(No Model.) 3 Sheets—Sheet 1.

D. MILLS.

BUTTON HOLE SEWING MACHINE.

No. 266,181. Patented Oct. 17, 1882.

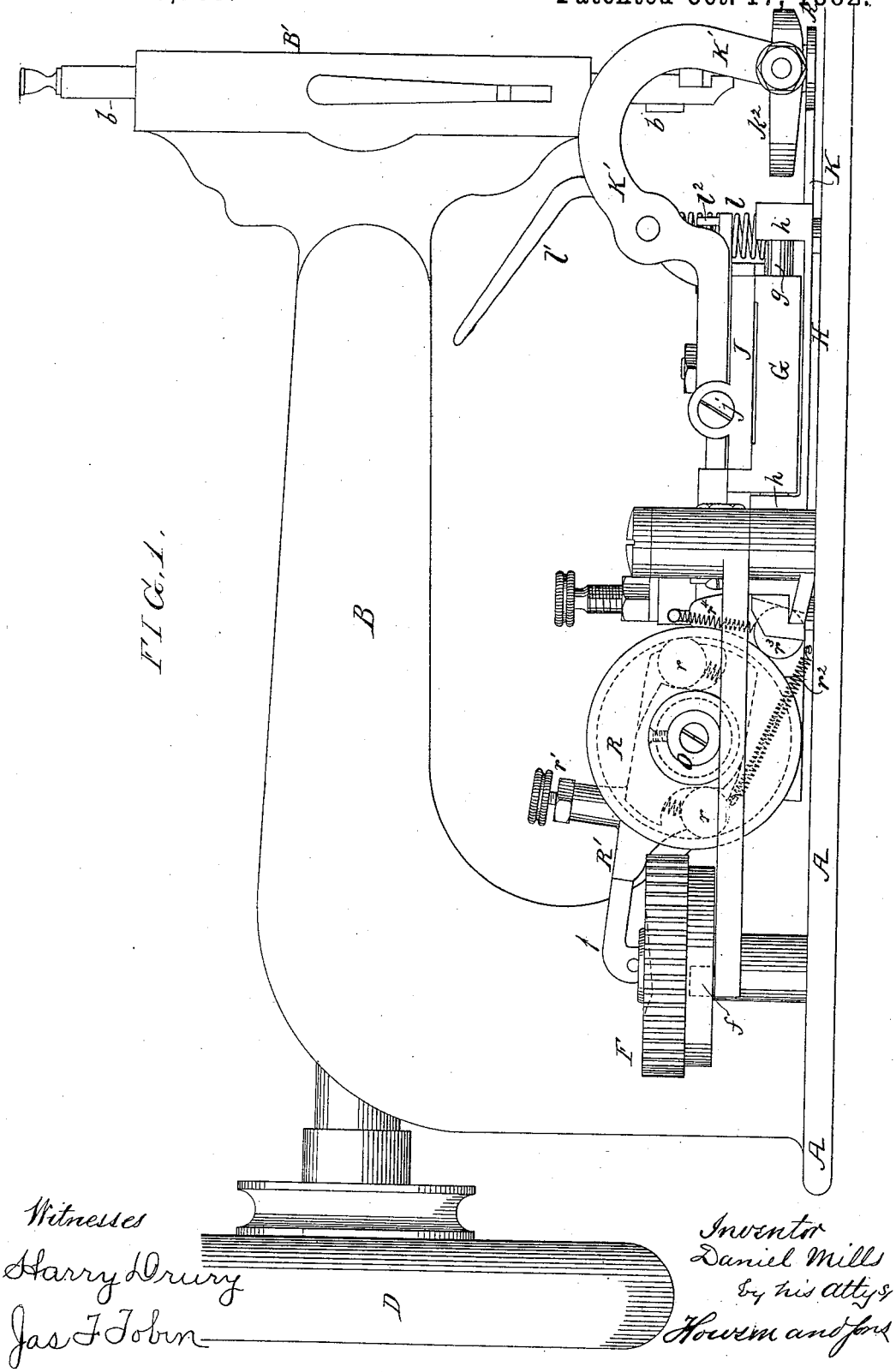


FIG. 1.

