

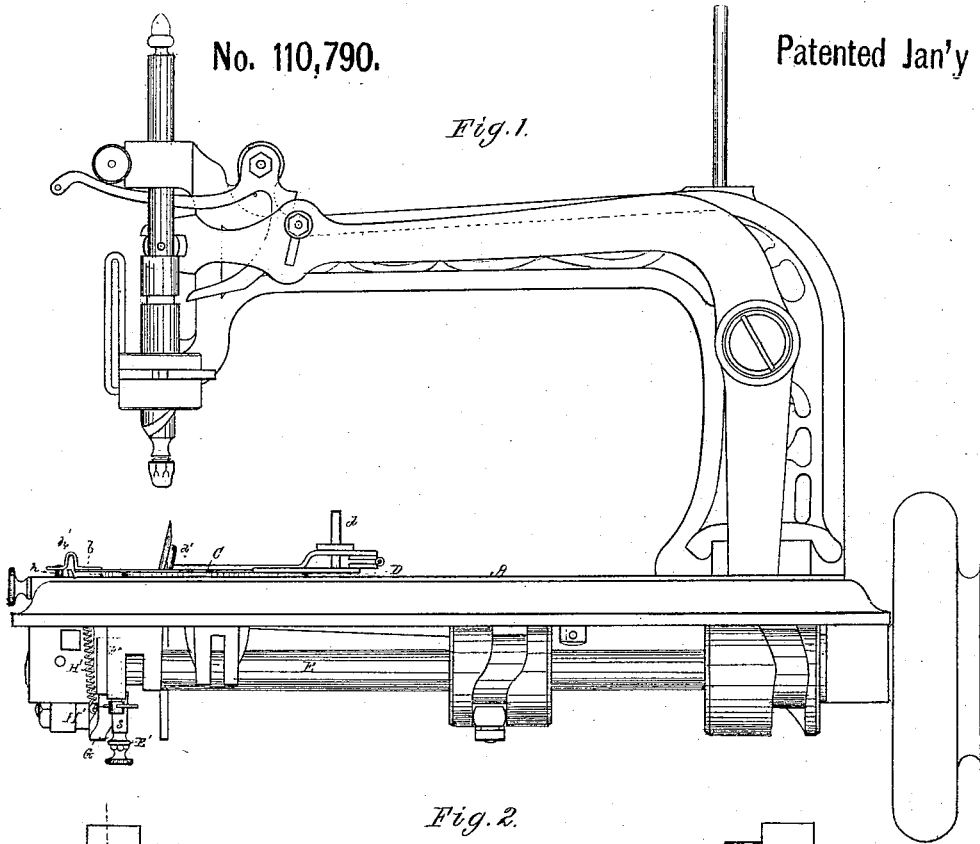
C. E. ROBINSON.

Machine for Making Button Holes.

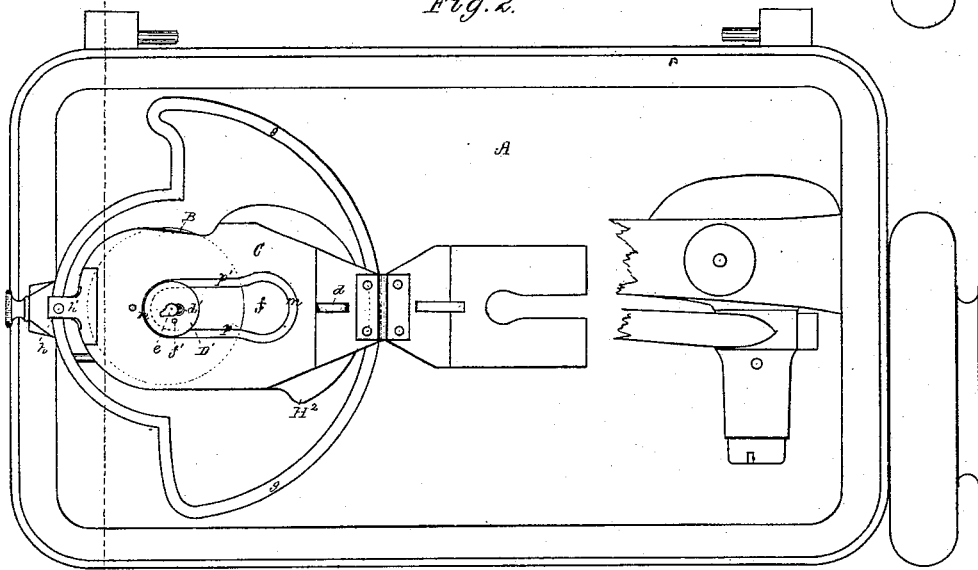
No. 110,790.

