(Model.) 3 Sheets—Sheet 1.

D. MILLS.

BUTTON HOLE SEWING MACHINE.

No. 266,044. Patented Oct. 17, 1882.

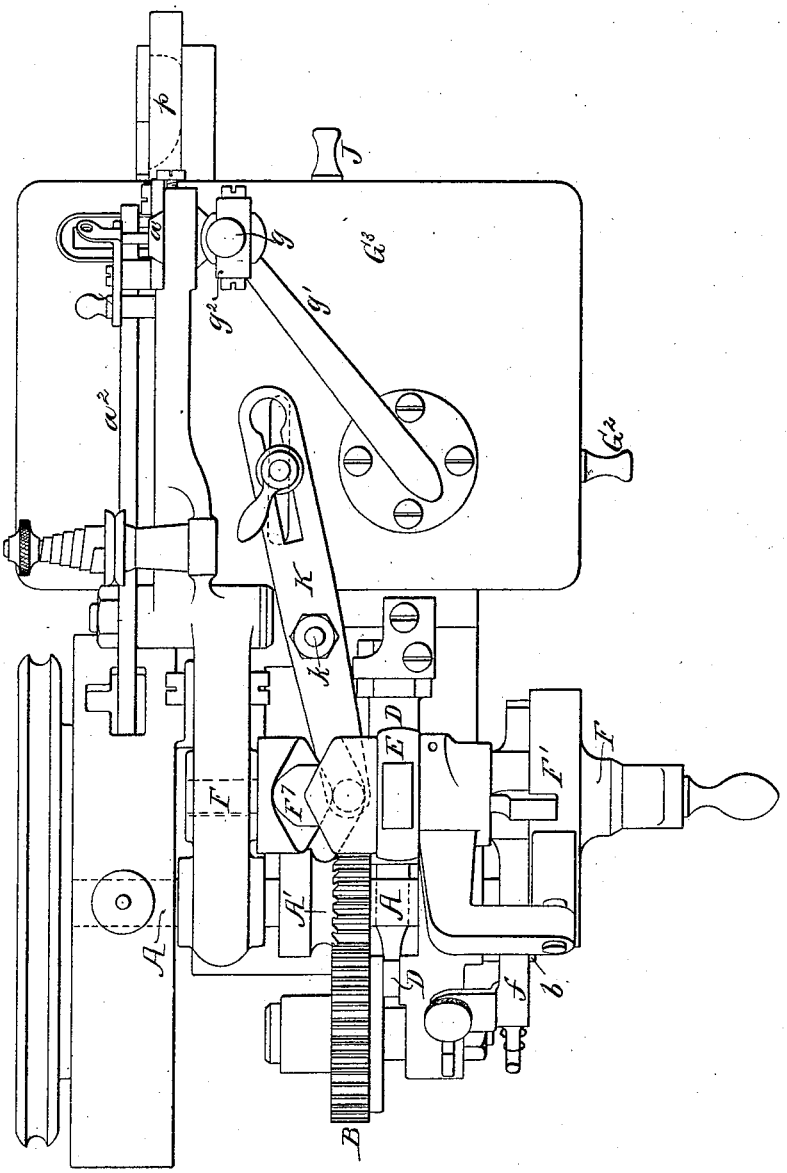

FIG. 1.

Witnesses:
David S. Williams
Harry Drury

Inventor:
Daniel Mills
by his Attorneys
Howson and Sons

(Model.)

3 Sheets—Sheet 2.

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BUTTON HOLE SEWING MACHINE.

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FIG. 2.

