

No. 765,120.

PATENTED JULY 12, 1904.

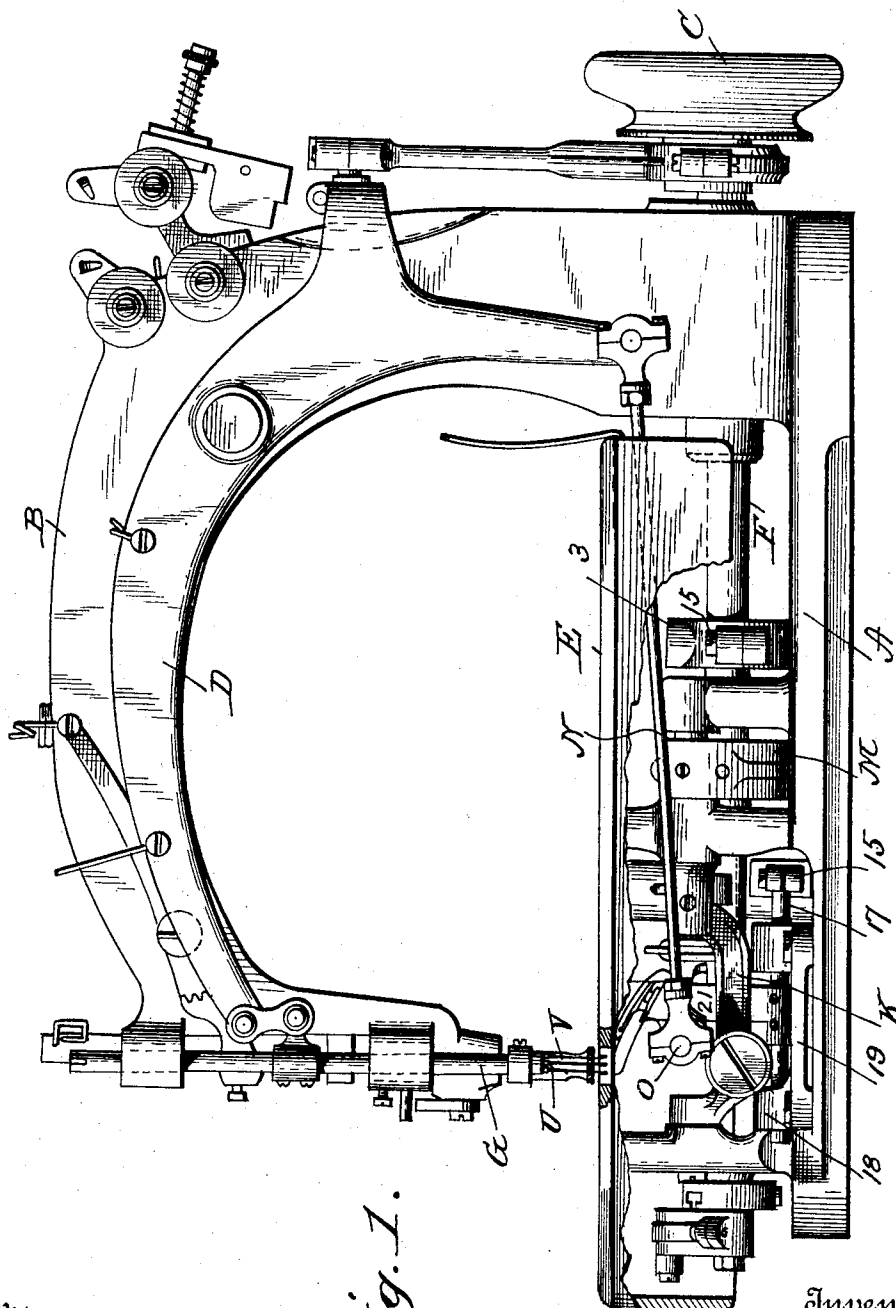
R. G. WOODWARD.

CHAIN STITCH SEWING MACHINE.

APPLICATION FILED FEB. 23, 1898. RENEWED APR. 7, 1904.

NO MODEL.

