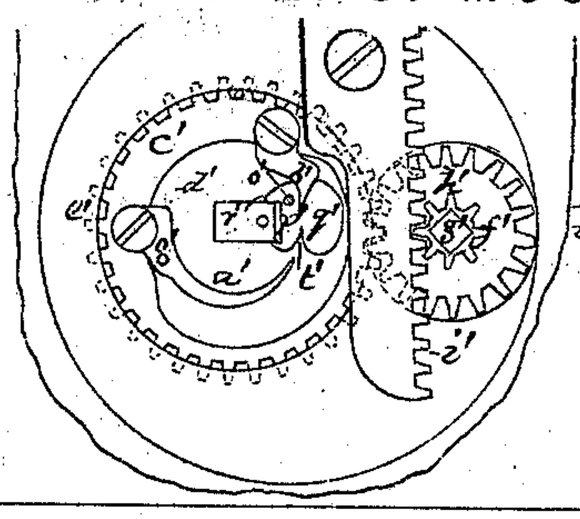
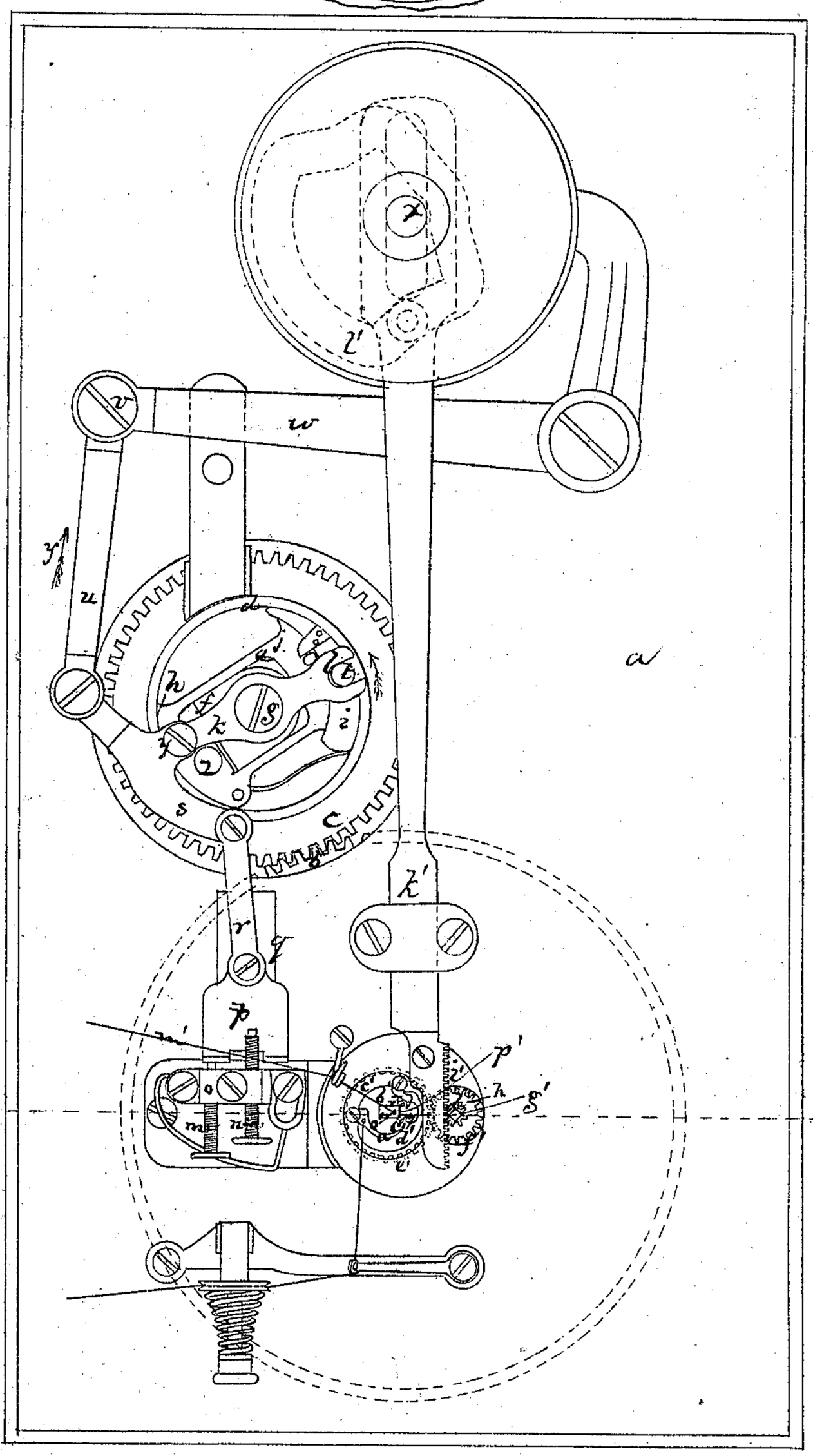
W. CHICKEN & E. S. MOULTON.

Improvement in Button-Hole Sewing Machines.

