(No Model.) 2 Sheets—Sheet 1.

D. MILLS.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 424,804. Patented Apr. 1, 1890.

FIG. 1.

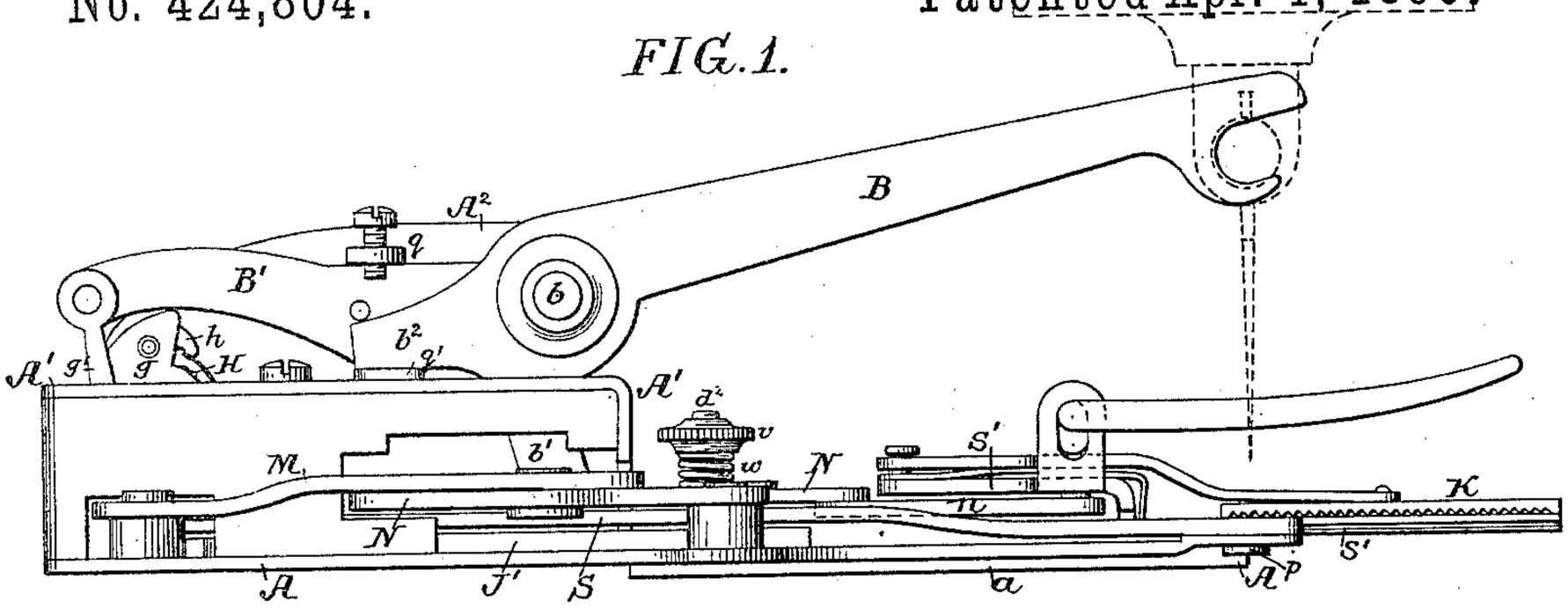


FIG. 2.

