

No. 624,793.

Patented May 9, 1899.

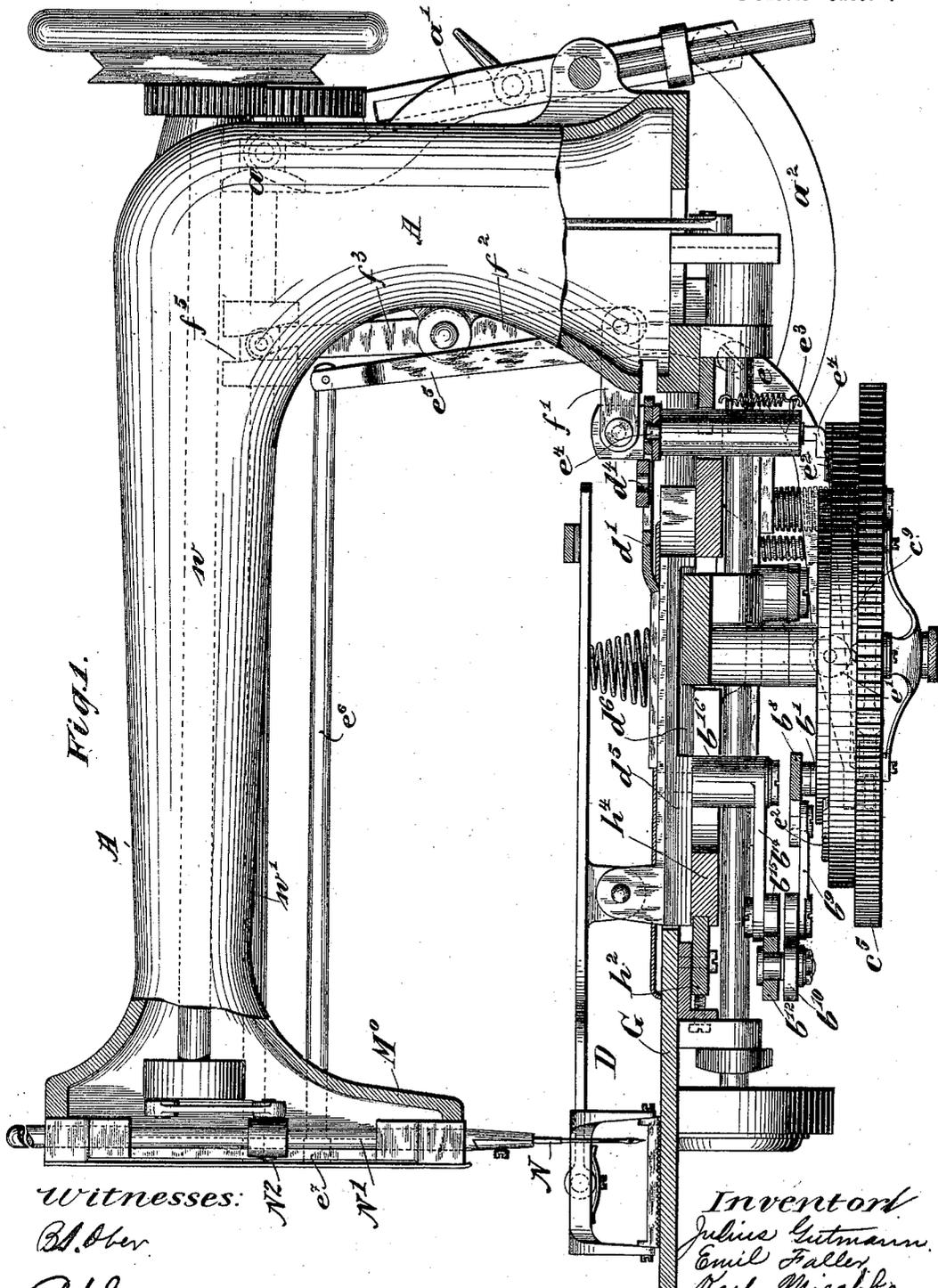
J. GUTMANN, E. FALLER & K. MISCHKE.