Witnesses
Harry Drury
Jas F Tobin

Inventor
Daniel Mills
by his attys
Howson and Sons

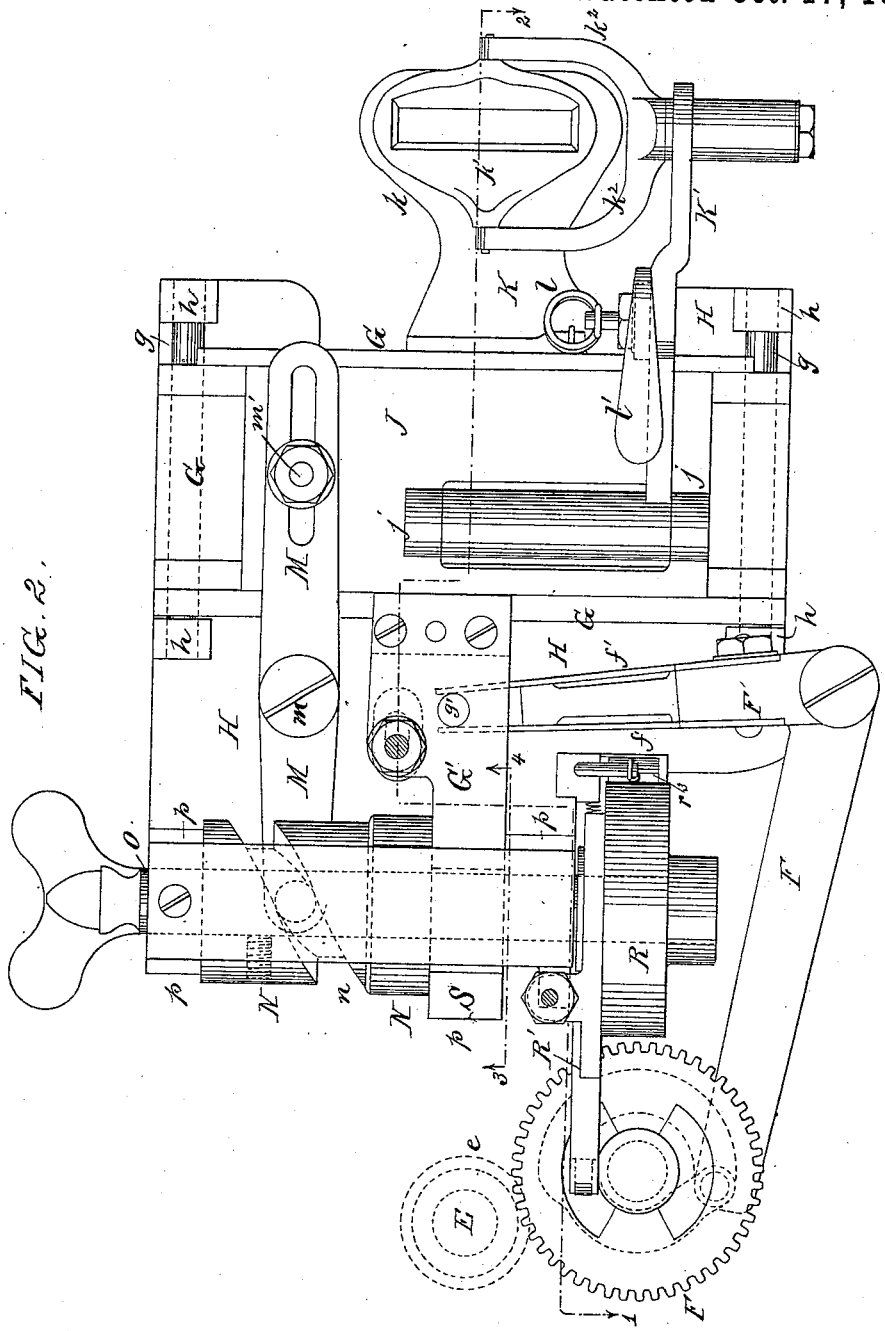
(No Model.) 3 Sheets—Sheet 2.

D. MILLS.

BUTTON HOLE SEWING MACHINE.

No. 266,181. Patented Oct. 17, 1882.

FIG. 2.



Witnesses.
Harry Drury
James J. Tobin

Inventor
Daniel Mills
by his Attorneys
Howson and Sons

(No Model.) 3 Sheets—Sheet 3.

D. MILLS.

BUTTON HOLE SEWING MACHINE.

No. 266,181. Patented Oct. 17, 1882.

