

**No. 648,618.**

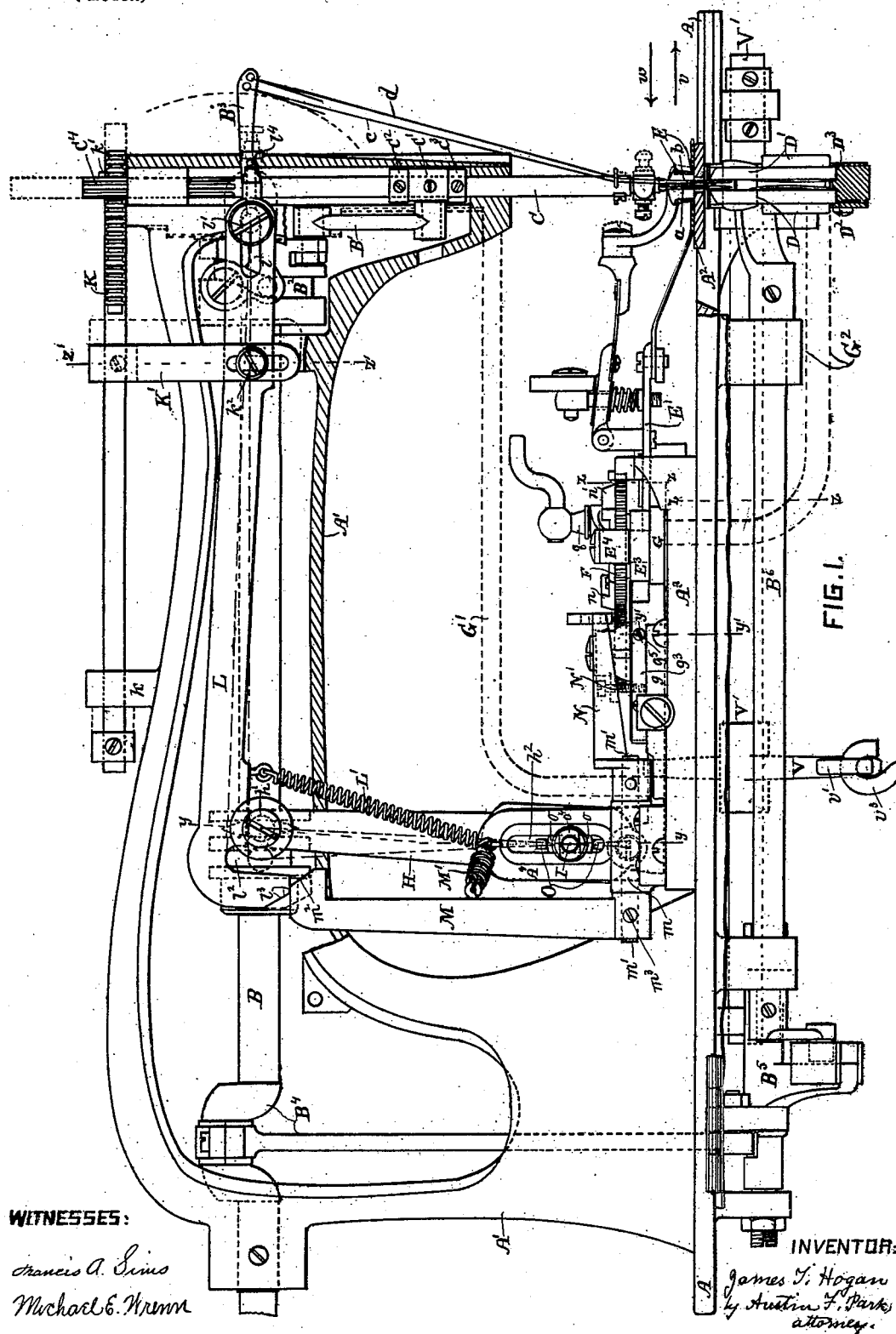
**Patented May 1, 1900.**

**J. T. HOGAN.**  
**BUTTONHOLE SEWING MACHINE.**

(Application filed Oct. 17, 1892.)

(Model.)

**8. Sheets—Sheet 1.**



**WITNESSES:**

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Michael E. Krenn

INVENTOR:

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No. 648,618.

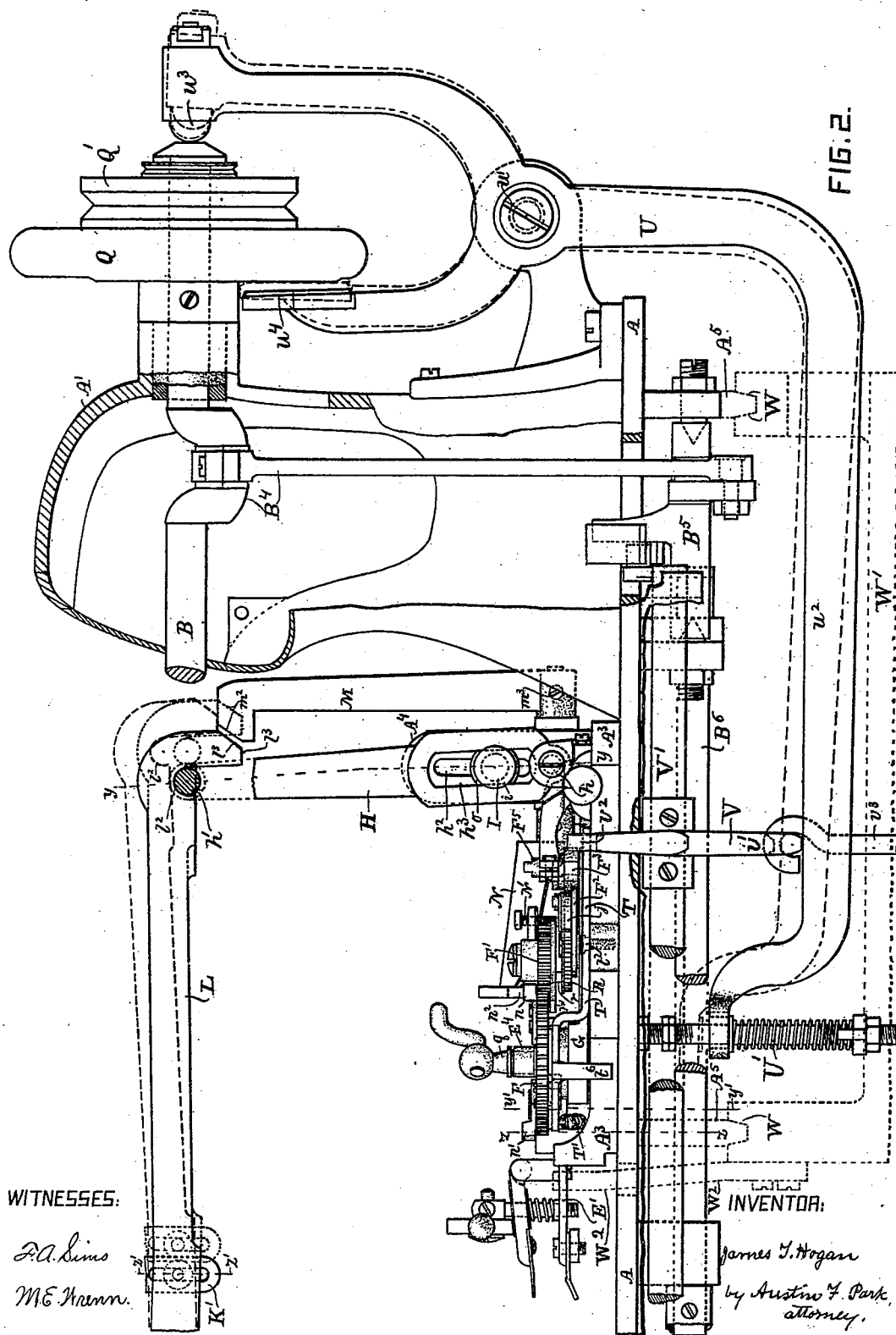
Patented May 1, 1900.

J. T. HOGAN.  
BUTTONHOLE SEWING MACHINE.

(Application filed Oct. 17, 1898.)

(Model.)

8 Sheets—Sheet 2.



WITNESSES:

