without removal from said bobbin case.

4. In a sewing machine, means for forming stitches comprising a bobbin and means for passing a thread around said bobbin, and a bobbin winder comprising means for securing the thread passed around the bobbin thereto and means for rotating said bobbin to wind thread thereon so that it can be wound without removal from the machine.

5. In a sewing machine, means for forming stitches comprising a bobbin case having a bobbin therein, means for driving said bobbin to wind thread thereon, means for forming a connection between said driving means and said bobbin without removing the latter from the bobbin case, and means for interrupting the connection between the driving means and the bobbin in response to winding a predetermined amount of thread thereon.

6. In a sewing machine, means for forming stitches comprising a bobbin case with a bobbin therein, means for driving the bobbin to wind thread thereon, means for moving said bobbin within said bobbin case so as to engage said driving means without removing said bobbin from said bobbin case, and means for disengaging the bobbin from said driving means in response to winding a predetermined amount of thread thereon.

7. In a sewing machine, means for forming stitches comprising a cup-shaped bobbin case having a bobbin therein, means for yieldably retaining said bobbin in frictional engagement with said bobbin case for tensioning the thread during the sewing operation, a rotatable member adjacent the mouth of said cup-shaped bobbin case, and means for moving said bobbin into engagement with said rotatable member for winding thread on the bobbin.

8. In a sewing machine, means for forming stitches comprising a cup-shaped bobbin case having a bobbin therein, means for yieldably retaining said bobbin in frictional engagement with said bobbin case for tensioning the thread during the sewing operation, a rotatable member adjacent the mouth of said cup-shaped bobbin case, means for moving said bobbin into engagement with said rotatable member to wind thread thereon, and means for disengaging said bobbin from said rotatable member in response to winding a predetermined amount of thread on the bobbin.

9. In a sewing machine having a stitch forming mechanism, a bobbin winder comprising means for supporting a bobbin, means for actuating said stitch forming mechanism, and means for disconnecting said

actuating means from said stitch forming mechanism and for connecting the actuating means to said bobbin winder including means for securing the thread to the bobbin.

5 10. In a sewing machine having a stitch forming mechanism, a bobbin winder comprising means for supporting a bobbin, means for actuating said stitch forming mechanism, means for disconnecting said actuating means from said stitch forming mechanism and for connecting the actuating means to said bobbin winder including means for securing the thread to the bobbin, and means for interrupting the driving connection between said actuating means and the bobbin in response to winding a predetermined amount of thread thereon.

11. In a sewing machine having a stitch forming mechanism including a bobbin and a needle, means for supplying thread to said needle, means for rotating said bobbin, means for connecting the thread extending through said needle supplying means to said bobbin and for moving said bobbin and said means for rotating the same into engagement with each other so as to wind thread on said bobbin without removing the same from the machine.

12. In a sewing machine having a bobbin and a needle, means for supplying thread to said needle, and means for rotating said bobbin so that thread through said needle supplying means can be wound on said bobbin without removing the same from the machine including means for securing the thread from said needle supplying means to said bobbin.

13. In a sewing machine having a bobbin and a needle, means for supplying thread to said needle, means for passing thread from said needle around said bobbin, and means for rotating said bobbin so that thread through said needle can be wound on said bobbin without removing the same from the machine including means for securing the thread to the bobbin passed around the same from said needle.

14. In a sewing machine having a stitch forming mechanism comprising a bobbin and means for passing a thread loop around said bobbin, means for actuating the stitch forming mechanism of the machine, means for clamping the thread passed around said bobbin thereto, means for disengaging the actuating means from the stitch forming mechanism, and means for rotating the bobbin to wind thread thereon so that said bobbin can be wound without removing the same from the machine.

15. In a sewing machine, a bobbin winder comprising means for supporting a bobbin, means for driving the bobbin to wind thread thereon, means for passing a thread around the bobbin, and means for securing the thread to said bobbin and for forming a driving con-

nection between said bobbin and said driving means.

16. In a sewing machine, a bobbin winder comprising means for supporting a bobbin, means for driving the bobbin to wind thread thereon, means for forming a driving connection between said driving means and the bobbin and for securing the thread to the bobbin, and means for interrupting the driving connection between said driving means and the bobbin in response to winding a predetermined amount of thread thereon.