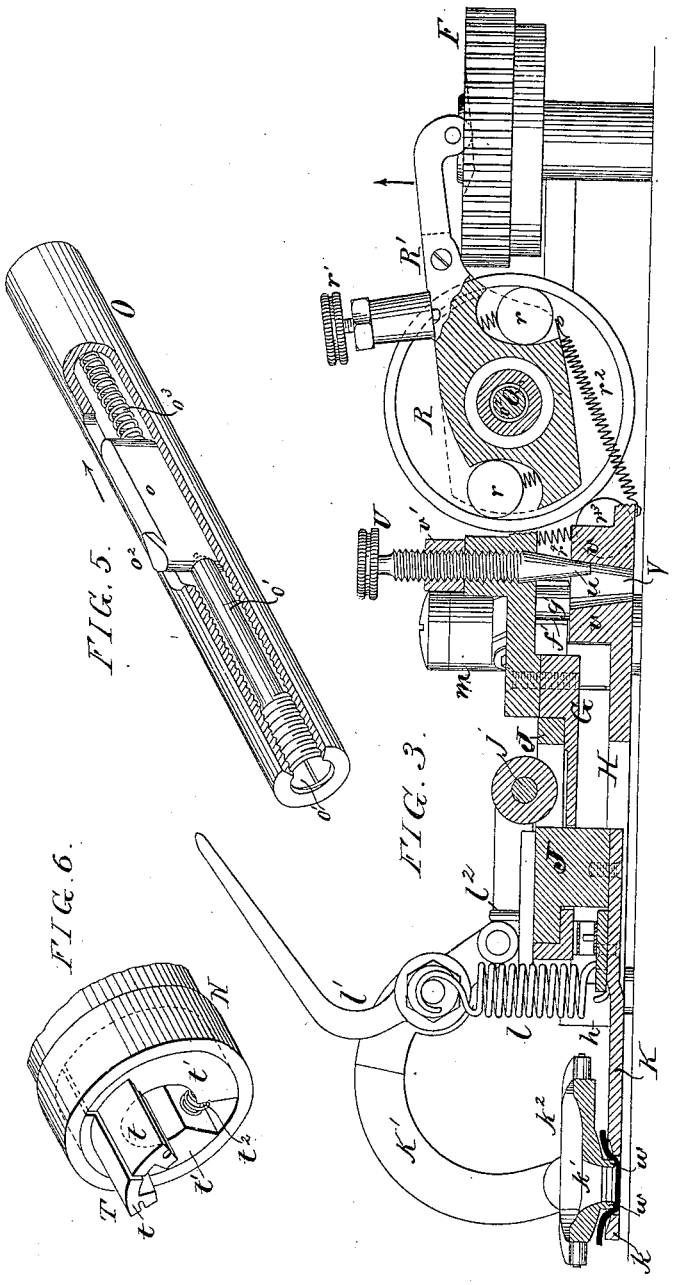


FIG. 3.

FIG. 5.

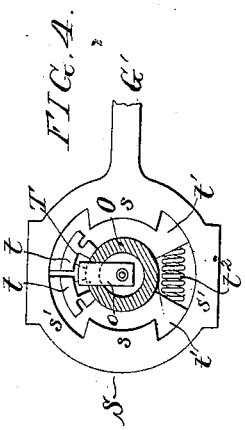


FIG. 4.

FIG. 6.

Witnesses,
James J. Johns
Harry Drury

Inventor
Daniel Mills
by his attorneys
Howson and Sons

UNITED STATES PATENT OFFICE.

DANIEL MILLS, OF PHILADELPHIA, PENNSYLVANIA.

BUTTON-HOLE SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 266,181, dated October 17, 1882.

Application filed March 16, 1882. (No model.) Patented in England July 28, 1881, No. 3,298; in Belgium October 31, 1881, No. 56,034; in Italy October 31, 1881, No. 13,480; in France November 8, 1881, No. 144,917, and in Austria-Hungary December 30, 1881, No. 33,249 and No. 48,249.

To all whom it may concern:

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

My invention relates to that class of button-hole feed mechanisms for 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 sewing mechanism may stitch the sides and bar the ends of the button-hole.

My present invention relates to certain improvements in the construction of the details of the button-hole feeding mechanism, the general principle of which is the same as in those machines for which Frederick Simmons obtained Letters Patent, June 24, 1879, reissued December 6, 1881, No. 9,962, and Letters Patent No. 249,411, dated November 8, 1881, and for which I applied for Letters Patent, March 28, 1881, Serial No. 29,448, and August 22, 1881, Serial No. 40,474.

In the accompanying drawings I have shown my improvements as applied to a button-hole feed mechanism in the form of an attachment which can be applied to an ordinary sewing-machine when it is desired to use the latter for stitching button-holes, and may be as readily removed when it is desired to use the machine for plain sewing.