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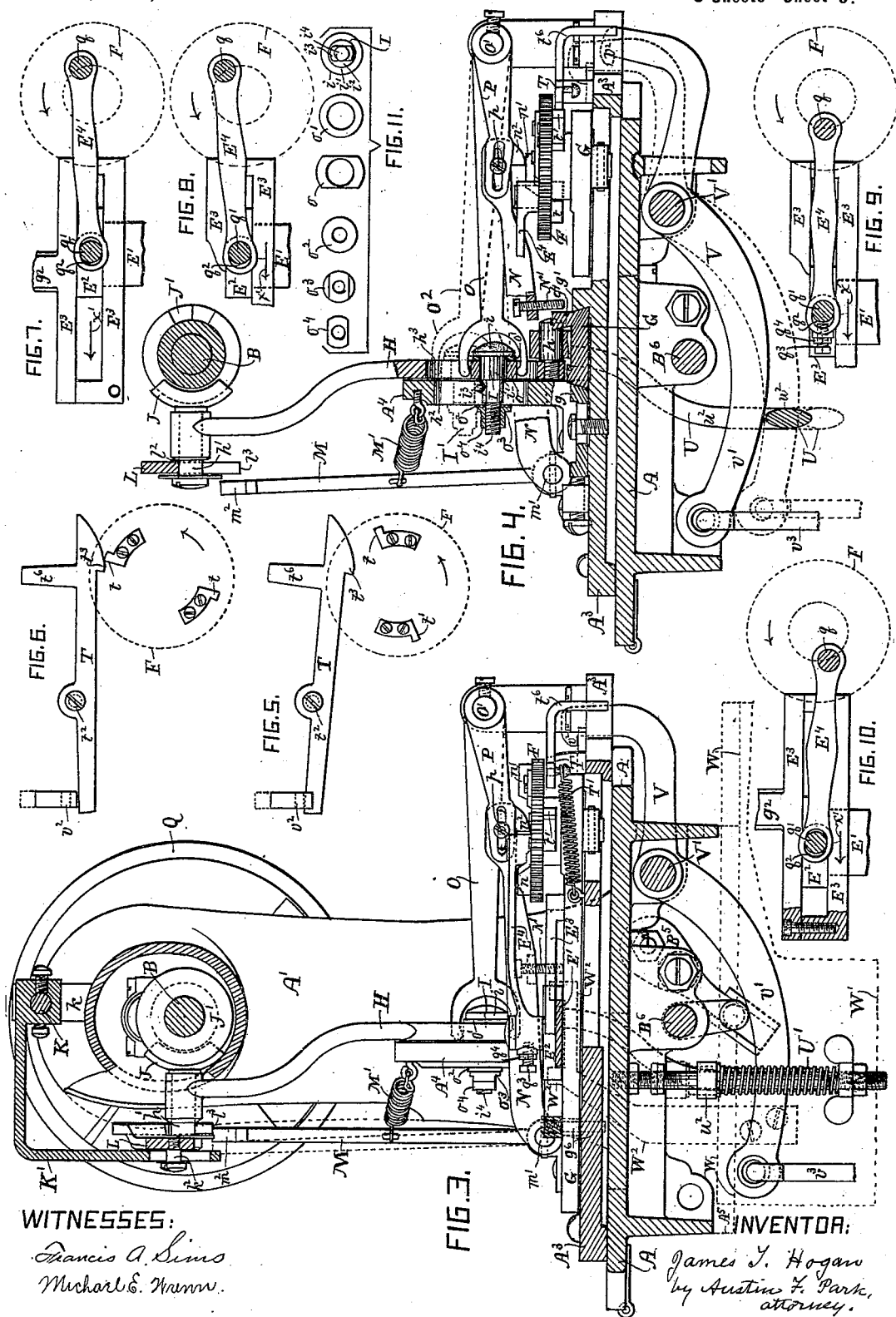
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BUTTONHOLE SEWING MACHINE.

(Application filed Oct. 17, 1892.)

6 Sheets—Sheet 3.

(Model.)



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FIG. 3.

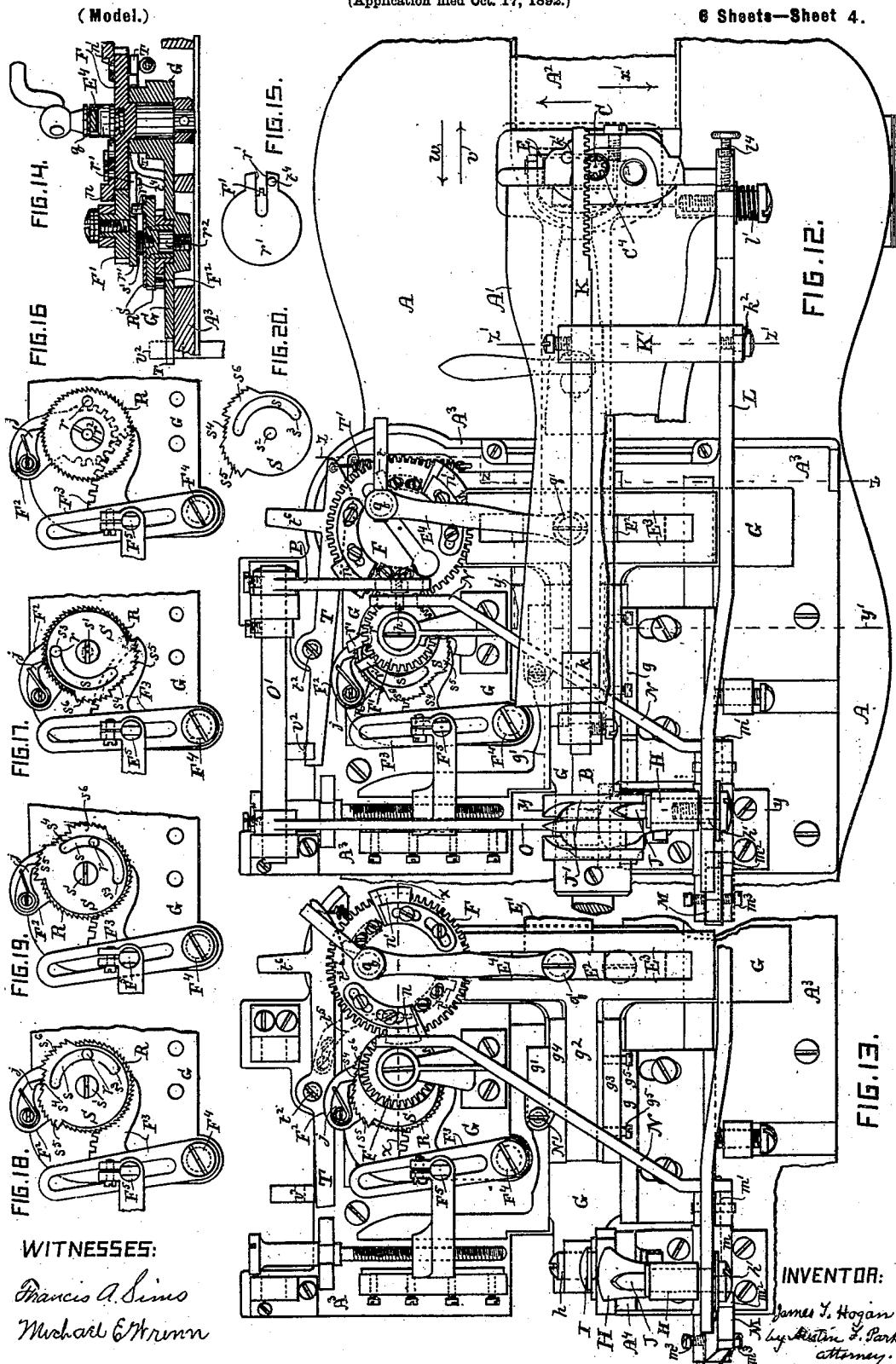
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**BUTTONHOLE SEWING MACHINE.**

(Application filed Oct. 17, 1892.)

**6 Sheets—Sheet 4.**

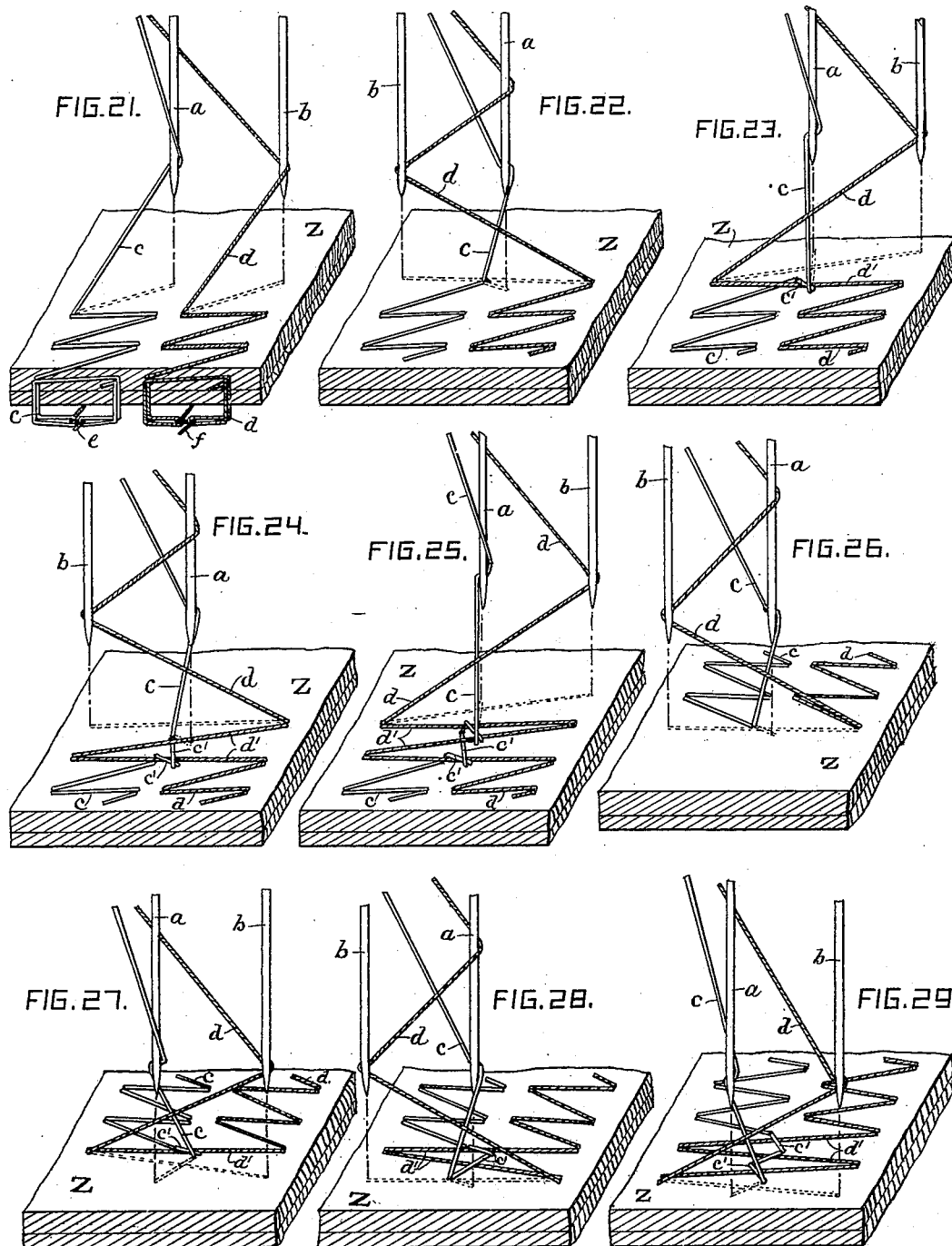


J. T. HOGAN.  
BUTTONHOLE SEWING MACHINE.

(Application filed Oct. 17, 1892.)

