

(No Model.)

2 Sheets—Sheet 1.

J. BIGELOW.  
SEWING MACHINE.

No. 365,665.

Patented June 28, 1887.

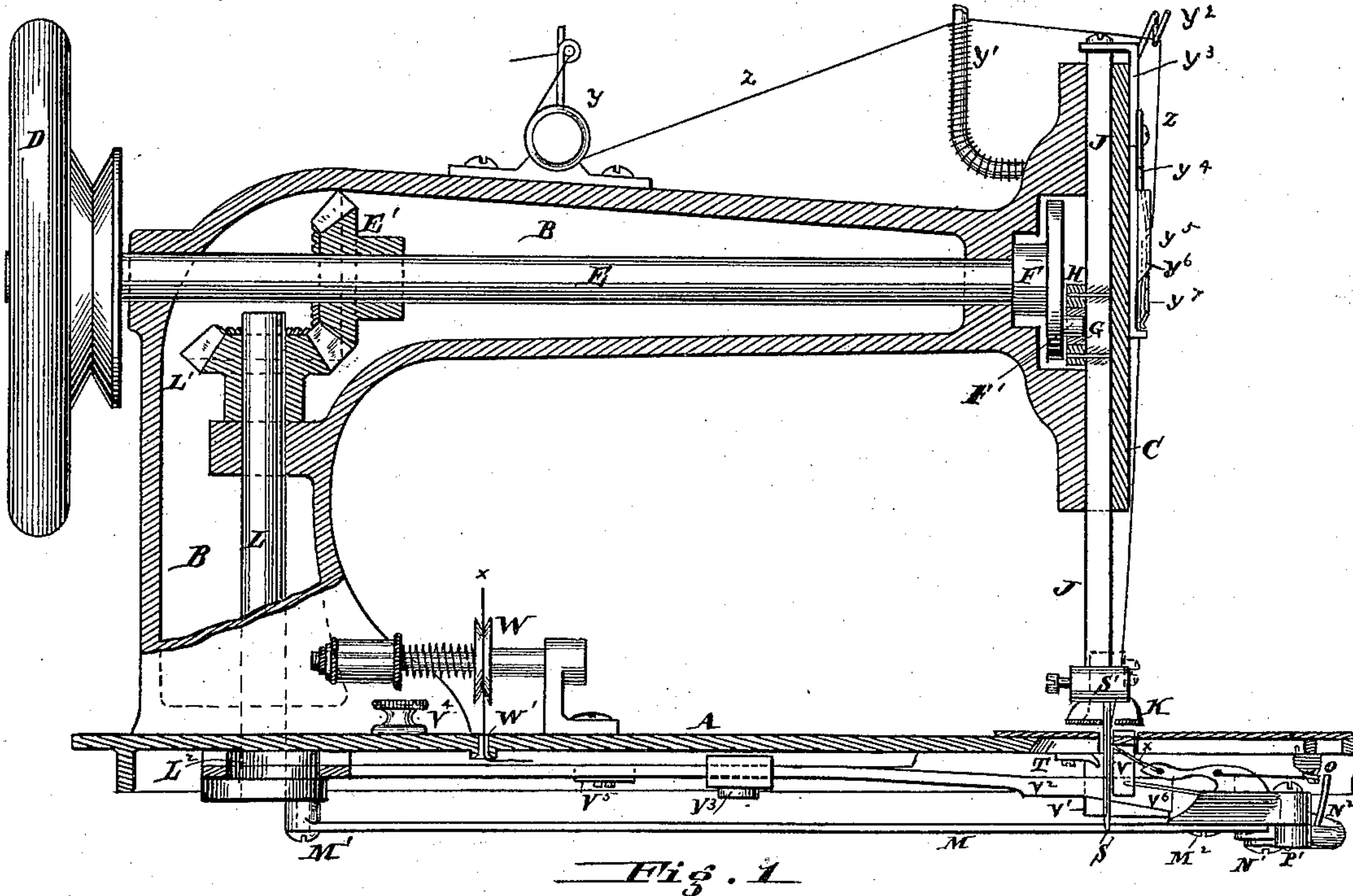


