Feb. 10, 1931. W. N. PARKES 1,792,237

BOBBIN THREAD PULL-OFF FOR LOCK STITCH MACHINES

Filed Jan. 15, 1929 2 Sheets-Sheet 1

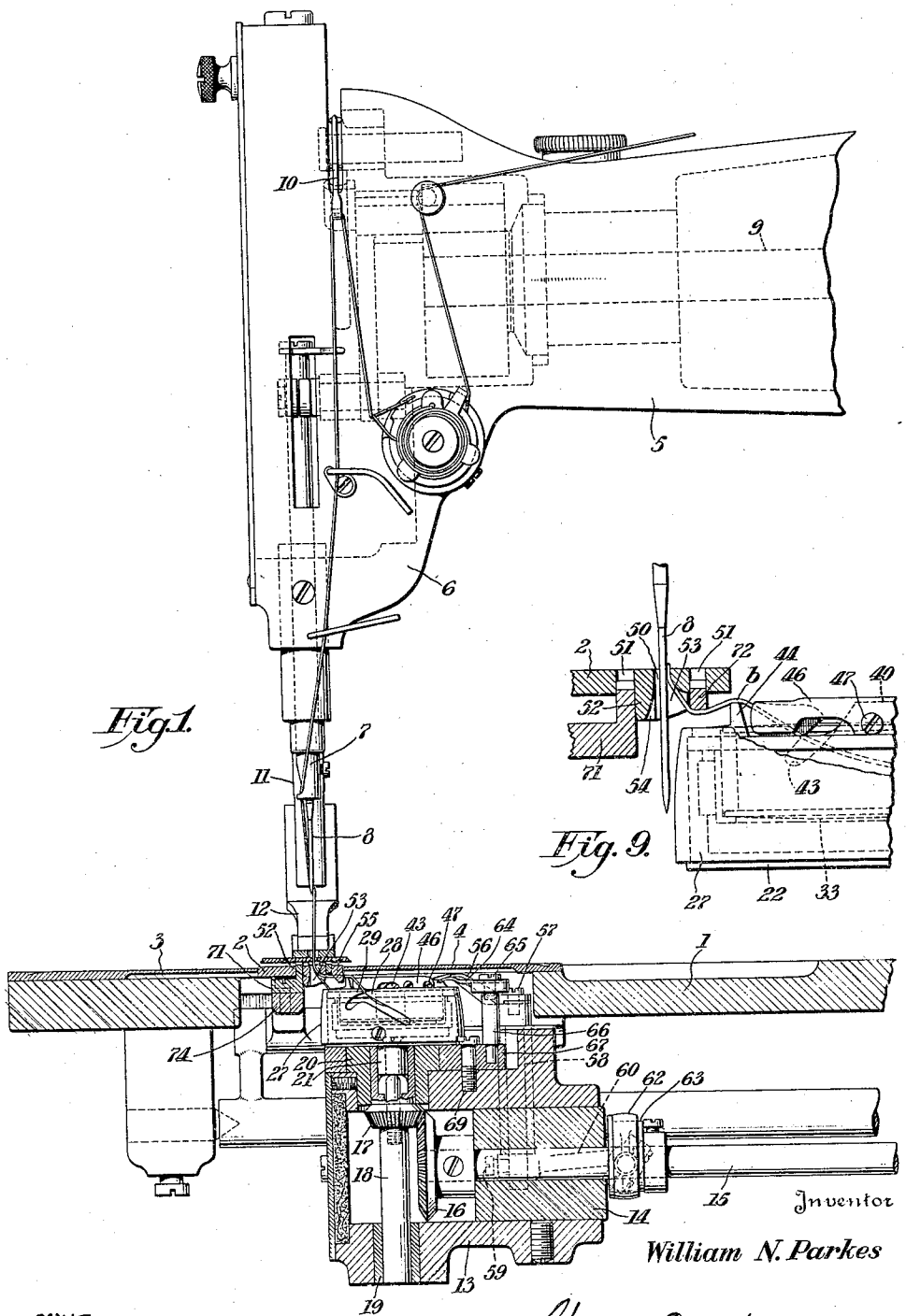


Fig. 1.