BUTTONHOLE SEWING MACHINE.

(Application filed Aug. 31, 1897.)

(No Model.,

5 Sheets—Sheet I.



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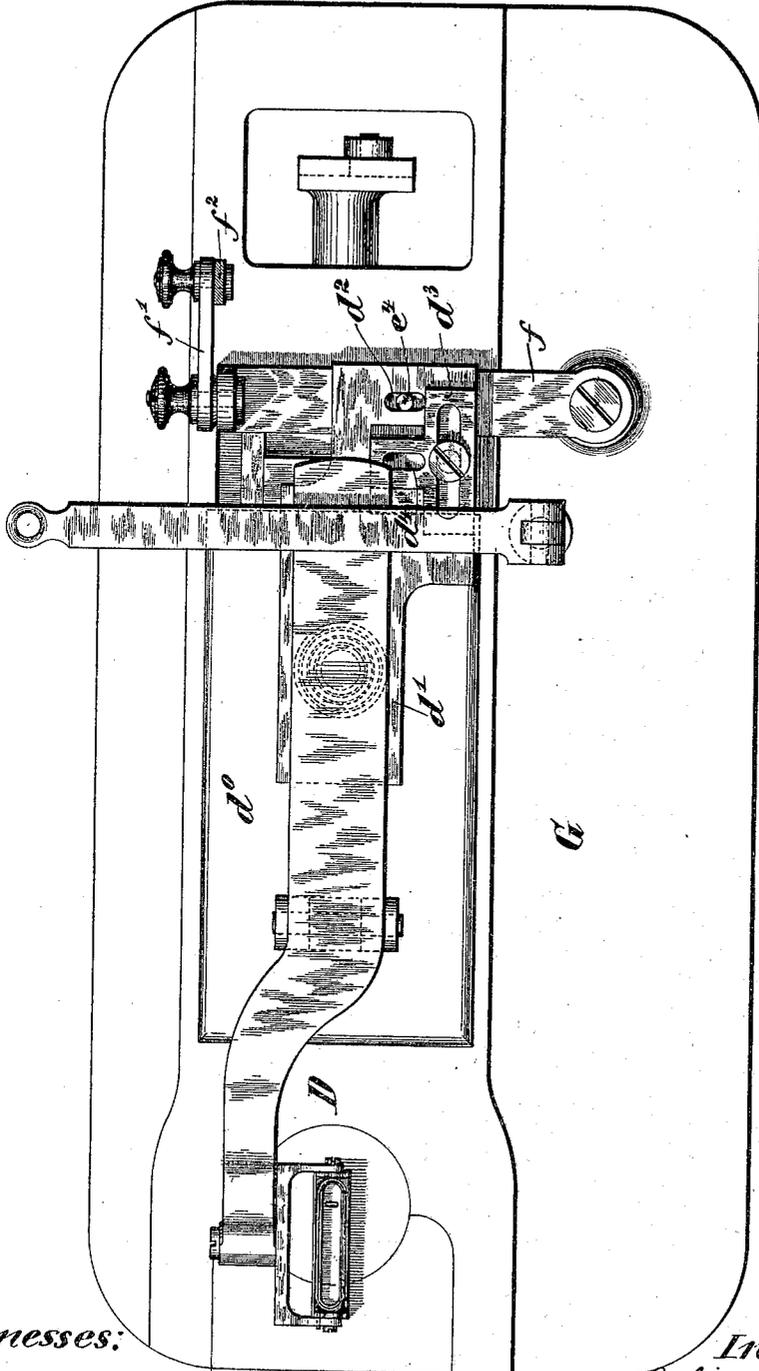


Fig. 2.