No. 120,855. Patented Nov. 14, 1871.



Enlarged view of ring c, &c.



Witnesses.
M. W. Frothingham.
L. H. Latimer.

W. Chicken & E. S. Moulton.
By their Attys.
Crosby & Gould

UNITED STATES PATENT OFFICE.

WILLIAM CHICKEN AND ERI S. MOULTON, OF CHELSEA, ASSIGNORS TO AMOS L. WOOD, TRUSTEE, OF BROOKLINE, MASSACHUSETTS.

IMPROVEMENT IN BUTTON-HOLE SEWING-MACHINES.

Specification forming part of Letters Patent No. 120,855, dated November 14, 1871.

To all whom it may concern:

Be it known that we, WILLIAM CHICKEN and ERI S. MOULTON, both of Chelsea, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Button-Hole Machines; and we do hereby declare that the following, taken in connection with the drawing which accompanies and forms part of this specification, is a description of our invention, sufficient to enable those skilled in the art to practice it.

Our invention relates to details of construction and arrangement of the mechanism of machines for working button-holes, and particularly that class of such machines shown in United States Letters Patent Nos. 49,627, 50,253, 72,974, 107,001, and 115,163, the improvements having reference to the formation and method of operating the thread-interlocking and loop-spreading devices, and to the friction, feed, and feed-regulating devices that operate and control the movements of the rotary clamp-operating disk or wheel.

The drawing represents a reversed plan of a machine embodying the improvements, and a section on the line *x x*.

a denotes the stationary bed-plate; *b*, the rotary cam-grooved gear-wheel that imparts feed-motion to the cloth-plate or clamp; *c*, the gear or pinion that drives the feed-wheel *b*, this pinion *c* being driven by friction mechanism, the movement of the wheels *b* and *c* being the same, or substantially the same, as in the patent No. 107,001, the wheel *b* being actuated by the gear *c*, variably driven by friction, instead of by a ratchet-and-pawl mechanism, which imparts only defined movements covering the extent of one or more ratchet-teeth. In the detail of arrangement of the friction feed devices the present invention is different from what is shown in the aforesaid patent No. 107,001, the present construction being not only more enduring, but also more certain to effect the proper feed. The feed-wheel or pinion *c* has a flange or ring, *d*, across which extends a bar, *j*, which is slotted, as seen at *e*, and slides on a plate, *f*, which turns on the center-pin *g* of the wheel *c*. One end, *h*, of the bar fits to the circular inner surface of the ring, and between the opposite end of the bar and the adjacent surface of the ring is a friction-pawl, *i*, one side of which fits to the ring and the other side to the end of the bar, as seen in the drawing. Under the wheel *c* is a rocker or pawl-lever, *k*, pivoted upon the pin *g*, one end of which lever has a fork or notch, *l*, which embraces a pin, *t*, extending from the pawl. Movement of the pawl-lever in the direction of the arrow drives the pawl forward, wedging it between the slide-bar *j* and ring, moving the slide *j* radially, so that its opposite end is driven against the ring, the bite of the pawl and slide upon the ring then causing the pawl and wheel to move as one. When the pawl-lever moves in the opposite direction the fork *l* throws the pawl back slightly, the bite of the pawl and plate upon the ring being thereby released, so that they move back without the ring and assume position to be again thrown into biting and feeding contact with the ring. By having the pawl-lever pivoted to be capable of only rotative movements, with a guide-block pivoted to the same pin, upon which block the slide *j* moves radially, the parts are very enduring and not liable to become loosened by their movements, as they incline to do if the bar slides upon the pivot-pin. The clamp-actuating wheel *b* has a variable feed-movement for the eye and the slit (respectively) of a button-hole, and the movements for the eye and slit part are controlled by two pins, *m n*, projecting from a block, *o*, said block being automatically moved at the termination of each feed movement along the slit or around the eye so as to bring the proper feed-regulating pin into position to be struck by the end of a slide, *p*, reciprocating upon a guide, *q*, and connected, by a link, *r*, with one end of a lever, *s*, whose other end is jointed to one end of a link, *u*, connected by a pin, *v*, with a lever, *w*, actuated by a cam on the vertical shaft, *x*. The lever *s* is pivoted to the end of the pawl-lever, as seen at *y*. When the cam moves the lever so as to draw the link *u* in the direction of the arrow *y* the lever *s* is thereby turned on its fulcrum and throws the link *r* in the opposite direction, carrying the slide up toward and against the particular pin *m* or *n* which may be in position to be struck by the slide, and, by striking such pin, further movement of the

slide is arrested and the continued movement of the cam-operated lever can then only result in changing the position of the fulcrum of the lever *s*, thereby actuating the pawl-lever and throwing back the friction-pawl and slide. As the extent of this back movement depends upon the position at which the slide strikes the pin *m* or *n*, and as the next feed movement always brings the pawl mechanism to the same position, it will be obvious that the extent of feed movement depends upon that pin *m* or *n* which is in position to be struck by the slide, while the extent of movement for either pin may be adjustably controlled by setting the pin forward or backward, the pins being screw-threaded and working in nut-threads formed in the block *o*. When the slide *p* moves back the lever is turned on its fulcrum, and finally a shoulder on the lever strikes a stud, *z*, projecting from the slide *j*, causing the pawl-lever to first throw the slide and pawl into biting contact with the ring, and then, by its further movement, to actuate the pinion-ring and effect the feed of the clamp-plate. The change of position of the block which carries the feed-changing pins is effected by a cam-groove in the clamp-actuating wheel *b*.

