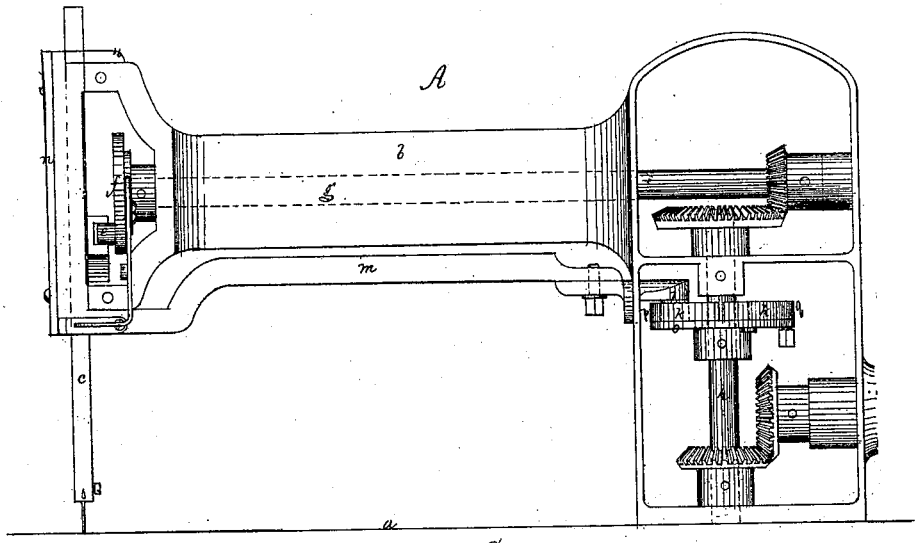
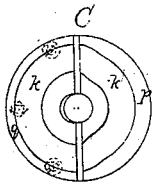
W. CHICKEN.

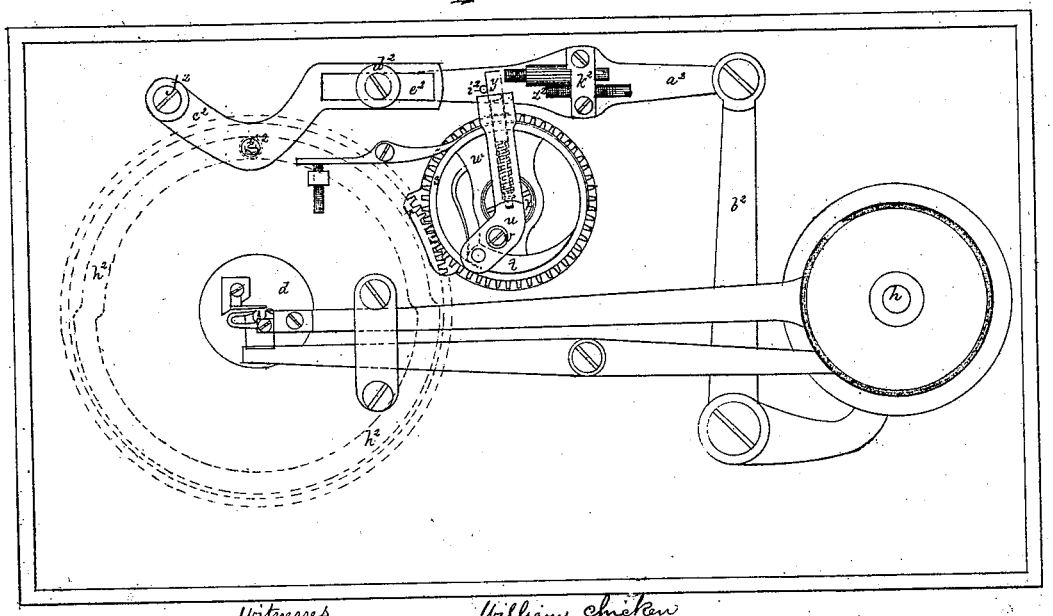
BUTTONHOLE SEWING MACHINE.

No. 107,001. Patented Sept. 6, 1870.





B.



Witnesses
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WILLIAM CHICKEN, OF CHELSEA, MASSACHUSETTS.