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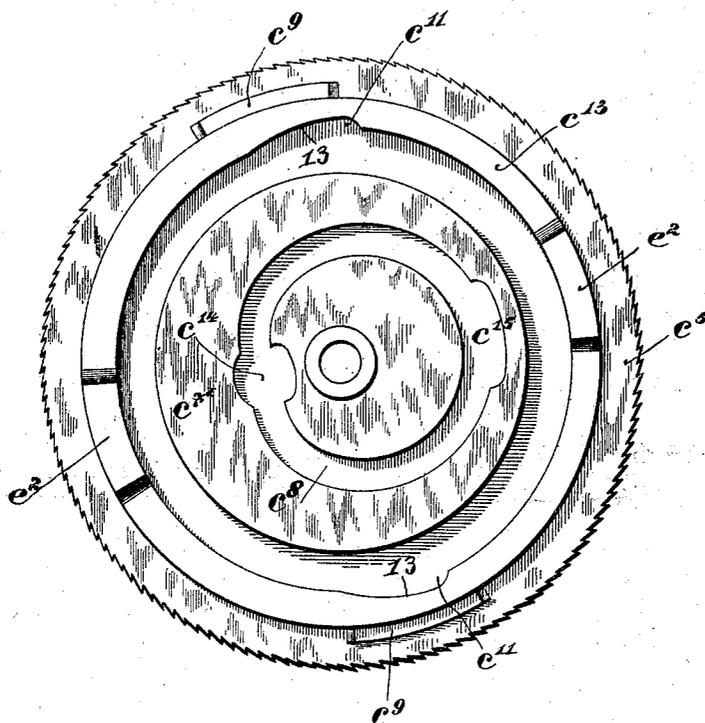
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5 Sheets—Sheet 5.

Fig. 5.



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UNITED STATES PATENT OFFICE.

JULIUS GUTMANN, OF BERLIN, GERMANY, AND EMIL FALLER AND KARL MISCHKE, OF ZURICH, SWITZERLAND, ASSIGNORS TO THE FIRMA FABRIK FÜR SPEZIALNAHMASCHINEN ACTIEN-GESELLSCHAFT, (PATENTE JULIUS GUTMANN,) OF ZURICH, SWITZERLAND.

BUTTONHOLE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 624,793, dated May 9, 1899.

Application filed August 31, 1897. Serial No. 650,163. (No model.)

To all whom it may concern:

Be it known that we, JULIUS GUTMANN, a subject of the Emperor of Germany, residing at Berlin, Germany, and EMIL FALLER, a citizen of the Republic of Switzerland, and KARL MISCHKE, a subject of the Emperor of Austria-Hungary, both residing at Zurich, Switzerland, have invented certain new and useful Improvements in Buttonhole-Sewing Machines; and we do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters and numerals of reference thereon, which form a part of this application.

The present invention has relation to buttonhole-sewing machines of the Gutmann type organized to bind the edges of a buttonhole in the usual manner and bar the ends thereof by stitches laid parallel with its said edges, or substantially so.

The invention has for its object certain improvements in the type of sewing-machines referred to, and particularly in the machines of the construction shown in our application for patent of the United States, filed August 31, 1897, Serial No. 650,162, and Letters Patent of Julius Gutmann, dated November 29, 1898, No. 615,165. In the machines shown and described in said application and patent the progressive or feed motion lengthwise of the buttonhole is imparted to the work-holder from the eccentric portion of a cam-groove in the feed-wheel through a pin projecting into said groove and through a lever or a system of levers connected with a slide with which the work-holder has motion crosswise of the buttonhole and independent motion lengthwise thereof.

In binding a buttonhole edge the work-holder is positively guided in the slide with which it has motion crosswise of the buttonhole. Practical experience has, however, shown that in barring the ends of a buttonhole the work-holder is liable to be displaced in one or the other direction, and although

excellent results are obtained the deviation of the work-holder in one or the other direction from a perfectly straight line during its progressive motion crosswise of the buttonhole has for its result a certain unevenness in the barring-stitches in that they are not laid absolutely parallel with one another. One of the objects of this invention is to obviate this defect, although slight and for many purposes—as, for instance, for the coarser class of work—practically immaterial, yet of importance in finer classes of work, and cause the barring-stitches to be laid absolutely parallel with one another, and consequently give to the buttonhole a better finish. The further object of this part of our invention is to materially simplify the appliances which transmit to the work-holder its progressive or feed motion lengthwise of the buttonhole.