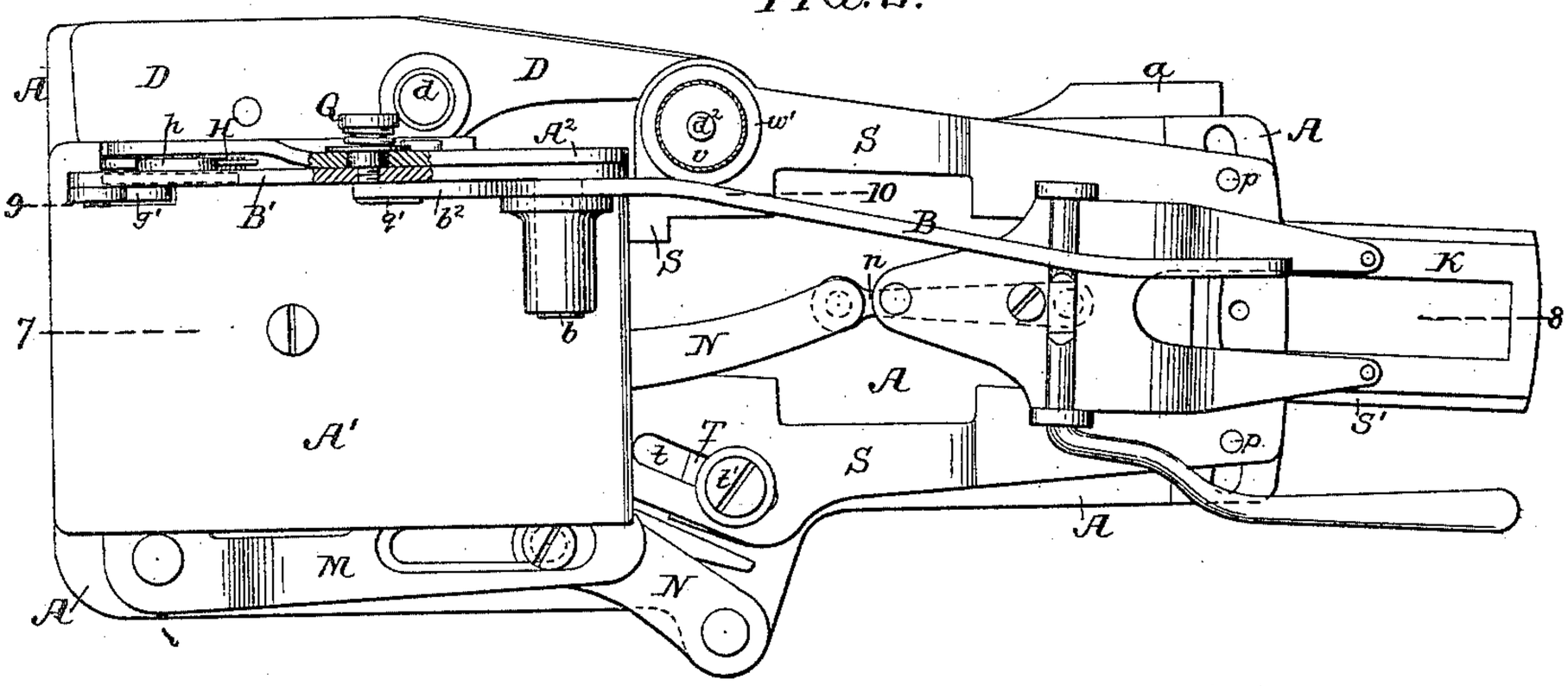


FIG. 3.