Fig. 1

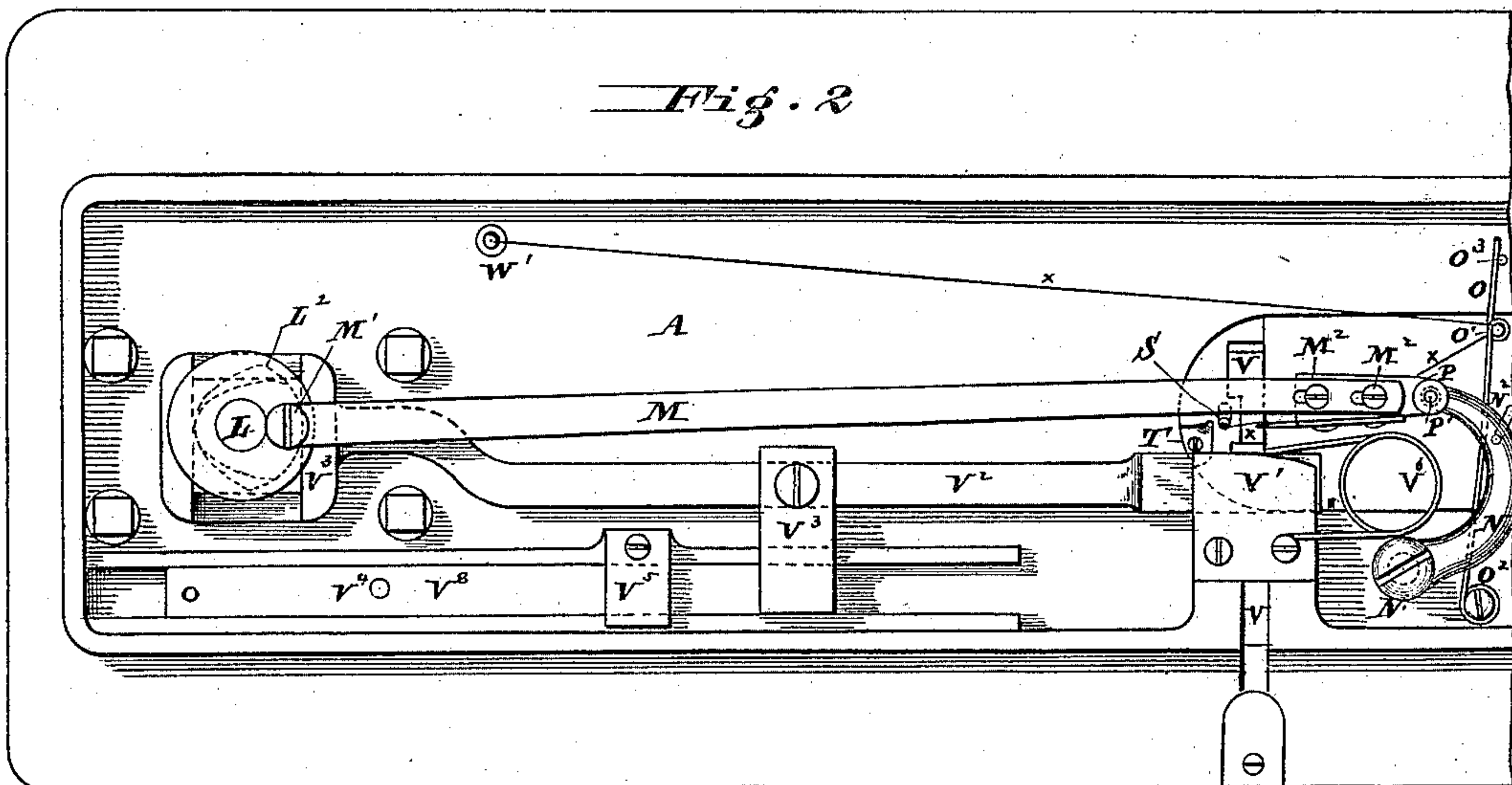


Fig. 2

Attests  
George Corwell  
J. H. Nottingham