In our application for patent, Serial No. 650,162, with a view to dispensing with coupling devices for coupling the work-holder to the feed-wheel during the progressive motion of said work-holder lengthwise of the buttonhole and uncoupling the same from said feed-wheel during its progressive motion crosswise of said buttonhole and while being reciprocated lengthwise thereof, we have shown and described said feed-wheel as provided with a sliding piece or plate in which is formed a cam-groove corresponding with that in the feed-wheel, so that during the reciprocations of the work-holder the said sliding plate can reciprocate with said work-holder, the concentric portions of the feed-wheel groove being made sufficiently wide to allow the pin that connects the work-holder with said groove to reciprocate in said wider portion. This arrangement involves, however, structural complications, irrespective of the additional power required to move the sliding plate; and the further object of this invention is to dispense with said plate, as well as with the coupling and uncoupling appliances, whereby the mechanism is materially simplified and the cost of construction, as well as the motive power required, reduced. In our

said application for patent, as well as in the patent of J. Gutmann, the pin which imparts to the work-holder its progressive motion crosswise of the buttonhole in barring an end thereof is secured directly to the lower feed-slide. Hence there is no provision for varying the amplitude of this feed movement. The further object of this invention is to so arrange the connection between said slide and the feed-wheel as to admit of the adjustment or variation in the extent of the feed motion. This is of great importance, in that we are enabled thereby to increase or diminish the distance between the edges of the buttonhole, as may be required, and thereby prevent the sewing together of said edges when long binding-stitches are formed or the overlapping of such edges.

In the accompanying drawings, Figure 1 is a sectional side view of a sewing-machine having a vertically reciprocating and vibrating needle-bar and needle embodying our improvements. Fig. 2 is a top plan view thereof, the overhanging machine-arm being removed and the various movements of the work-holder indicated by arrows numbered from I to V. Figs. 3 and 4 are under side views of the machine, the feed-wheel being removed in Fig. 4; and Fig. 5 is a plan view of the feed-wheel detached.

As shown in Figs. 1 and 2, the work-holder holds the work with the buttonhole lengthwise of the bed-plate, the needle-bar in binding a buttonhole edge vibrating crosswise of the buttonhole, while said work-holder receives a progressive motion lengthwise of said buttonhole—as, for instance, in the direction of arrow I, Fig. 2—from one of the eccentric portions of the heart-shaped groove in the feed-wheel, whereby the usual binding-stitches are formed. When the work-holder reaches the limit of its progressive motion in the direction of arrow I, the vibration of the needle-bar is stopped. The work-holder receives a reciprocating motion lengthwise of the buttonhole, arrow V, Fig. 2, and simultaneously therewith a progressive feed motion crosswise of the buttonhole, arrow II, Fig. 2, whereby the left end of the buttonhole is barred by stitches laid as hereinbefore described, the pin which transmits motion to the work-holder lengthwise of the buttonhole in binding lying during the barring operation in one of the concentric portions of the heart-shaped groove in the feed-wheel. When one end of the buttonhole is barred, the above-described operations for binding the opposite edge are repeated, the work-holder receiving, however, a progressive motion in a direction the reverse of that indicated by arrow I or in the direction of arrow III, Fig. 2. When the second edge of the buttonhole is bound, the operation of barring is repeated, and here also the direction of the progressive motion of the work-holder indicated by arrow II is reversed, as indicated by arrow IV in said

Fig. 2, the parts having returned to the starting-point.

