

Sept. 19, 1944.

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2,358,493

TAKE-UP MECHANISM FOR SEWING MACHINES

Filed June 21, 1943

3 Sheets-Sheet 1

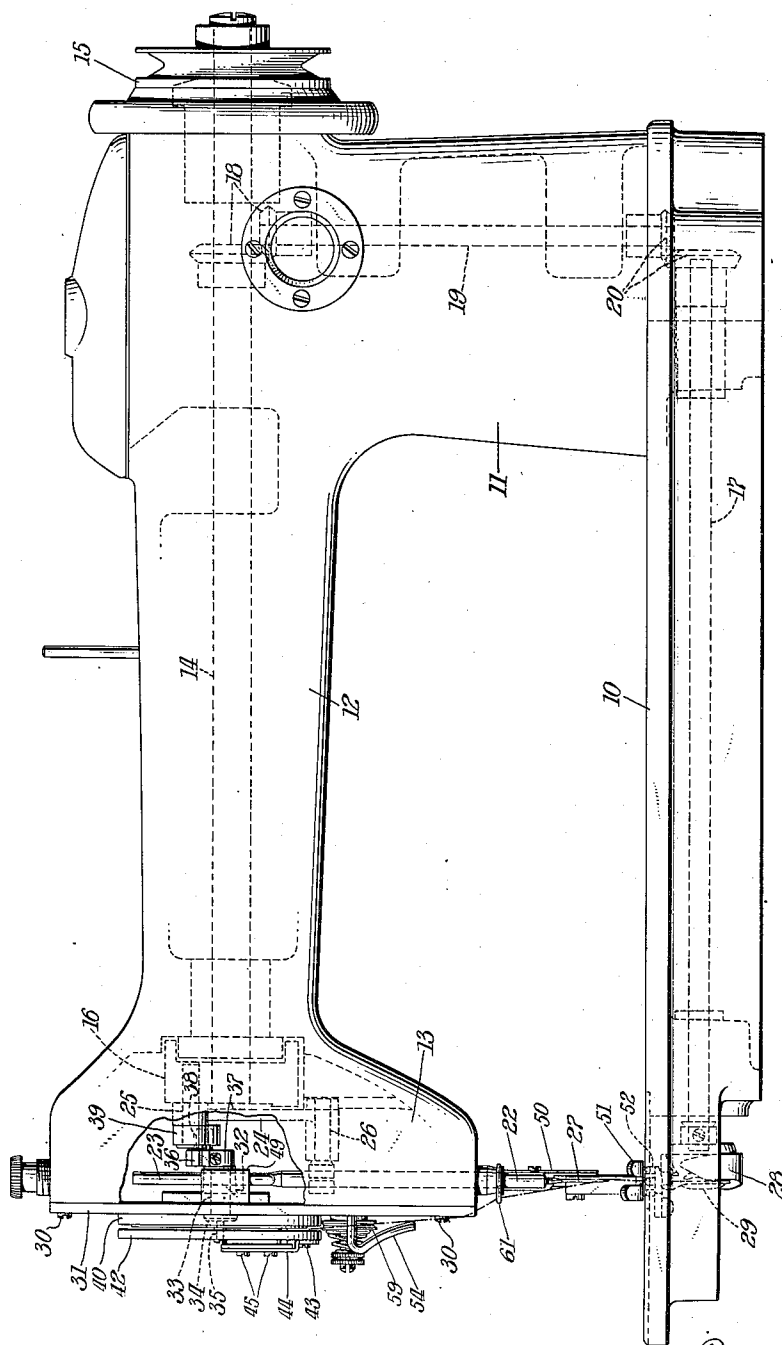


Fig. 1.