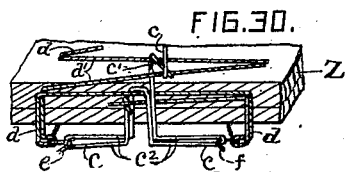
(Model.)

6 Sheets—Sheet 5.



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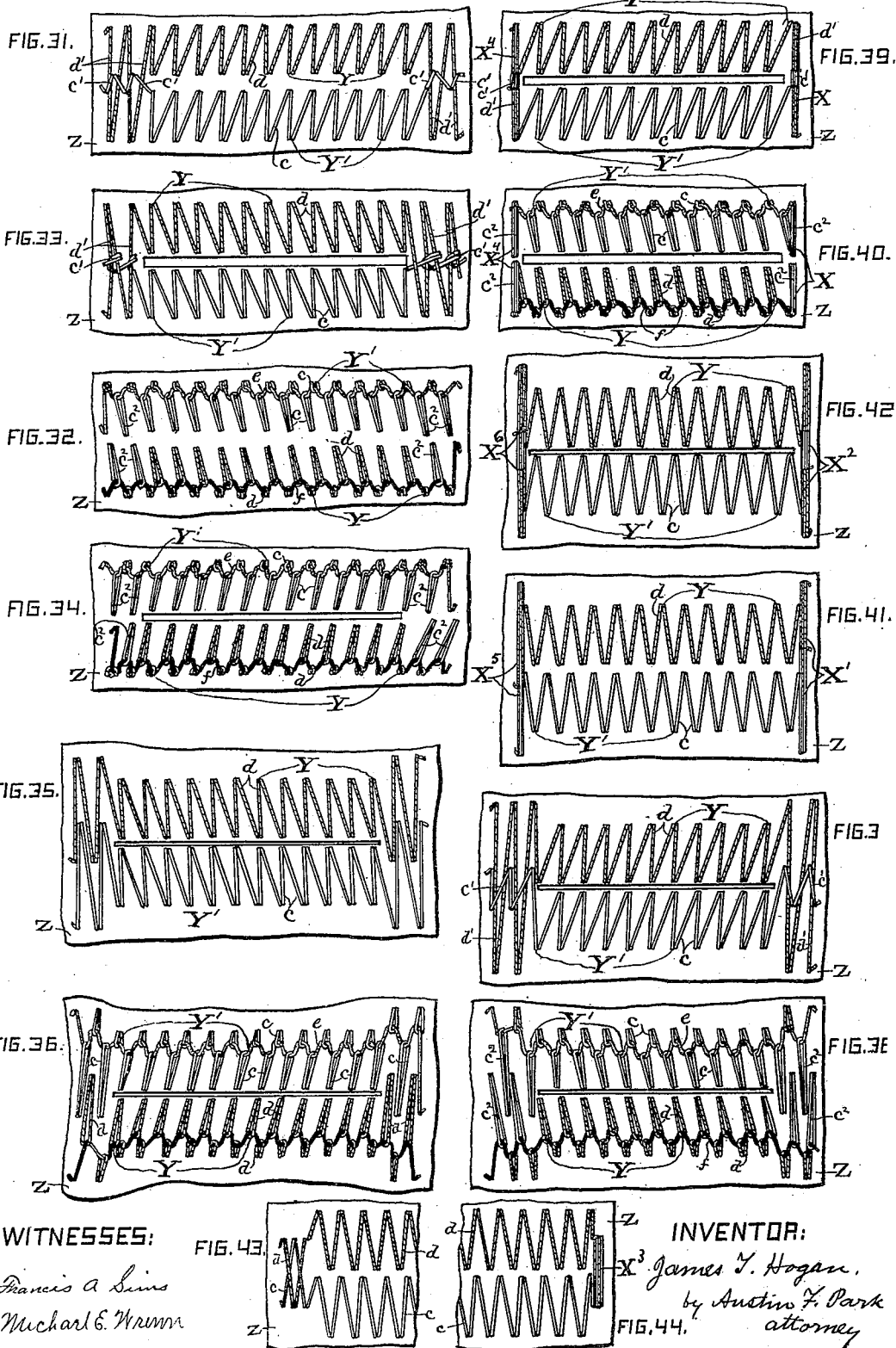
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J. T. HOGAN.  
BUTTONHOLE SEWING MACHINE.

(Application filed Oct. 17, 1892.)

(Model.)

6 Sheets—Sheet 6.



# UNITED STATES PATENT OFFICE.

JAMES T. HOGAN, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO THE  
NATIONAL MACHINE COMPANY, OF TROY, NEW YORK.

## BUTTONHOLE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 648,618, dated May 1, 1900.

Application filed October 17, 1892. Serial No. 449,121. (Model.)

*To all whom it may concern:*

Be it known that I, JAMES T. HOGAN, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Machines for Stitching Buttonholes, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to two-needle sewing-machines which can make two separate adjacent opposite rows of zigzag or to-and-fro stitches simultaneously.

The general objects of this invention are to produce a two-needle sewing-machine which will automatically make of a certain limited length two opposite rows of zigzag or to-and-fro stitches simultaneously along the two sides of a buttonhole, to produce a two-needle sewing-machine which will automatically make of a certain limited length two opposite rows of zigzag or to-and-fro stitches simultaneously along the sides of a buttonhole and barring-stitches at one end of said two rows of stitches, to produce a two-needle sewing-machine which will automatically stitch a buttonhole by first making barring-stitches at one end of it, then making simultaneously two rows of zigzag or to-and-fro stitches along its sides, and next making barring-stitches at its other end. These objects and others hereinafter specified are accomplished by mechanisms essentially such as are hereinafter described, and represented in the aforesaid drawings.

In said drawings, Figure 1 represents a rear elevation and partial section of the main portions of a well-known Singer two-needle sewing-machine with parts of one form of my invention combined therewith. Fig. 2 shows a front elevation and partial section of portions of the same with an automatic stopping mechanism. Fig. 3 represents front elevations of sections of the same mechanism at or near the lines  $z z$  and  $z' z'$  in Figs. 1, 2, and 12 and of some parts in rear of those sections. Fig. 4 shows front elevations of sections at or near the lines  $y y$  and  $y' y'$  in Figs. 1, 2, and 12 and of some parts in rear of these sections. Figs. 5 and 6 are plans illustrating

a part of said stopping mechanism. Figs. 7, 8, 9, and 10 are plans illustrating a modification. Fig. 11 represents in end elevation detached parts of an adjustable pivot-fulcrum shown in Fig. 4. Fig. 12 is a plan of the feeding mechanism in one position, and Fig. 13 is a plan of much of the same in another position. Fig. 14 shows a section of a part of the same at the line  $x x$  in Fig. 13. Figs. 15, 16, 17, 18, 19, and 20 are plans of parts of the mechanism represented in Figs. 12 and 13. Figs. 21, 22, 23, 24, 25, 26, 27, 28, and 29 indicate successive positions of the two needles in making the stitches represented in these figures, and Fig. 30 further illustrates the barring-stitches shown in Fig. 25. Figs. 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, and 44 approximately illustrate plans of the upper and under sides of some buttonhole-stitchings as made by mechanisms represented in the drawings.

In the drawings similar letters refer to similar parts throughout the several views.

A is the bed, A' the fixed standard and arm, and B is a rotary driving-shaft which by a crank and pitman B' reciprocates vertically the needle-bar C, having attached thereto the two eye-pointed needles  $a b$ , and the shaft B by a cam B<sup>2</sup> operates the take-up lever B<sup>3</sup> and through a crank and pitman B<sup>4</sup> and an armed rock-shaft B<sup>5</sup> oscillates the armed shaft B<sup>6</sup>, having an attached driver which oscillates the two hook-shuttles D D' in their circular races D<sup>2</sup> D<sup>3</sup>, all essentially the same as in a well-known Singer two-needle lock-stitch sewing-machine; but the principal parts of this invention are applicable to any suitable two-needle sewing-machine.

E is a work-clamp which may be of any suitable kind and operated by any suitable mechanism to properly hold the buttonhole work or fabric, as Z, and carry or slide it lengthwise with the work-clamp a certain predetermined limited distance upon the work-supporting throat-plate A<sup>2</sup> for the two stitching devices to act upon the work. In the drawings the work-clamp E is shown secured by the arm E' to the slide E<sup>2</sup>, which fits in guides E<sup>3</sup> and receives a step-by-step movement lengthwise of the work-clamp a certain

limited distance to and fro by a pitman E<sup>1</sup> from a radially-adjustable crank-pin *q*, secured to the feed-wheel F, which is normally turned a step by the sewing-machine at each alternate elevation of the needle-bar. When the crank-pin *q*, center of the wheel F, and the pivot-stud *q'* on the slide E<sup>2</sup> are all in a straight line, as indicated in Fig. 13, by then turning the wheel F through one-half of a revolution the slide E<sup>2</sup> and work-clamp E will be moved lengthwise of the work-clamp a certain limited distance in one direction and will be moved the same distance in the reverse direction by turning the wheel F through the other one-half of said revolution.

