

No. 723,460.

PATENTED MAR. 24, 1903.

J. GUTMANN.  
BUTTONHOLE MACHINE.  
APPLICATION FILED AUG. 14, 1897.

5 SHEETS—SHEET 1.

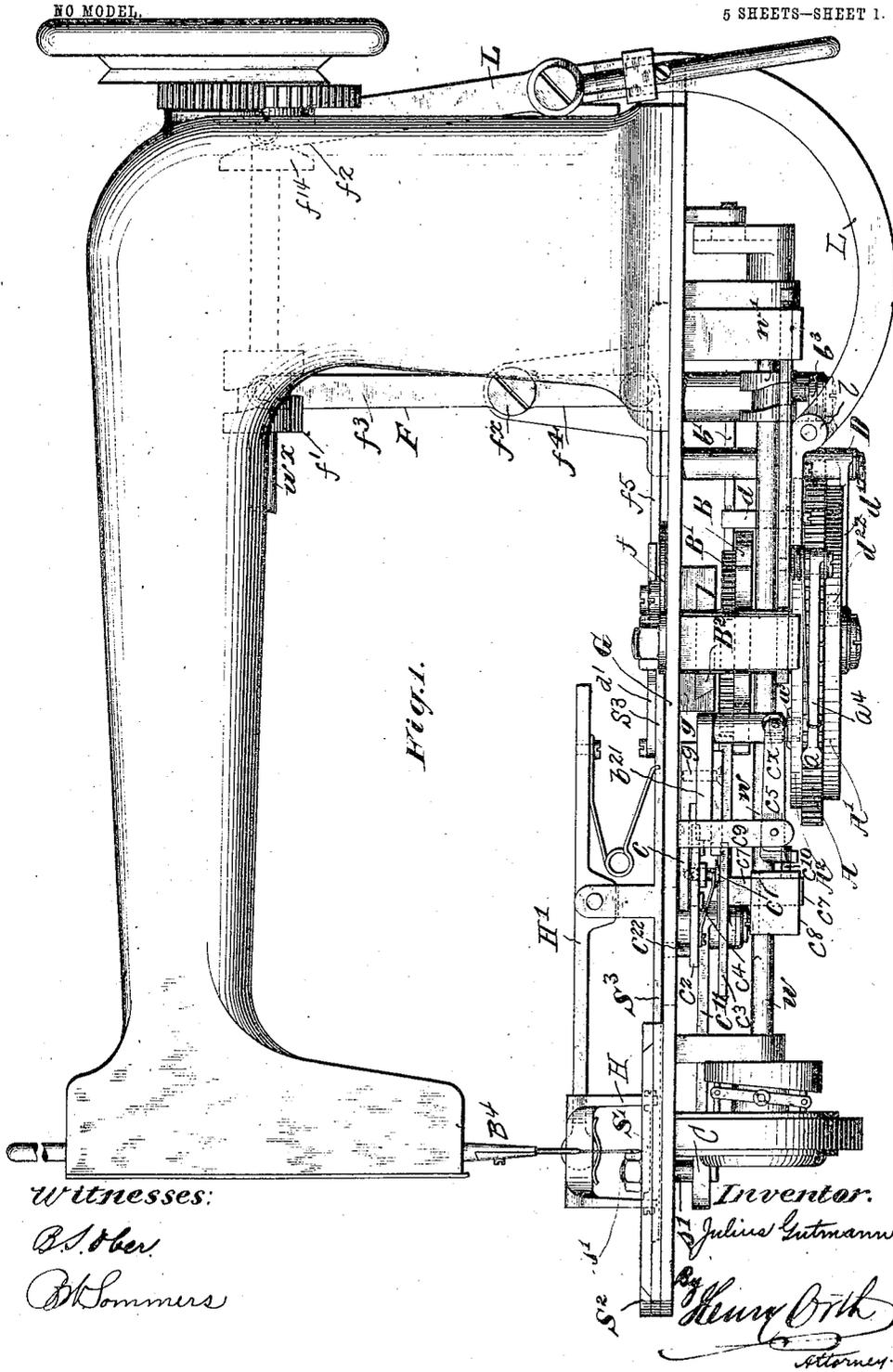


Fig. 1.

Witnesses:

B. S. Ober.  
B. Sommers

Inventor:

Julius Gutmann.  
By Henry Oth  
Attorney.

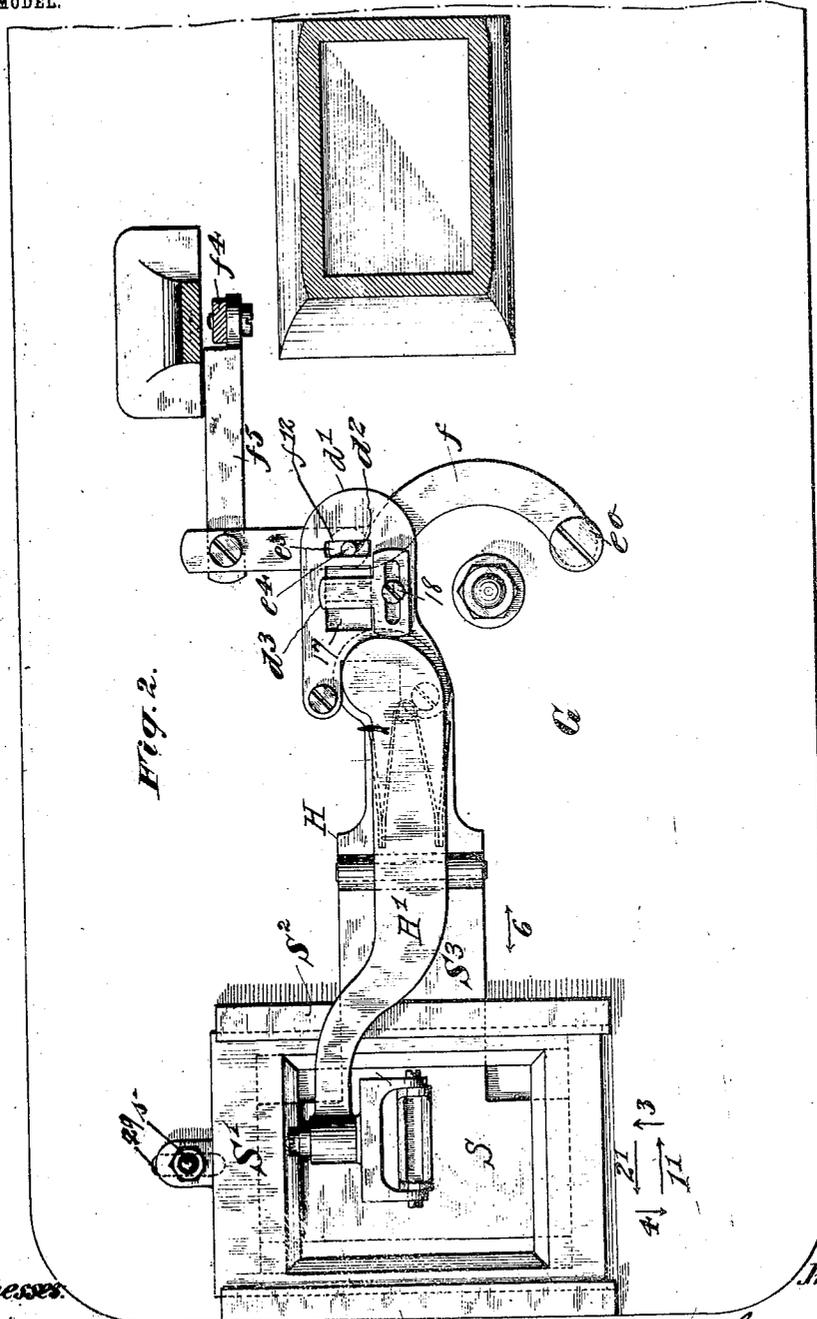
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NO MODEL.

