

(No Model.)

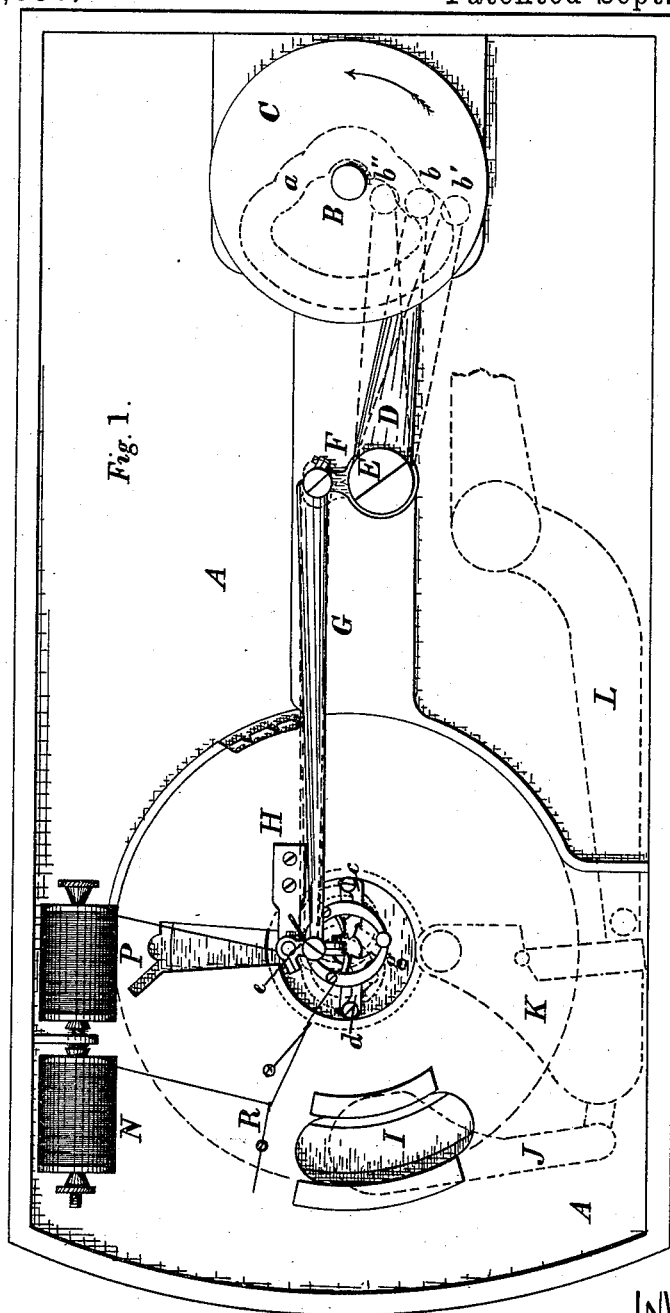
2 Sheets—Sheet 1.

J. G. GREENE.

BUTTON HOLE SEWING MACHINE.

No. 304,638.

Patented Sept. 2, 1884.



WITNESSES =

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INVENTOR=

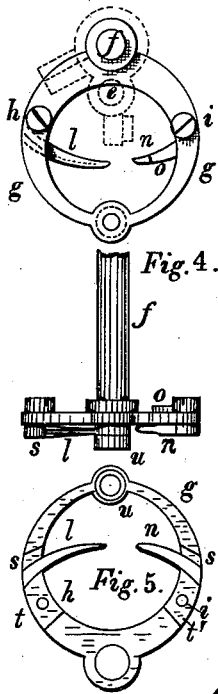
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2 Sheets—Sheet 2.

BUTTON HOLE SEWING MACHINE.

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Fig. 2.



b', Fig. 3.

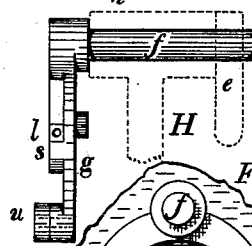


Fig. 6

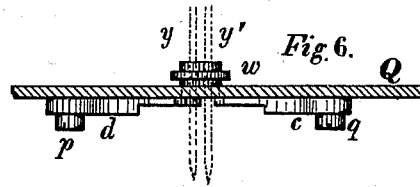


Fig. 10.

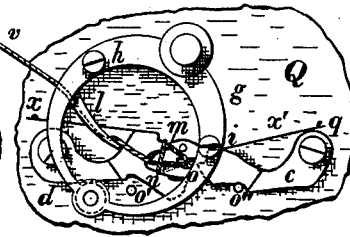


Fig. 8.