5 SHEETS—SHEET 1.



Witnesses
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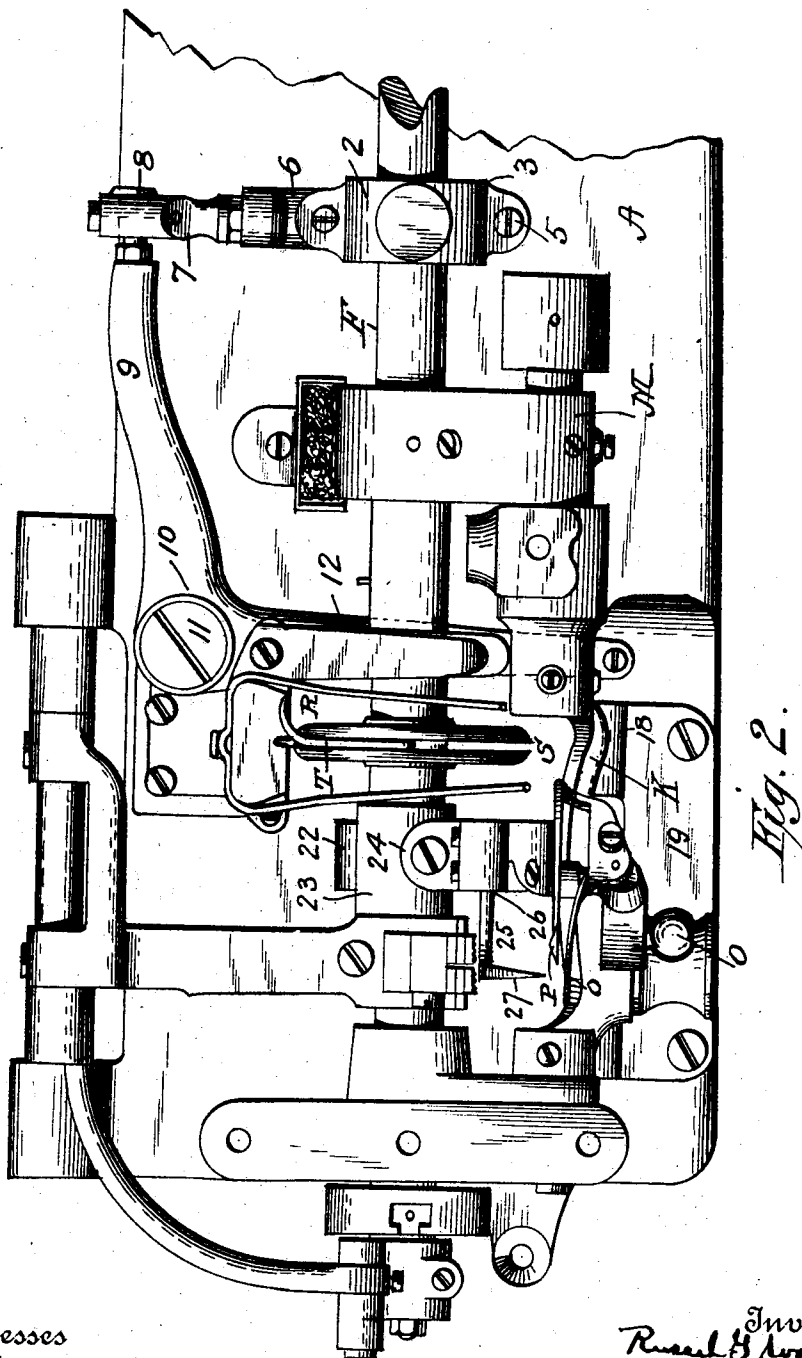
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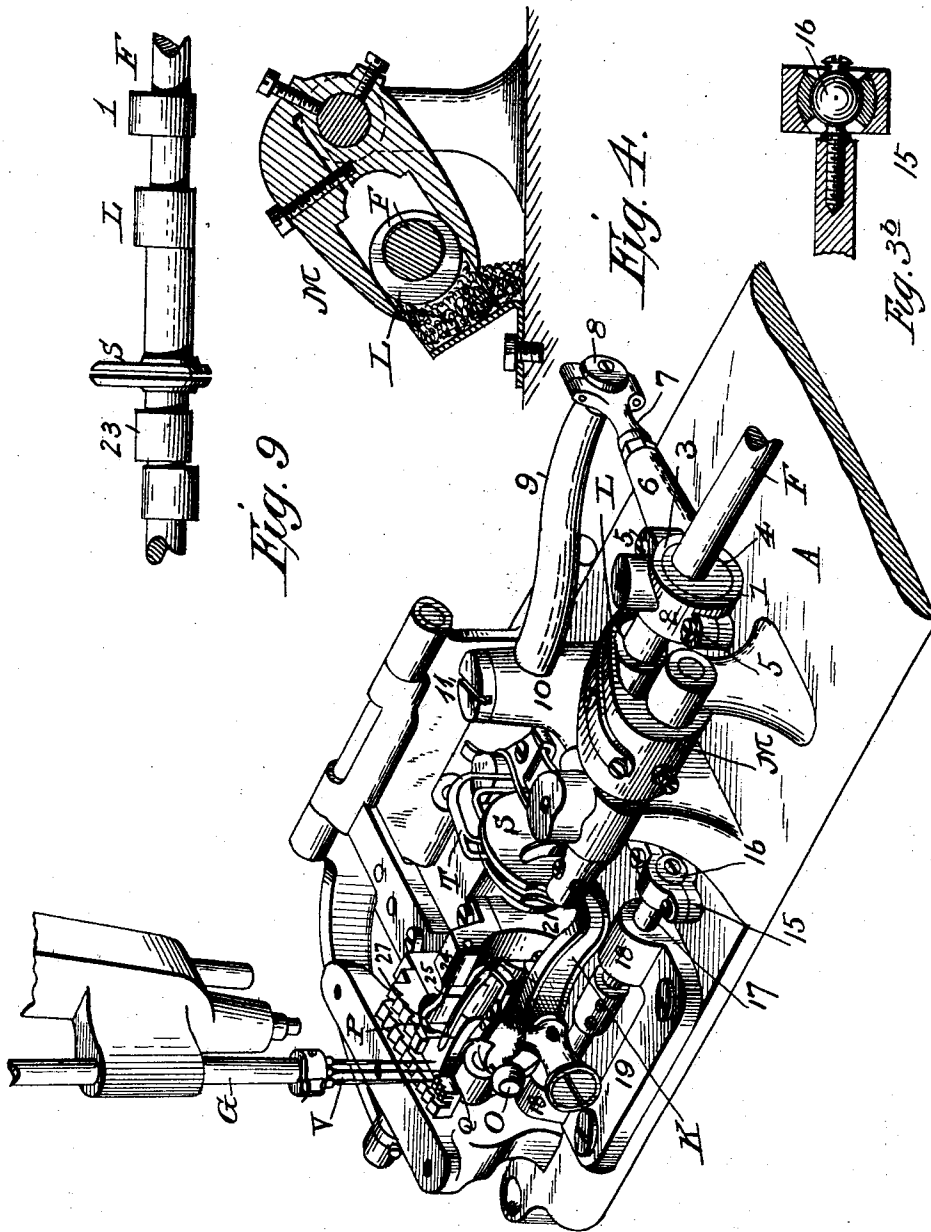
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5 SHEETS—SHEET 3.