The two needles *a b* are secured to the needle-bar C at a suitable distance apart and are normally in or nearly in a plane transverse to the length of the work-clamp. The needle *a* operates the thread *c* and the needle *b* operates the thread *d*, while the hooked shuttle D carries the thread *e* and the shuttle D' carries the thread *f*, and normally the needle *a* and shuttle D coact in making one set of stitches and the needle *b* and shuttle D' coact in forming the other set of stitches.

To render the above-specified two-needle sewing mechanism capable of making simultaneously two separate, opposite, parallel, and adjacent rows of to-and-fro or zigzag stitches as its work-clamp is moved step by step lengthwise in one direction, I combine with such mechanism devices which at each elevation of the needle-bar and needles will move the work-clamp or the two needles or the two needles and shuttles momentarily a certain distance transversely to the lengthwise movement of the work-clamp, said movement transversely being somewhat less or no greater than the horizontal distance between the points of the two needles and being in one direction at one elevation of the needles and in the opposite direction at the next elevation of the needles. As one means to accomplish this object the drawings show the work-clamp slide E<sup>2</sup>, Figs. 12 and 13, carried by the slide G, which has the guides E<sup>3</sup> and is mounted in guides *g g'* on the fixed base-plate A<sup>3</sup> and transverse to the slide E<sup>2</sup>. The slide G is connected by a pivot *h* to a lever H, Figs. 1, 2, and 4, which is furnished with a pivot-fulcrum I, adjustable along the lever and vertically on the fixed standard A<sup>4</sup>, and has a follower J, working in a switch-cam J' on the driving-shaft B, whereby at one elevation of the needles the work-clamp is moved transversely in one direction, as indicated by the arrow *w*, and is moved in the opposite direction (indicated by the arrow *v*) at the next elevation of the needles, and so on repeatedly, the fulcrum I of the lever H being normally adjusted on the standard A<sup>4</sup>, so as to cause that lever to move the slides G E<sup>2</sup> and work-clamp E momentarily to and fro a distance somewhat less or not greater than the horizontal distance between the points of the two

needles to make the two rows of zigzag or to-and-fro stitches separate and apart for a slit between them.

For rotating the feed-wheel F step by step in harmony with the reciprocating movements of the needle-bar the drawings show that gear-wheel carried by the slide G and as receiving therefrom step-by-step rotary motion through a pinion F', Figs. 12, 13, 14, and 15, eccentric to and having a sliding crank connection *r r'* with a ratchet-wheel R, which is rotated step by step by a driving-pawl *j* and its carrying-lever F<sup>2</sup>, geared with a lever F<sup>3</sup>, pivoted at F<sup>4</sup> to the slide G and having a fulcrum F<sup>5</sup>, adjustable along the lever and upon the base-plate A<sup>3</sup>, much the same as described in United States Patent No. 252,052, dated January 10, 1882. However, in carrying out the primary parts of my invention the feed-wheel or any equivalent therefor can be rotated step by step by other means and at every elevation of the needle-bar, as set forth in Patent No. 362,771, May 10, 1887, and generally the work-clamp can be moved step by step lengthwise in harmony with the elevations of the needle-bar and a certain limited distance to and fro by any suitable automatic mechanism—as, for instance, such as are described in Patents Nos. 303,453 and 303,557, of August 12, 1884.

A two-needle sewing-machine having combined therein a work-clamp mechanism to automatically make two separate opposite adjacent sets of to-and-fro stitches simultaneously and mechanism to automatically move the work-clamp step by step lengthwise a certain predetermined limited distance in one direction or in two opposite directions, substantially as above described, can automatically make of a certain limited length two rows of zigzag or to-and-fro stitches simultaneously along the two sides of a buttonhole. This result will be accomplished by the above-described sewing-machine upon first securing the work in the clamp when the machine is stopped and the work-clamp is at one end of its limited lengthwise movement in either direction, then operating the sewing-machine until the work-clamp is at the other end of its said lengthwise movement, and thereupon stopping the machine, as by hand or by automatic means, of which one form is hereinafter described.

Fig. 21 indicates a mode in which the above-described mechanism will simultaneously make two separate opposite rows of to-and-fro or zigzag lock-stitches, as along the two sides of a buttonhole, one of said two rows of stitches being made by the eye-pointed needle *a* and hooked shuttle D from the needle-thread *c* and shuttle-thread *e* and the other row being made by the needle *b* and shuttle D' from the needle-thread *d* and shuttle-thread *f*.

With a two-needle sewing-machine which can automatically make of a certain limited

length two separate opposite adjacent rows of to-and-fro or zigzag stitches simultaneously along the two sides of a buttonhole, essentially as hereinbefore described, I combine  
 5 stitch-changing mechanism to temporarily impart extraordinary lateral movements to the two needles or to the stitch-forming devices or to the work-clamp or to some of these parts of the sewing-machine, so as to  
 10 thereby cause the sewing-machine to automatically make barring-stitches at the beginning or at the ending or at the beginning and the ending of the formation of said two rows of zigzag or to-and-fro stitches. As  
 15 one means for that purpose the drawings represent the two needles *a b* secured to the cylindrical needle-bar *C* at opposite sides of it and at equal distances from its central line, and the needle-bar is mounted in bearings,  
 20 so that it can be semirotated therein to and fro, to thereby cause either needle to coact and form stitches with either shuttle, the driving-pitman *B'* being pivoted to a loose sleeve *C'* between two collars *C<sup>2</sup> C<sup>3</sup>*, secured  
 25 on the needle-bar. The upper part of the needle-bar is a pinion *C<sup>4</sup>*, which engages with a toothed rack or bar *K*, mounted to be slid endwise to and fro, as in fixed bearings *k k'*, Figs. 1 and 12, and furnished with an arm *K'*,  
 30 slotted and engaged with a pin *k<sup>2</sup>*, Figs. 1 and 3, on a slide-rod *L*, having at its forward part a slot *l*, fitting on a supporting-pivot *l'* and furnished with a downwardly-pressing spring *L'* near its rear part. The rear end part of the  
 35 rod *L* has a recess *l<sup>2</sup>*, which while fitting on the pivot-pin *h'* on the lever *H* will enable that lever in its aforesaid to-and-fro movements to slide the connected bars *L* and *K* lengthwise to and fro, and thereby impart to the needle-bar  
 40 to-and-fro semicircular movements about its axis. During the simultaneous formation of the two opposite rows of zigzag stitches the bar *L* is not engaged with the driving-pin *h'*, but rests at its heel *l<sup>3</sup>*, as in Fig. 1, on a standing  
 45 arm *M*, which has in a stationary bearing *m* a horizontal axis *m'*, with an attached lateral arm *N*, Figs. 3, 4, 12, and 13, extending over a part of the feed-wheel *F*, which has two attached diametrically-opposite stitch-controlling  
 50 cams or projections *n n'*, arranged so as to elevate and keep elevated the arm *N*, and thereby move and hold the arm *M*, as in Fig. 4, away from under the heel of the bar *L* and let the latter be and remain engaged  
 55 with and reciprocated by the pin *h'* of the lever *H* when the sewing-machine is stitching at or near or at and near the end parts of the lengthwise movements of the work-clamp. When in the rotation of the feed-wheel *F* the  
 60 cam *n* or *n'* ceases to elevate or support the arm *N* and the bar *L* is at the forward end of its lengthwise movement, as in Fig. 2, a spring *M'* then moves the arm *M*, with its inclined part *m<sup>2</sup>*, into the path of the heel *l<sup>3</sup>* of the bar  
 65 *L*, so as to then cause that bar in its rearward movement and as affected by the spring *L'* and set-stop *l<sup>4</sup>*, Fig. 1, to ascend the incline

*m<sup>2</sup>* and rest on the arm *M*, with the rack-bar *K* in proper position to guide the needle-bar and cause its needles to coact with the shuttles in simultaneously producing two rows of  
 70 to-and-fro or zigzag stitches.

*N'*, Figs. 1, 2, 3, and 4, is a stop-screw on the arm *N* to regulate the extent of its downward movement in respect to the parts *n n'*  
 75 on the feed-wheel.

In the drawings, Figs. 22, 23, 24, 25, 30, 33, and 34, and Figs. 26, 27, 28, 29, 31, and 32 illustrate the formation of two opposite rows of zigzag stitches and barring-stitches connecting the ends of the two rows of zigzag  
 80 stitches and composed of continuations of the four threads of the two rows of stitches as automatically produced by the above-described mechanism. These barring-stitches are made  
 85 by said mechanism when the work-clamp moves step by step lengthwise and momentarily to and fro transversely, the same as when the two rows of zigzag stitches are being made, and said barring-stitches are produced in consequence of the repeated to-and-fro,  
 90 semicircular, or approximately semicircular lateral movements of the two needles about their common axis, midway between them, such semicircular movements of the  
 95 two needles being in one direction at one transverse movement of the work-clamp and in the opposite direction at the reverse transverse movement of the work-clamp, so that  
 100 the needles coact with the different shuttles alternately in making these barring-stitches.

Figs. 23, 24, 25, 27, 28, 29, 30, 31, and 33 show long barring-stitches *d'*, extending on the upper surface of the fabric *Z* entirely across the stitching of the buttonhole and formed from  
 105 the thread *d* by the needle *b* and bound down at its middle by short stitches *c'*, formed from the thread *c* by the needle *a*, and extending downward through the fabric and laterally in the form of loops *c<sup>2</sup>*, Figs. 30, 32, and 34, at  
 110 both sides of the buttonhole, so as to thereby bar it, the tensions on the threads *c, d, e*, and *f* being suitably adjusted.