17. In a sewing machine, a bobbin winder comprising means for supporting a bobbin, means for driving the bobbin to wind thread thereon, and means for forming a driving connection between said driving means and the bobbin including means for securing the thread between the bobbin and the driving means

18. In a sewing machine, a bobbin winder comprising a rotatable member, means for retaining a bobbin in engagement with said member to wind thread thereon, means for disengaging said bobbin from said member upon winding a predetermined amount of thread thereon including means for adjusting the same to change the amount of thread required to be wound on said bobbin to disengage said bobbin from said rotatable member

19. In a sewing machine, a bobbin winder comprising a rotatable member, means for retaining the bobbin in engagement with said member to wind thread thereon including an adjustable cam, means for disengaging said bobbin from said rotatable member upon the winding of a predetermined amount of thread thereon including a follower bearing on the thread being wound on said bobbin and connected to the means for retaining said bobbin in engagement with said rotatable member, and means for changing the amount of thread required to be wound on said bobbin to release the same from said rotatable member including means for adjusting said cam

20. In a sewing machine having a stitch forming mechanism comprising a needle, a bobbin and a loop-taker adapted to pass a thread loop from said needle around said bobbin, a bobbin winder comprising a rotatable member, and means for bringing said bobbin and said rotatable member into engagement with each other in such time relation to the movement of said loop-taker as to clamp the thread passed around the bobbin between them.

21. In a sewing machine having a stitch forming mechanism comprising a needle, a bobbin and a loop-taker adapted to pass a thread loop from said needle around said bobbin, a bobbin winder comprising a rotatable member, means for bringing said bobbin and said rotatable member into engagement with each other in such time relation to

the movement of said loop-taker as to clamp the thread passed around the bobbin between them, and means for disengaging said bobbin from said rotatable member in response to winding a predetermined amount of thread thereon including a follower bearing on the thread being wound on said bobbin.

22. In a sewing machine having a needle and a bobbin, a loop-taker arranged about said bobbin for passing a thread loop from said needle over said bobbin and having an opening therein, a bobbin winder comprising a rotatable member, means for bringing said bobbin and said rotatable member into engagement with each other in such time relation to the movement of said loop-taker as to clamp the thread passed around the bobbin between them, and means for disengaging said bobbin from said rotatable member in response to winding a predetermined amount of thread thereon including a follower extending through the opening in said loop-taker and bearing on the thread being wound on said bobbin.

23. In a sewing machine, a bobbin winder comprising a rotatable member, means for moving the bobbin into engagement with said rotatable member including a shaft having its axis arranged parallel with the axis of said rotatable member, said shaft having a cam formed thereon eccentric with the axis of said shaft, means for retaining said bobbin in engagement with said rotatable member including a latch engaging the end of said shaft adjacent said cam, means for releasing the bobbin from said rotatable member upon the winding of a predetermined amount of thread thereon including a follower connected to said latch and bearing on the thread being wound on the bobbin, and means for changing the amount of thread required to be wound on the bobbin to release the same from said rotatable member including means for rotatably adjusting said cam.

24. In a sewing machine having a loop-taker and a bobbin supported therein, a bobbin winder comprising a rotatable member within said loop-taker for actuating the same, means for disengaging said rotatable member from said loop-taker and for moving said bobbin into engagement therewith so that thread can be wound on the bobbin without removing the same from the loop-taker.

25. In a sewing machine having a loop-taker and a bobbin supported therein, a bobbin winder comprising a rotatable member within said loop-taker for actuating the same, and means for moving said bobbin into engagement with said rotatable member in response to disengaging said loop-taker from said rotatable member for winding thread on said bobbin.

26. In a sewing machine having a stitch forming mechanism comprising a loop-taker with a bobbin therein, means for actuating

said stitch forming mechanism and winding thread on said bobbin including a drive shaft, a hollow shaft arranged on said drive shaft and connected thereto, said hollow shaft having said loop-taker secured thereto and being mechanically connected to the remainder of said stitch forming mechanism, and means for moving said hollow shaft longitudinally of said drive shaft to disengage said hollow shaft therefrom and to connect the bobbin thereto for winding thread on the bobbin.

27. In a sewing machine having a flywheel and a stitch forming mechanism comprising a loop-taker with a bobbin therein, means for driving said stitch forming mechanism and winding thread on said bobbin including an actuating shaft, a hollow shaft arranged on said actuating shaft and connected thereto, said hollow shaft having said loop-taker secured thereto and being mechanically connected to the remainder of said stitch forming mechanism, and means including said flywheel for connecting the bobbin to said drive shaft in response to moving said hollow shaft longitudinally of said actuating shaft for winding thread on the bobbin.

In witness whereof, I have hereunto set my hand.

HUGH M. STEPHENSON.

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