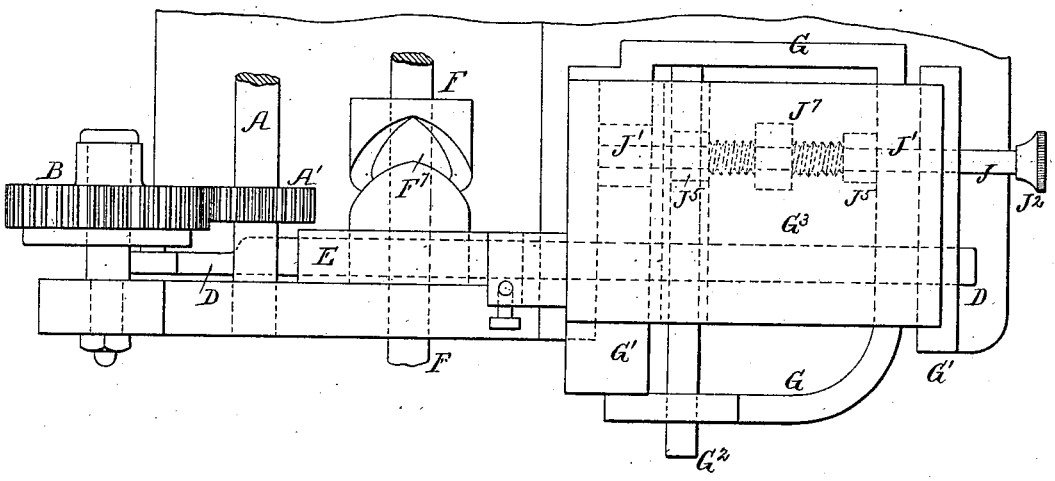


FIG. 3.

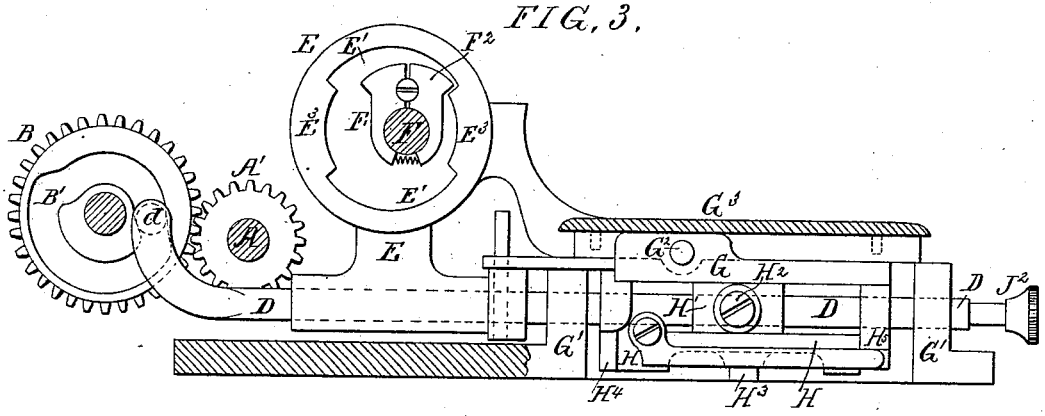
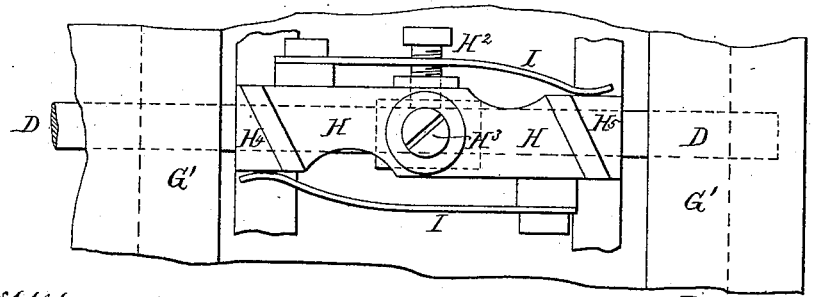


FIG. 4.



Witnesses:
David S. Williams
Harry Drury

Inventor:
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Howson and Sons

(Model.)

3 Sheets—Sheet 3.

D. MILLS.

BUTTON HOLE SEWING MACHINE.

No. 266,044. Patented Oct. 17, 1882.

FIG. 5.

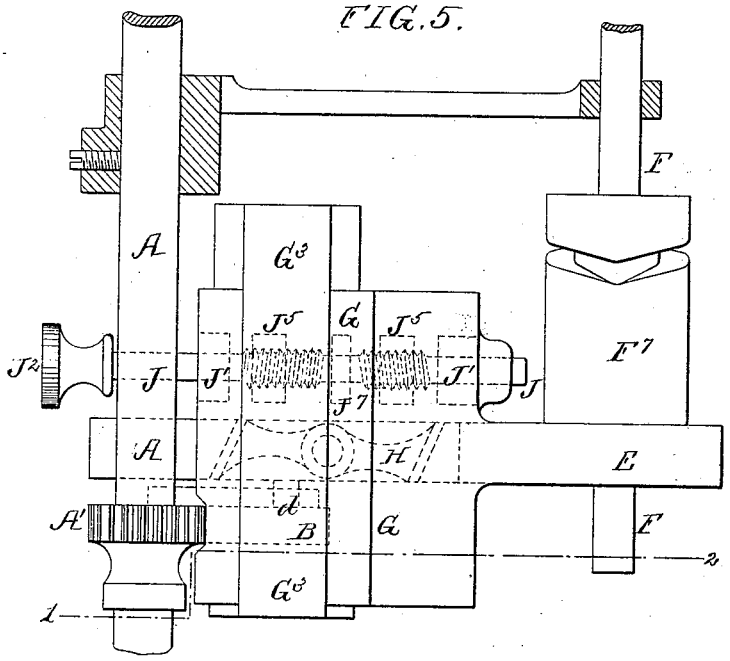


FIG. 6.