In Figs. 1 to 4, G indicates the bed-plate; A, the overhanging machine-arm; N', the needle-bar; N, the needle; N², the vibrating needle-bar frame; *w*, the main driving or crank shaft; *w'*, the parallel crank-shaft geared to said main shaft, said shaft *w'* imparting the vibratory movements to the needle-bar frame N² and said main crank-shaft the vertically-reciprocating movements to the said needle-bar. The shaft *w'* carries two cam-grooved sleeves *a f*⁵. The former, *a*, imparts the required reciprocating movements to the pawl-lever *a*⁴ and the latter a progressive movement to the feed-wheel *c*⁵ through the medium of a system of levers *a' a*² and the guide-bar *a*³, to which the pawl-lever *a*⁴ is pivoted, the pawl *a*⁵ of which lever is held in engagement with the ratchet-teeth of the feed-wheel by a spring *a*⁶. From the aforesaid cam-grooved sleeve *f*⁵ on shaft *w'*, and as shown and described in the Gutmann patent hereinbefore referred to, the work-holder receives the required reciprocating motion lengthwise of the buttonhole in barring an end thereof through a lever *f*², link *f*¹, lever *f*, and a pin *e*⁴, lifted periodically by projections *e*² on the upper face of the feed-wheel *c*⁵ through a longitudinal slot in lever *f*, arranged transversely of the bed-plate, into one or the other of two transverse slots *d*^{2 d⁴ in a plate *d*¹, secured to the work-holder slide *d*³, the slot *d*⁴ being formed in a separate plate *d*³, adjustable toward and from slot *d*², according to the length of the buttonhole to be sewed, Fig. 2, said slots *d*^{2 d⁴ being of sufficient length to admit of the progressive motion of the work-holder crosswise of the buttonhole. (See also Fig. 1.) The engagement of the pin *e*⁴ with one or the other of the two slots *d*^{2 d⁴ takes place immediately after a buttonhole edge is bound and the bar *e*⁶ has locked the needle-bar against vibration to reciprocate the work-holder lengthwise of the buttonhole in the formation of the barring-stitches, while the needle-bar reciprocates only, the projections *e*², diametrically opposite each other on the upper face of the feed-wheel *c*⁵, being so arranged relatively to the cam-groove *c*³ in its upper face, Fig. 5, that when the roller on pin *b*¹ passes from an eccentric portion of said cam-groove into wider concentric portions, either *c*¹⁴ or *c*¹⁵, at which time the stop-bar *e*⁶ locks the needle-bar against vibration, one of the aforesaid projections *e*² moves under pin *e*⁴ and lifts the same through the slot of lever *f* into engagement with one or the other of the two slots *d*^{2 d⁴, above referred to, according to the edge of the buttonhole to be bound, thereby imparting to the work-holder the reciprocatory motion necessary to the formation of the barring-stitches.}}}}

The needle-bar is held against vibration in barring a buttonhole end by a stop-bar *e*⁶, actuated periodically from a lever *e*⁵, connected

with a lever e on the under side of the bed-plate G , which lever e carries a roller e' in the path of projections c^9 on the feed-wheel h , (shown in dotted lines in Fig. 3 and in full lines in Fig. 5,) whereby the wedge-shaped stop e^7 at the end of said bar is moved into engagement with the needle-bar frame N^2 to stop its vibrations.

The mechanism for actuating the needle-bar for stopping its vibrations, for actuating the feed-wheel, for reciprocating the work-holder lengthwise of the buttonhole, and for imparting the progressive movements to the work-holder are in substance the same as the corresponding mechanisms shown and described in the aforesaid application and patent, with the exception of the mechanism which transmits to the work-holder the progressive motion lengthwise of the buttonhole and hereinafter described.