6 SHEETS—SHEET 2.



Witnesses.

*W. H. H.*

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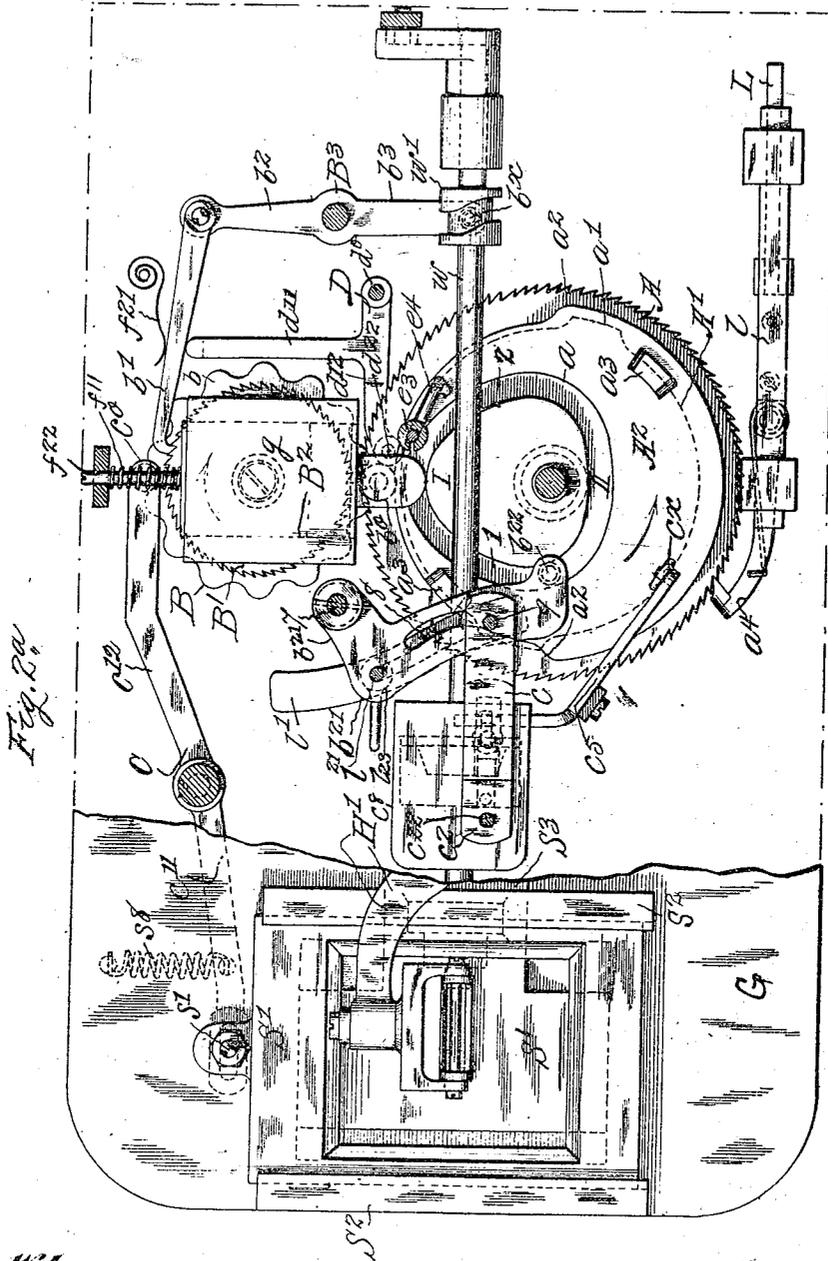
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NO MODEL.

5 SHEETS—SHEET 3.



Witnesses:

*W. H. Summers*

Inventor:

*Julius Gutmann.*  
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J. GUTMANN.  
BUTTONHOLE MACHINE.

APPLICATION FILED AUG. 14, 1897.

NO MODEL.