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Fig. 3.

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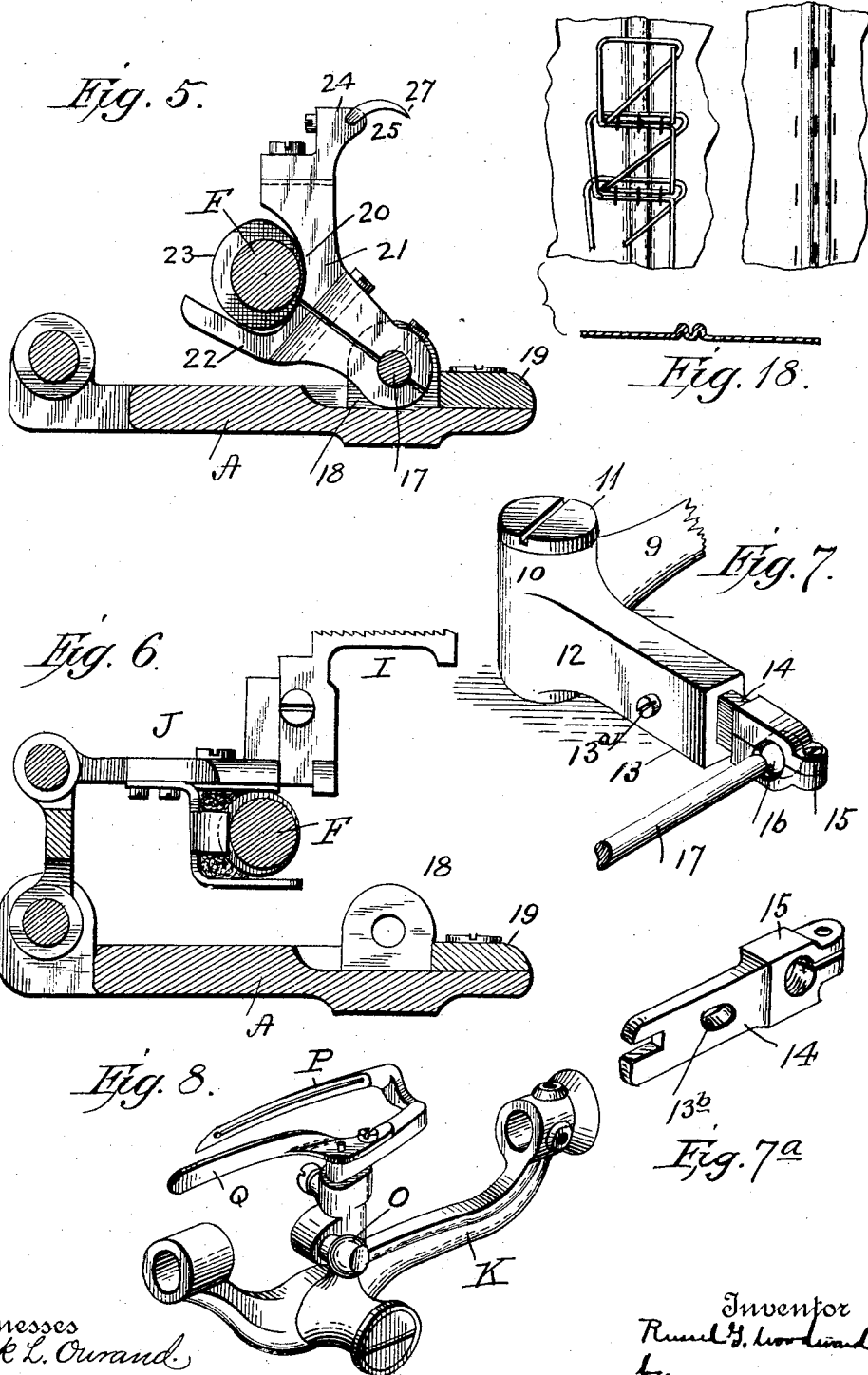
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6 