Figure 1, Sheet 1, is a side view of part of a sewing-machine and an attachment applied thereto and containing my improvements. Fig. 2, Sheet 2, is a plan view of the attachment. Fig. 3, Sheet 3, is a section on the line 1 2, Fig. 2; Fig. 4, a section on the line 3 4, Fig. 2; and Figs. 5 and 6, perspective views, partly in section, of parts detached.

Referring to Fig. 1, A is the ordinary bed-plate of the sewing-machine proper; B, the arm; B′, the head, and *b* the needle-bar, to which motion is imparted by the usual horizontal shaft having the fly-wheel D, while the vertical shaft E (shown by dotted lines in Fig. 2) imparts motion to the ordinary feed and shuttle mechanism below the bed of the machine, and in the present instance also imparts motion to the moving parts of the button-hole feed mechanism, as hereinafter described.

The entire buttonholing attachment is carried by a base-plate, H, which is to be secured to the bed-plate of the sewing-machine in the position illustrated in Fig. 1.

The general construction of the slides, clamping-arms, cams, and spring operating lever of the attachment does not differ materially from that shown in my above-cited application, No. 40,474.

My present improvements relate, first, to the devices for imparting an adjustable intermittent motion to the cam-shaft; secondly, to the devices for expanding the adjustable stop-cam; and, thirdly, to the devices for regulating the extent of lateral movement of the slides and clamps, and consequently the depth of bight of the button-hole stitch.

The primary slide, G, is mounted on cylindrical rods *g*, secured in lugs *h* on the base-plate, and to this slide is secured an arm, G′, having a stud, *g′*, against which bear the two flat springs *f′ f′*, carried by the bell-crank lever F′. This bell-crank lever F′ is pivoted to the base-plate H, and has a pin, *f*, on its outer arm adapted to a cam-groove on the under side of the pinion F, which is driven by a pinion, *e*, on the vertical shaft E, Fig. 2. Hence the vibrating motion imparted to the lever F′ by the pinion F, with its cam-groove, will be imparted through the springs *f′ f′* to the primary and secondary slides, G J, carrying the cloth-clamps, in order to enable the needle to form the button-hole stitch. The springs *f′ f′* yield, however, when the stop-cam T, as hereinafter described, is interposed to limit the reciprocating motion of the slides. On the primary slide, G, is mounted the secondary slide, J, which is adapted to guides in the former, as illustrated in Figs. 1 and 3. This slide J carries the two cloth-clamps, and has an intermittent feed motion imparted to it in the direction of the length of the button-hole, first in one direction and then in the other, by means of a lever, M, pivoted at *m* to the base-plate H, and operated by a scroll-cam, N, forming a right-and-left-hand screw on the shaft O, this shaft being

adapted to bearings in the standards *p* on the base-plate, and having an intermittent rotary motion imparted to it by the means described hereinafter. The length of movement of the slide J on the primary slide, G, can be varied by adjusting the connecting-pin *m'* in the slot in the lever M, as described in the above mentioned patent of Simmons, No. 249,411.

To the slide J, preferably to the under side, is secured the arm K, Fig. 3, carrying at its projecting outer end the lower cloth-clamp, *k*, which, when the attachment is applied to the bed of the machine, will be immediately below the needle, Fig. 1. The curved lever K' is pivoted to the slide J at *j*, and in the outer end of this lever is swiveled the forked piece k^2, to which in turn is pivoted the upper cloth-clamp, *k'*, the latter being thus practically mounted on a universal joint to adapt itself to any inequalities in the material being sewed. The lever K' is acted on by a spiral spring, *l*, connected at one end to the slide J and at the other to a pin on the arm, so that the two clamps will be normally held together; but the upper clamp can be raised by a cam-lever, *l'*, pivoted to the arm K', and having an anti-friction roller bearing on a projection on the slides between two stops, l^2, Figs. 1 and 3.

The yoke S, which is secured to or forms part of the arm G' on the slide G, has the usual segmental projections, *s s*, with intervening recesses *s' s'*, and embraces the adjustable stop-cam T, carried by the shaft O, Figs. 4 and 6.

The operation of the parts referred to is substantially the same as that described in my above-mentioned application, No. 40,474. Instead, however, of imparting the intermittent rotary motion to the shaft O by means of a pawl and ratchet, as in the machine shown in my said application, I provide the shaft with the friction-feed shown in Figs. 1 and 3, in order to obtain a greater nicety of adjustment in the feed.