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3 Sheets-Sheet 2

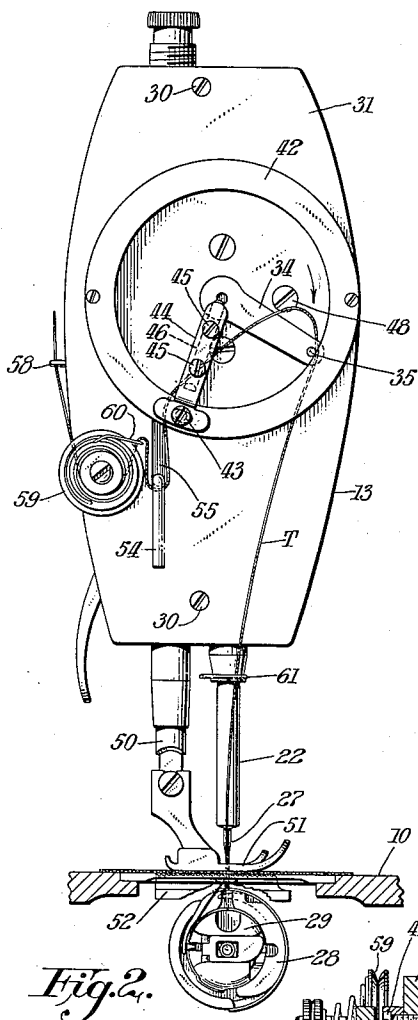


Fig. 2.

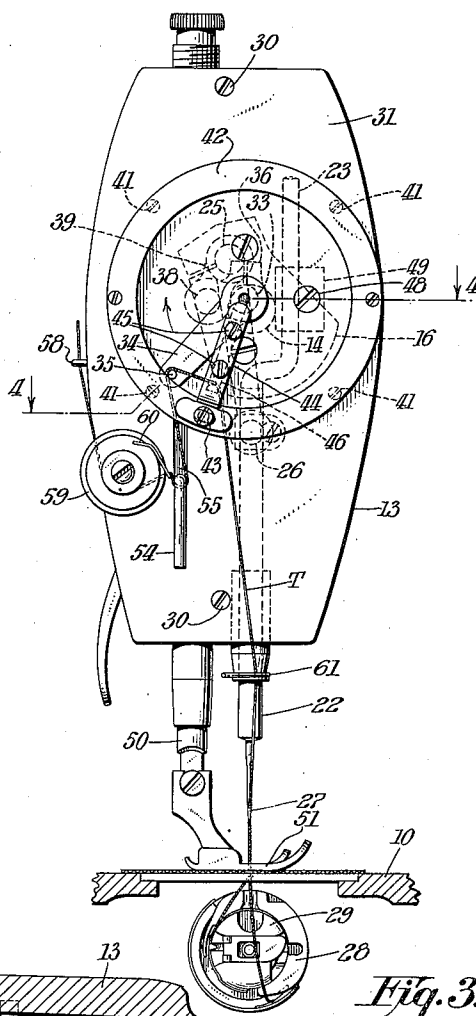


Fig. 3.

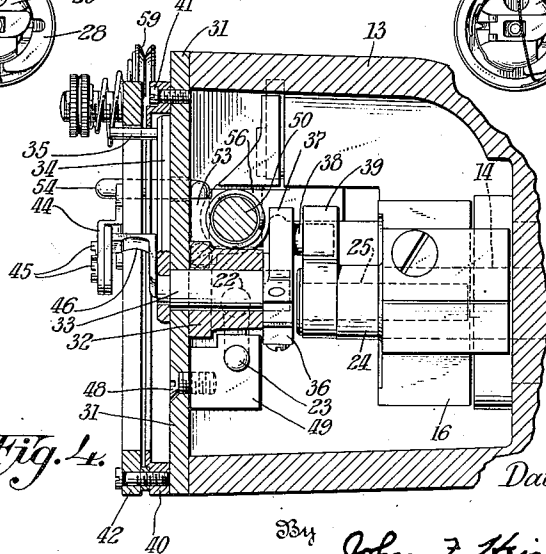


Fig. 4.