5 SHEETS—SHEET 4.

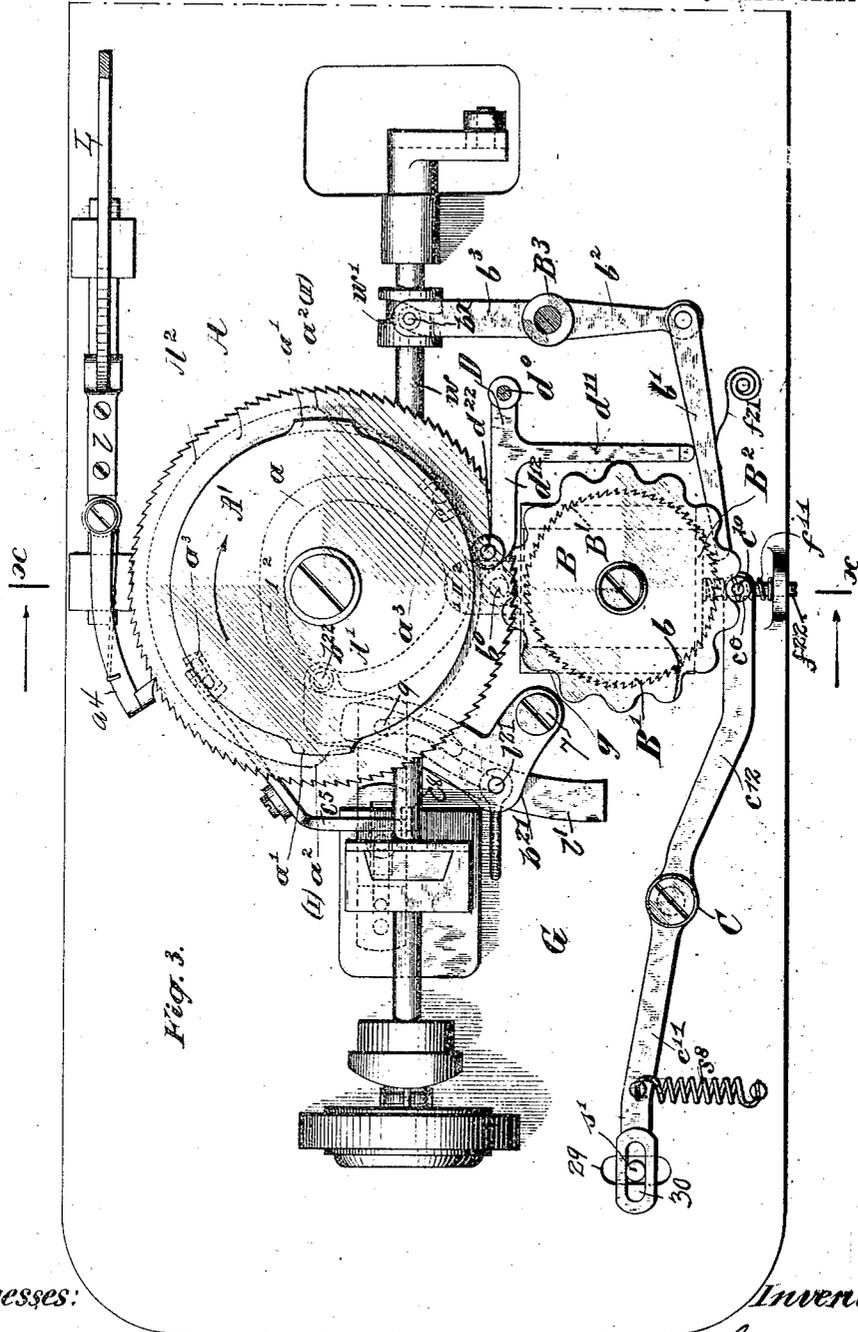


Fig. 3.

Witnesses:

B. Ober.  
B. Sommer

Inventor:

By Julius Gutmann.  
Henry Orth  
Attorney.

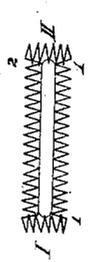
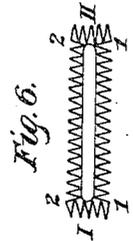
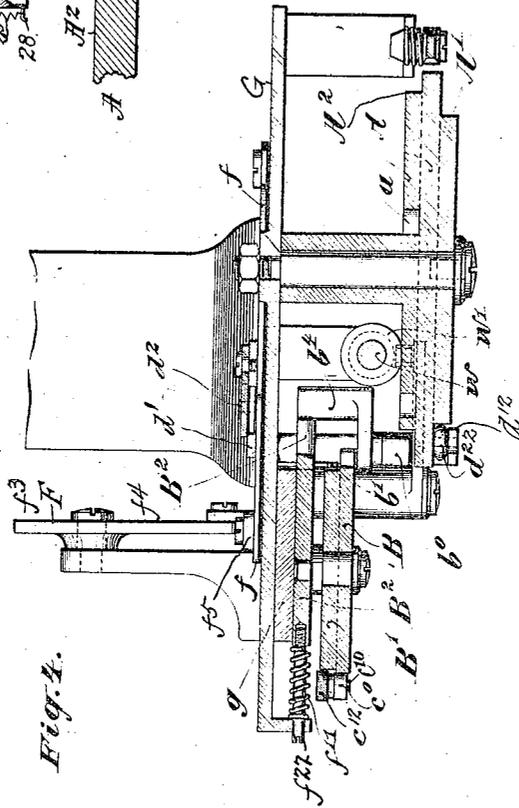
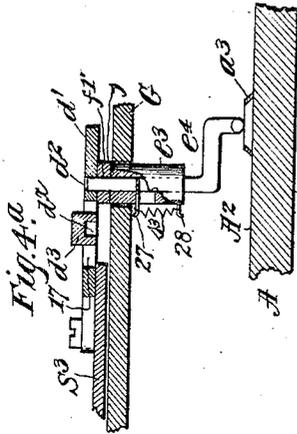
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NO MODEL.

5 SHEETS—SHEET 5.



Witnesses:  
B. Ober,  
A. Hommers.

Fig. 5.  
Inventor  
Julius Gutmann.  
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Attorney.

# UNITED STATES PATENT OFFICE.

JULIUS GUTMANN, OF BERLIN, GERMANY, ASSIGNOR TO THE FIRM OF  
FABRIK FÜR SPEZIALNÄHMASCHINEN A. G., (PATENTE JULIUS GUT-  
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## BUTTONHOLE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 723,460, dated March 24, 1903.

Application filed August 14, 1897. Serial No. 848,320. (No model.)

*To all whom it may concern:*

Be it known that I, JULIUS GUTMANN, a sub-  
ject of the Emperor of Germany, residing at  
Berlin, Germany, have invented certain new  
5 and useful Improvements in Buttonhole-Ma-  
chines, (for which Letters Patent have been  
obtained in Germany, numbered 92,150, and  
dated October 18, 1896; in France, No.  
253,443, (addition,) dated December 12, 1896;  
10 in Belgium, No. 125,495, dated December 16,  
1896, and in Switzerland, No. 13,400, dated  
December 24, 1896;) and I do hereby declare  
the following to be a full, clear, and exact de-  
scription of the invention, such as will enable  
15 others skilled in the art to which it appertains  
to make and use the same, reference being had  
to the accompanying drawings, and to let-  
ters and figures of reference marked thereon,  
which form a part of this specification.