The work-holder D is constructed substantially as shown in our application for patent Serial No. 650,162, and consists of a slide d^5 , to which the work-clamp is hinged and held to the work by a coiled spring. The slide d^5 has motion lengthwise of the buttonhole and bed-plate G in suitable ways d^5 on a slide h^4 , having motion crosswise of said buttonhole and bed-plate on the under side of the latter, and said slide d^5 has a stud or pin b^{10} projecting from its under side through a longitudinal slot in slide h^4 , so that slide h^5 is adapted to move lengthwise of the bed-plate independently of slide h^4 and crosswise of the bed-plate with said slide h^4 . To the stud or pin b^{10} on slide d^5 is pivoted one end of a link b^{14} , whose other end is pivoted to a lug b^{15} on the upper lever b^{12} of a pair of superposed and longitudinally-slotted levers b^{12} and b^{10} , articulated together by a binding-screw s^{12} , said levers b^{12} b^{10} being pivoted at diametrically opposite points 10 and 12, respectively, to the under side of the bed-plate. To a lug projecting from the lower lever b^{10} , near its free end, is pivoted one end of a link b^9 , whose opposite end is pivoted to the short arm of an angle-lever b^8 , likewise fulcrumed to the under side of the bed-plate at b^{8x} , to which is secured the pin b^7 , carrying a roller that projects into the cam-groove c^8 in the upper face of the feed-wheel c^5 , as shown in dotted lines in Fig. 3, through the medium of one half of which groove the work-holder D receives its progressive movement in one direction and through the other half in an opposite direction lengthwise of the buttonhole in binding the edges thereof. The two levers b^{10} b^{12} being adjustably connected by means of the binding-screw s^{12} , the amplitude of the progressive feed movement can be regulated in accordance with the length of the buttonhole to be bound by shifting the point of connection toward or from the free ends of the levers to lengthen or shorten the lower lever b^{10} , as will be readily understood.

By means of the mechanism described the deviations of the work-holder slide d^5 , above

referred to, from a straight line during its progressive motion crosswise of the buttonhole are avoided in that although the link b^{14} follows the movement of said slide d^5 , tending to displace the same lengthwise of the bed-plate, this is not the case, because said displacement of the link b^{14} is compensated at b^{15} by the reciprocal motion of the levers b^{10} b^{12} , which follow the movements of link b^{14} , as will be readily understood.

The progressive motion crosswise of the bed-plate and buttonhole is imparted to the work-holder slide d^5 by means of mechanism substantially as described and shown in our application for patent before referred to, the difference being in that the pin h , from which said motion is transmitted to said cross-slide, is not secured thereto in order to admit of varying the amplitude of said progressive motion, as hereinabove stated. c^{13} , Fig. 5, is the circular flange on the feed-wheel c^5 , provided on its inner face with the recesses c^{11} c^{11} at diametrically opposite points. g^8 g^8 are the springs that act upon the lower slide h^4 and tend to move the same in one direction crosswise of the bed-plate and buttonhole, arrow II, Fig. 2, and h is the pin, which carries a roller from which the progressive motion is imparted to said slide h^4 in the opposite direction crosswise of the bed-plate and buttonhole, arrow IV, Fig. 2. Hence when the feed-wheel c^5 and roller h are in the position shown in Fig. 3 the slide h^4 will be gradually moved against the stress of its springs g^8 as one of the inclines 13 moves along the roller h from x to x' , the feed-wheel c^5 moving progressively in the direction of arrow Fig. 3. While, on the contrary, the other incline 13 moves along the roller h from x' to x , the springs g^8 gradually move the said slide h^4 in an opposite direction.

The pin h instead of being secured to the slide h^4 , as shown and described in the application and patent hereinabove referred to, is secured to the free end of a segmental lever h^5 , pivoted at h^6 to the under side of the bed-plate. The said lever h^5 has a segmental slot h^{5x} , having for center the axis of rotation of a lever h^7 , pivoted to slide h^4 , in which segmental slot said lever h^7 is adjustable by means of a binding-screw h^{17} , as shown in Fig. 4, whereby the extent of the feed motion crosswise of the buttonhole can be varied within certain limits.

In order to avoid structural complications and to reduce the number of parts, as well as the power required to operate the machine, we have made a further improvement whereby the devices employed in the machines described and shown in the application and patent above referred to and through the medium of which the free reciprocation of the work-holder slide d^5 can take place are dispensed with in that we widen the concentric portions c^{14} c^{15} of the heart-shaped groove c^8 in the upper face of the feed-wheel c^5 , Fig. 5, to admit of the said reciprocations of the

work-holder slide d^5 in barring the ends of a buttonhole, said wider portions of the groove c^8 being of course so located relatively to the eccentric portions of said groove and relatively to the recessed portions c^{11} c^{11} of the inner face of the flange c^{13} that as soon as one edge of a buttonhole is bound the proper feed motion crosswise of the bed-plate and buttonhole may be imparted to the slide h^4 , as above described, and during this feed motion the work-holder D is reciprocated lengthwise of the bed-plate by mechanism already fully described.