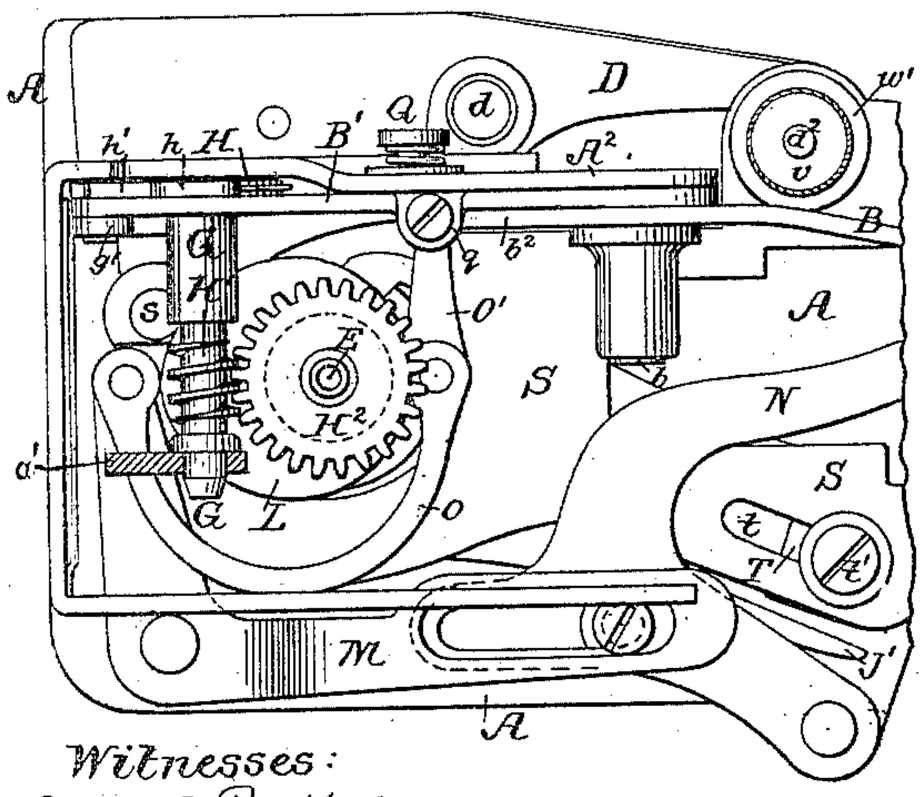
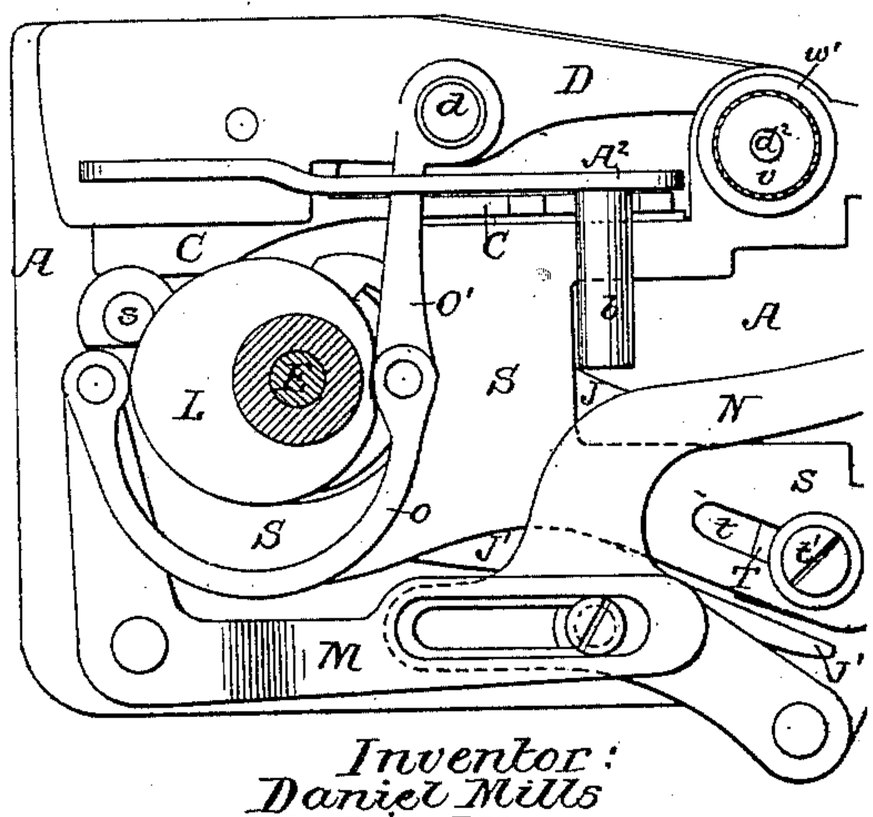


FIG. 4



Witnesses:
John E. Parker
Fley. Barkoff

Inventor:
Daniel Mills
by his Attorneys
Howson and Sons

(No Model.) 2 Sheets—Sheet 2.

D. MILLS.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 424,804 Patented Apr. 1, 1890.

FIG. 5.