20 This invention has relation to that type of  
buttonhole-sewing machines organized to  
bind both edges of a buttonhole and to bar  
both its ends by stitches laid parallel or sub-  
stantially parallel to the major axis of the  
25 buttonhole, as shown and described in Let-  
ters Patent of the United States granted to  
me under date of November 29, 1898, No.  
615,165.

30 In a machine organized as shown and de-  
scribed in the patent referred to the binding-  
stitches are produced by stitch-forming ap-  
pliances comprising a needle-bar having a  
vertical reciprocating and a vibrating motion  
35 across the buttonhole, a feed motion length-  
wise of the buttonhole being simultaneously  
imparted to the work-holder, and the barring-  
stitches are formed by vertical reciprocations  
of the needle-bar and by short reciprocations  
40 lengthwise of the buttonhole and a feed mo-  
tion crosswise of the buttonhole imparted to  
the work-holder.

45 This invention has for its object to simplify  
the construction of machines organized as  
briefly outlined, and this I attain, first, by  
dispensing with the mechanism for vibrating  
the needle-bar crosswise of the buttonhole in  
the formation of the binding-stitches and sub-  
stituting a simple mechanism for imparting  
50 motion lengthwise of the buttonhole, the re-

quired short reciprocations crosswise of such  
buttonhole; secondly, by simplifying the ap-  
pliances for periodically throwing the feed  
mechanism just referred to into and out of  
operation; thirdly, by combining with the  
55 mechanism for imparting to the work-holder  
the aforesaid short reciprocations crosswise  
of the buttonhole in binding an edge thereof  
mechanism for imparting to said work-holder  
its feed motion crosswise of the buttonhole  
60 in barring an end thereof and in simplifying  
the appliances for throwing said mechanisms  
into and out of operation, and, lastly, in sim-  
plifying the appliances for throwing into and  
out of operation the mechanism for impart-  
65 ing to the work-holder its short reciproca-  
tions lengthwise of the buttonhole in barring  
an end thereof.

70 That my invention may be fully under-  
stood I will describe the same in detail, refer-  
ence being had to the accompanying draw-  
ings, in which—

75 Figure 1 is a side elevation; Figs. 2 and 2<sup>a</sup>,  
sectional plan views, the bed-plate being  
broken away in Fig. 2<sup>a</sup>; and Fig. 3 is an un-  
der side view of a buttonhole-sewing machine  
organized in accordance with this invention.  
Fig. 4 is a section on line *xx* of Fig. 3. Fig.  
4<sup>a</sup> is a sectional detail view of the devices for  
80 periodically coupling the work-holder to the  
vibrating lever, which imparts to said work-  
holder reciprocating motion lengthwise of the  
buttonhole; and Figs. 5 and 6 are stitch dia-  
grams.

85 In view of the fact that any well-known and  
suitably-organized stitch-forming appliances  
comprising a needle-bar and means for im-  
parting to it a vertical reciprocating motion  
only may be used I deem it unnecessary either  
to illustrate or describe such in detail. 90

In Fig. 1 it is supposed that the needle-bar  
B<sup>1</sup> is reciprocated vertically by suitable con-  
nection with the upper or main driving-shaft.

95 The work-holder H, Figs. 1 and 2, is of sub-  
stantially the same construction as that shown  
in my patent above referred to, it being com-  
posed of a lower clamping-jaw or work-plate  
S, provided with the shank or extension S<sup>a</sup>,  
having at its end a slotted plate *d'*, through  
100 the medium of which the short reciprocations

lengthwise of the buttonhole are imparted to said work-holder by mechanism substantially such as shown and described in my said patent and hereinafter referred to, and H' indicates the upper clamping-jaw of said work-holder, hinged to the extension S<sup>3</sup> of the work-plate S, as shown.

In order that the short reciprocations crosswise of the buttonhole above referred to may be imparted to the work-holder to form the binding-stitches in conjunction with stitch-forming appliances comprising a needle-bar having a vertical reciprocating motion only, I provide a slide S', adapted to reciprocate crosswise of the bed-plate G in suitable guides S<sup>2</sup>, to which slide the work-plate S is so connected as to reciprocate therewith and to have independent motion lengthwise of said bed-plate.

The construction of the feed-wheel A differs somewhat from that shown in my said patent; but the mechanism which imparts to said feed-wheel its progressive rotation is substantially the same as that shown in said patent, a<sup>4</sup> indicating the actuating-pawl, L the rock-lever, l the link connecting said pawl and lever, and f<sup>14</sup> the sleeve provided with a cam-groove f<sup>2</sup>, that rocks or vibrates said lever L, said sleeve being shown as carried by the auxiliary shaft w<sup>x</sup>, shown in my said patent geared to the main driving-shaft, but may be and in practice is carried by said main driving-shaft, thus dispensing with shaft w<sup>x</sup>. The feed-wheel A has on its under face a discoidal boss A' and on its upper face a like boss A<sup>2</sup>, both of less diameter than the intermediate ratchet-toothed portion or feed-wheel proper. The boss A' has at diametrically opposite points peripheral projections a', and the boss A<sup>2</sup> is of a differential diameter—that is, one-half or substantially one-half of said boss is of greater diameter than the other to form at diametrically opposite points peripheral shoulders a<sup>2</sup>. On the upper face of boss A<sup>2</sup> at diametrically opposite points is secured or formed a ledge or projection a<sup>3</sup>, the ends of which are inclined, and in said face is formed a suitable cam-groove a, having the eccentric portions 1 and 2 merging into the intermediate concentric portions I and II, respectively, substantially as shown and described in the aforementioned patent. The relative arrangement of the projections a' on boss A', the shoulders a<sup>2</sup>, projections a<sup>3</sup>, and cam-groove a on and in boss A<sup>2</sup> is such to cause the actuating-mechanism to properly perform its functions in binding the edges and barring the ends of a buttonhole, as hereinafter explained.