Patented Jan'y 3, 1871.

*Fig. 1.*



*Fig. 2.*



Witnesses.

Simon Carter  
Jno. A. Lynch

C. E. Robinson

by his attorney  
J. F. Hale

Charles E. Robinson's Machine for making Button Holes.

Fig. 3.

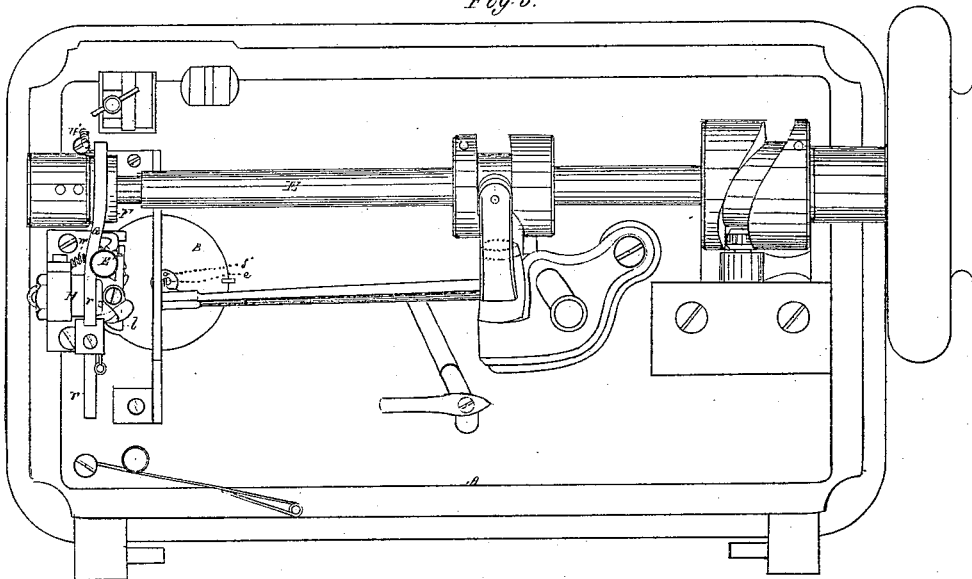


Fig. 4.

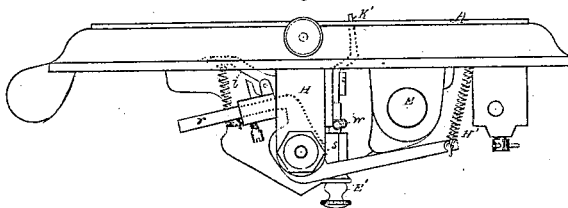


Fig. 6.

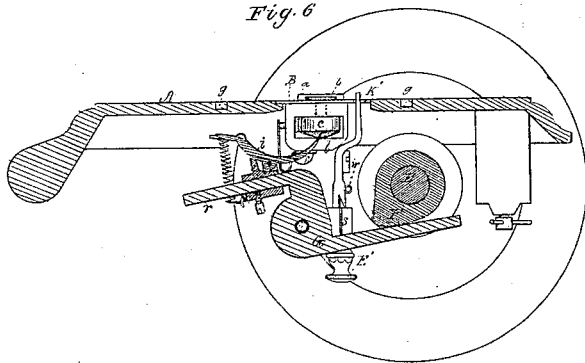


Fig. 5.