Fig. 9.

Witnesses:
Joseph Pecina
W. J. Stewart

Inventor
William N. Parkes

By Henry J. Miller
Attorney

Feb. 10, 1931. W. N. PARKES 1,792,237

BOBBIN THREAD PULL-OFF FOR LOCK STITCH MACHINES

Filed Jan. 15, 1929 2 Sheets-Sheet 2

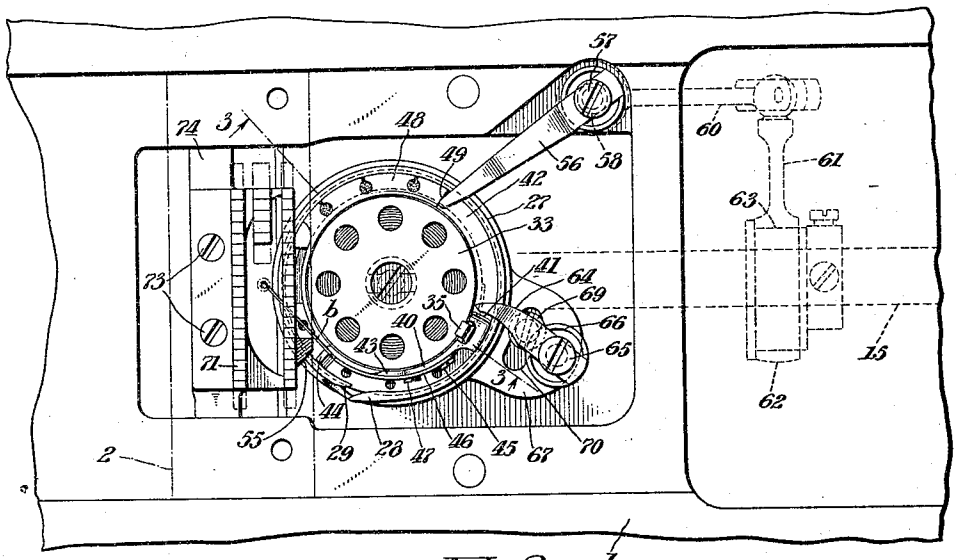


Fig. 2.

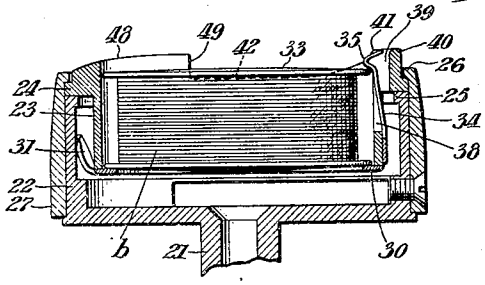


Fig. 3.

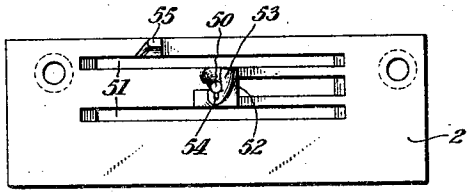


Fig. 6.

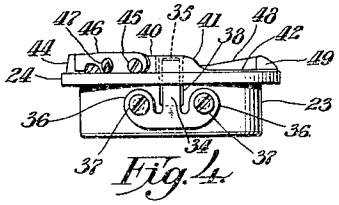


Fig. 4.

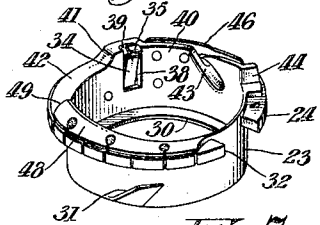


Fig. 7.