Figs. 31 and 32 illustrate the stitchings on the upper and under surfaces of a buttonhole  
 115 stitched by the above-described mechanism as its work-clamp is moved lengthwise in one direction, and Figs. 33 and 34 represent stitchings on the two surfaces of another buttonhole as stitched by the same machine when  
 120 its work-clamp is moved lengthwise in the reverse direction.

Figs. 27, 28, 29, and 31 show each long barring-stitch *d'* bound down at its middle by one short stitch *c'*, as may be done by the  
 125 above-described mechanism when the work-clamp moves lengthwise in one direction, and Figs. 23, 24, 25, 30, and 33 show the long barring-stitches *d'* bound down by one or two short stitches *c'*, as may be done by the same  
 130 mechanism when its work-clamp moves lengthwise in the reverse direction. The action of the same mechanism as to binding down and not binding down the long barring-

stitches by short ones, may, can, or will be somewhat different, according to the direction and length of the lengthwise steps of the work-clamp, somewhat - different positions and length of arc of the semicircular or approximately semicircular to-and-fro movements of the needles, and different adjustments of the tensions of the several threads of the stitching.

In using the above-described sewing-machine to automatically produce buttonhole-stitchings similar to those indicated by Figs. 31, 32, 33, and 34 the feed-wheel F is first to be turned, as by hand, to bring the work-clamp E to one end of its lengthwise movement, whereupon one of the cams—as  $n$ , for instance—of the stitch-controlling device will hold the arm N elevated, and the fabric to be stitched is secured in the work-clamp. By then operating the sewing-machine it moves the work-clamp lengthwise in one direction, and during that lengthwise movement of the work-clamp the machine first makes barring-stitches at one end of the buttonhole until by the turning of the feed-wheel the said cam  $n$  leaves and lets down the arm N, and then the machine makes two rows of zigzag or two-and-fro stitches Y Y' simultaneously along the two sides of the buttonhole until by the turning of the feed-wheel the other cam  $n'$  elevates the arm N, and thereby causes the machine to make barring-stitches at the other end of the buttonhole until the work-clamp arrives at the end of its said lengthwise movement in one direction, whereupon the machine is to be stopped, while the arm N remains elevated by the cam  $n'$ , and the stitched work is to be removed from the clamp and unstitched work secured therein. By then again operating the sewing-machine it moves the work-clamp lengthwise in the reverse direction, and during such reverse movement of the work-clamp the machine first makes barring-stitches until the cam  $n'$  leaves and lets down the arm N, then makes two rows of zigzag or to-and-fro stitches simultaneously until the cam  $n$  elevates the arm N, and then makes barring-stitches until the work-clamp reaches the end of its said reverse lengthwise movement, whereupon the machine is to be stopped, the stitched work removed from the clamp, unstitched work secured therein, the machine again operated, and so on repeatedly. The sewing-machine can thus automatically stitch and bar a buttonhole by making, first, barring-stitches at one end of it, then two rows of zigzag or two-and-fro stitches simultaneously along its sides, and then barring-stitches at its other end while moving the work-clamp lengthwise a certain limited distance in one direction and can likewise stitch and bar another buttonhole while moving the work-clamp the same distance lengthwise in the reverse direction.

In using this machine to automatically stitch and bar each one of a series of buttonholes while the sewing-machine moves the work-clamp lengthwise in one direction only

the feed-wheel is to be turned by hand through one-half of its revolution just after the stitching and barring of each buttonhole.

By having the stitch-changing mechanism controlled by only one long cam, as  $n$  or  $n'$ , on the feed-wheel, or by having only one such cam on that wheel, the sewing-machine will automatically stitch the two sides of a buttonhole simultaneously and bar only one end thereof while the machine moves the work-clamp lengthwise in either direction. In such case the barring-stitches will be made first when the work-clamp is being thus moved lengthwise in one direction and last when the work-clamp is being moved in the reverse direction.

By having each of the two cams  $n$   $n'$  suitably short and properly adjusted on the feed-wheel the machine will automatically stitch the two sides of a buttonhole simultaneously and bar one end only thereof while the machine moves the work-clamp in either direction lengthwise. By having but one such short cam on the feed-wheel the machine will automatically stitch the two sides of a buttonhole simultaneously and bar one end of it only when the machine moves the work-clamp lengthwise in a certain one of two opposite directions.

The pinion F' revolves just twice to the wheel F once, so that instead of having two cams, as  $n$   $n'$ , on the wheel F one such cam on the pinion F' can operate the arm N to control the action of the stitch-changing mechanism to produce barring-stitches, as hereinbefore described; and it is evident that instead of having such cam or cams in the form of a projection or projections the same can be in the form of a corresponding depression or depressions in a suitable ring on the pinion F' or wheel F, the standing arm M, Figs. 1, 3, 4 and 13, being correspondingly adjusted on its axis in relation to the heel  $l^3$  of the bar L, as by set-screws  $m^3$ . It is also obvious that the herein-described stitch-changing mechanism or any equivalent therefor to automatically cause a two-needle sewing-machine to temporarily make barring-stitches at one end or at the two ends of the formation of two rows of zigzag or to-and-fro stitches simultaneously can be controlled in its action by any suitable connection or connections with the wheel F, or pinion F', or ratchet-wheel R, or pitman E<sup>4</sup>, or slide E<sup>3</sup>, or arm E', or work-clamp E, or any part which shall move in unison or in harmony with the lengthwise movements of the work-clamp in whatever two-needle sewing-machine my broad invention shall be embodied.

To cause the above-described mechanism, which will normally make of a certain limited length two rows of zigzag or to-and-fro stitches simultaneously along the two sides of a buttonhole, to automatically make barring-stitches at one end or at both ends of said two rows of stitches without requiring any semicircular movements of the two needles, I provide means to automatically move the work-clamp or the two needles or the stitch-

forming devices to and fro transversely to the length of the work-clamp a materially greater or different distance when the needles are making stitches at or near one end or either end of the lengthwise movement of the work-clamp than when making the stitches of said two rows. As one means for this purpose I adjust the pivot-stud I so that it can be freely but closely slid upward and downward and held in fixed position when elevated and when depressed in the slots  $h^2$  and  $h^3$  of the standard  $A^4$  and lever H by means of an arm O, Figs. 3, 4, and 12, which has one end forked and embracing a flattened sleeve  $o$ , Figs. 4 and 11, on the pivot-stud I and has the other end secured to a rock-shaft  $O'$ , which is mounted in fixed bearings on the stationary plate  $A^3$  and has an attached arm P connected to the arm N by a slide-pivot  $p$ , and if the sewing-machine shall have means for semirotating the two needles, as above described, I adjust the arm M on its axis, as by set-screws  $m^3$ , so that the arm will constantly support the heel  $l^3$  of the slide-bar L, or I disconnect or leave off the means for semirotating the needles and fasten the sleeve  $c'$  to the needle-bar. In such case the arm N when not elevated by the cam  $n$  or  $n'$  will be depressed by the spring  $M'$  and will then through the arm P, rock-shaft  $O'$ , and forked arm O retain the pivot-stud I in proper depressed position, as indicated by full lines in Fig. 3, to cause the lever H to give proper to-and-fro transverse movements to the work-clamp to produce the two rows of zigzag or to-and-fro stitches. When the arm N is elevated by the cam  $n$  or  $n'$ , as in Fig. 4, that arm will then elevate and keep elevated the arms P and O, and thereby the pivot-stud I, as indicated by dotted lines at  $O^2$  and I' in Fig. 4, so as to then cause the lever H to impart a greater length of to-and-fro transverse movement to the work-clamp to produce longer barring-stitches, as indicated at the end parts of the buttonhole-stitching represented in upper and under surface views by Figs. 35 and 36, wherein the barring-stitches, which are formed from continuations of each of the two needle-threads  $c$  and  $d$ , extend in loop form across the central lengthwise line of the buttonhole on the upper and under surfaces of the fabric.

To cause the above-described mechanism to automatically stitch a buttonhole with barring-stitches, such as indicated by Figs. 37 and 38 in upper and under surface views, I have the above-described devices for temporarily imparting to the needles to-and-fro semicircular movements, and the above-described devices for temporarily increasing the length of the transverse to-and-fro movements of the work-clamp both coact together simultaneously in making the barring-stitches at the beginning and the ending of the formation of the two rows of zigzag or to-and-fro stitches simultaneously along the sides of the buttonhole.

To cause the above-described mechanism to automatically stitch a buttonhole with barring-stitches about as represented in top view by Fig. 43, I have the devices for temporarily altering the length of the transverse to-and-fro movements of the work-clamp arranged and adjusted so as to cause the lever H to greatly lessen or stop the to-and-fro transverse movements of the work-clamp while the devices for semirotating the needles are in action in making the barring-stitches.

The pivot stud or fulcrum I, Figs. 4 and 11, is shown formed with the head  $i$ , journal-stem  $i'$ , shoulders  $i^2$ , flattened stem  $i^3$ , and screw-stem  $i^4$  and furnished with the sleeve  $o$ , washer  $o'$ , washer  $o^2$ , and jam-nuts  $o^3$   $o^4$ , by means of which the pivot-stud can be either clamped fast to the standard  $A^4$  at various heights or set to be slid closely upward and downward on that standard, as by the forked arm O, whose extent of movement can be varied by means of the adjustable pivot  $p$ , connecting the levers P and N, and the stop-screw  $N'$ , above mentioned. If the pivot  $p$  be removed, the arm O will not act.

In case the barring-stitches shall be made by temporarily altering the length of the momentary to-and-fro transverse movements of the work-clamp, as above described, I generally prefer to have the work-clamp moved to and fro lengthwise from a feed wheel or device which is rotated step by step by the sewing-machine without using for that purpose the reciprocating slide from which momentary to-and-fro transverse movements are imparted to the work-clamp, examples being shown in the aforesaid patents, Nos. 362,771 and 303,453.