The eccentric portions 1 and 2 of the cam-groove a impart to the work-holder II its progressive feed motion lengthwise of the bed-plate and buttonhole in one or the other direction, according as the eccentric portion 1 or 2 is acting on the feed-transmitting appliances, and, as hereinbefore stated, the work-holder during these feed motions is reciprocated

crosswise of said bed-plate to form the binding-stitches by mechanism hereinafter described. These feed-transmitting appliances are organized substantially as shown and described in my said patent and consist, as shown in Figs. 1, 2<sup>a</sup>, and 3, of a feed-transmitting bell-crank lever b<sup>21</sup>, fulcrumed to a stud 7 on the under side of bed-plate G and having a pin b<sup>22</sup>, carrying a roller that projects into the aforementioned cam-groove a in boss A<sup>2</sup> of feed-wheel A. The lever b<sup>21</sup> is connected with an adjusting-lever l', likewise fulcrumed to the under side of the bed-plate G by means of the pin l'<sup>21</sup> of a clamping device l'<sup>23</sup>, said pin passing through a curved slot in said lever l' and through lever b<sup>21</sup>, and whereby the amplitude of the movement of said lever in one or the other direction under the action of the eccentric portions 1 or 2 of the cam-groove a may be varied in a well-known manner in accordance with the length of the buttonhole to be worked.

In the operation of the machine and, as hereinafter referred to, after one edge of a buttonhole is bound and before one end thereof can be barred the work-holder slide S<sup>3</sup> must be uncoupled from the feed-lever b<sup>21</sup> in order that a progressive feed motion crosswise of the buttonhole and a reciprocating motion lengthwise of the buttonhole may be imparted to said work-holder to form the barring-stitches. The mechanism for periodically coupling the feed-lever b<sup>21</sup> to and uncoupling the same from the work-plate S is, with one exception, hereinafter referred to, the same as the corresponding mechanism shown and described in my patent herein mentioned and may be briefly described, reference being had to Figs. 1, 2<sup>a</sup>, and 3. To the adjusting-lever l' is secured a pin 9, that projects through the slot 8 in feed-lever b<sup>21</sup> and into a hole of a connecting-bar c, adapted to be coupled to and uncoupled from a bar c<sup>2</sup>, connected with the extension S' of work-plate S by a pin c<sup>22</sup>, by means of a headed coupling-pin c', working in a hole in bar c<sup>2</sup> and adapted to be projected into a hole in connecting-bar c. The coupling-pin c' is secured to or engaged by the free end of a spring c<sup>4</sup>, whose opposite end is secured to the under side of bar c<sup>2</sup>. The power of the spring on pin c' is exerted in a downward direction to draw said pin out of engagement with bar c and is held in such engagement by a bar or plate c<sup>3</sup>, bearing on the head of the pin and having a foot c<sup>7</sup>, guided in a suitable bracket c<sup>8</sup> and held up by the forward arm of a two-armed lever c<sup>5</sup>, and connected to the foot of plate c<sup>3</sup> by a pin c<sup>10</sup>, projecting into a hole in the downwardly-bent end of said forward arm of lever c<sup>5</sup>. The lever c<sup>5</sup> is pivoted in a bracket c<sup>9</sup>, and its rear arm projects over the feed-wheel boss A<sup>2</sup> and carries a roller c<sup>x</sup> in the path of the projections a<sup>3</sup> on said boss and heretofore described. In my aforementioned patent I make use of two levers, one actuated by the projections a<sup>3</sup> on feed-wheel

boss  $A^2$  and actuating a second lever connected, as described, with the foot of lock-plate  $c^3$ . One of said levers is dispensed with in the present arrangement, this being the only difference between the two mechanisms. Of course in the present arrangement the roller of lever  $c^5$  must be held to the upper face of feed-wheel boss  $A^2$ , as otherwise the power of the spring  $c^4$  on bar or plate  $c^3$  would tend to tilt said lever  $c^5$  and hold its roller out of reach of the projections  $a^3$  on said boss. This may be done by any suitable means. A simple and very common expedient would be a spring having one end secured to bracket  $c^3$ , Fig. 1, and bearing with its free end on the roller-arm of lever  $c^5$ . This is an expedient so simple and common and no claim being made thereto that I have deemed it unnecessary to illustrate the same. It will be obvious that when a projection  $a^3$  on feed-wheel boss lifts the roller-arm of lever  $c^5$  the forward arm thereof will be depressed, thereby drawing down the bar or plate  $c^3$ , enabling the spring  $c^4$  to move the coupling-pin  $c'$  down out of engagement with the connecting-bar  $c$ , thereby uncoupling feed-lever  $b^{21}$  from bar  $c^2$ , and consequently from work-plate  $S$ . As soon, however, as a projection  $a^3$  moves from under roller  $c^x$  the forward arm of lever  $c^5$  is raised, and thereby the lock-plate  $c^3$ , which latter, acting on the head of coupling-pin  $c'$ , moves the same against the stress of its spring  $c^4$  into engagement with connecting-bar  $c$ , thereby coupling feed-lever  $b^{21}$  with bar  $c^2$ , and consequently with the work-plate  $S$ , as will be readily understood.

The short reciprocations lengthwise of the bed-plate, arrow 6, Fig. 2, are imparted to the work-holder  $H$  by appliances substantially such as described in my patent hereinbefore referred to through a two-armed rock-lever  $F$ , fulcrumed at  $f^x$  to a standard rising from bed-plate  $G$  and vibrated by a cam-grooved sleeve  $f'$ , carried, as shown, by the auxiliary shaft  $w^x$ , but which in practice is carried by the main driving-shaft and acts on a roller at the free end of the upper arm  $f^3$  of lever  $F$ . The lower arm  $f^4$  of lever  $F$  is connected by a link  $f^5$  with a rock-lever  $f$ , fulcrumed at  $e^0$  to bed-plate  $G$ , Fig. 2, said lever having a longitudinal slot  $f^{12}$ , Fig. 4<sup>a</sup>, adapted to register with a transverse slot  $d^2$  in plate  $d'$ , secured to the end of the extension  $S^3$  of the work-plate  $S$  of work-holder  $H$ , hereinbefore referred to. The plate  $d'$  has also a rectangular opening 17 of the same length as slot  $d^2$ , but considerably wider, and has adjustably secured thereto a plate  $d^3$ , having a recess in its under face, Fig. 4<sup>a</sup>, of the same length and width as the aforesaid slot  $d^2$ . This plate is, as shown in Fig. 2, T shaped, its transverse member being slotted longitudinally for the passage of the set-screw 18, by means of which said plate is adjusted along the opening 17 for purposes presently explained. In the bed-plate  $G$  and projecting slightly from its upper face is secured a sleeve  $e^3$ ,