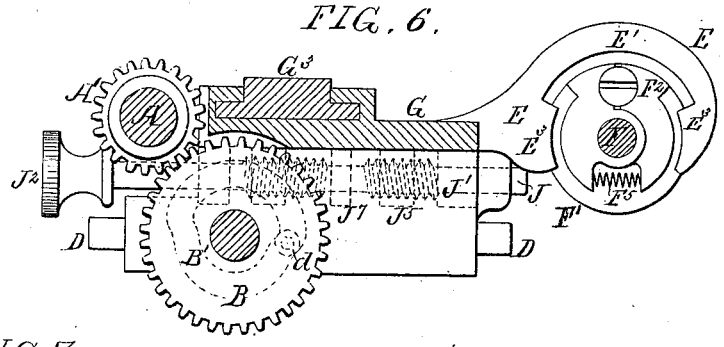


FIG. 7.

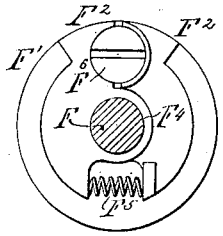


FIG. 8.

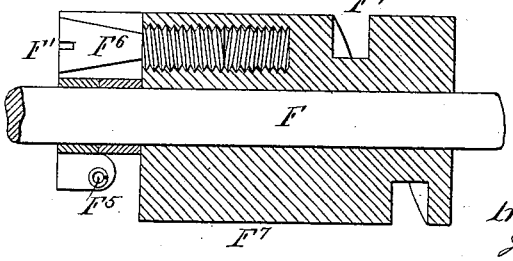


FIG. 9.

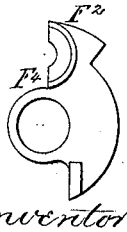
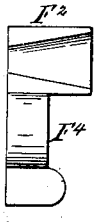


FIG. 10.



Witnesses:
David L. Williams
Harry Drury

Inventor:
Daniel Mills
by his atty's
Howson and Jones

UNITED STATES PATENT OFFICE.

DANIEL MILLS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE UNITED STATES AUTOMATIC BUTTON HOLE SEWING MACHINE COMPANY, OF NEW JERSEY.

BUTTON-HOLE SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 266,044, dated October 17, 1882.

Application filed March 28, 1881. (Model.)

To all whom it may concern:

Be it known that I, DANIEL MILLS, of Philadelphia, Pennsylvania, have invented certain Improvements in Button-Hole Sewing-Machines, of which the following is a specification.

My invention relates to certain improvements in that class of button-hole sewing-machines in which the material is held between a pair of clamps having an automatic lateral reciprocating motion and an intermittent feed-movement imparted to them, so that the needle may stitch the sides and "bar" the ends of the button-hole.

My invention relates more particularly to the devices through which the lateral reciprocation is imparted to the cloth-clamps, the object of my invention being to so construct these devices as to make them adjustable to vary the depth of bight of the stitches forming the sides of the button-hole, and also of the stitches forming the bar at each end of the button-hole.

My improvements are more particularly applicable to the class of machines, of which an example is seen in the patent granted to Frederick Simmons, June 24, 1879, No. 216,902, and reissued December 6, 1881, and in the accompanying drawings I have shown my improvements as applied to the improved form of machine for which the said Simmons obtained Letters Patent of the United States, November 8, 1881, No. 249,411.

In the accompanying drawings, Figure 1, Sheet 1, is a plan view of the Simmons improved machine, to which my invention can be applied; Fig. 2, Sheet 2, a plan view of sufficient of the machine to illustrate the application of my improvements thereto; Fig. 3, a side view of the same, partly in section; Fig. 4, an inverted plan view of the let-off motion or yielding connection employed on the Simmons machine; Fig. 5, Sheet 3, a plan view of a modification, partly in section; Fig. 6, a vertical section of the same on the line 1 2, Fig. 5; and Figs. 7, 8, 9, and 10, views of the adjustable cam for regulating the length of the reciprocating movement of the cloth-clamps.