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3 Sheets-Sheet 3

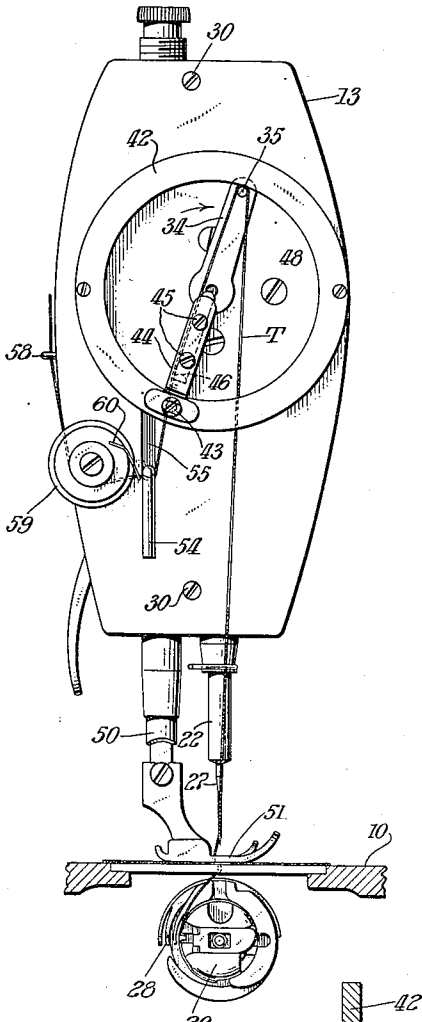


Fig. 5.

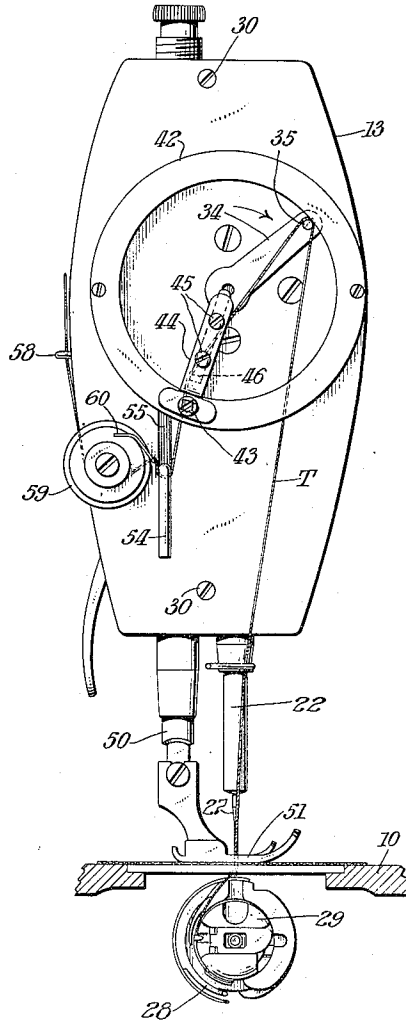


Fig. 6.

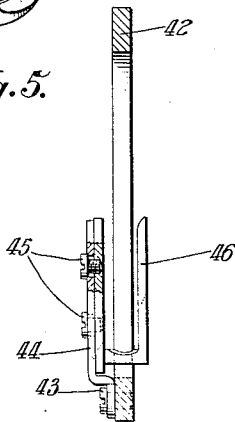


Fig. 7.

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2,358,493

TAKE-UP MECHANISM FOR SEWING MACHINES

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7 Claims. (Cl. 112—248)

This invention relates to needle-thread take-up mechanism for lock-stitch sewing machines having a reciprocatory needle and a cooperating rotary hook which makes two complete rotations for each needle reciprocation.

One of the objects of this invention is to provide an improved and simplified needle-thread take-up mechanism having a thread-engaging element which travels in a circular path at a variable speed and is capable of high speed operation.