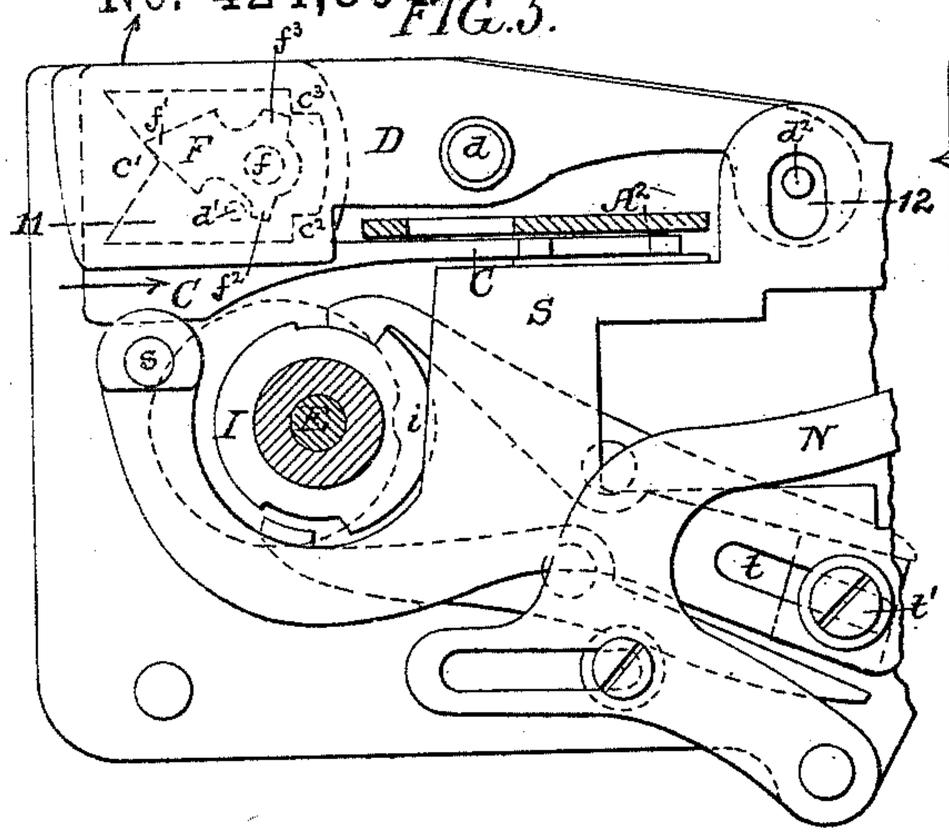


Fig. 6.

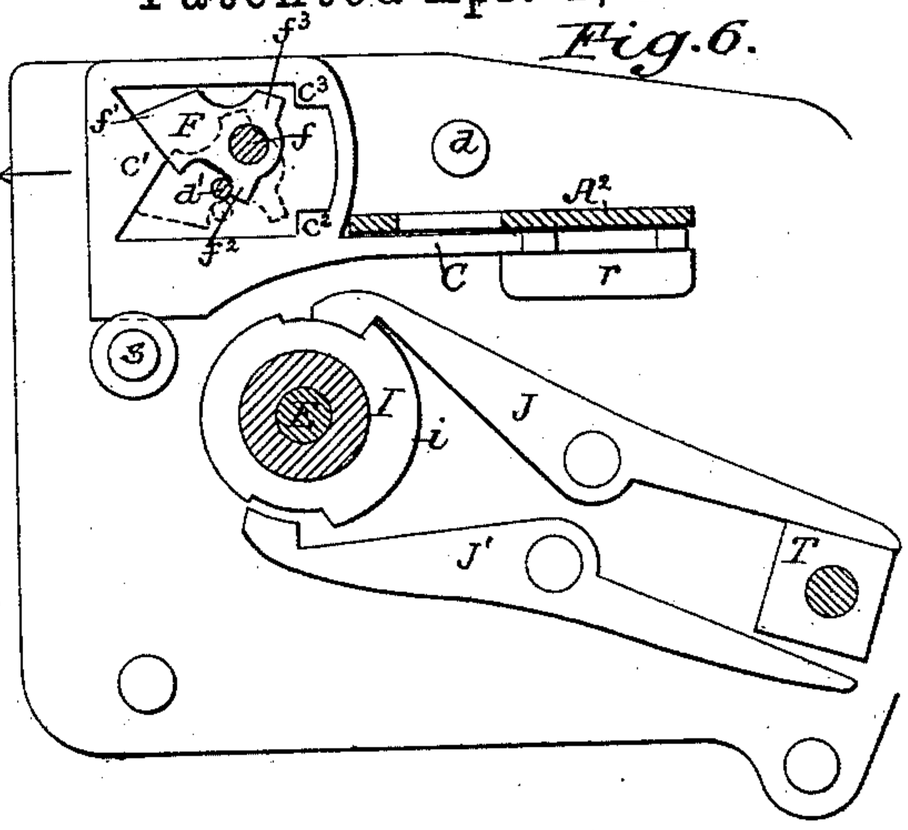


FIG. 7.