SHEETS—SHEET 4.



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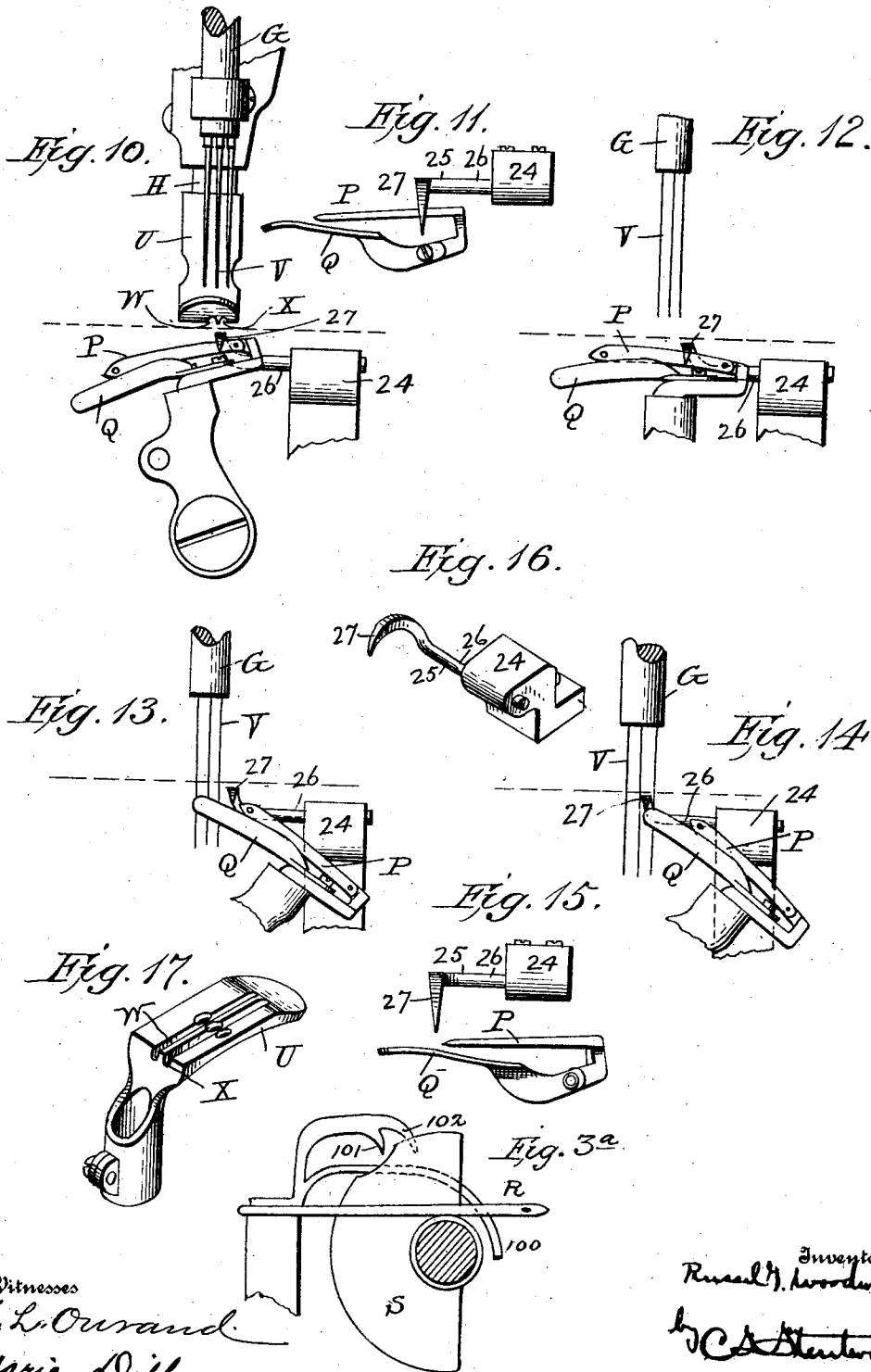
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NO MODEL.