Another object of this invention is to provide improved thread-guides which direct and maintain the needle-thread in the path of travel of the take-up element. A still further object of the invention is to provide a needle thread take-up mechanism which may be assembled separate from the machine and then applied to the machine as a unit.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations, and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the drawings:

Figure 1 is a front elevation of a lock-stitch sewing machine embodying the invention.

Figure 2 is an end elevation of the machine showing the position of the parts of the stitch-forming and thread controlling mechanism at the point in the stitch-forming cycle when the loop seizing beak of the hook is entering the needle-loop.

Figure 3 is a view similar to Figure 2 showing the position of the parts at the point in the stitch-forming cycle when the loop is cast off the beak of the hook.

Figure 4 is a horizontal section taken along the line 4—4 of Figure 3.

Figures 5 and 6 are end elevations of the machine showing the position of the parts of the machine at the stitch-setting point in the stitch-forming cycle, and the point in the cycle in which the needle is entering the work.

Figure 7 is detailed view of my improved form of thread-guide.

In the embodiment of my invention selected for illustration, I have shown my improved take-up mechanism applied to a "Singer" Class 241 lock-stitch sewing machine which comprises a bed 10, standard 11, and overhanging arm 12 terminating

in a hollow-head 13. Journalled in bearings in the overhanging arm 12 is a needle-bar actuating shaft 14 having the usual hand-wheel and pulley 15 secured to one of its ends and a needle-bar actuating crank 16 fixed to its other end. Journalled below the bed is a hook actuating shaft 17 which is operatively connected to the needle-bar shaft 14 by means of the gears 18, vertical shaft 19 and gears 20. The ratio of the gearing between the shafts 14 and 17 is as 1 is to 2, and, therefore for each rotation of the needle-bar actuating shaft 14 the hook actuating shaft 17 makes two complete rotations. The above described mechanism is all old and well known, and for a more detailed description reference may be had to the patent to Kaier No. 2,206,285, dated July 2, 1940.

Journalled in the hollow head 13 for reciprocatory endwise movement is a needle-bar 22 having an offset portion 23. The needle-bar is operatively connected to the crank 16 by a link 24 which has one of its ends connected to a crank-pin 25 carried by the crank 16, and its other end pivotally secured to a pin 26 fixed to the needle-bar 22. An eye-pointed needle 27 is carried by the needle-bar and cooperating with the needle in the formation of lock-stitches is a rotary hook 28 secured upon the end of the shaft 17 and carrying a bobbin-case 29 which houses the lower thread mass.

Secured to the head of the machine by the screws 30 is a face or cover plate 31 formed with a boss 32 in which is journalled a short shaft 33. The shaft 33 extends through the plate 31 and to the end of the shaft extending through the plate there is fixed an arm 34 carrying a needle-thread engaging element 35 at its end. To the end of the shaft 33 extending into the hollow head 13 there is adjustably secured by means of the split hub 36, one end of a short arm 37 carrying a laterally extending bearing pin 38 at its other end. The pin 38 is received by a suitable aperture in one end of a link 39, the other end of the link being pivotally secured to the crank-pin 25. The take-up shaft 33 and the needle-bar shaft 14 are arranged parallel to each other and the axes of the shafts are offset relative to each other so that the shaft 33 will receive a differential movement. The take-up pin 35 in the arm 34 is, therefore, given a fast and slow motion for each rotation of the needle-bar shaft 14. The fast take-up motion is timed to occur during the needle-thread take-up portion of the cycle and the slow or retarded motion occurs during the thread "give-up" portion of the cycle.

To guide the thread to the take-up element 35 a ring 40 of "Bakelite" or similar material is secured to the face plate by screws 41 and secured, in spaced relation, to the ring 40 is a second ring 42, the space between the rings 40 and 42 defining a thread passageway for preventing lateral displacement of the thread and maintaining it on the take-up pin 35. Adjustably secured to the outer ring 42 by the screw 43 is an inverted T-shaped member 44 and adjustably secured thereto, by the screws 45, which pass through elongated apertures in the member 44, is a U-shaped thread controlling or confining member 46 having its two limbs extending upwardly towards the shaft 33.