The eye-pointed thread-carrier *a'* that carries the under thread, and the thread-spreading looper *b'*, are fixed to the inner side of a gear-ring, *c'*, which is located just beneath the plate *d'*, and is surrounded by a circular-guide-wall, in which it rotatively moves, a plate, *e'*, projecting under the gear-teeth and keeping the ring in place. The ring is eccentric to each path of vertical movement of the needle, and its reciprocating rotative movements are imparted to it by a pinion, *f''*, on a vertical spindle, *g'*, that carries a pinion, *h'*, driven by a horizontally-reciprocating gear-bar, *i'*, on the end of a slide, *k'*, whose other end is actuated by a cam, *l'*, on the vertical shaft *x*. *m'* denotes the button-hole cord or bar passing from a suitable spool through a suitable guide to an eye, *o'*, in the plate *d'*, through which eye it passes up into the button-hole slit in the usual manner. In front of the eye *o'* is a guard, *p'*, extending down from the throat-plate. The angles of the throat *q'* on one side of the guard extend back, as seen at *r'*, and on one side of the throat is a beak, *t'*.

When the needle is descending through the button-hole slit, and just as its point is passing through the throat-plate, the gear-ring is turned (by the cam) to carry the under-thread carrier forward, and as the point of the carrier approaches the needle the latter, having completed its descent, begins to rise, bowing out the thread at its side. The carrier-point passes close to the needle and through said bow, and, the needle rising and the carrier continuing to move forward, the needle-loop is drawn around the shank of the carrier. The forward circular movement of the carrier causes its thread to be extended from the eye of the carrier across the bend of the carrier-shank to the notch or angle *r'* of the throat, and the needle then descending again the carrier is started back, so that the needle-point passes between the thread of the needle-carrier (held in the notch) and the carrier-shank, thus interlocking the needle-thread and carrier-thread, the needle, previous to its descent, having been moved laterally, so that it passes through the cloth at the requisite distance from the slit required in the working of the button-hole. The back movement of the carrier is then completed, the loop slipping from the carrier-shank and the carrier-thread being passed through it and the needle-point remaining below the throat-plate. As the looper *b'* approaches the needle the latter starts up and the point of the looper passes into the bow formed at the side of the needle, and as the needle rises and the looper goes forward the latter carries this bow or loop over the beak *t'*, one side of the loop being drawn over one side of the beak and the opposite side of the thread over the opposite side of the beak, the carrier-thread being also thrown over the back of the beak. The needle next descends and passes through the previous loop of its own thread, said loop being spread open by the beak so as to insure the passage of the needle-point through it, the needle in this descent passing close to the point of the beak and through the button-hole slit, having been moved laterally since its last descent.

The formation, spreading, and interlocking of the loops of the needle and those of the thread-carrier are thus effected by the reciprocating movements of one bar or slide and by the eccentric rotative movements of the carrier and the looper, and the position of the loop-spreading beak, and the passage of the points of the thread-carrier and the point of the looper into the bowing-thread at the needle side, and of the needle-thread into the loops formed thereby, is rendered more certain.

We claim—

1. In combination with the friction-pawl feed mechanism, the pawl-lever *k* hung to the center-pin *g*, and having a fork or slot, *l*, which embraces the pin *m* of the pawl *i*, substantially as shown and described.

2. The slide-bar *j* moving radially on the guide-block *h* hung upon the center-pin *g*, and driven up against the ring *d* by the forward movement of the pawl *i*, substantially as shown and described.

3. The pawl-lever *k*, hung upon the center-pin *g*, and actuated by the link or lever *s*, which is jointed to it by the pin *y*, said link or lever being connected to and driven by the cam-actuated lever *w*, all substantially as shown and described.

4. The reciprocating slide *p*, connected to the lever *s* by the link *r* and controlling the extent of feed movement of the clamp-ring, the extent of movement of the slide being determined by the automatically-located pins *m n*, substantially as shown and described.

5. The rotatively-reciprocating looper-ring *c'*,

carrying the thread-carrier a' and looper b', substantially as shown and described.

6. In combination with the ring c', looper b', and thread-carrier a', the notch r' in the throat and the loop-spreading beak t', substantially as shown and described.

7. The looper, thread-carrier, and loop-spreading mechanism, all controlled or brought into action by the reciprocating bar or slide i', substantially as shown and described.

WM. CHICKEN.
E. S. MOULTON.

Witnesses:
FRANCIS GOULD,
M. W. FROTHINGHAM.

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