5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

RUSSEL GREEN WOODWARD, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE UNION SPECIAL SEWING MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CHAIN-STITCH SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 765,120, dated July 12, 1904.

Application filed February 23, 1898. Renewed April 7, 1904. Serial No. 202,079. (No model.)

To all whom it may concern:

Be it known that I, RUSSEL GREEN WOODWARD, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Chain-Stitch Sewing-Machines, of which the following is a description, reference being had to the accompanying drawings and to the letters and figures of reference marked thereon.

My invention relates to an improvement in sewing-machines, particularly of the double-chain-stitch type, in which an under-thread-carrying device coöperates with a vertically-reciprocating thread-carrying needle to form the stitches, although in its broadest sense the invention is applicable to any machine having a thread-manipulating device complementary to the needle, whether said thread-manipulating device actually carries a thread, as in a double-chain-stitch machine, or whether it has no thread, as in a single-chain-stitch machine.

The main object of the invention is to provide a device coöperating with the looper or loop-taker which when the latter has passed into the loop of needle-thread shall seize or move against the loop or loops of needle-thread and force or keep the same back upon the looper while the latter is moving backward and the needle or needles are coming down, said detainer holding said loop or loops back until the needle passes down below the point where there is any danger of its cutting off the thread of its previous loop or until in a double-chain-stitch machine it has passed into the bight of the looper-thread.

The invention consists, primarily, of a sewing-machine having stitch-forming mechanism comprising a needle and loop-taker and a loop-manipulating device moving into action at the proper time to hold the loop on the loop-taker for a limited time.

Secondly, the invention consists of a sewing-machine having stitch-forming mechanism which includes a needle and a loop-taker and a loop-manipulating device having movements corresponding with the movements of the loop-taker.

Thirdly, the invention consists of a sewing-machine having stitch-forming mechanism including a needle and a four-motion looper and a four-motion loop-manipulator.

Fourthly, the invention includes a looper and a coöperating loop-detainer which is so timed as to move forward slightly in advance of the looper, to move into engagement with the needle-loop in advance of the sidewise or needle-avoiding movement of the looper, and to move backward slightly in advance of the looper and to release the needle-loop at the proper time to allow it to pass off the point of the looper.