To provide upper bearings for the needle-bar, there is fixed to the face plate 31, by the screw 48, a metal bearing block 49 apertured to receive the offset portion 23 of the needle-bar 22.

This arrangement distributes the lateral thrust of the link and crank connection of the needle-bar between the two bearings. The machine is also provided with the usual presser-bar 50 and presser-foot 51 which co-operates with the feed-dog 52 to advance the work through the machine. Embracing the presser-bar 50 is a collar 56 formed with a laterally extending portion 53 carrying a thread-guide 54 which extends through a slot 55 in the face plate 31. From the above, it will be understood that the guide 54 is fixed to the presser-bar 50 and moves up and down with the presser-bar.

From the foregoing description it will be observed that the entire needle-thread take-up mechanism is carried by the face-plate 31 and that the take-up mechanism may be assembled on the face-plate. The face-plate 31 with the take-up mechanism assembled thereon may then be attached as a unit to the hollow-head 13 by the screws 30.

Operation

The needle-thread T is led from the source of supply (not shown) to the stationary guide 58, to the usual disk tension device 59, over the check spring 60, under which the thread-guide 54, over the take-up pin 35, between the arms of the U-shaped controller or thread confining member 46, through the stationary guide 61 and thence through the needle-eye. Assuming the parts to be in the position illustrated in Figure 2, the needle 27 has started its upward movement and has thrown out a thread-loop into which the loop-seizing beak of the hook 28 is entering. It will be noted that at this point in the stitch-forming cycle the take-up pin or element 35 has moved away from the thread, thus providing a small amount of slack thread. The slack thread, however, is under complete control as it is confined between the spaced guide-rings 40 and 42 and the upstanding arms of the U-shaped controller 46.

In Figure 3, the parts are shown at the point in the stitch-forming cycle at which the rotary-hook beak begins to shed or cast off the needle-loop. Comparing Figures 2 and 3 it will be observed that the take-up element 35 has passed under the U-shaped controller 46 and the needle-thread at this point in the cycle is subjected to a slight pulling action as the element 35 moves away from the controller 46. This slight tension or pulling action causes the thread to slip over the beak of the hook and is the beginning of the needle-thread take-up.

Figure 5 illustrates the position of the parts

at the stitch setting point in the cycle. The take-up action must occur quickly and the offset between the shafts 33 and 14 is arranged so that the take-up element 35 will be given a quick motion between the points illustrated in Figures 3 and 4. It will be observed that at the beginning of the take-up action, as illustrated in Figure 3, the pin is moving relative to the controller 46 and guide 54 at an angle which will produce a rapid pull of the thread as the thread slides over the beak of the hook. However, at the stitch setting point the element 35 is moving along the upper arc of its circular path, thereby producing a slow and gentle pull on the thread as the stitch is drawn up and set.

Figure 6 illustrates the position of the parts just after the needle has penetrated the work. From the stitch setting point (Figure 5) to the position illustrated in Figure 6, the thread is under control of the element 35 and controller 46. During this interval there is a slow give-up action to produce a slight pull on the thread T. This action prevents a small loop from forming in front of the needle as it descends.

From the foregoing it will be observed that the U-shaped controller 46 may be adjusted end-wise towards and away from the axis of the element 35 and also sidewise to vary the point in the stitch-forming cycle, at which the pull of the thread T begins. This adjustment of the thread guide 54 does not affect the stitch setting point in the cycle as the guide 54, controller 46, the axis of the rotary take-up element 35, and the element 35 are all substantially in a right line at the stitch setting point. It will also be observed that the timing of the rotary element 35 relative to the needle-bar shaft 14, may be varied by loosening the split hub 36 and adjusting the shaft 33 to any desired position.