In making buttonhole-stitchings, such as are indicated by Figs. 31 and 32, or 33 and 34, or 35 and 36, or 37 and 38, or 43, by the above-described mechanism its work-clamp is moved lengthwise step by step in making the barring-stitches, as well as in forming the two rows of zigzag stitches.

To render the mechanism capable of automatically stitching buttonholes with two rows of zigzag or to-and-fro stitches simultaneously and with barring-stitches bunched or close together at one end or at both ends of the two rows of stitches, about as indicated by Figs. 39 and 40, 41, 42, or 44, I furnish the mechanism with devices to automatically prevent, retard, lessen, or stop the lengthwise movement of the work-clamp while the barring-stitches are being made. One device for this purpose consists of a lost-motion connection between the pitman  $E^4$  and the work-clamp slide  $E^2$  or the feed-wheel F, one form being illustrated in partial sectional plan by Figs. 7, 8, 9, and 10 and consisting of a crank-pin  $q$  on the feed-wheel F, (here indicated by dotted lines,) fitting closely in a round socket in the pitman, and a pivot-stud  $q'$ , fast on the slide  $E^2$  and extending into a suitable oblong socket  $q^2$  in the pitman, the slide  $E^2$  being clamped or held by the guides  $E^3$ , so as

to slide tightly therein. Fig. 7 shows the slide  $E^2$  as at rest, with its pivot-pin  $q'$  about midway in the long socket  $q^2$  and the crank-pin  $q$  of the feed-wheel at a point in its rotation when the arm  $N$  is elevated and its end part  $n^2$ , Fig. 4, rests on the middle part of one of the cams  $n'$ , as when the stitching of a buttonhole is just completed, the machine stopped, the stitched buttonhole removed from the clamp, and a buttonhole-blank secured therein. When the machine is then operated, it will first make a bunch of barring-stitches, as  $X$ , Figs. 39 and 40, or  $X'$ , Fig. 41, or  $X^2$ , Fig. 42, or  $X^3$ , Fig. 44, while the crank-pin  $q$  turns from its place in Fig. 7 to its position in Fig. 8, and thereby moves the pitman until the pushing end of its long socket  $q^2$  is against the pin  $q'$ , as in Fig. 8, whereupon the cam will have just passed and let down the end  $n^2$  of the arm  $N$  and the barring device will be out of action. Then the machine will make two rows of zigzag stitches, as  $Y$   $Y'$ , while the crank-pin  $q$  moves from its position in Fig. 8 to its place in Fig. 9, and thereby moves the slide by the pitman to the end of its lengthwise movement in the direction of the arrow  $X'$ , when the other one of the two cams will have just elevated the arm  $N$ , and thereby put in action the barring device, which will then cause the machine to make a bunch of barring-stitches, as  $X^4$ ,  $X^5$ , or  $X^6$ , Figs. 39 and 40, 41, or 42, at the other end of the two rows of stitches, while the slide  $E^2$  remains stationary and the crank-pin passes from its place in Fig. 9 to its place in Fig. 10, when the machine is to be stopped, with the arm  $N$  elevated and the pin  $q'$  midway in the socket  $q^2$ , the stitched buttonhole removed from the clamp, and work to be stitched secured therein. By then operating the machine it will likewise stitch another buttonhole by making, first, at one end of it barring-stitches close together or bunched, thence two rows of zigzag stitches simultaneously along its sides, and then barring-stitches bunched or close together at its other end, all while the feed-wheel turns the crank-pin  $q$ , and thereby moves the pitman  $E^4$  and the slide, with its pin  $q'$ , from their places in Fig. 10 to their positions in Fig. 7, whereupon the machine is to be stopped. Figs. 9 and 3 show the pitman furnished with a stop-screw  $q^3$  and jam-nut  $q^4$ , by which lost motion by the pin  $q'$  in the long socket  $q^2$  can be reduced to different lengths or prevented, as may be desirable to bunch more or less or none of the barring-stitches.

In using the above-described machinery to automatically make buttonhole-stitchings which have barring-stitches that are spaced about the same as the stitches in the two rows, as indicated in Figs. 31, 33, 35, and 37, no lost motion is allowed between the feed-wheel and the slide which carries the work-clamp, and the driving-pawl  $j$  constantly remains engaged with the teeth of the ratchet-wheel  $R$ , as indicated in Fig. 16.

To render the mechanism capable of automatically making buttonhole-stitchings having barring-stitches bunched or close together, about as indicated by Figs. 39, 41, and 42, without having any temporary lost motion between the feed-wheel and the slide which carries the work-clamp, I commonly have a partially-toothed shield  $S$ , Fig. 20, applied to the ratchet-wheel  $R$ , about as shown by Figs. 12, 13, 14, 17, 18, and 19, with the pin  $r$  on the ratchet-wheel extending into an opening or curved slot  $s$  in the shield and a headed screw  $s'$ , having its shank extending through a perforation  $s^2$  in the shield and screwed securely into the supporting-stud  $r^2$ , Fig. 14, for the ratchet-wheel, with a friction surface or disk between the shield and the head of the screw  $s'$  or the top of the stud  $r^2$ , so that the ratchet-wheel in turning forward may turn the shield forward only by the pin  $r$  pressing against the forward end  $s^3$  of the slot  $s$ , as shown in Fig. 17, and so that the shield can be temporarily turned forward by the pawl  $j$  independently of the ratchet-wheel. The shield  $S$  has a few teeth  $s^4$ , which coincide with the teeth of the ratchet-wheel and are just between two projections  $s^5$   $s^6$ , that have ratchet-teeth entirely beyond the ratchet-wheel, which extends beyond the toothless part of the shield. This shield has its teeth  $s^4$ , projections  $s^5$   $s^6$ , and the forward end  $s^3$  of its slot so arranged in relation to the pin  $r$  of the ratchet-wheel, driving-pawl  $j$ , the work-clamp, and intermediate operating connections that when the machine is stopped with the work-clamp at one end of its lengthwise movement and the middle part of a stitch-controlling cam, as  $n$ , elevating the end  $n^2$  of the arm  $N$  the pawl  $j$  will then normally engage the teeth  $s^4$  of the shield and coinciding teeth of the ratchet-wheel, as indicated in Figs. 13 and 18. By then securing in the clamp the work to be stitched and operating the machine it will first make barring-stitches close together or bunched, about as indicated at  $X$ ,  $X'$ , or  $X^2$  in Figs. 39, 41, and 42, while the pawl  $j$  leaves the teeth  $s^4$  and engages with the teeth of the projection  $s^5$ , as in Fig. 19, so as to then turn the shield, but not the ratchet-wheel, until that projection leaves the pawl in engagement with the ratchet-wheel only and the stitch-controlling cam simultaneously stops the action of the barring devices. The machine will then make the two rows of zigzag stitches simultaneously, while the pawl  $j$  turns forward the ratchet-wheel step by step, and thereby the shield, after the pin  $r$  has overtaken the advanced forward end  $s^3$  of the slot  $s$  and until the projection  $s^6$  meets the pawl  $j$  and lifts it out of the ratchet-wheel, whereupon the two rows of stitches will have been completed and a stitch-controller, as  $n'$ , will have thrown the barring devices into action. Then the machine will make barring-stitches bunched or close together, about as indicated at  $X^4$ ,  $X^5$ , or  $X^6$  in Figs. 39, 41, and 42, while the pawl  $j$  turns only the shield by

its projection  $s^6$  until the latter passes forward of the pawl and leaves it engaged with the shield-teeth  $s^4$  and coinciding teeth of the ratchet-wheel, and the pawl has then turned 5 the shield and ratchet-wheel together about one step, whereupon the work-clamp will have completed its lengthwise movement in one direction, the stitching of the buttonhole will have been finished, and the machine is 10 to be stopped. By then taking the stitched buttonhole out of the clamp, securing an unstitched buttonhole in the clamp, and again operating the machine it will in the same manner stitch the latter buttonhole by mak- 15 ing, first, barring-stitches close together at one end of it, thence two rows of zigzag or to-and-fro stitches simultaneously along its sides, and then barring-stitches close together at its other end during the lengthwise move- 20 ment of the work-clamp the same distance in the reverse direction.

The shield on the ratchet-wheel R of the feeding mechanism need have only one suitable toothed projection, as  $s^5$  or  $s^6$ , when the 25 machine shall be used to stitch a buttonhole with bunched barring-stitches at only one end of it and with spaced barring-stitches or no barring-stitches at its other end, or when the machine shall make bunched barring- 30 stitches at each end of a buttonhole and the pawl  $j$  shall engage the middle part of such one-toothed projection when the machine is stopped at the completion of the stitching of a buttonhole at the end of each half-revolu- 35 tion of the feed-wheel.

When the lost-motion device illustrated by Figs. 7, 8, 9, and 10 shall be used in making bunched barring-stitches at one end only of a buttonhole, the making of such one bunch 40 of stitches will use all proper lost motion between the pivot-pin  $q'$  and the oblong socket  $q^2$  at one end of the lengthwise movement of the work-clamp in either direction, and the sewing-machine is to be stopped at the end 45 of each half-revolution of the feed-wheel F, as the stitching of each buttonhole is completed either just as the pitman  $E^4$  ceases to move the work-clamp slide  $E^2$ , as indicated in Fig. 9, or just when the pitman arrives in 50 place to commence moving the work-clamp slide, as shown in Fig. 8. In such case the machine can be used to stitch a buttonhole with bunched barring-stitches at one end of it and with spaced barring-stitches or no barring- 55 stitches at its other end, according as the machine shall be adjusted to make barring-stitches at both ends or at only one end of a buttonhole.