Letters Patent No. 107,001, *dated September* 6, 1870.

IMPROVEMENT IN BUTTON-HOLE SEWING-MACHINE.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, WILLIAM CHICKEN, of Chelsea, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Sewing-Machines for "Working" Button-Holes; and I do hereby declare that the following, taken in connection with the drawing which accompanies and forms part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

My invention has reference to details of construction of that class of sewing-machines used to "work" button-holes, and particularly to such machines as are shown in United States Patents numbered 49,627, 50,253, and 72,974, the last of which Patents was granted to me.

My present invention relates to the means employed for automatically changing the extent of feed-movement of the cloth-clamp or holder, when the straight part of the button-hole is brought to the action of the stitch-forming mechanism, after the eye has been worked, and *vice versa*, and also to the means employed for adjusting the depth of the stitches for button-holes in different fabrics.

The drawing represents a machine embodying my improvements.

A shows the upper part of the machine (above the bed or work-supporting surface,) in elevation.

B is a reversed plan of the mechanism beneath the table.

a denotes the work-supporting table.

b, the goose-neck.

c, the needle-bar.

d, the movable cloth-plate.

The needle-bar is reciprocated or moved up and down by a pin, *e*, projecting from a crank-wheel, *f*, on the end of a horizontal shaft, *g*, carrying at its rear end a bevel pinion, meshing into and driven by a bevel gear on a vertical shaft, *h*, which carries another gear actuated by a gear on the driving-shaft.

On this shaft *h* is a cam-wheel, *i*, in the top of which is a cam-groove, *k*, into which extends a pin, *l*, at the rear end of a long slide-bar, *m*, the front end of which carries the head *n*, in which the needle-bar plays, this head *n* being supported on the front end of the arm *b*, and having a capability of slight horizontal movement front and back, with relation to such arm, this movement being effected by the cam-groove *k*, actuating the pin *l*, and the movement taking place during the formation of each stitch, to carry the needle from the edge of the button-hole back to a distance therefrom equal to the depth to be given to each stitch, the needle having a downward movement at each point, or at the extremity of its forward and back movement.

All of this mechanism is the same or substantially the same, and operates in the same, or substantially the same manner as the mechanism shown in the patents referred to. But in the machines shown and described in such patents, there is no provision for changing the depth of the stitch, and in order to effect such change, it was necessary to remove the vertical cam-shaft and take from it the cam, replacing the cam by another, in which the groove had a different throw, or else to use entirely different machines, each machine being adapted to making stitches of but one depth.

To keep a gang of machines for making different button-holes, involves, of course, very great expense, and to take the machine partly to pieces for change of cams, necessitates the employment of a machinist; and to obviate these difficulties, I make the machine with an adjustable cam, or with a movable cam-piece or pieces, by adjustment of position of which the throw of the cam can be so changed as to effect all changes which may be desirable in the extent of horizontal movement of the needle-bar to change the depth of the stitch for large or small button-holes, or fine or coarse work. This arrangement is shown at B and C, C representing a top view of the cam.

Fixed on the shaft is a disk, *o*, and to the top of this disk I fasten two cam-plates, *p q*, one at least of which is made movable and adjustable with relation to the other, it being fastened to the disk by screws extending through slots in the disk, so that, by loosening the screws, the cam-plate can be moved toward or from the other plate, the relative disposition of the two plates being as seen at C.

As the extent of movement of the needle in one direction is always the same, namely, just to the edge of the hole to be worked, it is only the side of the cam that affects the inward movement of the needle-bar that needs to be made adjustable, and the other or fixed cam-piece may be made an integral part of the disk.

It will readily be seen that the adjustment of position of the movable cam-piece may be effected by any person skilled in running a sewing-machine, the necessary manipulation being as simple, or nearly as simple, as the manipulation required to effect change of length of stitch or change of tension in an ordinary sewing-machine, and the improvement enables the same machine to be readily used for button-hole stitches of any depth required.