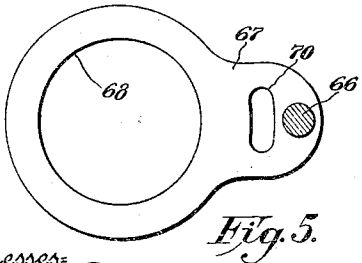


Fig. 5.

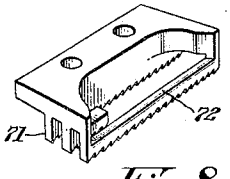


Fig. 8.

Inventor

William N. Parkes

Witnesses:
Godfrey Peirce
W. P. Stewart

By Henry J. Miller

Attorney

Patented Feb. 10, 1931 1,792,237

UNITED STATES PATENT OFFICE

WILLIAM NELSON PARKES, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, OF ELIZABETH, NEW JERSEY, A CORPORATION OF NEW JERSEY

BOBBIN-THREAD PULL-OFF FOR LOCK-STITCH MACHINES

Application filed January 15, 1929. Serial No. 332,610.

This invention relates to improvements in sewing machines employing rotary loop-takers each complemental to a reciprocatory thread-carrying needle in the formation of lock-stitches, the invention being particularly adapted for machines in which a relatively large thread-carrying bobbin is contained within a carrier, journaled in the loop-taker and restrained against rotation therewith.

The present invention has for its object to provide for a decided increase in the speed of operation of sewing machines of the kind referred to and nevertheless maintaining uniformity in the character of the stitches produced.

In its preferred embodiment, the present improvement comprises a sewing machine having a vertical-axis loop-taker in which is journaled a bobbin-carrier provided with thread-guiding means for directing the bobbin-thread substantially horizontally to the throat-plate needle-aperture. The sharp bend thus formed in the bobbin-thread at the lower edge of said needle-aperture has a tendency to resist the passage of the needle-thread loop cast off by the loop-taker. In order to obviate this resistance and thereby permit of a higher speed of operation of the machine, a small quantity of thread is drawn off the bobbin just before the setting of each stitch.

The lead of the bobbin-thread to the throat-plate being upon the cast-off side of the loop-taker, the bobbin-thread is in the present instance pulled off its supply by mechanically oscillating the bobbin-carrier in a direction opposite to the direction of rotation of the loop-taker. To this end, the rotation-restraining means for the bobbin-carrier is so arranged and the opener mechanism employed for providing a thread-passage past said rotation-restraining means is so timed that a small quantity of bobbin-thread is thereby pulled from its supply once for each stitch produced.

Additional means is provided for pulling a definite quantity of bobbin-thread from its supply subsequently to the time of operation of the above described pull-off means and for the purpose of obtaining greater uniformity in the character of the stitches at high speed operation. This additional pull-off means is particularly advantageous in sewing machines having a large under-thread bobbin, as it compensates for varying degrees of inertia between a full and practically empty bobbin.

To provide for this additional pull-off means, the feed-dog, which is of the lower four-motion type, carries a rib or flange positioned to engage the bobbin-thread between the bobbin-carrier and throat-plate needle-aperture during the downward or work-disengaging movement of said feed-dog next succeeding the pull-off action of said opener mechanism.

In the accompanying drawings, Fig. 1 is a view in front elevation and partly in section of the front end of a sewing machine containing the present improved stitch-forming mechanism. Fig. 2 is a top plan view of the loop-taker mechanism and the feed-dog, with the throat-plate and adjacent slide-plate of the cloth-plate removed. Fig. 3 is a sectional view of the loop-taker on substantially the line 3—3 of Fig. 2. Fig. 4 is a view in elevation of the bobbin-carrier on the bobbin-latch side thereof. Fig. 5 is a top plan view of the bracket supporting the adjustable stop-finger for the bobbin-carrier. Fig. 6 is a bottom plan view of the throat-plate of the machine. Fig. 7 is a perspective view of the bobbin-carrier. Fig. 8 is a perspective view of the feed-dog, shown inverted. Fig. 9 is a detail view of the stitch-forming mechanism, illustrating the bobbin-thread pull-off action of the feed-dog.