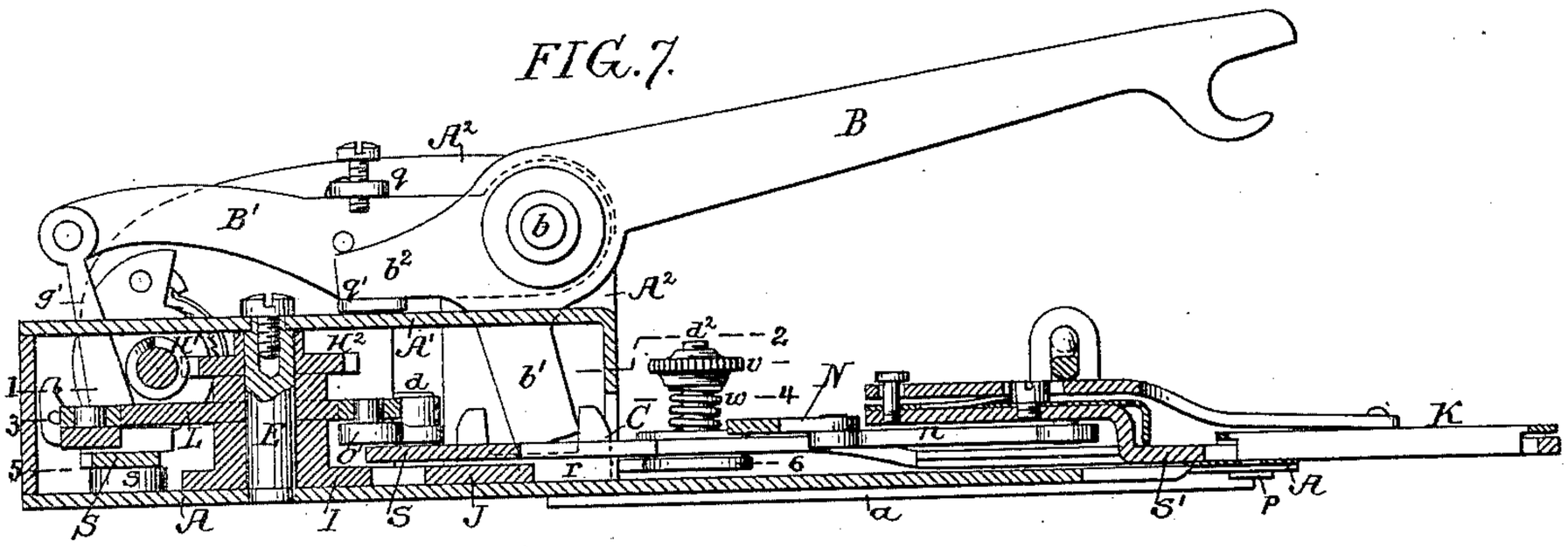


FIG. 8.

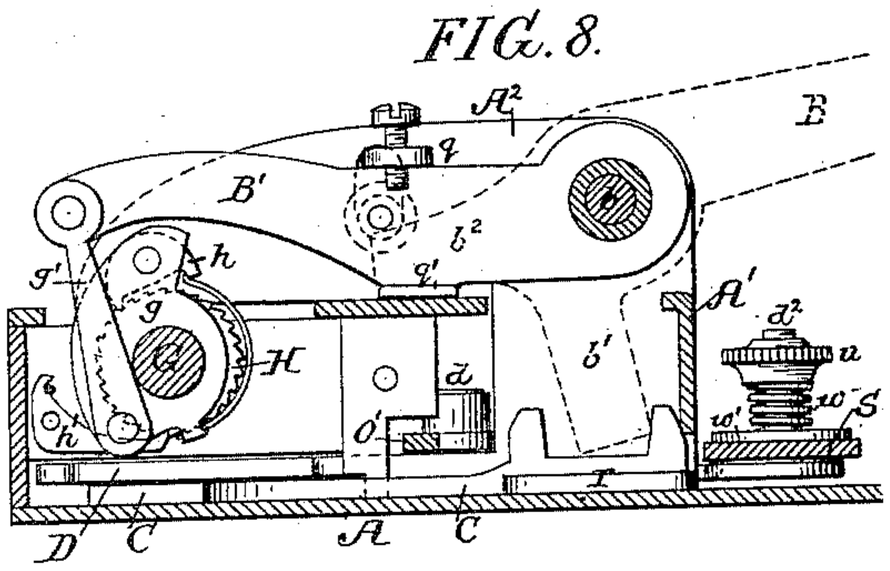


FIG. 9.