The mechanism for automatically varying the spacing of the respective stitches of the eye and straight slits of a button-hole, is as follows:

The movable cloth-plate is actuated by a cam-groove in the upper side of a feed-ring, *r*, on the periphery of which are gear-teeth, into which the teeth of a pinion, *s*, mesh, to rotatively move the ring, and thereby

effect the feed of the cloth-plate, the pinion *s* being actuated by a friction-pawl apparatus, which operates, (in principle,) like the friction-pawl mechanism shown in the aforesaid patent, No. 72,974, and also in a United States patent, No. 57,287, granted to me, the method of operating the cloth-plate through the gears *r s* being also the same as the method shown in my Patent 72,974.

The lever-operated wedge or pawl *t*, of the friction feed mechanism, is shown as jointed to a rocker-lever, *u*, turning on a fulcrum-pin, *v*, extending from a rocker-plate, *w*, fulcrumed on the center-pin *x*. The long arm of this lever extends under the wheel, and has projecting from it a tongue or slide, *y*, against which one of two pins $z\ z^2$ strikes, to throw the lever-arm forward, the two pins being attached to a long arm or link, a^2, jointed at its rear end to one arm of a bent rocker-lever b^2, the other arm of which is actuated by a cam on the vertical shaft *h*. The front arm of the link is jointed to a lever, c^2, by a pin, d^2, running in a slot, e^2, in the lever, the opposite end of this lever being fulcrumed to a stationary pin, f^2, beneath the table *a*.

From this lever c^2 projects a pin, g^2, which enters a cam-groove, h^2, in the under side of the feed-ring *r*. The friction feed-lever *u* is moved forward by one of the pins $z\ z^2$, and back by a pin, i^2. When the button-hole eye is being worked, the parts are in the position seen at B, the pin g^2 being in the part of the cam-groove h^2 nearest the center of the feed-ring, bringing the link a^2 into position to cause the pin *z* to actuate the friction feed-lever, and, as this pin sets near to the lever-slide, as seen in the drawing, the pin is in contact with the slide during nearly all of the movement of the link, and consequently imparts a correspondingly long feed movement to the lever and friction-pawl.

As the feed-ring, in the course of its rotative movement, brings the slit of the button-hole into position to be worked, the outer portion of the cam-slot comes around to the pin g^2, and throws the pin and its lever c^2 outward, which movement of the lever carries the link a^2 into position to bring the pin z^2 into line with the friction feed-lever or lever-slide, and the end of this pin z^2, setting back further from the feed-lever, (or with a greater space between it and the back-movement pin i^2,) the feed-lever is moved through a shorter portion of the movement of the link, and a correspondingly less extent of feed movement is imparted to feed-lever, friction-pawl, pawl-wheel, gear-ring, and cloth-plate, this change in extent of feed movement for the respective straight and eye parts of the hole being thus produced automatically.

To vary the amount of change between the respective movements, and also to make the spacing of the stitches, either in the eye or in the slit, or in both, as great or small as may be required by the varying degrees of fineness of texture in goods in which button-holes are to be worked, I make each pin *z* or z^2 as a screw, working through a nut-threaded piece, k^2, turning either screw, bringing its acting point more or less distant from the pin i^2, the extent of movement of the pawl-lever varying in accordance with any variation in the position of the pins $z\ z^2$, as will be readily understood.

It will be obvious that, when no variation is to be made in the extent of movement of the feed-ring, while the eye and slit of the hole are being worked, one pin may be used, (the cam-groove *k* not being employed,) the spacing of the stitches being varied, when desirable, by making this pin adjustable in position as described.

I claim—

An adjustable cam or cam-piece, *q*, in combination with the slide *m*, reciprocating head *n*, and needle-bar *c*, substantially as described.

Also, the pins $z\ z^2$, in combination with the stitch-spacing mechanism, and arranged to automatically effect the change of feed movement of the cloth-plate actuating-ring, when the cloth-plate brings the eye of the button-hole and the slit into position to be worked, substantially as described.

Also, the feed-regulating pin *z* or z^2, made adjustable in position with relation to the friction feed-lever, substantially as described.

WILLIAM CHICKEN.

Witnesses:
J. B. CROSBY,
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