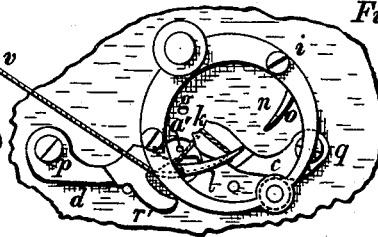


Fig. 11.

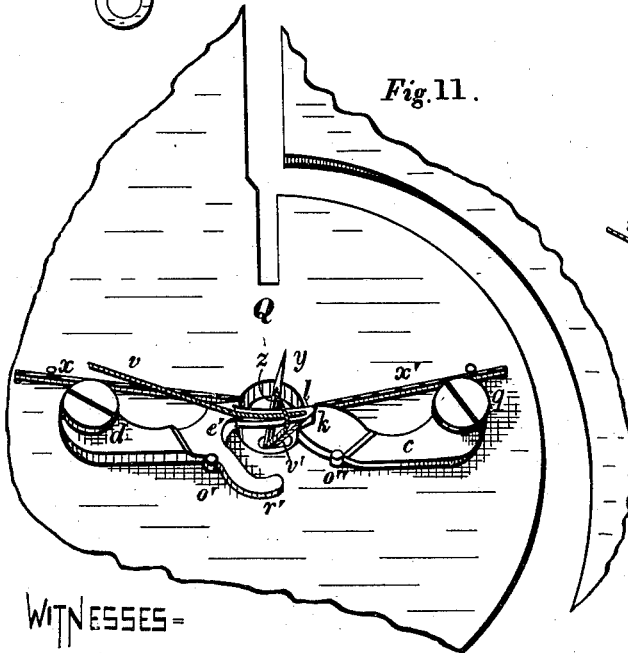
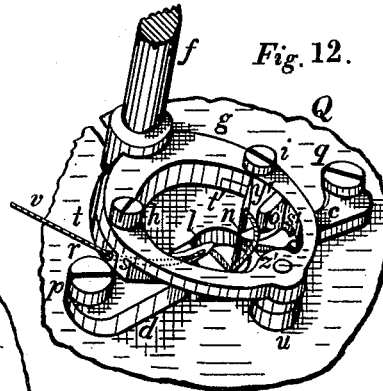


Fig. 12.



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UNITED STATES PATENT OFFICE.

JAMES G. GREENE, OF ROCHESTER, NEW YORK, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, OF NEW JERSEY.

BUTTON-HOLE SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 304,638, dated September 2, 1884.

Application filed December 13, 1882. (No model.)

To all whom it may concern:

Be it known that I, JAMES G. GREENE, of Rochester, Monroe county, New York, have invented certain Improvements in Button-Hole Sewing-Machines, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to improved mechanism for forming the stitch in button-hole sewing-machines; and it consists in an improved construction of the stitch-forming mechanism, as hereinafter more fully described and specified.

Figure 1 is an inverted view of the bed of a button-hole sewing-machine, showing my improvements. Fig. 2 is a view of the swinging looper-carrier and the loopers, as seen from below, when in the machine. Fig. 3 is a side view of the looper-carrier. Fig. 4 is an elevation of the same. Fig. 5 represents the same inverted. Fig. 6 is a section through the plate of the machine, showing the spreaders attached to the lower side thereof. Fig. 7 represents the position of the parts at the beginning of the stitch. Fig. 8 represents the position of the parts when the looper-carrier is at the end of its oscillation to the right. Fig. 9 represents the position of the parts while the looper-carrier is swinging to the left, showing the loop of upper thread on the short looper. Fig. 10 represents the position of the parts when the looper-carrier has completed its swing to the left, showing the position of the thread about the short looper and around the point of the long spreader. Fig. 11 represents the position of the parts when the long looper is carrying the lower thread through the loop formed by the needle when it descends in the button-hole slit. Fig. 12 represents the position of the parts when the short looper is engaged with the loop of needle-thread formed by the needle when it descends through the cloth.

My improvements are designed to be attached to the well-known "Singer" button-hole sewing-machine, in place of the stitch-forming mechanism ordinarily used thereon.

In the accompanying drawings, Fig. 1 represents the under side of the bed of a Singer button-hole sewing-machine, showing the manner of operating my improved swinging loop-

er-carrier from a groove in the cam C on the upright spindle B of the machine, by means of the lever D and connection G. The cam C is provided (preferably on its upper side, the under side being furnished with a cam-groove to operate the feed-lever L) with the cam-groove *a*, in which runs the roller *b* on the end of the lever D. By the rotation of the cam C the roller *b* is caused to assume the positions indicated at *b'* *b''*, thereby causing the lever D and arm F to oscillate about the stud or pin E, as represented by the dotted lines. The connection G is pivoted to the end of the arm F, and receives a longitudinal reciprocating movement therefrom, which it transmits to the looper-carrier *g* through the arm *e* and rock-shaft *f*. The arm *e* is pivoted to the end of the connection, and attached to the rock-shaft outside of the journal *h*, which is secured to the bed of the machine by the foot H. The swinging motion of the circular looper-carrier is represented by dotted lines in Fig. 1. During its reciprocation it actuates the spreaders *c* and *d* by means of a roller, *u*, which comes in contact with the outer surfaces of the spreaders, which are pivoted at their outer ends to the plate Q at *p* and *q*, Figs. 7, 8, and 12.