Referring to the drawings, the present improvements are shown as embodied in a sewing machine having a cloth-plate 1, upon which is suitably secured a throat-plate 2 and the slide-plates 3 and 4, disposed at opposite sides of the throat-plate. The sewing machine, as usual, is provided with an overhanging bracket-arm 5, terminating at its free end in a head 6 in which is journaled a vertically-reciprocatory needle-bar 7 carrying at its lower end a needle 8. The needle-bar is reciprocated by operative connections with a rotary shaft 9, said connections also serving to operate a take-up 10 in a manner well

known and disclosed in, for instance, the U. S. patent to W. F. Dial et al., No. 695,915, Mar. 25, 1902. Also carried by the head 6 is a presser-bar 11 to which is secured a presser-foot 12.

Suitably secured to the underside of the cloth-plate is a loop-taker bracket 13, in which is fixed a bushing 14 constituting the journal for the forward end of a horizontally disposed loop-taker actuating shaft 15, which rotates once for each rotation of the needle-actuating shaft 9. Secured upon the end of the shaft 15 is a bevel-gear 16 in mesh with a similar gear 17 upon the vertically disposed loop-taker shaft 18. The shaft 18 is journaled at its lower end in a bushing 19 and at its upper end in a bushing 20, both of which bushings are suitably fixed in vertically alined apertures in the bracket 13. The gears 16 and 17 are proportioned to impart two rotations to the shaft 18 for each rotation of the actuating shaft 15.

Detachably secured within the tubular upper end of the shaft 18, for rotation therewith, is the stub-shaft 21 of the inner loop-taker body 22, which is cupped to receive a bobbin-carrier 23. The bobbin-carrier 23 is peripherally provided with an interrupted bearing-rib 24 journaled in a raceway constituted by a flange 25 at the upper edge of the inner body 22 and a flange 26 at the upper edge of the outer loop-taker body 27 secured upon and in peripheral contact with the inner body 22. It is to be understood that the inner body 22 and the outer body 27 together comprise the loop-taker proper, said outer body being provided with a loop-seizing beak 28 and an oppositely directed loop-discharging spur 29.

The bobbin-carrier 23 is open at its top and is substantially bottomless, its base comprising a narrow, internal, bobbin-supporting flange 30. Extending outwardly and upwardly from the bobbin-carrier base is an auxiliary hook 31 disposed between the inner loop-taker body and the bobbin-carrier, said hook 31 acting to direct toward the bottom of the bobbin-carrier a limb of the needle-thread loop initially caught by the nose 32 afforded by one end of the interrupted bearing-rib 24. Sustained upon the flange 30 within the bobbin-carrier is a bobbin 33, which may be of any suitable construction but contains a larger quantity of thread than has been usually employed in high speed machines of the present type.

The bobbin 33 is latched against accidental upward movement out of its carrier by a bobbin-retainer comprising a spring-tongue 34, the free upper end of which is reversely bent to provide a V-shaped lip 35, having its apex directed toward the bobbin-axis and overhanging the outer edge only of the bobbin. The inclined upper and under sides of the lip 35 provide for readily deflecting the tongue 34 outwardly by the action upon the lip of a bobbin when manually inserting or removing the same. The tongue 34 extends upwardly from a base-member which at opposite sides of the tongue is provided with apertured ears, as 36, for the reception of screws, as 37, whereby the retainer-member base is fastened upon the outer side-wall of the bobbin-carrier below its bearing-rib 24. The tongue 34, above its base, extends through a slot 38 provided in the wall of the bobbin-carrier adjacent the bearing-rib 24, said slot 38 merging at its upper end into a U-shaped recess 39 opening into the interior of the bobbin-carrier to afford clearance for the tongue 34 and its lip 35.