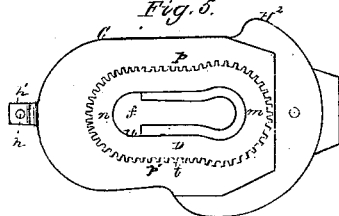


Fig. 8.

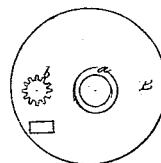


Fig. 7.



Witnesses.

Simon Carter  
Jno. I. Lynch.

C. E. Robinson.

by his attorney.

J. P. Hale

# UNITED STATES PATENT OFFICE.

CHARLES E. ROBINSON, OF BOSTON, MASSACHUSETTS.

## IMPROVEMENT IN MACHINES FOR SEWING OR WORKING BUTTON-HOLES.

Specification forming part of Letters Patent No. **110,790**, dated January 3, 1871.

*To all persons to whom these presents may come:*

Be it known that I, CHARLES E. ROBINSON, of Boston, in the county of Suffolk and State of Massachusetts, have made a new and useful invention having reference to Machinery for Making Button-Holes; and I do hereby declare the same to be fully described in the following specification, and represented in the accompanying drawing, of which—

Figure 1 denotes a side elevation of a machine for making button-holes as provided with my invention. Fig. 2 is a top view of the machine, the upper needle-carrier, its arm and supporting-frame being represented as broken off in order to more clearly exhibit my invention, the cloth-clamp being shown as open. Fig. 3 is a bottom view of the machine containing my improvement; Fig. 4, an end view, showing that portion of my invention located underneath the table. Fig. 5 is an under-side view of the feed-clamp, showing the "irregular gear," to be hereinafter described. Fig. 6 is a vertical and transverse section taken through the driving-cam, the ratchet, and its actuating-lever. Fig. 7 is a side view of the shipper-lever and its adjustable stop as detached. Fig. 8 is a top view of the circular plate to which the feed-clamp is attached.

My invention consists in combining, with a machine provided with devices for making a button-hole stitch, a means for holding the material to be operated on, and also a means of feeding the material along automatically, and with a variable speed, in manner and for the purpose hereinafter specified; also, in the combination of the automatic variable feed motion or mechanism with the guiding mechanism, arranged and operating together as hereinafter set forth; also, in the peculiar construction of the feed-clamp for holding the material to be operated on, in combination with the feeding and guiding mechanism, as hereinafter described; also, in the means or combination and arrangement of mechanism for effecting the equable and increased feed motion or movement of the cloth-carrier, and consequently producing the desired length of stitch; also, in the means or combination and arrangement of mechanism, as hereinafter described, for imparting rotary or horizontal

motion to the feed-clamp or cloth-carrier; also, in the peculiar construction of the button-hole or irregular-shaped gear for imparting the desired form to the button-hole.

In Fig. 1 of the drawing I have exhibited a properly-organized machine for making a button-hole stitch. To such machine in the abstract I make no claim. My invention is supplemental thereto, and relates principally to the peculiar feeding mechanism I have added thereto.

In the said drawing, A denotes the base-plate or work-supporting stand of the machine, to which my invention is applied. Near the front end of the said plate, and within a cavity made through it, and between the needle-carriers, a circular table, B, is disposed, the same being so applied thereto as to be readily detached therefrom, as circumstances may require. Extending up from the said plate is a short projection or annular guide, *a*, around which the clamp or cloth-carrier is to revolve or travel. *b* is a small pinion, which engages with the irregular or button-hole-shaped gear, to be hereinafter described. The spindle of the said pinion, extending down through the table B, carries on its lower end a beveled ratchet-wheel, *c*.

C is the feed-clamp for carrying and holding the material in which the button-hole is to be made. This clamp or cloth-holder consists of two plates of metal hinged together, and having a turn-button, *d*, which operates with a cam or incline in confining the plates together. The said clamp I term the "cloth-holding mechanism."