The looper-carrier consists of a ring, *g*, fastened at one side to the rock-shaft *f*, carrying the roller *u* on its opposite side, and provided with the long and short loopers *l* and *n*, projecting inward from the ring. The looper-carrier oscillates to and fro immediately below the spreaders *c* and *d*, which may be made thicker toward their pivotal points to receive the impact of the roller *u*. (See Fig. 6.) The long looper *l* is provided with an opening or slot on its back, or the side away from the needle, in which the lower thread passes, (see Figs. 11 and 12,) and through an eye-hole near its point. The long looper is attached to the looper-carrier by a clamp-block, *t*, and screw *h*, by which it is held in position against a lug, *s*. (See Figs. 3 and 5.) Any other suitable mode of attaching the looper to the looper-carrier may be adopted. The short looper *n* is secured to the looper-carrier, in a manner similar to that employed on the long looper, by the use of screw *i*, clamp-block *t'*, and lug *s'*. The short looper *n* is provided on its lower surface, or that away from the plate Q,

with a projecting shoulder or lug, *o*, Fig. 12. The surfaces of the loopers next the needle are formed on a circular line struck from the center of the rock-shaft *f*, so that in their oscillations they just clear the needle in its different positions. The spreaders *c* and *d* are held against the pins or stops *o' o''* by the springs *x x'*, Figs. 10 and 11. The form of the spreaders is represented in the drawings. The long spreader is provided with an arm, *r'*, Fig. 9, which extends inward away from the operator into the path described by the roller *u* in its oscillations, so that the point of the long spreader is moved forward by the roller as it passes the center of the to-and-fro motion of the looper-carrier. The long spreader *d* is provided at its inner end with a projecting point, *m*, Figs. 7 and 10, having a shoulder to prevent the thread from passing too far on the point. Back of the point there is formed a notch, *e'*, Figs. 9 and 11, which receives the lower thread, as represented in Figs. 9 and 10, during the left-hand throw of the looper-carrier. The edge of this notch may be rounded or beveled, to prevent abrading the thread. The short spreader *c* is also provided with a notch, *k*, Figs. 8 and 11, which receives the lower thread from the eye of the long looper, and carries it forward to form a loop, through which the needle descends when it comes down through the cloth.

The mechanism for operating the needle and the cloth-clamp are of ordinary construction. The needle descends near each end of a slot in the plate-button *w*, Fig. 6, its position when down through the button-hole slit being represented at *y*, Figs. 6 and 11, and when down through the cloth at *y'* in Figs. 6 and 12. A recess is formed in the lower side of the button *w*.

The operation of forming the stitch is performed as follows: The needle comes down through the slit of the button-hole, and by a slight upward motion of the needle a loop of thread is thrown out, through which the lower thread is carried by the motion of the long looper from left to right in Figs. 7 and 11. The needle comes down just forward of the length of thread reaching from the eye in the point of the long looper to the fabric through the slot in the button *w*. The needle rises while the long looper swings to the right into the position shown in Fig. 8, the roller *u* striking against the side of the short spreader *c* and throwing it forward into the position shown in Fig. 8, the point *k* of the short spreader carrying forward the lower thread between the long looper and the slot, as represented in Fig. 8, so as to form a loop through which the needle descends in passing through the fabric at the right-hand end of the slot. As the needle descends, throwing out a loop of the upper thread, the short looper swings toward the left, the loop of the upper thread, which encircles the long looper, slips off the point of the long looper *l*, being drawn up toward the fabric by the descent of the needle through the cloth,