Referring more particularly to Figs. 3, 4 and 7 of the drawings, it will be observed that the recess 39 is provided in a flange 40 extending upwardly from the bearing rib 24 above the flange 26 of the loop-taker and upon the cast-off side thereof. The flange 40 adjacent to the lip 35 terminates in a stop-shoulder 41 rising from a cutaway, segmental upper edge 42 of the bobbin-carrier which lies below the upper side of the bobbin to provide for convenient access to said bobbin for removal. Intermediate its ends, the flange 40 is intersected by a thread-slit 43 inclined downwardly in the direction of rotation of the loop-taker, through which slit the bobbin-thread *b* may be readily passed. At its end opposite to the shoulder 41, the flange 40 is bent outwardly to provide a stop-shoulder 44 extending substantially the width of the bearing rib 24.

Bridging the thread-slit 43 and secured upon the outer side of the flange 40 by a screw 45 is a bent tension-spring 46 of which the upper edge extends above said flange and therefore serves as a guard to prevent entrance of the needle-thread loop into said slit 43. The free end of the tension-spring 46 terminates in advance of the shoulder 44 and bears against the side of the flange with a pressure which may be regulated by an adjusting screw 47 disposed at the same side of the thread-slit 43 as is the securing screw 45.

Above the bearing-rib 24 and beginning substantially from the nose 32 thereof is an inclined flange 48 which serves to initially direct a limb of the needle-thread loop over the upper side of the bobbin. This flange 48 terminates abruptly in a shoulder 49 which defines one end of the depressed portion 42 of the bobbin-carrier.

The throat-plate 2 is provided with a needle-aperture 50 and with parallel feed-dog slots, as 51 extending longitudinally of the throat-plate. Depending from the under side of the throat-plate is a thread-controlling lug 52 in position to overlie the loop-taker beak as it is entering the needle-thread loop. This lug 52 has a front loop-abutment face 53 extending generally transversely of the length of the feed-slots 51 and disposed directly

rearward of the needle-aperture 50, said abutment face being inclined downwardly in a direction toward the lower rear edge of the lug and inclined laterally toward the rear corner of the edge nearest the loop-taker axis. Furthermore, the lower edge of the lug is inclined upwardly from the needle-aperture toward the lug-edge nearest to the bobbin-carrier.

As the loop-taker beak 28 enters the loop of thread presented by the needle, it carries the loop against the lug-face 53. The loop being thus held against freely following the point of the beak 28, said loop is forced toward the throat of the beak and is therefore rapidly spread to facilitate the casting of the loop about the bobbin-carrier. The described inclines of the abutment face are designed to accommodate the separation of the loop-limbs during the loop-spreading operation and particularly the upward movement of the loop-limb cast across the upper side of the bobbin. Upon the side of the needle-aperture 50 directly opposite to the loop-taker side thereof, the lug 52 is provided with a vertically disposed groove 54 adapted to receive a limb of the needle-thread loop and thereby directionally present the other limb for entrance by the loop-taker beak.

In order to restrain the bobbin-carrier 23 against rotation with the loop-taker, the throat-plate is additionally provided with a depending stop-lug 55 at the edge nearest the loop-taker axis, said lug 55 being spaced a substantial distance from a line extending transversely of the throat-plate through the needle-aperture thereof. This lug 55 is adapted to be engaged by the bobbin-carrier stop-shoulder 44, thereby limiting the rotation of the bobbin-carrier in one direction. The lug 55 and shoulder 44 are intermittently separated to provide clearance for the needle-thread loop, this being effected by oscillating the bobbin-carrier in a direction opposite to the direction of rotation of the loop-taker. To this end, the shoulder 49 of the bobbin-carrier is intermittently engaged by a vibratory opener-finger 56 secured by a screw 57 upon the upper end of a vertically disposed rock-shaft 58 suitably journaled in the bracket 13. Adjustably secured upon the lower end of the rock-shaft, by means of a screw 59, is an arm 60 having a ball-joint connection at its free end with a pitman 61 provided with a strap 62 embracing an eccentric 63 upon the actuating shaft 15. As the shaft 15 rotates in one-to-one relationship with the needle-shaft 9, it is evident that the opener-finger is vibrated once only for each needle-reciprocation.