*f* is an irregular oblong slot made through the lower clamp-plate. Around the said slot and on the under face of the lower clamp-plate, an irregular oblong rack or gear, D, (somewhat resembling the shape of a button-hole,) is disposed. This gear is of a novel and peculiar shape, both the peripheries of its outer and inner edges being working-surfaces, the teeth *t* of the gear working into those of the pinion *b*, and the inner edge *u* of the gear against the annular guide *a*.

In order to produce the eye or oval shape of the button-hole as made by hand, the perimeter and teeth of the gear D require a peculiar construction and arrangement—that is to say,

the said teeth are to be arranged on the arcs of four different circles and two straight or parallel lines.

The portion *m* to form the eye of the button-hole is an arc of a circle of greater radius than the opposite inner portion, *n*, while the portions *p p'*, intervening between the straight parts and the wider portions of the eye, are cut in arcs of circles whose centers are outside of the gear, and the teeth formed thereon, instead of standing parallel or radiating like the other portions of the gear, converge, the object of this peculiar construction of the gear or teeth on the parts *p p'* being to slightly change the direction of the cloth-carrier from an outer gear movement to an inner one, in order that the stitches on the corresponding parts of the button-hole may be properly and uniformly made. Were it not for this peculiar construction and arrangement of the teeth on the parts *p p'* the proper form would not be given to the button-hole, and the stitches would be formed unevenly and too far apart, thereby not only destroying the symmetry and finish of the button-hole, but greatly impairing the wear thereof.

The width of the rim of the said gear D should correspond with the distance between the guide *b* and the center of the teeth of the pinion *b*, in order that the gear in its movements may be maintained in contact with the pinion.

The feed-clamp C is so applied to the table B as to be capable of being rotated or moved horizontally thereon and around the guide *a*.

D' is a cap, which has a male screw cut on its shank, and which screws down into the hollow guide *a*, and thus secures the clamp to the table. This cap has a horn or button-hole spreader, *d'*, extending up from it, and an elongated slot, *e*, made down through it for the needles to work through. It also has a cord-hole, *f'*.

On the upper face of the table A an eccentric or cam groove, *g*, is made, the same being to receive a stud, *h*, disposed on the under side of an arm, *h'*, projecting from one end of the clamp, as seen in Figs. 1 and 2. The said stud and groove, with the guide *a* and the slot in the gear D, constitute what I term the "guiding mechanism."

E is the driving-shaft of the machine, which is suitably supported in bearings. On the inner end of this shaft a cam, F, is arranged, which operates upon the lower arm of a curved lever, G, which is pivoted to the hanger H, as seen Figs. 3 and 4. The upper curved arm, *v*, of this lever carries an adjustable dog or impelling-pawl, *i*, which engages with the beveled ratchet *c* disposed on the lower end of the spindle, which carries the pinion *b* before mentioned. This ratchet is disposed within a supporter or frame, *t*, attached to the under face of the plate A, as seen in Fig. 6, and is provided with a retaining-pawl or detent to prevent any backward movement of the ratchet.

It also has a friction-brake applied to its periphery to prevent any undue forward movement.

H' is a coiled spring, one end of which is attached to the under side of the table A and the other end to the outer extremity of the lever G, the said spring serving to restore the lever to its normal position after being acted on by the cam F. This mechanism—viz., the gear D, the pinion *b*, the ratchet *c* and pawl *i*, the lever G, and its spring H', with the cam F—composes what I call the "feed motion or mechanism."

E' is what I term the "shipper-lever," the same being pivoted to a projection from the hanger H, and carries on its outer end the stud K', and on or near its inner end an adjustable stop, *s*, which consists of a triangular prismatic block provided with shoulders *v* of different lengths, these shoulders operating in conjunction with the lever G in determining the extent of backward motion of the lever under the retractile action of its spring, and consequently the back throw of the dog or impelling-pawl *i* over the teeth of its ratchet during the equable movement of the gear D or the feed-clamp.

*w* is a coiled spring, which serves to maintain the stop *s* in its proper position with respect to the lever G after such stop may have been adjusted to allow the lever the required movement or throw to produce the requisite equable or lesser feed.