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

1. In a buttonhole-sewing machine such as described, the combination with the stitch-forming appliances comprising a reciprocating and vibrating needle-bar, the work-holder, mechanism for periodically imparting thereto a reciprocating motion lengthwise of the buttonhole, and means for stopping the vibration of the needle-bar during said reciprocation of the work-holder; of a progressively-revolving feed-wheel provided with a cam-groove c^8 having portions c^{14} c^{15} wider than the remaining portions and intermediate mechanism connected with the work-holder, one of the elements of said mechanism provided with a pin projecting into the aforesaid cam-groove, for the purposes set forth.

2. In a buttonhole-sewing machine such as described, the combination with the work-holder and the stitch-forming appliances comprising a reciprocating and vibrating needle-bar; of a progressively-revolving feed-wheel provided with a suitably-shaped feed-groove, the superposed connected levers b^{10} b^{12} , the bell-crank lever b^8 having secured thereto a pin b' projecting into the aforesaid feed-groove, and connected with lever b^{10} near its free end, and the link b^{14} connecting lever b^{12} with the work-holder, substantially as and for the purpose set forth.

3. The combination with the stitch-forming appliances comprising a reciprocating and vibrating needle-bar, the feed-wheel provided with a cam-groove c^8 having portions c^{14} c^{15} wider than the remaining portions; of the work-holder slide d^5 , mechanism for periodically reciprocating the same lengthwise of the buttonhole, means for stopping the vibrations of the needle-bar during said reciprocation of the work-holder, the spring-actuated slide h^4 connected with said work-holder slide as described, means coöperating with the feed-wheel for periodically imparting to slide h^4 a progressive motion crosswise of the buttonhole when slide d^5 reciprocates lengthwise thereof, the superposed connected levers b^{10} b^{12} , said lever b^{12} connected by link with slide

d^5 , and the bell-crank lever b^8 linked to lever b^{10} , said lever b^8 provided with a pin projecting into the cam-groove of the aforesaid feed-wheel, substantially as and for the purpose set forth.

4. In a buttonhole-sewing machine such as described, the combination with the work-holder and the stitch-forming devices comprising a reciprocating and vibrating needle-bar; of a progressively-revolving feed-wheel provided with a suitably-shaped feed-groove, the superposed longitudinally-slotted and adjustably-connected levers b^{10} b^{12} , the bell-crank lever b^8 having secured thereto a pin b' projecting into the aforesaid feed-groove and connected with lever b^{10} near its free end, and the link b^{14} connecting lever b^{12} with the work-holder, substantially as and for the purpose set forth.

5. In a buttonhole-sewing machine, the combination with stitch-forming appliances comprising a reciprocating and vibrating needle-bar, the work-holder, means for periodically reciprocating the latter and means for simultaneously stopping the vibration of the needle-bar, of the spring-actuated cross-slide h^4 connected with said work-holder, and the feed-wheel c^5 provided with a circular flange having recesses c'' c'' in its inner face; of the lever h^5 carrying a pin in contact with the inner face of the aforesaid flange, and the lever h^7 connecting lever h^5 with the aforesaid cross-slide, substantially as and for the purpose set forth.

6. In a buttonhole-sewing machine, the combination with stitch-forming appliances comprising a reciprocating and vibrating needle-bar, the work-holder, means for periodically reciprocating the latter, and means for simultaneously stopping the vibration of the needle-bar, of the spring-actuated cross-slide h^4 connected with said work-holder, and the feed-wheel c^5 provided with a circular flange having recesses c'' c'' in its inner face; of the lever h^5 , carrying a pin in contact with the inner face of the aforesaid flange, and the lever h^7 adjustably connected with the lever h^5 and connecting the latter with cross-slide h^4 , substantially as and for the purpose set forth.

In witness whereof we have hereto signed our names in the presence of the subscribing witnesses.

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EMIL FALLER.
KARL MISCHKE.

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