Fig. 1 it will not be necessary to describe in detail, as it illustrates simply the Simmons improved machine, the sewing mechanism consisting of a reciprocating shuttle, p, with a vertically-reciprocating needle, whose needle-bar a' is operated by an arm, a^2, pivoted to the head of the machine and controlled by a cam on the main shaft A. The lower half of the cloth-clamp is formed on or by the traversing table G^3, while the upper part of the clamp is carried by a stem, g, passing through an opening in the arm g' carried by the table G^3, the stem being raised upward by a spring and held down by a pivoted catch, g^2, like an ordinary presser-foot. The table G^3 is mounted on a laterally-reciprocating slide by means of a rod, G^2, secured to the under side of the table and passing through openings in the slide, so that the necessary intermittent feed-motion may be imparted to the table G^3 and cloth-clamps by means of the lever K, pivoted at k to a fixed point on the machine, and acted on by a scroll-cam, F^7, forming a right-and-left-hand screw. This cam is mounted on a shaft, F, to which an intermittent rotary motion is imparted by the friction-clutch F' through the arm f, acted on by a cam, b.

The slide G, which carries the table G^3 and cloth-clamp, is mounted on a horizontal bar, D, and has the necessary reciprocating motion imparted to it in the direction of the length of this rod to form the bight of the stitches for the sides and ends of the button-hole. The bar D passes through openings in the portions G' of the frame, and at one end carries an anti-friction roller, d, adapted to a cam-groove, B', carried by the pinion B, by which a reciprocating motion is imparted to the bar, this pinion B being geared with and driven by a pinion, A', on the main shaft. To this bar is secured a block, H', by a screw, H^2, Fig. 4, and to the under side of the block is pivoted, by the pin H^3, a block, H, having beveled ends bearing against the correspondingly-beveled pendent portions H^4 H^5 of the slide G.

To each end of the block H is secured a spring, I, whose free end bears against the piece H^4 H^5, so as to tend to keep the block H centrally in position, with its ends bearing closely against the said pendent pieces. These devices constitute a yielding connection of the bar D with the slide G, so that while the latter will partake of the full extent of the recip-

rocating motion of the bar when there is nothing to obstruct it, yet when anything is interposed to limit the motion of the table the springs I will yield and allow the block H to turn on its pivot and the beveled ends of the block to slip on the pieces H^4 H^5. It is these limiting devices that determine the length of vibration of the table and cloth-clamp, and consequently the depth of bight or length of the stitches, the motion being limited while the sides of the button-hole are being formed, and the table having full play to give the long stitch to form the bars at the ends of the button-hole.

To the slide G is secured a yoke, E, which is guided on the rod and embraces a cam, F′, on the shaft F, Fig. 3, this cam having an intermittent rotary motion imparted to it with the cam F^7. This yoke has two internally-projecting segments, E^3 E^3, of equal size, and between the latter equal recesses E′ E′. The cam F′ has a single tappet or projection, F^2, which, when turned to a position to bear against either of the projections E^3 E^3, presents a working-face to limit the movement of the table and cloth-clamps in one direction; but when the cam lies in the recesses E′ between the projections the table has its full extent of movement with the bar D, limited only by the stops hereinafter referred to. The cam F′ bears such relation to the cam F^7 that when the pin on the lever K is at either of the junctions of the right and left hand screw of the cam F^7 to reverse the direction of the feed-motion of the table the cam F^2 will be in one or other of the recesses E′, and allow full play in both directions to the table G^3 to form the long stitches to bar the end of the button-hole. Then as the cam F′ continues to rotate intermittently each time the needle rises out of the material the projection will come into contact again with one of the segments E^3 and limit the motion of the table to form the short stitches down the other side of the button-hole.

The parts to which I have referred are fully shown and described in the above-mentioned patent of Frederick Simmons, except that in the Simmons machine the cam F′ has two working-faces for the yoke to come into contact with—that is, the cam limits the movement of the table in both directions—while one of the features of my present invention consists in constructing the cam with only one working-face, to limit the movement of the yoke and table at one end of their movement only, the other limitation being accomplished by separate adjustable nuts, hereinafter referred to.

My present invention also consists in combining a cam, F′, which is expansible and contractible, with the clamps, yoke, and yielding operating devices to vary the length of time the tappet F^2 will occupy in passing across the recesses E′ from one segment E^3 to the other when the machine is in operation, and so vary the number of long stitches for the bar.

My invention further consists in combining adjustable stops with the reciprocating clamps and yielding operating devices to vary the depth of bight or length of the stitches.