When an increased movement of the feed or gear becomes necessary to form the eye portion of the button-hole, the stud K', automatically impinging against the cam H<sup>2</sup> formed on the lower clamp-plate, throws the shoulder *v* of the stop *s* out of action or contact with the lever G, and thus maintains it until the eye portion of the button-hole is completed, thus allowing the lever its full range of motion after having been acted on by the cam E, which, correspondingly acting upon the impelling-pawl, moves it backward and over a greater or the desired number of teeth, and consequently forward a like distance, thus increasing the speed of the ratchet, and of course that of the pinion and the gear and cloth-carrier, in a like ratio.

The mechanism last described—viz., the lever E, its stop *s*, spring *w*, stud K', and the cam H<sup>2</sup>, combined with the gear D, pinion *b*, ratchet *c*, impelling-pawl *i*, lever G, spring H', and cam F—constitutes what I term the "variable feed motion or mechanism."

The operation of my invention is as follows: If we suppose a machine to be organized for making a button-hole stitch and my mechanism applied thereto, as described, we first place the piece of cloth or material in which the button-hole is to be made between the leaves or jaws of the clamp and confine the parts together, the clamp being so placed as to commence the making of button-hole at the inner end. By imparting a rotary motion to the driving-shaft

the cam F will be revolved, and, acting upon the lever G, carrying the impelling-pawl *i*, will actuate the said pawl and give to its ratchet an intermittent rotary motion. The said ratchet, being affixed to the spindle which carries the pinion *b*, will communicate a like motion to it, which, in turn, will impart the desired motion to the gear D, which will be fed forward equably, being guided in its movement by the guide *a*, the stud *h*, and its groove *g*. After the first side of the button-hole has been made by the needles the stud K', acting against the cam H<sup>2</sup>, will throw the stop *s* of the shipper-lever E' out of action upon the lever G, and allow the latter lever to have its full range of motion under the action of its spring, which, acting upon the impelling-pawl, will impart a corresponding greater incremental motion or speed to the ratchet, which, in turn, acting upon the pinion, and the pinion upon the gear D, will give a correspondingly-increased motion or speed to the said gear, and, of course, to the cloth or material while the eye of the button-hole is being made. As soon as the eye is finished the stud K' or the shipper-lever E', relieved of the action of the cam H<sup>2</sup> by the action of the spring *w*, again throws the stop *s* into action upon the lever G, when the lesser or equable feed motion again takes place, and continues until the button-hole is finished.

Having described my invention, what I claim is as follows:

1. The combination, with an organized machine for making a button-hole stitch, of the following elements—viz., a means of holding the cloth or material while being operated on, and a means, as hereinbefore specified, of feeding the cloth or material along automatically,

and with a variable speed—the said elements being constructed, arranged, and made to operate together, and with the stitch-forming mechanism, as and for the purpose set forth.

2. The combination of the automatic variable feed motion or mechanism with the guiding mechanism, the whole being constructed, arranged, and made to operate together in manner and for the purpose set forth.

3. The feed-clamp, constructed substantially as described, for holding the cloth or material to be operated on, in combination with the feeding and guiding mechanism, constructed, arranged, and operating in manner and for the purpose specified.

4. The mechanism, substantially as described, for imparting rotary or horizontal movements to the feed-clamp or cloth-carrier, the same consisting of the gear D, the pinion *b*, the impelling-pawl and ratchet, the lever G and its spring, the cam F, and means of imparting rotation to the latter.

5. The means or mechanism, as described, for regulating the movement or rotation of the pinion *b* or the feed-clamp, in order to produce the lesser equable and uniform feed, the same consisting of the prismatic shouldered block or stop *s*, or its equivalent, arranged upon the lever E', in combination with the lever G, the whole being combined and arranged together in manner as set forth.

6. The irregular gear D, having its teeth arranged in the arcs of different circles, all as described and shown, and adapted to operate in connection with the pinion *b*, as set forth.

CHAS. E. ROBINSON.

Witnesses:

F. P. HALE,  
CHAS. MOORE.