The oscillation of the bobbin-carrier under the action of the opener-finger is limited by a stop-finger 64 positioned to engage the bobbin-carrier stop-shoulder 41. The stop-finger 64 is secured by a screw 65 upon the upper end of a post 66 rising from a supporting bracket 67, provided with a circular opening 68 loosely entered by the bushing 20 in which the loop-taker shaft is journaled. This construction provides for adjustment of the stop-finger 64 about the loop-taker axis, the bracket 67 being secured in adjusted position to the bracket 13 by a screw 69 passing through an arcuate slot 70 in the bracket 67.

The bobbin-thread *b* is directed upwardly from the tension-spring 46 and over the laterally extending end of the flange 40, i. e., over the shoulder 44, and thence to the throat-plate needle-aperture in substantially the plane of the lower side of the throat-plate. In order to ease the passage of the cast-off needle-thread loop into the needle-aperture 50 past the sharp bend in the bobbin-thread at the lower edge of said aperture 50, the operation of the opener-finger 56 is so timed as to pull off thread from the bobbin by its action to provide thread-clearance past the stop-lug 55. By spacing the stop-lug 55 a substantial distance from the needle-aperture 50, the pull-off and opener functions may be usefully combined so as to occur sufficiently early in the drawing up of the needle-thread loop by the take-up 10. In fact, the pull-off action occurs at substantially the time that the needle-thread loop is discharged upon the loop-taker spur 29 by the beak 28. Furthermore, this timing may be slightly changed to suit different sewing conditions by loosening the screw 59 and relatively adjusting the rock-shaft 58 and its actuating arm 60.

Additional means is provided for pulling thread from the bobbin 33 after the setting of each stitch to insure a uniform quantity of slack thread for the succeeding stitch, whereby to nullify the varying inertia effects of full and comparatively empty bobbins upon the quality of the stitching produced. To this end, the feed-dog 71, which is projected through the throat-plate slots 51 for advancing the work, is provided with a pull-off rib 72 which operates between the needle-aperture 50 and the bobbin-carrier and as illustrated more particularly in Fig. 9 of the drawings, engages the bobbin-thread during its downward or work-disengaging movement following upon the feed of the work and thereby pulls thread from the bobbin. The feed-dog 71 is secured by screws, as 73, upon a feed-bar 74 which may be actuated in any manner to impart the usual four motions to the feed-dog, common in this type of feeding mechanism.

While I have claimed herein only certain features of the mechanism shown in the accompanying drawings, having claimed others of said features in separate applications filed Jan. 15, 1929, with Serial Nos. 332,611, 332,612, and 332,613, it is to be understood

that all novel features disclosed herein are of my invention and are intended to be claimed in the several referred to applications.

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

1. In a sewing machine having a throat-plate provided with a needle-aperture, a reciprocatory needle, work-feeding mechanism, a vertical-axis loop-taker complemental to said needle in the formation of lock-stitches, a bobbin-carrier journaled in said loop-taker provided with a stop-shoulder, a thread-carrying bobbin positioned within said carrier, a stop-lug depending from the throat-plate in position to be engaged by said stop-shoulder to prevent rotation of the bobbin-carrier in one direction, said stop-lug being spaced a substantial distance from a line intersecting the throat-plate needle-aperture transversely of the direction of feed of the work, and means for oscillating said bobbin carrier once only for each needle reciprocation to open a needle-thread loop passage between said stop-lug and stop-shoulder and thereby pull thread from said bobbin.