To cause the machine to automatically stop 60 when it completes the simultaneous stitching of the two sides of a buttonhole or completes the stitching of the two sides and one end or the two sides and both ends of a buttonhole, I combine in the sewing-machine any suit- 65 able stopping device or mechanism that will automatically release the driving mechanism from and apply a clutch or brake to the sew-

ing-machine when its work-clamp is at the end of its lengthwise movement in one direc- 70 tion, or in either one of two opposite directions, or when the stitching of a buttonhole is completed and the feed-wheel or device for moving the work-clamp lengthwise a certain limited distance is in a certain predetermined part of its movement. As one means for 75 this purpose the drawings show the shaft B, Fig. 2, with an attached balance-wheel Q, which has on its rear side a friction-surface against which fits a driving-pulley  $Q'$ , which usually runs loose and free and which when 80 properly pressed and held against the wheel Q will rotate it, and thereby operate the sewing-machine. U is a shipper-lever which has a fixed pivot-fulcrum at  $u'$ , a lower arm  $u^2$  extending forward, a rear arm, with a finger 85  $u^3$  to press against a rear central bearing on the pulley  $Q'$ , and a forward arm with a brake  $u^4$  to bear against the front face of the balance-wheel. U' is a spring which constantly tends to press the lever U into its position 90 indicated by broken lines in Fig. 2. V is a lever which has as its fulcrum the shaft V', mounted in fixed supports, and has one arm  $v'$  extending over a forward part of the arm  $u^2$  of the lever U and has another arm ex- 95 tending upward and formed at its upper part as a catch  $v^2$ . T is a trip-lever having a fixed pivot-fulcrum at  $t^2$ , Figs. 12 and 13, and T', Fig. 3, is a spring which constantly tends to press and hold the lever T in its place. (Shown 100 in Figs. 5 and 12.) The feed-wheel F, which in Figs. 5 and 6 is indicated by a dotted circular line, has attached adjustably to its under surface two trips, as  $t$  and  $t'$ , Figs. 3, 4, 5, and 6, concentric and diametrically opposite, and 105 the lever T has an inclined projection  $t^3$ , which, as indicated in Figs. 5 and 6, is normally in the path of the two trips. When the machine is normally at rest, the spring U' will then hold the lever U with its brake 110  $u^4$  pressed against the wheel Q, as indicated by dotted lines in Fig. 2, and with the lever V disengaged from the lever T, as indicated in Fig. 4 by full lines. To then operate the machine, the arm  $v'$ , Fig. 4, of the lever V 115 is depressed from its position in full lines in Fig. 4 to its place in full lines in Fig. 3, as by a person drawing down an attached rod or link  $v^3$ , so as to thereby turn the lever U from its position in broken lines in Fig. 2 120 to its place in full lines in that figure, and thus remove the brake  $u^4$  from and press the driving-pulley  $Q'$  against the wheel Q and compress the spring U' and move the catch  $v^2$  of the lever V over the rear end 125 part of the lever T, which will be retained under that catch by the spring T', as in Figs. 3, 5, and 12, and will then keep the levers V and U stationary and the machine in operation until the lever T shall be turned 130 from under the catch  $v^2$ , as in Figs. 6 and 13, whereupon the spring U' will instantly turn the lever U, and thereby release the pulley  $Q'$  and apply the brake  $u^4$  to the wheel Q, and

thereby stop the machine. The trips  $t t'$  are so adjusted on the feed-wheel F that when that wheel is turned in the stitching operation into either of the two positions it is in when the work-clamp is at the end of its lengthwise movement in either direction or the stitching of a buttonhole is completed one or the other of the two trips will have moved the lever T so that it will just then release the catch  $v^2$ , as in Figs. 6 and 13, and consequently cause the automatic stopping of the machine, as above stated.

When the shield S is used over the ratchet-wheel R, as above described, the trips  $t t'$  are to be adjusted so as to cause the machine to stop when the pawl  $j$  is engaged with the shield-teeth  $s^4$ , Figs. 13 and 18, and as the pawl then turns the ratchet-wheel a step at the completion of the stitching of a buttonhole. In case there shall be lost motion between the pitman  $E^4$  and the pivot-pin  $q'$  on the work-clamp slide  $E^2$ , as above described and illustrated by Figs. 7, 8, 9, and 10, the trips  $t$  and  $t'$  are to be ordinarily adjusted to cause the machine to stop when the pin  $q'$  is at the middle of the oblong socket  $q^2$  in the pitman, as indicated in Figs. 7 and 10. As the pinion F' and ratchet-wheel R each has one complete revolution to the wheel F one-half of a rotation, one trip on the pinion or on the ratchet-wheel or on any suitable part moving in unison therewith may serve instead of the two trips on the feed-wheel to coact with the lever T to stop the machine. For instance, one trip, as  $t^4$ , Figs. 14 and 15, on the disk  $r'$ , fast on the pinion F', may coact with an arm on the lever T (indicated in Fig. 13 by dotted lines at  $t^5$ ) about the same as the trip  $t$  or  $t'$  coacts with the part  $t^3$  on the lever T to stop the machine at the completion of the stitching of a buttonhole.

The lever T is shown with a bent arm  $t^6$ , so that a person can thereby conveniently pull and turn that lever from under the catch  $v^2$ , and thus cause the machine to stop when the stitching of a buttonhole is completed or when the work-clamp is at either end of its lengthwise movements or whenever it is desirable to stop the machine.

My invention is above described as applied to a two-needle sewing-machine in which the work-clamp is moved momentarily to and fro transversely to make the two opposite sets of to-and-fro stitches simultaneously. My invention is also applicable to any suitable two-needle sewing-machine in which the two needles or the two needles and their complementary shuttles or loopers are moved momentarily to and fro transversely to the length of the work-clamp or direction of feed to produce the two opposite sets of to-and-fro stitches.

When my invention is applied to a two-needle sewing-machine which does not reciprocate its work-clamp transversely to its length to make the to-and-fro stitches, the two needles are normally in a plane trans-

verse to the length of the work-clamp, or approximately so. In such case, when the two shuttles or loopers work parallel to the length of the work-clamp, as shown in the aforesaid drawings, the machine will laterally reciprocate the two needles and the two shuttles or loopers transversely to the length of the work-clamp to make the to-and-fro stitches; but the machine may laterally reciprocate the two needles only transversely to the length of the work-clamp to make the to-and-fro stitches when the shuttles or loopers work transversely to the length of the work-clamp and one shuttle or looper takes a loop from one needle only and the other shuttle or looper takes a loop from the other needle only at every descent of the two needles during their lateral reciprocating movements.

The drawings show the guides  $E^3$ , Fig. 13, with a tongue  $g^2$  fitting between lengthwise guides  $g^3 g^4$  on the slide G and adjustably fastened by set-screws  $g^5$ , so that the guides are reciprocated by and with the slide, as above described. Upon suitably loosening the screws  $g^5$  the guides  $E^3$  can be held stationary, as by a removable pin (indicated by dotted lines at  $g^6$  in Fig. 3) extending tightly through perforations in the part  $E^3$  and plate  $A^3$  and freely through a large opening in the slide G, so that the latter will then be freely reciprocated by the lever H, while the work-clamp slide  $E^2$  will be moved step by step lengthwise to and fro, as above described, in its then stationary guides.

The vertically-reciprocating needle-bar C, Fig. 1, can be mounted in a carrier vibrating or reciprocating horizontally on the head of the machine transversely to the length of the work-clamp, to thereby produce to-and-fro stitches essentially as in some well-known buttonhole-sewing machines, and in the machine represented by the drawings such a needle-bar carrier could be thus reciprocated by being connected with the reciprocating slide G, as by a rod, indicated by broken lines at G' in Fig. 1. In such case the needle-bar carrier could or would carry the forward support  $l'$  of the bar L and have bearings for the forward parts of the connected bars L and K, so as to reciprocate these bars horizontally with the needle-bar in making the to-and-fro stitches and permit the bar L to be temporarily connected with and reciprocated a longer stroke by the lever H to cause the semirotations to and fro of the needle-bar in making barring-stitches, as hereinbefore described. Also the two shuttle-races  $D^2 D^3$ , holding the two shuttles D D', can be mounted in suitable guides and, horizontally reciprocated transversely to the length of the work-clamp, as by being connected to the reciprocating slide G by a rod or bar (indicated by broken lines at G<sup>2</sup> in Fig. 1) and extending through suitable apertures in the plates under the slide G, so that the shuttles would be reciprocated with the needles transversely to the length of the work-clamp in making

the two rows of zigzag stitches and the barring-stitches.

My invention, as shown by the aforesaid drawings and above described, is illustrated as applied to a sewing-machine in which the work-clamp is moved lengthwise a certain limited distance by the machine to feed the work to the stitch-forming devices, as I commonly prefer; but in carrying out my invention the work-clamp may not have any lengthwise movement and the sewing-machine may move the stitch-forming mechanism step by step a certain limited distance lengthwise of the work-clamp to feed the stitch-forming devices to the work—for instance, as indicated by broken lines in Figs. 2 and 3, by having ways A<sup>5</sup> fast to the under side of the bed A and parallel to the lengthwise direction of the work-clamp and fitting coinciding ways W, fast on a suitable stationary supporting-frame W', having a bracket W<sup>2</sup> fast on said frame and extending upward through a suitable opening in the bed A and fitting against the two opposite side edges of the arm E' of the work-clamp, and by then rotating the shaft B the machine will operate as hereinbefore described, except that the work-clamp will not be moved lengthwise and the bed A with the stitch forming and feeding mechanisms will be moved step by step a certain limited distance lengthwise of the work-clamp to and fro, and while the machine is thus moving the stitch-forming mechanism lengthwise of the work-clamp a certain limited distance in one direction the machine will automatically stitch a buttonhole by making, first, barring stitches at one end of it, then simultaneously two rows of zigzag or to-and-fro stitches along its sides, and, next, barring-stitches at its other end, and will thereupon automatically stop.