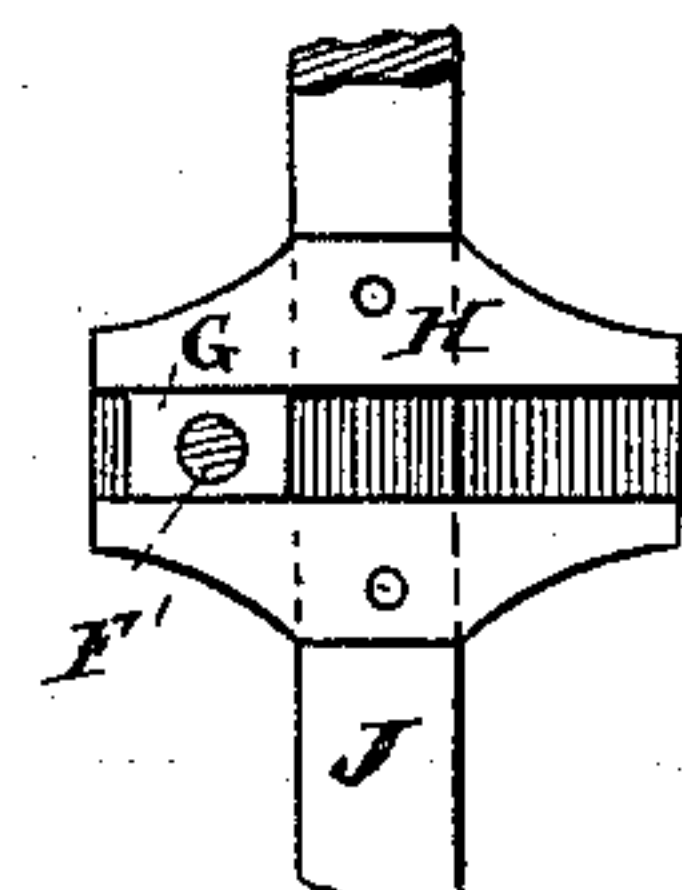


Fig. 3

Inventor  
John Bigelow  
by L. Deane  
his atty

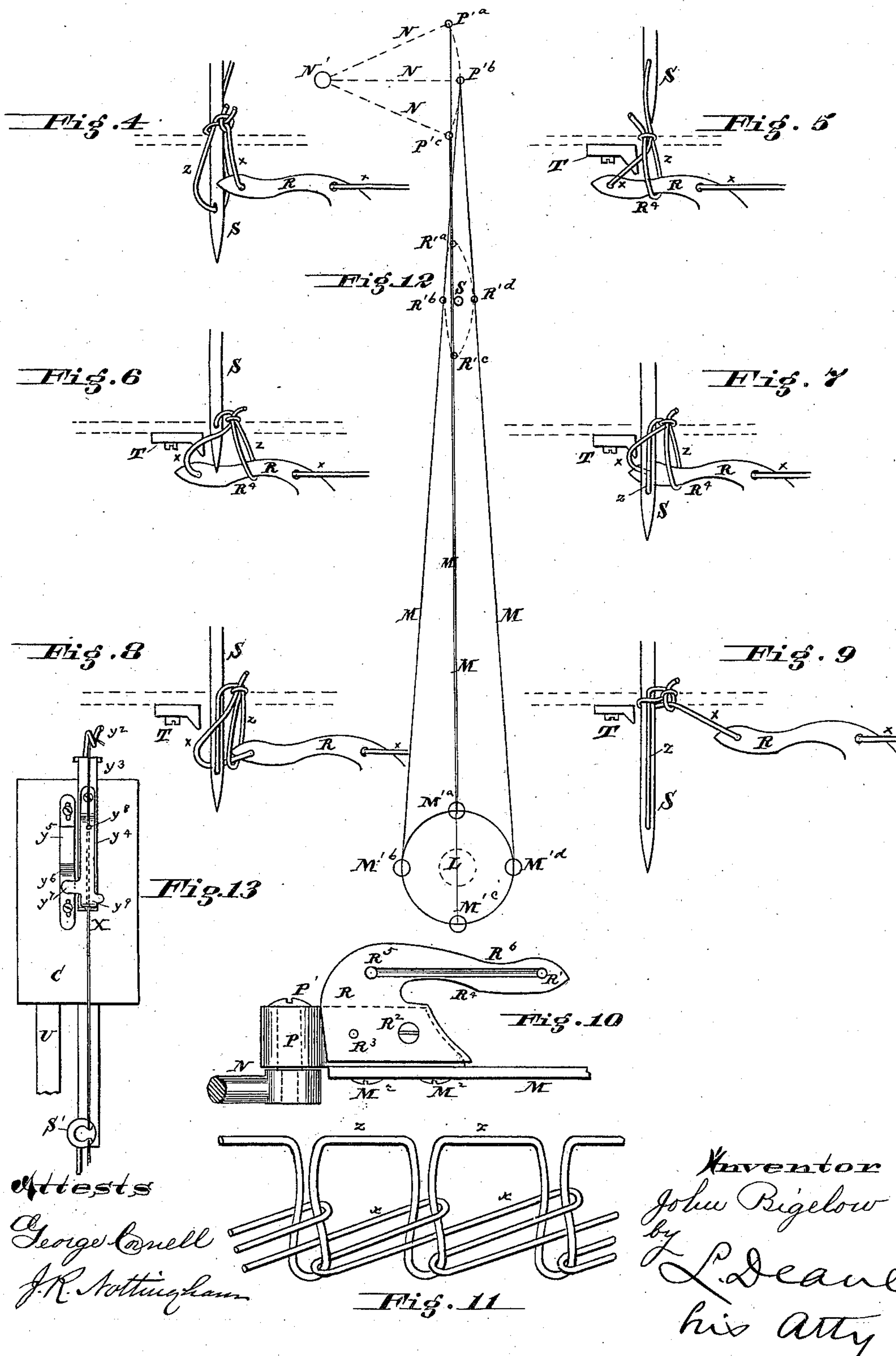
(No Model.)