To the end of the shaft O is secured a hollow rimmed disk, R, and against the interior face of this rim bear the anti-friction rollers *r*, which are adapted to pockets in the lever R', mounted loosely on the hub of the disk R. This lever R' carries at its outer end an anti-friction roller, which is acted on by cams on the face of the wheel F, so that as the said wheel revolves the lever R' will be lifted by the cams, as indicated by the arrows, Figs. 1 and 3, and the rollers *r*, binding between the edges of the enlarged pockets and the rim of the disk, Fig. 3, will cause the latter to turn to the extent of the lift of the lever R'. After the latter is released from the cam a spring, r^2, returns it to its normal position, with the point of the thumb-screw r' resting on a projection on one of the standards, *p*, Fig. 2. By regulating this screw the extent of movement of the arm R' and shaft O and of the feed can be easily regulated, as will be readily understood.

To prevent back movement of the feed-disk when the spring r^2 draws back the lever R' and the rollers *r* return into their enlarged pockets, I provide a friction-roller, r^3, adapted to a pocket in the base-plate H and bearing against the outer periphery of the rim, so that when the disk tends to turn backward this roller will bind between the rim and the inclined wall of the pocket and hold the disk and shaft in the positions to which they have been moved.

To keep the rollers *r r* r^3 in acting positions I prefer to provide the roller r^3 with a pull-spring, r^4, and the rollers *r r* with small push-springs, as shown in Figs. 1 and 3.

The expansible stop-cam T in the present instance differs slightly from those described in my former applications, in that the tappet or acting portion of the cam T is composed of lateral projections *t* on the two segments *t' t'*, of which the cam is composed, these segments being adapted to a cylindrical recess in the end of the cam N, and fitting freely over the shaft O. The ends of the segments carrying these projections *t* are normally pushed together by a spiral spring, t^2, inserted between the opposite ends, Fig. 4, as in my former machines. As a means of expanding the projecting tappet *t t*, this end of the shaft O is hollow and slotted at one portion, as shown in Fig. 5, and in this slotted portion is inserted a slide, *o*, carrying a projecting wedge, o^2. On the outer end of this slide bears a screw adjusting-rod, *o'*, by screwing which in the threaded end of the shaft the slide *o* may be moved in the direction of the arrow, Fig. 5, against the spiral spring o^3, the wedge o^2 being thus caused to enter between the two parts *t t* of the tappet and expand it for the purpose of regulating the number of stitches to form the bar at the end of the button-hole, as fully set forth in my former applications.

The tappet of the stop-cam T limits the reciprocating movement of the slides in one direction, and in my application No. 29,448 I have described a construction of stops for limiting this movement in the other direction during the stitching of the sides of the button-hole, and for limiting the movement in both directions during the "barring" of the button-hole, when the tappet on the stop-cam T lies in one of the recesses *s'* of the yoke S. Instead of the stopping devices shown in said application, I use in the present instance a thumb-screw, U, passing through a projection of the arm G', provided with a jam-nut, *v'*, and having a tapering point, *u*, which can come into contact with inclined projections *v v* on the base-plate H, these projections in the present instance being the beveled ends of a slot, V. By turning this screw so as to project its tapering point more or less into this slot the extent of the lateral reciprocating movement of the slides will be limited accordingly.

In order that the clamps may hold the material firmly, I form on the upper clamp two straight ribs, *w*, which project downward within the slot in the lower jaw, as shown in Fig. 3.

It will be understood that the button-hole attachment may be applied to other constructions of sewing-machines than that shown in the drawings, and that motion may be imparted to the shaft O and lever F′ in any other convenient way than as shown without departing from my invention.

I claim as my invention—

1. The combination of a base, a slide carrying the clamps of a button-hole feed mechanism, lever M, and cam-shaft, with a rimmed disk carried by said shaft, lever R, anti-friction rollers in pockets in said lever R, an anti-friction roller, r^3, in a pocket on the base, lever R′, and cam-wheel, all substantially as set forth.

2. The combination of the reciprocating slide of a button-hole sewing-machine, and a yoke connected thereto, having projecting faces and intervening recesses, with a stop-cam made in two parts, shaft O, slide *o*, having projecting wedge, and adjusting-screw and wedge for acting on the slide.

3. The combination of a yoke, S, and shaft O, with segments t' t', spring t^2, projections t t, and expanding devices, all substantially as described.

4. The combination of reciprocating slides, cloth-clamp, operating devices for the latter, and intermediate yielding connection, with base-plate having projections, with inclined faces, and taper screw to come into contact with said projections, all substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DANL. MILLS.

Witnesses:
W. W. DALTON,
HARRY SMITH.