2. In a sewing machine having a throat-plate provided with a needle-aperture, a reciprocatory needle, a vertical-axis loop-taker performing a multiple of rotations for each reciprocation of the needle, a bobbin-carrier journaled in said loop-taker, a thread-carrying bobbin positioned within said carrier, bobbin-thread guiding and tensioning means upon the bobbin-carrier in position whereby the pull of the bobbin-thread in its passage to the throat-plate needle-aperture tends to rotate the bobbin-carrier in the direction of rotation of the loop-taker, means for restraining the bobbin-carrier against rotation with the loop-taker, an opener-finger positioned to engage the bobbin-carrier to oscillate it in a direction opposite to the direction of rotation of the loop-taker, and means for operating said opener-finger to oscillate the bobbin-carrier in said direction once only for each needle reciprocation in timed relation to pull thread from the bobbin-supply before the cast-off needle-thread loop reaches the throat-plate aperture just previous to the setting of the stitch.

3. In a sewing machine, a reciprocatory thread-carrying needle, a take-up, a rotary loop-taker complemental to said needle in the formation of lock-stitches, a bobbin-carrier journaled in said loop-taker, a thread-supply within the bobbin-carrier, means for restraining the bobbin-carrier against rotation with the loop-taker, means for pulling thread from said thread-supply before the completion of the stitch-setting action of said take-up, and additional means for pulling thread from said thread-supply to provide slack thread for the succeeding stitch.

4. In a sewing machine, a reciprocatory thread-carrying needle, a needle-thread take-up, work-feeding mechanism, a rotary loop-taker complemental to said needle in the formation of lock-stitches, a bobbin-carrier journaled in said loop-taker, a thread-supply within the bobbin-carrier, means for restraining the bobbin-carrier against rotation with the loop-taker, means for pulling thread from said thread-supply before the completion of the stitch-setting action of said take-up, and additional means acting subsequently to said thread pull-off means and before the work-advancing action of said feeding mechanism for pulling thread from the bobbin-carrier thread-supply to provide slack thread for the succeeding stitch.

5. In a sewing machine having a throat-plate provided with a needle-aperture, a reciprocatory thread-carrying needle, a needle-thread take-up, work-feeding mechanism, a rotary loop-taker complemental to said needle in the formation of lock-stitches, a bobbin-carrier journaled in said loop-taker, a lower thread-supply within the bobbin-carrier, means for restraining said bobbin-carrier against rotation with the loop-taker, means for opening a thread-passage past said bobbin-carrier rotation-restraining means and thereby pulling thread from said thread-supply, and a pull-off member carried by said feeding mechanism adapted to engage the lower thread leading to the throat-plate needle-aperture to pull off additional thread from said lower thread-supply.

6. In a sewing machine, a reciprocatory thread-carrying needle, work-feeding mechanism, a vertical-axis rotary loop-taker complemental to said needle in the formation of lock-stitches, a bobbin-carrier journaled in said loop-taker, a thread-supply within the bobbin-carrier, means for restraining the bobbin-carrier against rotation with the loop-taker, and a plurality of devices operating independently of each other to pull thread from said thread-supply in addition to the action upon the lower thread by the advance of the work under the action of said work-feeding mechanism.

7. In a sewing machine having a throat-plate provided with a needle-aperture, a four-motion feed-dog operating through said throat-plate, a reciprocatory needle, a vertical-axis rotary loop-taker positioned below the plane of the throat-plate, a bobbin-carrier journaled in said loop-taker, means for restraining the bobbin-carrier against rotation with the loop-taker, a lower-thread supply within the bobbin-carrier, a thread-guiding means upon the bobbin-carrier for directing the lower thread to the throat-plate needle-aperture in substantially the plane of the lower surface of the throat-plate and at an inclination to the direction of feed, and a

pull-off member carried by said feed-dog for drawing slack thread from said lower-thread supply.

In testimony whereof, I have signed my name to this specification.

WILLIAM NELSON PARKES.