Figs. 2<sup>a</sup>, 4<sup>a</sup>, in which is guided a coupling-pin  $e^4$ , held in contact with the face of boss  $A^2$  of feed-wheel  $A$  by a spring  $s^3$ , secured, respectively, to an arm 27, projecting from the pin through a vertical slot in the sleeve, and to an arm 28, projecting from said sleeve, Fig. 4<sup>a</sup>. The lower crank-arm of pin  $e^4$  lies in the path of the projections  $a^3$  on aforesaid boss  $A^2$  and is adapted to pass through slot  $f^{12}$  in rock-lever  $f$  and either the slot  $d^2$  in plate  $d'$  or into the recess in the under face of the adjustable plate  $d^3$ , according as one or the other end of a buttonhole is being barred, and by means of said plate  $d^3$  the coupling of the coupling-pin  $e^4$  with the rock-lever  $f$  and with the work-holder through slot  $d^2$  or plate  $d^3$  may be effected in accordance with the length of the buttonhole to be bound and barred. The arrangement of these appliances is such that when one or the other concentric portion I or II of the cam-groove  $a$  in boss  $A^2$  of feed-wheel  $A$  is moving along the roller of pin  $b^{21}$  of feed-lever  $b^{21}$  the latter remains stationary, and at the same time a projection  $a^3$  on said boss moves under the roller  $c^x$  on lever  $c^5$ , tilting the latter and depressing the lock-plate  $c^3$  and allowing spring  $c^4$  to move coupling-pin  $c'$  out of engagement with link  $c$  and bar  $c^2$  to uncouple the work-holder  $H$  from the feed-lever  $b^{21}$ , as above described. Simultaneously therewith the other projection  $a^3$  on the aforesaid boss  $A^2$  of feed-wheel  $A$  moves under the coupling-pin  $e^4$  and couples the work-holder to the rock-lever  $f$ , as and for the purposes hereinbefore set forth. By so arranging the coupling-lever  $c^5$  and uncoupling-pin  $e^4$  as to be simultaneously acted upon by the aforesaid projections  $a^3$  the mechanism performing the described functions is materially simplified.

The short reciprocations crosswise of the bed-plate necessary to form the binding-stitches, in conjunction with stitch-forming appliances, comprising a needle-bar and needle having a vertical reciprocating motion only, and a feed motion crosswise of the bed-plate in one or the other direction, necessary to the formation of the barring-stitches, are imparted to the work-holder  $H$  through the following instrumentalities: The work-holder slide  $S'$ , Fig. 2, has a lug to which is secured a pin  $s'$ , that projects through a slot 29 (also shown in Fig. 3) in bed-plate  $G$  into a longitudinal slot 30, Fig. 3, in arm  $c^{11}$  of a two-armed rock-lever  $C$ , the other arm,  $c^{12}$ , of which carries a roller  $e^0$ , held in engagement with the undulating teeth  $b$  of a wheel  $B$  by a spring  $s^3$ , secured to arm  $c^{11}$  of said lever and to a stud on bed-plate  $G$ , respectively, Figs. 2<sup>a</sup> and 3. The wheel  $B$  is mounted on a spindle, which has its bearing in a slide  $B^3$ , guided in a guide-plate  $g$ , secured to the under side of bed-plate  $G$ , Figs. 1, 2<sup>a</sup>, and 4. The slide  $B^3$  has a crank-arm  $b^4$ , provided with a pin carrying a roller  $b^0$ , held in contact with the periphery of boss  $A^2$  of feed-wheel  $A$  by a spring  $f^{11}$  on a pin  $f^{22}$ , secured to said slide and

guided in a lug on bed-plate G. The wheel B has formed on or secured to its upper face a ratchet-wheel B', actuated by a pawl b', held in engagement with said ratchet-wheel by a spring f<sup>21</sup>, said pawl being connected with and reciprocated by an arm b<sup>2</sup> of a two-armed rock-lever B<sup>3</sup>, the arm b<sup>3</sup> of which has a pin b<sup>x</sup>, that carries a roller which projects into a cam-groove in a sleeve w', secured to the lower machine-shaft w. It is obvious that the progressive rotation of the ratchet-wheel B' is imparted to the wheel B and the latter vibrates the lever C, whose vibrations are transmitted to the slide S' of work-holder H through pin s', thereby imparting to said work-holder the short reciprocations necessary to the formation of the binding-stitches. Inasmuch as the lever C is in perpetual engagement with wheel B and as the latter is carried by and has motion with the feed-slide B<sup>2</sup>, the movements of the latter are transmitted to the work-holder slide S' and there-through to the work-holder. Since the roller on pin b<sup>o</sup> of slide B<sup>2</sup> is held in contact by the slide-spring f<sup>11</sup> with the periphery of the boss A<sup>2</sup> on feed-wheel A, whenever during the rotation of the latter a shoulder a<sup>2</sup> on said periphery of boss A<sup>2</sup> acts upon said roller the feed-slide B<sup>2</sup> is progressively moved crosswise of the bed-plate in one or the other direction, either by such shoulder or by the feed-slide spring f<sup>11</sup>, according as said roller rides along a shoulder a<sup>2</sup> from the part of smaller diameter onto the part of greater diameter of said boss A<sup>2</sup>, or vice versa, and whereby the feed motion crosswise of the bed-plate in one or the other direction necessary to the formation of the barring-stitches is imparted to the work-holder H.

In barring a buttonhole end it is of course necessary to throw out of operation mechanism which actuates the wheel B, that vibrates the lever C. This is effected by a bell-crank lever D, Figs. 2<sup>a</sup> and 3, fulcrumed at d<sup>0</sup> to the under side of bed-plate G. The arm d<sup>11</sup> of said lever has bearing on the pawl b', that actuates the ratchet B', and the arm d<sup>12</sup> of the lever has a pin d<sup>22</sup>, carrying a roller held by said pawl through its spring f<sup>21</sup> against the periphery of the boss A' on the under face of feed-wheel A, so that when during its rotation a shoulder a' on said boss passes along said roller on pin d<sup>22</sup> on arm d<sup>12</sup> of lever D the latter is tilted, causing its arm d<sup>11</sup> to move pawl b' away from or out of engagement with the ratchet-wheel B'.