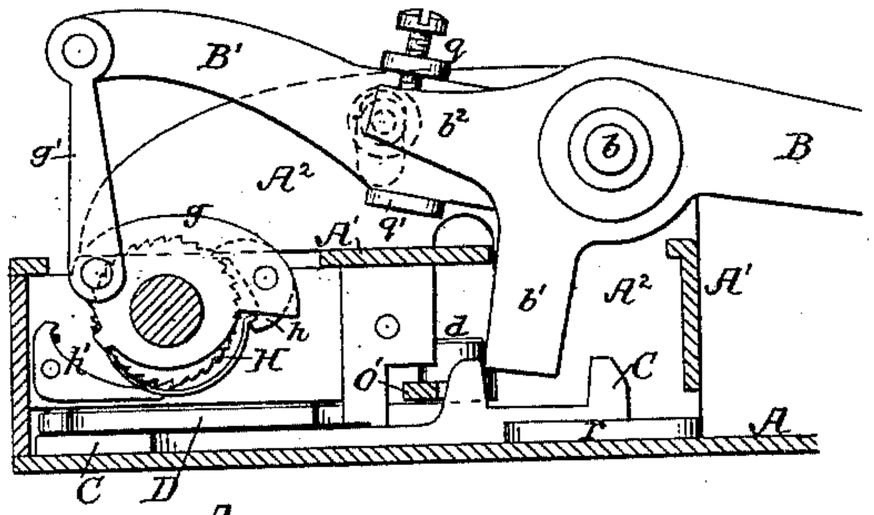


FIG. 10.

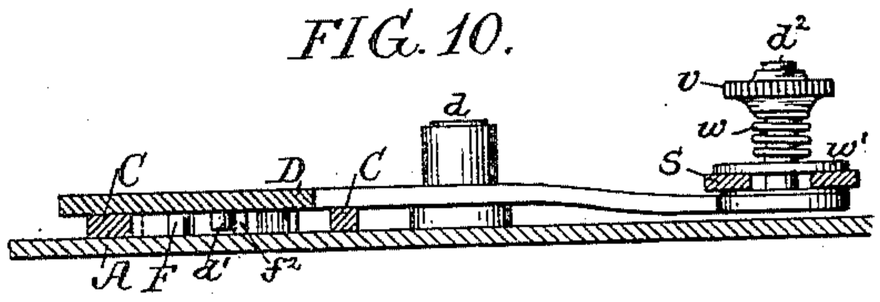
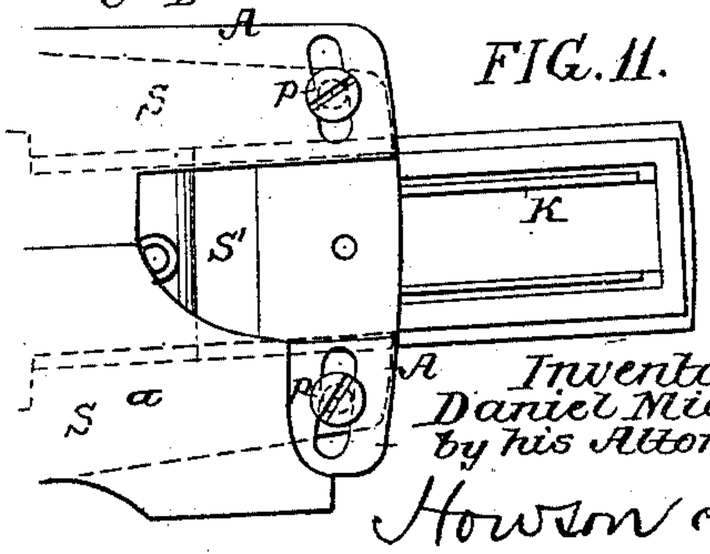


FIG. 11.



Witnesses:
John E. Parker
Hby. Barkoff

Inventor:
Daniel Mills
by his Attorneys
Howson and Son

UNITED STATES PATENT OFFICE.

DANIEL MILLS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE BARRED END BUTTON HOLE ATTACHMENT COMPANY, OF CAMDEN, NEW JERSEY.

BUTTON-HOLE ATTACHMENT FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 424,804, dated April 1, 1890.

Application filed March 30, 1887. Renewed July 27, 1889. Serial No. 318,902. (No model.)

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 Mechanism, of which the following is a specification.

My invention consists of certain improvements in the button-hole-feed mechanisms for sewing-machines for which I have obtained Letters Patent of the United States, and more particularly the mechanism for which Letters Patent No. 305,624 were granted to me September 23, 1884.

The main object of my invention is to simplify the construction of the mechanism and reduce the number of parts without detracting from its efficiency for stitching the sides and barring the ends of the button-hole.