2 Sheets—Sheet 2.

J. BIGELOW.  
SEWING MACHINE.

No. 365,665.

Patented June 28, 1887.





# UNITED STATES PATENT OFFICE.

JOHN BIGELOW, OF PHILADELPHIA, PENNSYLVANIA.

## SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 365,665, dated June 28, 1887.

Application filed April 19, 1882. Serial No. 53,843. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN BIGELOW, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Sewing-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to sewing-machines; and it consists of an organized stitch-forming mechanism capable of being driven at the highest rates of speed and by the interlooping of two threads making a stitch known as the "Grover and Baker."

The practicable speed hitherto for operating double-thread shuttle-machines is from six hundred to fourteen hundred stitches per minute. The crank which operates the needle-bar is at the end of the driving-shaft of the machine, on the opposite end of which, counterbalancing the reciprocations of the needle-bar, is the balance-wheel of the machine, while the rod carrying my looper is actuated directly by an eccentric or cam having a small throw, which eccentric or cam is rotated by means of beveled gearing from the driving-shaft of the machine. The end of the rod carrying my looper, and opposite to its end secured to and operated by the eccentric, is controlled and governed by a swinging link secured to the frame of the machine, and swings in so small a segment of a large arc as to practically have only a forward and back movement in a straight line. The point of my looper is situated between the link-connection and eccentric, which situation on the rod causes its movements to be that of an elongated flattened oval. The elongation is at right angles to the feed, and its flattening is sufficient to cause the looper, in its forward movement, to pass on one side of the sewing-needle, from which it takes a loop, and on its return to pass on the opposite side of the needle, to which needle, on its downward movement, it delivers a loop of its own thread. My looper is so arranged in relation to an opening in the bed-

plate of the machine that it can be easily threaded. Its thread is so controlled by the intermittent action of a thread-controller as to be tightened just when the needle is about to pass through its loop. At this time the thread has been caught by the point of a spreader, over which, in its movements, the looper has swung, and is so spread out as to prevent the sewing-needle from missing its loop, and thus causing a skip in the series of stitches. The looper is adapted to spread the needle-loop which it takes in a direction opposite to that in which its own thread is held and spread, so that the sewing-needle in its downward movement may pass between the two. It is grooved on the side opposite to that on which it delivers its thread, in order to prevent friction between its own and the needle thread when it carries a loop of the same, or else reduce the friction to a point barely sufficient to assist in the drawing back and spreading of said needle-thread loop, as before referred to. The needle-thread is controlled in a manner somewhat similar to the old Grover and Baker mechanism, but in a new and special combination, while the lower or looper thread is controlled by a tension device and the intermittent action of a thread-controller, already referred to. I use the old and well-known form of feed mechanism to be found on the Singer sewing-machines, making no claim to its details, and not limiting myself to its use, since others may answer equally well. The needle-bar is connected with the driving mechanism by means of a straight cross head (see Fig. 3) arranged at right angles to its line of reciprocation, and in a slot of said cross-head slides a square block fitted in size to the width of the said slot, said block being fitted to and working on a pin through its center, which pin is fastened to the end of the driving-shaft of the machine sufficiently out of center to give the required reciprocation of the needle-bar. Instead of the block, a friction-roll can be used, and instead of the cross-head and block a swinging-link connection between the needle-bar and eccentric-stud can equally well be used.

The accompanying drawings show the principle of construction of my mechanism without special reference to exactness of dimension of parts.