The aforesaid drawings show my invention applied to a two-needle sewing-machine which will normally make two separate opposite rows of lock, zigzag, or to-and-fro stitches simultaneously. My invention is likewise applicable to any suitable two-needle sewing-machine which will make simultaneously two separate opposite rows of chain, to-and-fro, or zigzag stitches.

I have been informed that prior to my invention a two-needle sewing-machine provided with a single shuttle had been contrived to make two separate opposite rows of zigzag or to-and-fro stitches simultaneously. I therefore do not claim such a two-needle sewing-machine broadly.

I wish to cover all equivalents of two shuttles coöperating with two needles, and for this purpose I will adopt in my claims the phrase "two needles and two sets of complementary parts."

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, substantially as described, with a stitch-forming mechanism comprising two needles and two sets of com-

plementary parts, of a work-support and mechanism for producing between said stitch-forming mechanism and work-support, one relative feeding and jogging movement suitable for forming two independent rows of stitches for the sides of a buttonhole, and another relative movement for forming barring-stitches at each end of the aforesaid two rows of stitches extending across the line of the buttonhole.

2. The combination, substantially as described, with stitch-forming mechanism comprising two needles and two sets of complementary parts, of a work-support and mechanism for producing between said stitch-forming mechanism and work-support, one relative movement suitable for forming barring-stitches at one end of a buttonhole across the middle line of the latter, subsequently another relative movement suitable for forming two independent rows of stitches for the sides of a buttonhole, and finally another relative movement for forming similar barring-stitches at the other end of the buttonhole, all three sets of stitches being produced by a single movement lengthwise of the buttonhole.

3. The combination, substantially as described, with stitch-forming mechanism comprising two needles and two sets of complementary parts, of a work-support, mechanism for producing between said stitch-forming mechanism and work-support, one relative movement suitable for forming barring-stitches at one end of a buttonhole across the middle line of the latter, subsequently another relative movement suitable for forming two independent rows of stitches for the sides of a buttonhole, and finally another relative movement for forming similar barring-stitches at the other end of the buttonhole, and an automatic stop mechanism for terminating the stitching operation after the completion of the second set of barring-stitches.

4. The combination, substantially as described, with stitch-forming mechanism comprising two needles and two sets of complementary parts, of a work-support, mechanism for producing between the said stitch-forming mechanism and work-support, one relative movement for forming a set of barring-stitches at one end of a buttonhole, another relative movement for forming two rows of stitches for the sides of a buttonhole, another relative movement suitable for forming a set of barring-stitches at the other end of the buttonhole, and for repeating these operations for a second buttonhole, and a stop mechanism for stopping the operation of the said mechanisms after the completion of each buttonhole.

5. The combination, substantially as described, with stitch-forming mechanism comprising two needles and two sets of complementary parts, of a work-support, and mechanism for producing between the said stitch-forming mechanism and work-support, a relative jogging movement only for forming a set of barring-stitches for one end of a button-

hole across the middle line of the latter, a relative jogging and feeding movement for forming two rows of stitches for the sides of the buttonhole, and a relative jogging movement only for forming a set of similar barring-stitches at the second end of the buttonhole.

6. The combination, substantially as described, of stitch-forming mechanism comprising two needles and two sets of complementary parts, of a work-support, mechanism for producing between the said stitch-forming mechanism and work-support a relative jogging movement only for forming a set of barring-stitches for one end of a buttonhole, extending across the line of the latter, a relative jogging and feeding movement for forming two rows of stitches for the sides of the buttonhole, and a relative jogging movement only for forming a set of similar barring-stitches at the second end of the buttonhole, and a stop mechanism for stopping the operation of the aforesaid mechanisms after the completion of each buttonhole, substantially as specified.

7. The combination, substantially as described, with stitch-forming mechanism comprising two needles and two sets of complementary parts, of a work-support and mechanism for producing between the said stitch-forming mechanism and work-support, a relative jogging movement only for forming a set of barring-stitches for one end of a buttonhole, a relative jogging and feeding movement for forming two rows of stitches for the sides of the buttonhole, and a relative jogging movement only for forming a set of barring-stitches at the second end of the buttonhole, and means for causing a relative swinging movement between the needles during the forming of the barring-stitches.

8. The combination, substantially as described, with stitch-forming mechanism comprising two needles and two sets of complementary parts, of a work-support, mechanism for producing between said stitch-forming mechanism and work-support, one relative movement suitable for forming barring-stitches at one end of a buttonhole across the middle line of the latter, subsequently another relative movement suitable for forming two independent rows of stitches for the sides of a buttonhole, and finally another relative movement for forming similar barring-stitches at the other end of the buttonhole, and means for causing a relative swinging movement between the needles during the forming of the barring-stitches, substantially as specified.

9. The combination, substantially as described, with stitch-forming mechanism comprising two needles and two sets of complementary parts, of a work-support, mechanism for producing between said stitch-forming mechanism and work-support, a relative feeding and jogging movement suitable for forming two independent rows of stitches for the sides of a buttonhole, a stitch-regulating

mechanism which normally acts momentarily to and fro a certain distance transversely to the length of the work-support, and a stitch-changing mechanism which will automatically alter the extent of action of said stitch-regulating mechanism during the formation of the barring-stitches, and simultaneously cause a relative swinging movement between the needles.

10. The combination, substantially as described, with stitch-forming mechanism comprising two needles and two sets of complementary parts, of a work-support, mechanism for producing between said stitch-forming mechanism and work-support, a relative feeding and jogging movement suitable for forming two independent rows of stitches for the sides of a buttonhole, a stitch-regulating mechanism which normally acts momentarily to and fro a certain distance transversely to the length of the work-support, and a stitch-changing mechanism which will automatically alter the extent of action of said stitch-regulating mechanism during the formation of the barring-stitches.

11. The combination, substantially as described, with stitch-forming mechanism comprising two needles and two sets of complementary parts, of a work-support, mechanism for producing between said stitch-forming mechanism and work-support, a relative feeding and jogging movement suitable for forming two independent rows of stitches for the sides of a buttonhole, a driving mechanism, a normally-inactive stitch-changing mechanism which when in action will cause the sewing-machine to make barring-stitches, a stitch-controller, or cam, moving in harmony with said mechanism producing a relative feeding and jogging movement between said stitch-forming mechanism and said support, and a connection between said stitch-controller or cam and said stitch-changing mechanism whereby the stitch-changing mechanism is temporarily caused to be engaged with, actuated by, and disengaged from, said driving mechanism.

12. The combination, substantially as described, with stitch-forming mechanism comprising two needles and two sets of complementary parts, of a work-support, mechanism for producing between said stitch-forming mechanism and work-support a relative feeding and jogging movement suitable for forming two independent rows of stitches for the sides of a buttonhole, a normally-inactive stitch-changing mechanism which when in action will cause a relative swinging movement between the needles to make barring-stitches, a driving device for said stitch-changing mechanism, a stitch-controller moving in harmony with said feed mechanism, and a connection between said stitch-controller and said stitch-changing mechanism, whereby the latter is temporarily caused to be engaged with, actuated by and disengaged from said driving device.

13. The combination, substantially as described, with stitch-forming mechanism comprising two needles and two sets of complementary parts, of a work-support, mechanism  
 5 for producing between said stitch-forming mechanism and work-support, a relative feeding and jogging movement suitable for forming two independent rows of stitches for the sides of a buttonhole and the necessary movement for forming barring-stitches, a normally-  
 10 inactive stitch-changing mechanism which when in action will cause a relative swinging movement between the needles to make barring-stitches, a vibrating lever, a stitch-controller moving in harmony with the relative  
 15 movement of the work-clamp and stitch-forming mechanism, and a connection between said stitch-controller and said stitch-changing mechanism whereby the latter is temporarily  
 20 caused to be engaged with, actuated by, and disengaged from said vibrating lever.

14. The combination, substantially as described, with stitch-forming mechanism comprising two needles and two sets of complementary parts, of a work-support, mechanism  
 25 for producing between said stitch-forming mechanism and work-support, a relative feeding and jogging movement suitable for forming two independent rows of stitches for the sides of a buttonhole, a ratchet-wheel,  
 30 its driving-pawl, a connection between the ratchet-wheel and the work-clamp to feed the latter lengthwise a certain distance, a shield pivoted relatively to the ratchet-wheel and  
 35 having a toothed projection extending beyond the ratchet-wheel, and a lost-motion

connection between the ratchet-wheel and shield, whereby the driving-pawl will turn the ratchet-wheel while the sewing-machine makes the two rows of side stitches, and will  
 40 turn only the shield when the barring-stitches are being made.

15. The combination, substantially as described, with stitch-forming mechanism comprising two needles and two sets of complementary parts, of a work-support, mechanism  
 45 for producing between said stitch-forming mechanism and work-support, a relative feeding and jogging movement suitable for forming two independent rows of stitches for  
 50 the sides of a buttonhole, a ratchet-wheel, its driving-pawl, a connection between the ratchet-wheel and work-clamp to feed the latter lengthwise a certain distance, a rotary  
 55 shield concentric with the ratchet-wheel and having two toothed projections somewhat apart and extending beyond the ratchet-wheel and intermediate teeth coinciding with  
 60 teeth of the ratchet-wheel, a lost-motion connection between the ratchet-wheel and shield, and a mechanism which will automatically stop the sewing-machine when said driving-pawl is engaged with the shield between said two projections.

In testimony whereof I hereunto set my  
 65 hand, in the presence of two subscribing witnesses, this 13th day of October, 1892.

JAMES T. HOGAN.

Witnesses:

N. C. TEMPLETON,  
 THO. QUIST.