In the accompanying drawings, Figure 1 is a side view of my improved button-hole mechanism constructed, like my said patented machine, in the form of an attachment to be detachably applied to the bed of a sewing-machine. Fig. 2 is a plan view of the same. Fig. 3 is a plan view of part of the mechanism with the cover-plate removed. Fig. 4 is a sectional plan view on the line 1 2, Fig. 7, with the operating-levers and walls of the case removed. Fig. 5 is a similar sectional plan on the line 3 4, Fig. 7. Fig. 6 is a sectional plan view on the line 5 6, Fig. 7. Fig. 7 is a longitudinal section on the line 7 8, Fig. 2. Fig. 8 is a sectional view on the line 9 10, Fig. 2. Fig. 9 is a similar view, but showing the operating parts in another position. Fig. 10 is a sectional view on the line 11 12, Fig. 5; and Fig. 11 is an inverted plan view of the outer end of the attachment, and showing the friction devices for vibrating the slide.

The base-plate A of the attachment has on its under side a dovetailed guide-piece *a*, which is adapted to be fitted to the groove of the throat-plate of the sewing-machine bed. In Fig. 1 a portion of the sewing-machine head and needle-bar are shown in dotted lines.

All the operative parts of the button-hole mechanism receive motion from the needle-bar, a pin on the latter being adapted to a notch or jaws on the end of the long arm of the operating-lever B. This lever is pivoted at *b* to an upright A^2 on the base-plate.

In my present mechanism, as in the patented one before referred to, there is pivoted to the base-plate a primary slide S, intermittently vibrated to an extent determined in this case by a single pattern cam or former for the formation of the sides and barred ends of the button-hole. On this primary slide is mounted the secondary slide S′, which carries the cloth-clamps K, and to which an intermittent feed motion on the primary slide is imparted by the usual heart-shaped cam L.

I will now describe in detail the devices for imparting the desired vibrating motion to the primary slide, the devices for limiting and determining its extent of movement, and the devices for intermittently rotating the cams.

On the lever B are two short arms *b′* and b^2, one *b′* for transmitting motion to the primary slide, and the other b^2 for transmitting motion to the cams which control the feed movement of the secondary slide and also the extent of movement of the primary slide. The arm *b′* of the lever B enters with some free play between jaws on a slide C, guided on the base-plate between the pivot-pin *s* of the primary slide and the upright A^2 and a rib *r* on the base-plate. This slide-bar has a lateral yoke or arms with a central V-shaped projection *c′* at one end and two shoulders or projections c^2 and c^3 at the other end, Fig. 6. Within the open space between these projections plays a tappet F, carried by and free to turn on a pivot *f* on the lever D to an extent limited by a stop-pin *d′*. This pivoted tappet has a tapering point *f′* and two arms f^2 and f^3, as shown in Figs. 5 and 6. The lever D is pivoted at *d* to the base-plate, and at its opposite end from the tappet is connected by a frictional device to the primary slide S, which is pivoted at *s* to the base-plate. The frictional connection between the lever D and the primary slide is illustrated more fully in Fig. 10, and consists of a pin d^2 on the lever D, passing through an enlarged slot in the slide and threaded at its upper end for the reception of an adjusting-nut *v*. This nut bears on a spring *w*, which in turn bears

on a washer or disk w', resting on the slide. By thus making a direct connection between the lever D and the primary slide and providing the simple frictional connection described, with its pressure-adjusting nut always accessible, the mechanism is much simplified.

The operation of these devices will be more readily understood on reference to Figs. 5 and 6. As represented in Fig. 5 the parts are about midway of their movement, and the slide-bar C is supposed to be moving in the direction of its arrow, so that the V-shaped projection c', acting on the tappet F, is pushing the lever D over in the direction of the arrow, and this motion is transmitted to the primary slide S, of course. When the slide-bar C has reached the end of its movement, the parts will be in the positions shown by full lines in Fig. 6. When the slide-bar C is moved back in the direction of the arrow by means of the lever B, the projection c^3 will first strike the arm f^3 of the tappet and turn it on its pivot on the lever D, so that when the slide-bar C makes its return movement in the direction of the arrow, Fig. 5, the V-shaped projection c' will, as indicated by dotted lines in Fig. 6, strike the opposite side of the tapering point of the tappet from that previously operated on, and therefore throw the lever D over in a direction contrary to that shown in Fig. 5. By this means the reciprocating movement of the slide-bar is converted into an intermittently-vibrating movement of the lever D and of the primary slide S.