From the foregoing description considered in connection with the accompanying drawings, the construction, manner of operation and several advantages of my improved take-up mechanism for lock-stitch sewing machines will be clearly and fully understood. It is apparent that a take-up mechanism in which the take-up element moves in a circular pattern and is giving an accelerated and retarded motion for each stitch-forming cycle has a wide variety of uses in sewing machines, and it will be understood that the form, construction and arrangement of the elements employed may be varied. Therefore, the privilege is reserved of resorting to all such legitimate changes therein, as may be fairly embodied within the spirit and scope of the appended claims.

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

1. A lock-stitch sewing machine having in combination, a reciprocatory needle-bar carrying a needle, a rotary hook cooperating with said needle in the formation of stitches, a needle-thread take-up element movable in a circular path, mechanism for rotating said element at a variable speed and a stationary needle-thread controlling member located within the confines of the circular path described by said element.

2. A lock-stitch sewing machine having in combination, a reciprocatory needle-bar carrying a needle, a rotary hook cooperating with said needle in the formation of stitches, a needle-thread take-up element movable in a circular path, mechanism for rotating said element at a variable speed and a stationary U-shaped thread controlling member located within the confines

of the circular path described by said element and adjustable relative to said circular path.

3. In a sewing machine having a reciprocating needle and a loop-taker cooperating therewith to produce lock-stitches the combination of, a rotary take-up element operable about a fixed center, mechanism for imparting a variable motion to said take-up element and timed to produce a fast take-up action after the needle-thread has been cast off by the loop-taker and a thread retaining member cooperating with said take-up element and located within the circle described by the rotary take-up element, said member being adjustable towards and from the center of the circle described by the rotary take-up element to vary the time at which the needle-thread take-up action of the element begins.

4. In a sewing machine having a reciprocatory eye-pointed thread carrying needle and a rotary loop-taker cooperating therewith in the formation of lock-stitches the combination of, a circularly moving needle-thread engaging take-up element operable about an axis, mechanism for imparting a differential speed to said element during each rotation thereof, spaced rings encircling the path of travel of said element for guiding the thread to said element and a thread retaining member secured to the rings and cooperating with the take-up element in the formation of stitches.

5. In a sewing machine having a reciprocatory eye-pointed thread carrying needle and a rotary loop-taker cooperating therewith in the formation of lock-stitches the combination of, a circularly moving needle-thread engaging take-up element operable about an axis, mechanism for imparting a differential speed to said element during each rotation thereof, a thread retaining member cooperating with said element in the formation of stitches, the retaining member, take-up element and the axis about which the

element rotates being in alignment at the stitch-setting point in the stitch forming cycle.

6. A sewing machine having in combination, a bracket-arm terminating in a hollow-head, a needle-bar shaft journaled in said arm, a crank carried by said shaft, a reciprocatory needle-bar operatively connected to said crank, a plate adapted to be removably secured to the head of the machine, a stub shaft extending through said plate and offset relative to said needle-bar shaft, an arm carrying a take-up element secured to one end of said stub shaft, an arm secured to the other end of said stub shaft, a link connecting the free end of said last mentioned arm with the crank on the needle-bar shaft, a presser-bar, a thread guide carried by the presser-bar and a thread-guiding member located within the path of travel of the take-up element and cooperating with said element during the thread take-up action of said element.

7. A sewing machine having in combination, a bracket-arm terminating in a hollow-head, a needle-bar shaft journaled in said arm, a crank carried by said shaft, a reciprocatory needle-bar operatively connected to said crank, a plate adapted to be removably secured to the head of the machine, a stub shaft extending through said plate and offset relative to said needle-bar shaft, an arm carrying a take-up element secured to one end of said stub shaft, an arm secured to the other end of said stub shaft, a link connecting the free end of said last mentioned arm with the crank on the needle-bar shaft, and a thread-controlling member adjustably secured to said plate, said member being U-shaped and arranged within the path of travel of the take-up element for the purpose of controlling the point in the stitch forming cycle at which the thread take-up action of the element on the needle-thread begins.

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