Finally, the invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, which illustrate the invention, Figure 1 is a side elevation, partly in section, of a sewing-machine embodying my invention. Fig. 2 is a plan view of the same with the bed-plate and all the upper works of the machine removed. Fig. 3 is a perspective view of Fig. 2. Fig. 3^a is a side view, partly in section, illustrating the take-up and coöperating parts. Fig. 3^b is a detail sectional view showing the connection between the head 15 and the sliding and rocking shaft 17. Fig. 4 is a detail sectional view through the looper-rocking fork. Fig. 5 is a sectional view illustrating the support for the loop-detainer and the cam for oscillating it. Fig. 6 is a sectional view illustrating the feed-rocking fork and the stud in which one end of the loop-detainer rock-shaft is journaled. Fig. 7 is a detail perspective view of a portion of the bell-crank lever, showing its connection with the oscillating rock-shaft, on which the loop-detainer is supported. Fig. 7^a is a detail of the bar 14. Fig. 8 is a detail perspective view of the looper-rocker. Fig. 9 is a detached view of a portion of the driving-shaft, showing thereon the various operating-cams and the take-up disks. Fig. 10 is a detail side view showing the relative arrangements of the respective parts as the needles have commenced their downward movement, the looper commenced its backward

movement, and the loop-detainer has already moved backward bodily slightly to face the needle-loops back on the looper. Fig. 11 is a plan view showing the position of looper and loop-detainer in Fig. 10. Fig. 12 is a view similar to Fig. 10, showing the parts after the needles have moved farther down and the looper and loop-detainer farther back. Fig. 13 represents the parts as the needles have almost reached the lowest point of their stroke, the loop-detainer is beginning to swing away from the looper that is backward in the direction of the length of the detainer, and the looper has not quite reached the limit of its backward movement. Fig. 14 represents the needles at the limit of their descent, the looper in its most retracted position, and the detainer moving bodily forward—that is, sidewise. Fig. 15 is a plan of Fig. 13. Fig. 16 is a detail of the loop-detainer and its supporting-head. Fig. 17 is a bottom view of the presser-foot; and Fig. 18 represents upper, lower, and edge views of the seam made on this machine.

In the drawings the sewing-machine illustrated is as to its main features of the well-known "Union Special" type, and in the figures A is the base or bed of the machine; B, the gooseneck; C, the driving-wheel; D, the needle-lever; E, the bed-plate; F, the main or driving shaft; G, the needle-bar; H, the presser-bar; I, the feed-dog; J, the feed-rocking frame; K, the rocking frame (shown in Fig. 8) which supports the looper; L, the cam, and M the rocking-fork (shown in Fig. 4) which rocks the looper-frame and gives the sidewise movement to the looper, while N is the pitman connected at one end with the needle-lever and at the other end with the ball-stud O, which gives the forward and backward or loop-taking and loop-leaving movement to the looper P, which, with the looper-guard finger Q, is carried by the looper-rocker K. R is the take-up mechanism as a whole, and S the feed raising and lowering cam working in the fork T.

The presser-foot is represented at U and is provided with openings for the passage of the needles, of which three (marked V) are herein shown, this presser-foot having on its under surface two grooves W with a ridge X between the grooves cooperating with projections Y on the throat-plate Z, so that when the presser-foot is let down and the material to be sewed is clamped between it and the throat-plate said material will be crimped before sewing, thus when sewed giving it the appearance (shown in Fig. 18) as though it had been corded.

The important feature of the present invention relates to the stitch-forming mechanism, and especially to a movable loop-detainer for detaining the loop of the needle-thread on the looper or holding it back out of the way of the needle in its next descent to prevent it interfering with or severing the thread, and at

the outset of this description I desire to say that while I illustrate and describe the use of three needles I do not wish to be limited to any particular number thereof.

Referring now to the drawings, and especially to Figs. 2, 3, 5, 7, and 9, on the main shaft F is a cam or eccentric 1, embraced by a strap or collar 2, formed of two sections 3 4, secured together by screws 5. Attached to the lower section 4 is a connection-rod 6, having secured to its outer end a head 7, formed with a socket to receive a ball-stud 8, screwed into the end of the arm 9 of a bell-crank lever of which the central portion 10 forms a sleeve and is pivoted on the stud 11, supported on the bed of the machine. The other arm, 12, of the bell-crank lever (see Fig. 7) is shorter than the arm 9 and has an opening to receive the bar or rod 14, which has at its outer end the head 15, embracing the ball on the stud 16, secured on the end of the sliding and rocking shaft 17. The bar or rod 14 is held within the opening 13 by the set-screw 13^a, which passes through an elongated slot 13^b in the bar 14, this slot allowing the bar to have a slight longitudinal movement. This shaft 17 slides and rocks in bearings formed in lugs 18 on the standard 19, secured to the bed of the machine, the sliding movement of said shaft being transmitted to it from the driving-shaft through the bell-crank lever and connection just described, the feature of the sliding connection between the arm 12 and the end of the shaft being necessary to prevent any binding, for of course the arm 12 swings in the arc of a circle, while the shaft 17 is confined in fixed bearings. Thus to allow it to move bodily in a straight line without bind, means have to be provided to compensate for the variation between the arc of the circle in which the arm 12 swings and a straight line. It will be understood that any compensating connection may be used, and I do not wish to be limited to the particular one above described nor to any other details of the mechanism for transmitting motion from the driving-shaft to the shaft 17. Fixed to the rock-shaft 17, between the bearings thereof, is the lower end of the loop-detainer carrying-frame, (represented as a whole by the numeral 20,) of the form shown most clearly in Fig. 5, having the two parts 21 and 22 clamped together around the shaft 17, the two parts 21 and 22 being so cut away as to form a fork in which rides the eccentric 23 on the driving-shaft, which gives the rocking movement to said frame and shaft, the cam or eccentric 23 of width sufficient to allow of the sliding bodily movement of the shaft 17 and the carrying-frame 20. The part 21 of the carrier-frame is extended vertically and is flattened to receive the under side of the head 24, screwed thereto, which head has a horizontal socket in which the end of the loop-detainer 25 is removably and adjustably secured. The "loop-