Referring to Figs. 1, 2, and 3, in working a buttonhole the work-holder receives, for instance, its feed motion in the direction of arrow 1', Fig. 2, from feed-lever b<sup>21</sup>, actuated by the eccentric portion 2 of cam-groove a in feed-wheel A and through the described connections connecting said lever with the extension S<sup>3</sup> of said work-holder. Simultaneously therewith a reciprocating motion in the direction of double-headed arrow 5, Fig. 2, is imparted to the work-holder through the

wheel B, actuated as described, and the lever C, connected with slide S' of said work-holder, to form, in conjunction with the stitch-forming appliances, the binding-stitches and bind one edge of a buttonhole. As soon as the roller on pin b<sup>22</sup> of feed-lever b<sup>21</sup> passes into the concentric portion II of the aforesaid cam-groove the feed-lever b<sup>21</sup> remains stationary and is uncoupled from the extension S<sup>3</sup> of the work-holder H by a projection a<sup>3</sup> on the face of boss A<sup>2</sup> of feed-wheel A acting on roller c<sup>x</sup> of lever c<sup>5</sup>, the latter moving lock-plate c<sup>3</sup> downward to enable the uncoupling-spring c<sup>4</sup> to move the coupling-pin c' out of engagement with the link c and bar c<sup>2</sup>. Simultaneously therewith the other projection a<sup>3</sup> on the face of the aforesaid boss of feed-wheel A moves under the coupling-pin c<sup>4</sup>, lifts the same through the slot f<sup>12</sup> in rock-lever f into the recess in the under side of the adjustable plate d<sup>3</sup> on plate d' of extension S<sup>3</sup> of work-holder H to impart to it the short reciprocations in the direction of the double-headed arrow 6, Fig. 2. At the same time a projection a' on boss A' of feed-wheel A acts on the roller on pin d<sup>22</sup> of bell-crank lever D, causing the latter to disengage the pawl b' from ratchet-wheel B', thereby stopping the rotation of wheel B, the vibrations of lever C, and the reciprocation crosswise of the bed-plate of slide S' and work-holder H. Simultaneously therewith a shoulder a<sup>2</sup> on the periphery of the boss A<sup>2</sup> of feed-wheel A acts upon the roller on pin b<sup>o</sup> of slide B<sup>2</sup>, said roller moving from the part of smaller diameter onto the part of greater diameter of said boss, during which movement the said slide B<sup>2</sup> receives its progressive motion in the direction of arrow 3, Fig. 2, whereby the barring-stitches are formed and one end of the buttonhole is barred. When the roller on pin b<sup>22</sup> of feed-lever b<sup>21</sup> passes from the concentric portion II into the eccentric portion I of aforesaid cam-groove a, the direction of feed of the work-holder H is reversed—namely, in the direction of arrow 2'—and simultaneously therewith said work-holder is uncoupled from the rock-lever f in that the projection a<sup>3</sup> on boss A<sup>2</sup> of feed-wheel A, which had previously moved the coupling-pin c<sup>4</sup> into engagement with rock-lever f and adjustable plate d<sup>3</sup> of slotted plate d' on extension S<sup>3</sup> of work-holder H, moves from under said coupling-pin c<sup>4</sup>, allowing the spring s<sup>3</sup>, Fig. 4<sup>a</sup>, to draw said pin down and out of engagement with rock-lever f and plate d<sup>3</sup>. At the same time the other projection a<sup>3</sup> on the aforesaid boss A<sup>2</sup> on feed-wheel A moves from under the roller c<sup>x</sup> of lever c<sup>5</sup>, allowing its spring to depress it and lift the lock-plate c<sup>3</sup> and there-through the coupling-pin c' against the stress of its spring c<sup>4</sup> into engagement with the link c and bar c<sup>2</sup> again, thereby coupling feed-lever b<sup>21</sup> with the work-holder. Simultaneously with these operations the roller on pin b<sup>o</sup> of slide B<sup>2</sup> has passed along a shoulder a<sup>2</sup> on boss A<sup>2</sup> of feed-wheel A from the part of

smaller diameter to the part of greater diameter, thereby stopping the feed motion of slide B crosswise of the bed-plate. At the same time the projection  $a'$  on boss  $A'$  of feed-wheel A moves clear of the roller on pin  $d^{22}$  of arm  $d^{12}$  of bell-crank lever D, permitting the pawl-spring  $f^{21}$  to move pawl  $b'$  again into engagement with ratchet-wheel B' to impart to the work-holder H the short reciprocations crosswise of the bed-plate through the medium of the wheel B, lever C, and work-holder slide S', thus placing the mechanism again in condition for binding, and as the feed motion of the work-holder is now reversed the second edge of the buttonhole will be bound. At the completion of this operation and as the roller on pin  $b^{22}$  of feed-lever  $b^{21}$  enters the concentric portion I of the cam-groove  $a$  in boss  $A^2$  of feed-wheel A the mechanism is again placed in condition for barring, as above set forth; but now the roller on pin  $b^9$ , carried by feed-slide B<sup>2</sup>, moves along a shoulder  $a^2$  on the aforesaid boss  $A^2$  from the part of greater diameter to the part of least diameter of said boss, the progressive or feed motion crosswise of the bed-plate being now imparted to said feed-slide by its spring  $f^{11}$  in a reverse direction, arrow 4, Fig. 2, to bar the other end of the buttonhole. It will thus be seen that the binding and barring operations take place alternately, so that one edge of a buttonhole can be bound and one end barred, then the other edge bound, and finally the opposite end barred.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In a buttonhole-sewing machine, the combination with the work-holder, a progressively-rotating feed-wheel having a cam-groove  $a$  in, and projections  $a^2$  on its upper face, stitch-forming appliances comprising a vertically-reciprocating needle-bar, a feed-lever detachably connected with the work-holder and acted upon by the aforesaid cam-groove to feed the work-holder lengthwise of the bed-plate, a rock-lever connected with said work-holder to reciprocate the same crosswise of the bed-plate, a progressively-revolving toothed wheel rocking said lever, said wheel also having motion crosswise of the bed-plate, and means for preventing such motion while said wheel vibrates the rock-lever, for the purpose set forth.