In order that the invention and the manner



of carrying the same into effect may be fully understood, the same will now be described in connection with the accompanying drawings, which form a part of this specification.

5 Figure 1 is a sectional view of the stitch-forming mechanism on the line of the needle. Fig. 2 is a plan view of the bottom of the machine, showing the looper mechanism and parts. Fig. 3 is a plan view of the needle-bar cross-head, its sliding block, and crank-stud. 10 Figs. 4, 5, 6, 7, 8, and 9 illustrate the formation of the stitch. Fig. 10 is an enlarged view of the looper proper, showing its thread-holes, grooves between the same, connection 15 with looper-rod, and the connection of the rod with its link. Fig. 11 is an enlarged view showing the interlocking of the threads in the formation of the stitches. Fig. 12 is a diagram to illustrate the passage of the looper- 20 points about the needle. Fig. 13 is a plan view of the face-plate to illustrate the construction of the intermittent adjustable tension of the sewing-needle thread.

The same letters indicate like parts when 25 they occur in the different figures.

A is the bed-plate of the machine; B, the neck; C, the face-plate; D, the driving and balance wheel.

E is the driving-shaft of the machine; F, the 30 crank-disk at the end of the shaft E, from which, by means of the stud F', block G, and cross-head H, a vertical reciprocating motion is conveyed to the needle-bar J, Figs. 1 and 3, said bar being confined in the necessary 35 bearings, either in the face-plate C or attached to the neck B. The needle S, Figs. 1 and 2, is clamped at S' to the end of the needle-bar J. Since the stud F' is secured to the crank-disk F out of its true center on the shaft E, 40 each revolution of said shaft causes a reciprocation of the needle-bar J equal to said eccentricity. By means of the equal-sized beveled gears E', attached to the horizontal shaft E, and L', attached to the vertical shaft L, the 45 movements of the shaft E are conveyed through the shaft L down the neck B, through and to the bottom of the bed-plate A, to which the neck B is attached. At the end of the shaft L which projects below the bed-plate A 50 are attached the feed-cams L<sup>2</sup>, which operate a feeding device similar to that used on the Singer Family Machine, consisting of the feed-lever yoke V<sup>3</sup>, lever V<sup>2</sup>, incline V<sup>6</sup>, raising incline V<sup>7</sup>, stitch-regulator V<sup>8</sup>, thumb-screw V<sup>4</sup>, 55 and feed-dog V, Fig. 2.

As I do not lay any claim to the mechanism, and as the operation of a four-motion feed is well known, I will not describe the movements of the parts in detail, but refer to them from 60 time to time, as their movements become essential to the operation of my stitch-forming mechanism.

Beneath the bed-plate A is the looper-rod M, connected at one of its ends by the crank- 65 stud M' to the end of the revolving shaft L, from which it receives its motion, and at its other end it is adjustably secured, as at M<sup>2</sup>, to

the looper-block P, Figs. 1, 2, 10, which block P is connected by the stud P' to the link N, which in turn swings on the stud N' in the 70 bed-plate A.

Between the ends P' and M' of the looper-rod M is the looper R, attached to the looper-block P by pin R<sup>3</sup> and screw R<sup>2</sup>, or other suitable manner, with its working-point R' pointing toward the stud M'. The looper R, being 75 thus connected with and attached to the looper-rod M, necessarily conforms in its movements to that of the rod. Now, the rod M at its end connected by the crank-pin M' with the revolving shaft L has a circular motion, and at its end connected by the stud P' with the link N has a reciprocating movement. The point R' of the looper R is between the studs M' and P', but nearest the stud P', and moves on the 85 line of a flattened or elongated oval, by which movement it passes alternately on either side of the sewing-needle S, whose line of vertical reciprocation is substantially the center of the oval. This I illustrate by the diagram, Fig. 12, 90 in which lines N represent the link swinging on a stationary point, N', to which link the rod M is attached at one of its ends, as at P<sup>a</sup>, and at its other and opposite end at M<sup>a</sup>. The point R' shows the relations of the looper-point to the 95 ends of its rod M. When the end of rod M has reached a point marked M<sup>a</sup>, its other end will be at a point indicated by P<sup>a</sup> and the looper-point at the place indicated at R<sup>a</sup>. When the end of the rod M has moved from M<sup>a</sup> to M<sup>b</sup>, the 100 other end has come from P<sup>a</sup> to P<sup>b</sup> and the looper-point to R<sup>b</sup>. When the end of the rod is at M<sup>c</sup>, its other end is at P<sup>c</sup> and the looper at R<sup>c</sup>. When the end of rod M is at M<sup>d</sup>, the other end is again at P<sup>b</sup>, but the looper-point 105 is at R<sup>d</sup>. Finally, the end of the rod M having returned to M<sup>a</sup>, its opposite end is again at P<sup>a</sup> and the looper-point again at R<sup>a</sup>.