and the action of the upper take-up spring, which is of ordinary construction. As the long looper is swung to the left, the lower thread is left around the needle in its position at the right-hand end of the slot. The lower thread has thus formed a loop about the loop of upper thread brought down by the needle through the cloth. As the short looper swings to the left its point passes through the loop of upper thread thrown out by the needle, as shown in Figs. 9 and 12. The needle rises during the continued motion of the short looper to the left, which carries the loop of needle-thread to the left, so that the portion of the loop nearest the operator is caught on and carried forward by the point *m* of the long spreader, as represented in Fig. 10, the point of the long spreader being carried forward by the roller *u* on the looper-carrier at the extremity of its swing to the left. A loop is thus formed in the needle-thread, through which the needle, in coming down through the slit in the fabric, brings another loop of needle-thread, through which the lower thread is carried by the long looper by its motion to the right at the commencement of the next stitch. The long spreader is provided with an arm, *r'*, which reaches outward and comes in contact with the roller *u* on the looper-carrier at the middle of its reciprocating path. When the looper-carrier swings from left to right, the roller carries forward the inner end of the long spreader by coming in contact with the arm *r'*; but this motion is without operative effect in the formation of the stitch. When the looper-carrier swings from right to left, the spreader is also carried forward by the roller *u*, and this forward motion allows the lower thread to pass back of the point *m* of the spreader into the position in the notch *e'* in the end of the spreader, as represented in Figs. 9 and 10. The lower take-up spring, *R*, Fig. 1, serves to keep the lower thread taut during the operation of making the stitch.

A strengthening-cord from the spool *P*, Fig. 1, may be used in the ordinary manner, passing through the hole *a'*, Fig. 8, in the button *w*.

The advantages which my improved stitch-forming mechanism possesses over the devices for the same purpose generally in use are, that the strength of the lower take-up spring may be reduced, thereby avoiding the unthreading of the lower thread at the completion of the button-hole; the motion of the loopers and spreaders is obtained from a single cam-groove, so that there is no liability of their getting out of their proper relative time; the oscillating motion of the loopers is shortened, thereby reducing wear and friction; the parts are more readily accessible and susceptible of finer adjustment. My improved stitch-forming mechanism is also more durable at high speeds.

It is obvious that the looper-carrier *g* may be made of a form other than the circular one shown in the drawings. Instead of using the

roller *u*, the spreaders may be provided with arms extending forward from the pivotal points actuated by lugs or rollers on the loop-carrier between the loopers and the rock-shaft.

In Fig. 1, I have represented, by dotted lines at L K J I, the improved feed mechanism patented to me October 31, 1882, No. 266,690; but my present improvements in the stitch mechanism may be used in connection with any preferred feed devices.

I claim—

1. The combination, with the reciprocating looper-carrier *g*, carrying the loopers *l* and *n*, of the separately-pivoted spreaders *c* and *d*, the latter being provided with notch *e'* and arm *r'*, substantially as and for the purposes set forth.

2. The combination, with the reciprocating looper-carrier *g*, provided with loopers *l* and *n*, and arranged to operate the spreaders *c* and *d*, of the rock-shaft *f*, arm *e*, connection *G*, bent lever *D F*, and cam-groove *a*, substantially as described.

3. In a mechanism for stitching button-holes, the combination of the horizontally-swinging looper-carrier *g*, provided with the loopers *l* and *n*, roller *u*, and the pivoted spreaders *c* and *d*, substantially as and for the purposes set forth.

4. In a mechanism for stitching button-holes, the combination, with the reciprocating looper-carrier, loopers, and movable spreaders, of a single cam-groove, and suitable connecting mechanism for operating the looper-carrier from the cam-groove, and for operating the spreaders from the looper-carrier, substantially as and for the purposes set forth.

5. The combination, in a mechanism for stitching button-holes, of the reciprocating

looper-carrier *g*, having loopers *l* and *n*, and roller *u*, with the spreaders *c* and *d*, substantially as and for the purposes described.

6. The combination, in a mechanism for stitching button-holes, of the spreaders *c* and *d*, provided with suitable cam-surfaces adapted to impart the proper motion thereto, with the pin or roller *u*, and suitable mechanism for operating the same from the single cam-groove *a*, which also operates the loopers, substantially as and for the purposes set forth.

7. In a mechanism for stitching button-holes, the combination of the single reciprocating pin or roller *u* with the pivoted spreaders *c* and *d*, provided with cam-surfaces which actuate the spreaders at each end of the reciprocation of the roller by contact therewith, substantially as and for the purposes set forth.

8. In a button-hole sewing-machine, a pivoted looper-carrier provided with two loopers, combined with two pivoted loop-spreaders, and with mechanism for operating said carrier, substantially as set forth.

9. In a button-hole sewing-machine, the combination, with two pivoted loop-spreaders, of a looper-carrier having two loopers and adapted to operate both of the said spreaders, and mechanism for operating said carrier, substantially as set forth.

10. In a button-hole sewing-machine employing a vertically and laterally reciprocating needle, a pivoted looper-carrier provided with two loopers, combined with two pivoted loop-spreaders arranged to vibrate across the line of the path traversed by the needle in its lateral movements, substantially as set forth.

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Witnesses:

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GEO. B. SELDEN.