2. In a buttonhole-sewing machine, the combination with the work-holder, comprising a work-plate and a slide connected therewith to move it crosswise of the bed-plate and to allow said work-plate to move independently lengthwise of said bed-plate, stitch-forming appliances comprising a vertically-reciprocating needle-bar, a progressively-revolving feed-wheel having a cam-groove  $a$  in, and projections  $a^2$  on its upper face, a feed-lever acted upon by said cam-groove to feed the work-holder lengthwise of the bed-plate, said lever detachably connected with said

work-holder, and mechanism for reciprocating the aforesaid slide comprising a rock-lever and a progressively-revoluble toothed wheel B, said wheel also having motion crosswise of the bed-plate; of the rock-lever  $f$  connectible with the work-holder and reciprocating the same lengthwise of the bed-plate, a vertically-movable coupling-pin  $e^1$  arranged to be projected through a slot in said lever into engagement with the work-holder, said pin in the path of the projections  $a^2$  on the feed-wheel, means acted upon by one of said projections to disconnect the feed-lever from the work-holder when the other projection acts upon the coupling-pin  $e^1$ , and means for simultaneously stopping the progressive rotation of the wheel B and for imparting to said wheel a feed motion crosswise of the bed-plate, for the purpose set forth.

3. In a buttonhole-sewing machine, the combination with the work-holder, comprising a work-plate and a slide connected therewith to move it crosswise of the bed-plate and to allow said work-plate to move independently lengthwise of said bed-plate, stitch-forming appliances comprising a vertically-reciprocating needle-bar, a progressively-revolving feed-wheel having a cam-groove  $a$  in, and projections  $a^2$  on the upper face of a boss  $A^2$  on said feed-wheel A, said boss having peripheral shoulders  $a^2$ , a feed-lever acted upon by said cam-groove to feed the work-holder lengthwise of the bed-plate, said lever detachably connected with said work-holder, and mechanism for reciprocating the aforesaid slide, comprising a rock-lever and a progressively-revoluble toothed wheel B, said wheel also having motion crosswise of the bed-plate; of the rock-lever  $f$  connectible with the work-holder and reciprocating the same lengthwise of the bed-plate, a vertically-movable coupling-pin  $e^1$  arranged to be projected through a slot in said lever into engagement with the work-holder, said pin in the path of the projections  $a^2$  on the feed-wheel, means acted upon by one of said projections to disconnect the feed-lever from the work-holder when the other projection acts upon the coupling-pin  $e^1$ , and means for simultaneously stopping the progressive rotation of the wheel B and for imparting to said wheel feed motion crosswise of the bed-plate, comprising a spring-actuated slide carrying wheel B, said slide provided with an arm carrying a roller acted on by one of the aforesaid shoulders  $a^2$  on boss  $A^2$  of the feed-wheel, for the purpose set forth.

4. In a buttonhole-sewing machine, the combination with stitch-forming appliances comprising a vertically-reciprocating needle-bar, the work-holder comprising a work-plate and a slide S' connected to move together crosswise of the bed-plate of the machine and to allow the work-plate to move independently lengthwise of said bed-plate, a feed-wheel having a cam-groove  $a$  in its upper face and peripheral projections  $a'$  on a

boss on its lower face, a feed-lever detachably connected with the work-holder and acted upon by said cam-groove *a* to feed said work-holder lengthwise of the bed-plate, a  
 5 rock-lever connected with the slide *S'*, a toothed wheel *B* in perpetual engagement with said lever, a ratchet-wheel on said toothed wheel, a pawl, and a vibrating lever  
 10 connected with said pawl; of means for disconnecting the feed-lever from the work-holder and simultaneously therewith imparting to said work-holder a reciprocating motion lengthwise of the bed-plate, means for  
 15 stopping the rotation of the ratchet-wheel comprising a bell-crank lever *D*, one of whose arms has bearing on the aforesaid pawl and the other carrying a roller acted upon by a projection *a'* on the aforesaid feed-wheel  
 20 boss *A'* to move the pawl out of engagement with its ratchet, and means acting simultaneously on the aforesaid wheel *B* to feed it crosswise of the bed-plate, for the purpose set forth.

5. In a buttonhole-sewing machine, the  
 25 combination with stitch-forming appliances comprising a vertically-reciprocating needle-bar, the lower machine-shaft, the work-holder comprising a work-plate and slide *S'* connected to move together crosswise of the bed-plate  
 30 of the machine and to allow the work-plate to move independently lengthwise of said bed-plate, a progressively-revolving feed-wheel having a boss *A*<sup>2</sup> on its upper face provided with peripheral shoulders *a*<sup>2</sup>, with a cam-groove *a* in, and with projections *a*<sup>3</sup> on its upper  
 35 face, said cam-groove having eccentric portions I and 2 and concentric portions I and II, a feed-lever detachably connected with the work-holder and acted upon by an eccentric  
 40 part of the cam-groove *a* to feed the work-holder lengthwise of the bed-plate in one direction, a toothed wheel *B*, and mechanism

for revolving the same, operated by the lower machine-shaft, a rock-lever in perpetual engagement with said wheel and connected with  
 45 the aforesaid slide *S'* to reciprocate the same crosswise of the bed-plate; of means automatically disconnecting the feed-lever from the work-holder when said lever ceases to  
 50 be acted upon by an eccentric portion of the aforesaid cam-groove, appliances for reciprocating the work-holder lengthwise of the bed-plate, means automatically coupling said work-holder with said appliances when said  
 55 work-holder is disconnected from the aforesaid feed-lever, means for simultaneously stopping the rotation of the aforesaid wheel *B*, and means feeding the same crosswise of the machine bed-plate, consisting of a slide  
 60 *B*<sup>2</sup> carrying the wheel *B*, and provided with an arm carrying a roller, and a spring acting on the slide to hold said roller to the periphery of the boss *A*<sup>2</sup> on the feed-wheel for the action thereon of a shoulder *a*<sup>2</sup>, whereby and  
 65 by a complete revolution of the feed-wheel the work-holder is reciprocated crosswise of the bed-plate and fed lengthwise thereof to bind one edge of a buttonhole, said movements then stopped and the work-holder reciprocated lengthwise of the bed-plate and fed  
 70 crosswise thereof to bar one edge of said buttonhole, these operations being successively repeated to bind the opposite edge and bar the opposite end of such buttonhole, the direction of feed in the last two operations being  
 75 reversed, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

JULIUS GUTMANN.

Witnesses:

HENRY HASPER,  
 W. HAUPT.