The dotted line R<sup>a</sup> R<sup>b</sup> R<sup>c</sup> R<sup>d</sup> shows the path of the looper-point R' and the elongated oval, 110 to which I have referred; also, the point S shows the relation of the needle to the same. The looper R has a reversed sinuous curved outline. It is secured to the block P at R<sup>2</sup> and R<sup>3</sup>, and above has a long needle-like projection with thread-holes at R' and R<sup>5</sup>, and between them, on one side, a groove for the thread. 115 On its outer and upper edge, Fig. 10, between the points R' and R<sup>5</sup>, it has a concave outline, R<sup>6</sup>, while on its lower outline, as shown on the 120 drawings, is formed a swell at R<sup>4</sup>. Beyond R' the looper ends in a point.

In the drawings, *z* represents the needle-thread, and *x* the lower or looper thread. The needle-thread *z* is controlled by the tension- 125 disks *y*, Fig. 1, the take-up spring *y'*, the support for which is shown cut off at the top, the guide *y''*, which is at the top of the needle-bar and follows its movements. From the guide *y''* the thread passes through the opening *y'''* in 130 the spring *y'*, which is attached to the piece *y''*, which in turn is attached to the top of the needle-bar J and follows the reciprocations of said bar. After passing through the opening



$y^8$ , the thread passes beneath the end of the spring  $y^4$ , where it presses at  $y^9$  on the piece  $y^3$ , thence through a guide on the turned-up end of  $y^3$  and down to and through the needle S. The  
 5 spring  $y^4$  has a projection,  $y^7$ , on its side, which extends out and over an adjustable piece,  $y^5$ , having an inclined plane,  $y^6$ , which piece  $y^5$  is attached to the face-plate C of the machine. When the needle-bar is down, the projection  
 10  $y^7$  is relieved from pressure on its under side, and the thread  $z$  is pinched at  $y^9$  between the end of the spring  $y^4$  and the piece  $y^3$  and a tension additional to that of the tension  $y$  placed upon the needle-thread. As the needle-bar  
 15 rises the projection  $y^7$  is pressed up, when it meets the inclined plane  $y^6$  and the pressure on the thread  $z$  is relieved. The lower or looper thread,  $x$ , passes between the disks W, and thence through the bed-plate at W', Fig.  
 20 1, to a ring or eye, O', in the thread-controller O, Fig. 2. It passes through said ring or eye O' to and through the thread-hole R<sup>5</sup> in the looper R, along the grooved side of said looper, and finally through the thread-hole R'.  
 25 On the under side of the needle throat-plate, and a little in advance of the line of its perforation by the needle, is the thread-spreader T, Figs. 1 and 2.

The presser-foot is shown at K, Fig. 1.

30 The thread-controller O is attached to the bed-plate A at O<sup>2</sup>, and bears at its opposite end against a pin, O<sup>3</sup>, in said bed-plate. It has an eye, O', through which the thread passes. This thread-controller is operated by  
 35 a pin, N<sup>2</sup>, in the link N, which strikes it and presses it forward toward the direction in which the looper R' is being moved, which is toward the tension W. Its movement is begun just as the looper-point R' passes the needle.  
 40 Since it receives its forward movement from the link N, it follows it back on its return movement, assisted by the agency of a spring, and tightens the thread just as it has been caught on the spreader T and before the  
 45 needle has passed through the loop, when the action of the pressure from link N upon it ceases, although link N itself swings still farther back. Since the controller stops and the looper is drawn still farther back toward it,  
 50 the thread  $x$  is loosened sufficiently to allow the needle to set up its thread  $z$ —that is, take up its own back loop.