5 detainer," so called, or "spreader" or "manipulator," whatever it may be called, has the shaft 26 practically parallel with the shaft 17 and the beak 27, extending at right angles thereto or toward the front of the machine or toward the plane in which the looper lies. It will thus be seen through the mechanism described that the loop-detainer has four motions—a bodily forward motion in the direction of the length of the shaft 17, an oscillating movement at practically right angles thereto—that is, an oscillating movement on the axis of the rock-shaft 17—which movement is in the direction of the length of the beak of the loop-detainer, then a bodily movement the reverse of the first movement, and finally an oscillating movement the reverse of the second movement—the movements being properly timed with respect to the movements of the looper so that the loops of needle-thread entered by the looper will be held back on the looper or forced back thereon by the detainer until such time as the needle-points in their next descent have passed below the point of the looper and all danger of the needles cutting off their own thread avoided.

15 In the operation of the machine, referring to Fig. 15, we will suppose the needles to be at their lowest point, the looper in its farthest retracted position, and the loop-detainer as just having started its bodily forward movement in the direction of the axis of the shaft 17. In the continued movement of the main or driving shaft the looper, with the loop-detainer, moves forward, the looper passing into the loops of needle-thread on the rear side of the needles, the needles moving up to a point where the looper is on about the half-stroke of its forward movement, when the loop-detainer begins to oscillate toward the front of the machine—that is, in the direction of the length of the beak thereof—and continues this movement until just before the looper reaches the extreme limit of its forward movement, at which time the beak of the detainer has passed over the plane in which the looper lies. The loop-detainer while the looper is finishing its forward stroke then begins to move slowly backward and continues its backward movement while the looper is oscillating sidewise to avoid the needle, and then the loop-detainer and looper move backward together, the beak of the loop-detainer being across the looper, almost at the heel thereof, and forcing the needle-thread loops back to the heel. The looper and loop-detainer move back together, and as the looper is set on a horizontal incline during the backward movement of the loop-detainer and said looper the beak of the loop-detainer gradually loosens its hold on the needle-loops, so that when the looper has almost reached the limit of its backward movement merely the point of the beak holds the loops on the looper, and as the looper is finishing its backward stroke the loop-detainer oscillates

sidewise just as the needle-points have passed down about to the point of the looper, and in the further sidewise oscillation of said loop-detainer the loops which it has been holding back on the looper are released and the looper and needles complete, respectively, their backward and downward movements.