Referring first to the adjustable cam F′, which is fully illustrated in Figs. 7, 8, 9, and 10, it will be observed that it is made in two parts, each provided with a socket, F^4, adapted to fit on the shaft F, to which the cam F^7 is secured. Each half of the cam is provided on the projecting portion F^2 with a tapering semi-circular recess, which together form a tapering opening for the tapering head of the screw F^6, which screws into the cam F^7 and holds the two cams together. The two parts of the cam F′ are made to bear against the tapered head of the screw by means of a spring, F^5. Hence by turning this screw F^6 the size of the working-face of the tappet F^2 may be increased or diminished, so as to vary the number of long stitches to form the bar at the end of the button-hole.

Fig. 2 indicates in dotted lines my arrangement of adjustable stops carried by the slide G to vary the depth of bight of the stitches. In the pendent portion of the under side of the slide G are formed bearings J′ for a rod, J, parallel with the bar D, and which can be turned by its milled head J^2 in its bearings, but cannot move longitudinally therein. This rod J carries the stop-nuts J^5 J^5, which have internal screw-threads adapted to the right and left hand screw-threads on the said rod. The squared edges of these nuts bear against the under side of the slide G, so that by turning the rod J the nuts J^5 will not be turned with the rod, but will be caused to advance toward or recede from each other. Between the two nuts, and in their path, is a stop, J^7, secured to a fixed portion of the frame. In this case the rod J is shown as passing through the stop, having free play therein.

It will be seen that as the slide G, with its table G^3 and cloth-clamp, is vibrated by the bar D the movement of the table while the sides of the button-hole are being switched is limited in one direction by the tappet F^2 bearing against one of the segmental projections E^3, and in the other direction by one of the nuts J^5 striking the stop J^7. When the tappet F^2 is in one of the recesses E′ between the projections and the bar is being formed at one or other end of the button-hole, the extent of vibration of the table is limited in both directions by the stops J^5. By turning the rod J, therefore, so as to adjust the nuts nearer to or farther from each other, the length of the stitches or depth of bight may be accurately regulated.

In the modification shown in Figs. 5 and 6 the general construction and operation are the same as that above described, the location only of the parts being changed to adapt the improvements to a different style of sewing-machine. The upper slide or table, G^3, which carries the cloth-clamp, has the intermittent feed-motion imparted to it from the cam F^7 through the medium of an adjustable lever, as described

with reference to Fig. 1, while the lower slide, G, which carries the upper one, has the lateral reciprocating motion imparted to it to form the button-hole stitch from the driving-shaft A through the medium of the pinion B, cam B′, bar D, and yielding spring let-off or block H. The bar D in this case is a short rod adapted to bearings in the fixed portion of the frame, having a pin, *d*, adapted to the cam-groove B′, and carrying the pivoted block H and its springs, which act on the pendent portions of the slide G. The motion of this slide G is limited by the adjustable cam F′ and yoke E, which in this case is shown as made in one piece with the slide. The slide G also carries the adjusting-rod J, adapted to bearings J′, and carrying the stop-nuts J^5, which come into contact with the fixed stop J^7 on the frame and limit the motion of the slide G in connection with the cam F′, with its single working-face or tappet.

I claim as my invention—

1. In a button-hole sewing-machine, the combination of a stitching mechanism and reciprocating cloth-clamp, operating devices, and intermediate yielding connection, with a yoke attached to the clamp and having two projecting faces and intervening recesses, and a rotating cam with a single working-face, substantially as set forth.

2. In a button-hole sewing-machine, the combination of a stitching mechanism and reciprocating cloth-clamp, operating devices for the latter, and intermediate yielding connection, with a yoke having two projecting faces and intervening recesses, and an adjustable cam therefor, substantially as specified.

3. In a button-hole sewing-machine, the combination of a stitching mechanism and reciprocating cloth-clamp, operating devices for the latter, and intermediate yielding connection, with adjustable stops for limiting the reciprocating movement of the clamp, all substantially as described.

4. In a button-hole sewing-machine, the combination of stitching mechanism, a reciprocating cloth-clamp, operating devices for the latter, and an intermediate yielding connection, with adjustable stops limiting the motion of the clamp, a yoke connected to the clamp, and a cam controlling the yoke, all substantially as set forth.

5. The combination of the reciprocating cloth-clamp of a button-hole sewing-machine with a yoke connected thereto, having projecting faces and intermediate recesses, and a cam provided with a tappet having an expansible working-face.

DANL. MILLS.

Witnesses:
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VAN WYCK BUDD.