The operation of the machine in the formation of the stitch is as follows: The material to  
 55 be sewed having been placed between the presser-foot K and the work-plate A of the machine, and the needle in the bar J having descended to its lowest point, and the spring  $y^4$  having passed off from the inclined plane  
 60  $y^6$ , pinching the upper thread,  $z$ , at  $y^9$ , the needle beginning to rise, the spring holding the thread  $z$  at  $y^9$  causes it to rise with the needle and throw out a loop, Fig. 4. With the rising of the needle the looper R is timed  
 65 to move forward. It passes through the needle-loop on the front side of the needle, as shown in the drawings, sufficiently far for said

loop when the needle is at its highest elevation to have slipped over the swell R<sup>4</sup>, as shown in Fig. 5, when the looper-thread  $x$  has  
 70 the position shown in said figure. At this time the looper-point R' is passing the position R<sup>6</sup> in the diagram, Fig. 12. As it swings around its thread  $x$  is caught on the point of the spreader T. With the rising of the needle-  
 75 bar J the pressure on the needle-thread  $z$  is relieved by the lifting of the spring  $y^4$  from the piece  $y^3$  at  $y^9$  as the projection  $y^7$  rides up the incline at  $y^6$ . The material being sewed is fed forward when the needle has been lifted  
 80 free from the work. After the needle begins to descend and has pierced through the work, and the looper slightly drawn back, the relation of the needle and looper will appear, as shown in Fig. 6. The looper is now  
 85 back of the needle, instead of in front, as in Fig. 4. Its loop is drawn around the spreader T, and the needle-loop is drawn in an opposite direction by the swell R<sup>4</sup> on the looper R. This secures the positive passage of the needle  
 90 through a loop of the looper-thread, as is shown, while the needle has descended lower and the looper has drawn still farther back in Fig. 7. The looper having drawn back clear of the needle draws its thread off from  
 95 the spreader T and leaves it around the needle S; also frees itself from the needle-thread loop, as is shown at Fig. 8. At this time the needle-thread  $z$  is pinched, as described at  $y^9$ , and no more thread given off. As the needle descends  
 100 still lower it must receive a thread-supply from some source, and obtains it by drawing up its own long loop (shown at  $z$ , Fig. 8) to the position shown in Fig. 9, and the stitch is formed. As the needle rises and the looper moves for-  
 105 ward the position of the parts shown in Fig. 4 is again assumed, the looper passing a loop of its own thread through a loop of the needle-thread. With the continued movements of the parts, as shown in Figs. 5, 6, 7, 8, 9, in suc-  
 110 cession the needle passes a loop of its own thread through a loop of the looper-thread, which again is taken by the looper and a series of stitches formed, as shown by Fig. 11.

In my application filed August 7, 1883, Serial No. 103,057, some features now shown and referred to are shown, and I do not propose to claim any such as new in this case.

It will be observed that the looper R is arranged to point toward the crank by which  
 120 the looper-bar is operated. This arrangement is of importance, as the looper being thus brought nearer to the forward end of the machine than if it were arranged to point in the  
 125 opposite direction it can be more conveniently threaded. It also better insures the engagement of the loop with the loop-spreader and permits the latter to be placed more out of the way of the feed. The forward end of the looper-rod M, instead of being carried by  
 130 the swinging link N, may be pivoted to a slide, which can be arranged to reciprocate in guides arranged longitudinally of the bed-plate of the machine, in which case the forward end of the



looper-rod will move in a rectilinear path, instead of describing a curved path, as in the arrangement shown. It will be obvious to those skilled in the art that these two constructions will be substantial equivalents.

I claim—

1. A looper held between two operative bearings, one of which has a circular movement and the other a reciprocating movement, in combination with mechanism to actuate said bearings, and with a reciprocating needle, substantially as described.

2. The combination, with the reciprocating needle operated by a crank on the driving-shaft, of a looper held between two movable bearings, one of which has a circular movement and the other a reciprocating movement, said looper being arranged to point in the direction of its operative crank, substantially as and for the purpose set forth.

3. In a sewing-machine, a looper hung between two operative bearings, one of which

has a circular movement and the other a reciprocating movement, said looper moving in an elliptical path around the line of movement of the needle, in combination with a reciprocating needle, suitably-connected cranks for operating the looper and the needle, and mechanism for operating said cranks at a uniform speed, substantially as described.

4. In a sewing-machine, the combination, with the looper-bar M, held between two operative bearings, one of which has a circular movement and the other a reciprocating movement, and the looper R, constructed and actuated as described, of the tension W, the thread-controller O, and the reciprocating needle, substantially as described.

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

JOHN BIGELOW.

Witnesses:

G. W. BALLOCH,  
L. DEANE.