I have also devised special arrangement of take-up and cast-off fingers, (illustrated particularly in Fig. 3^a.) In order to properly control the thread in the machine employing a loop-detainer, as herein illustrated, it has been found necessary to slightly change the cast-off wire from the ordinary construction of "Union Special" take-up mechanism. As shown in said figure, the cast-off wire which enters the slot milled into the take-up disk has three prongs 100, 101, and 102. The one marked 100, which travels at the bottom of the groove in the take-up, is the same as in the ordinary "Union Special" take-up mechanism; but the prong or cast-off wire which extends over the top has the two fingers or prongs 101 102. In the travel of the thread through the machine to be finally deposited into the seam it passes in the regular way across the face of the take-up and is acted upon by it in the usual manner. In the movement of the take-up the lower prong forces the thread upon the outer periphery of the take-up and is next acted upon by the prong at the top of the cast-off wire and nearest to the back of the machine first. This takes up the slack in the lower thread while the looper is on its backward travel and holds the thread until the short prong reaches the cut-out portion of the take-up cam, when the thread is released, and then the longer or front prong of the cast-off wire retains the lower thread and takes all the slack out of it when the eye of the looper has reached a point just past the left-hand needle and insures that the traveling loop-detainer will pass underneath the lower thread, of which lower thread one portion is through the eye of the looper and the other up through the throat-plate. Unless this loop-detainer should pass beneath the lower thread it will engage with it and break the same. In other words, the action of all the take-up parts is the same as usual—as, for instance, in Patent No. 299,568—except that the cast-off wire has two prongs acting upon the thread when it is upon the outer periphery of the take-up. The back prong is the same as the regular prong shown in said patent, and the front prong when the looper is going ahead acts as a check on the lower thread and straightens it out, so the finger or loop-detainer can pass under the lower thread, which is between the goods and front eye of the looper. This checking action of the thread takes place while the looper is going forward. The other prong alone cannot produce this result, as it is too far back when compared with the action of the take-up. Unless the thread is straight-

ened out to let the finger under the thread imperfect work will result. I do not, however, claim this take-up, as it forms the subject-matter of a divisional application filed on the 17th day of April, 1902, Serial No. 103,322.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a sewing-machine having a stitch-forming mechanism including a needle and a loop-taker, a movable needle-loop manipulator acting on the needle-loop to hold it out of the path of the needle in its descent, and means for operating said loop-manipulator to give it the movements of the loop-taker but slightly in advance thereof; substantially as described.
2. In a sewing-machine a needle, a looper having forward and backward loop-taking and loop-leaving movements and sidewise or needle-avoiding movements, and a cooperating movable loop-detainer with means for operating it so that it moves forward slightly in advance of the looper, to move into engagement with the needle-loop in advance of the sidewise or needle-avoiding movement of the looper, and to move backward slightly in advance of the movement of the looper whereby the needle-loop is deflected and held back on the looper, and to release the needle-loop at the proper time to allow it to pass off the point of the looper; substantially as described.
3. In a sewing-machine, stitch-forming mechanism including a needle and a looper and a detaining device for the needle-loop, a support for said detaining device, and means for positively reciprocating said support comprising an eccentric on the driving-shaft, and lever and crank connections between said eccentric and the support and means for positively rocking said support; substantially as described.
4. In a sewing-machine, stitch-forming mechanism and a detaining device for the needle-loop, support for said detaining device, and means for positively reciprocating said support, including a horizontally-swinging lever with a compensating connection between it and the said support; substantially as described.
5. In a sewing-machine, stitch-forming mechanism and a detaining device for the needle-loop, a support for said detaining device,

and means for positively reciprocating said support comprising a horizontally-swinging lever with a compensating connection between it and the support, a rock-shaft on which the support is secured, and means for rocking the same; substantially as described.

6. A driving-shaft, a bell-crank lever oscillated thereby, a rock-shaft, a compensating connection between the rock-shaft and the lever to allow said rock-shaft to slide in its bearings without bind, a loop-detainer, a support therefor on the rock-shaft, and means for oscillating the support; all substantially as described.

7. A driving-shaft, a bell-crank lever, an eccentric and ball-joint connection between the shaft and the bell-crank lever, a loop-detainer or the like, a rocking support for the same, and a head having a ball-joint connection with the rocking support and a sliding connection with the bell-crank lever; substantially as described.

8. In a sewing-machine having a needle, a looper and a loop-detainer, a support for said loop-detainer comprising a rock-shaft, a frame clamped thereon and having a fork, a driving-shaft, a cam on the driving-shaft embraced by the fork, and an upwardly-extending arm to which the loop-detainer head is secured; substantially as described.

9. In a sewing-machine, a loop-detainer support, including a rock-shaft, means for rocking the same, a bell-crank lever having a link freely connected with the rock-shaft at one end and having a sliding engagement with the bell-crank lever at the other end, and means for operating the bell-crank lever; substantially as described.

10. A sewing-machine comprising a loop-detainer, a frame or support for the same, means for rocking said frame or support and means for sliding said frame or support including a bell-crank lever, means for operating it, the bar 14 slidably mounted in the bell-crank lever, and freely connected with the frame; substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

RUSSEL GREEN WOODWARD.

Witnesses:

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FRANCIS S. NORTH.