I will now describe the devices for imparting intermittent rotary motion to the cams upon the center post or pivot E. These cams are the heart-shaped cam L, for giving the feed movement to the secondary slide, and the pattern cam or former I, controlling the extent of movement of the primary slide. These cams are secured or formed together and carry at the top a worm-wheel H^2, into which gears a worm H' on a shaft G, mounted in bearings in the wall of the case, and in a lug a' on the under side of the cover-plate A', Fig. 3. To the outer end of this shaft is secured a ratchet-wheel H, which engages a spring-pawl h on the pawl-carrier g, turning on the shaft G, Figs. 8 and 9. A suitable locking-pawl h' prevents back movement of the ratchet-wheel. The pawl-carrier g is connected by a link g' to an arm B', mounted on the pivot-pin b and operated by the arm b^2 of the lever B, which projects and plays between two stops q q', the former or upper one being adjustable, so that the extent of play of the arm b^2, and consequently the feed movement, may be varied.

By the devices described the vibrating movement of the lever B is converted, as will be readily understood, into an intermittent rotary motion of the cams on the post or spindle E.

In order to prevent accidental back movements of the arm B', I combine therewith a friction device Q, Fig. 2, preferably consisting of a pin passing through a slot in the upright A^2 and a spring and adjusting-nut quite similar to the frictional connection between the lever D and primary slide S. I dispense with the second pattern-cam I' of my previous mechanism and construct a single pattern cam or former I to act on both the stop-levers J J' for the adjustable stop T of the primary slide. In the drawings these levers J J' are shown as of a somewhat different shape from those shown in the drawing of the Patent No. 305,624, but without change in operation or effect. In order, however, to simplify the construction of the parts and the adjustment of the stop T on the slide S, I arrange the levers J J' to project to one side instead of having them in a longitudinal line with the slides. I can thus simply cut an angular slot t in the body of the slide S, mount the stop T in this slot, and secure it adjustably by means of a set-screw t'. By loosening this set-screw and moving the stop T to another position in its slot the depth of bight can be readily varied, as found desirable. The larger face i of the pattern cam or former is of such a radius that when either lever J J' bears on that face the inner face of the jaw j' of that lever will be parallel with a line radiating from the center of the spindle E, so that in forming the sides of the button-hole the inner lines thereof will always be at the proper distance apart.

The devices through which the heart-shaped cam L transmits the feed motion to the secondary slide S', carrying the cloth-clamp, are substantially the same in construction and operation as those described and shown in my aforesaid patent, the only difference being that in this case I have shown the lever N as connected to the slide by a link n, Figs. 2 and 7, instead of by a pin and slot. This lever N has, as before, an adjustable connection with the elbow-lever M, which is held up to the cam by the radius-bar O' through the curved connecting-link o.

To prevent the outer end of the primary slide from being raised by the pull of the sewing-machine needle off the base-plate, I screw into the under side of the slide near its outer end set-screws $p\,p$, which pass through curved slots in the base-plate and whose heads bear against the under side of the said plate or recesses therein, Fig. 11.

I claim as my invention—

1. The combination of the primary slide of a button-hole-sewing mechanism with a lever having a direct frictional connection with the slide and carrying a tappet, a slide-bar having projections to act on the tappet, and a lever to reciprocate the slide-bar, all substantially as set forth.

2. The combination of the primary slide of a button-hole-sewing mechanism with a lever having a frictional connection with the slide and carrying a three-armed tappet, and a reciprocating slide-bar having a yoke provided

at one end with a central V-shaped projection and at the other with shoulders to act on the tappet, substantially as set forth.

3. The combination of the primary slide of a button-hole-sewing machine, vibrating mechanism for said slide, a yielding connection between said vibrating mechanism and the slide, a stop on the slide, a single pattern cam or former, and a pair of levers acting on the stop and acted on by the pattern-cam, the contact-faces of the two levers, which are acted on by the cam, being on opposite sides of the axis of the latter, all substantially as specified.

4. The combination of the primary slide of a button-hole-sewing mechanism, and devices, substantially as set forth, for vibrating the same, with a former or pattern cam, stop-levers projecting to one side, a slot in the primary slide, and a stop adjustably secured in the slot, all substantially as described.

5. The combination of the primary and secondary slides of a button-hole-sewing mechanism, and devices, substantially as specified, for vibrating the primary slides, with cams controlling the slides, and a worm-wheel and worm-shaft having a pawl-and-ratchet-operating mechanism, 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:
DANL. MILLS, Jr.,
HARRY SMITH.