

No. 741,340.

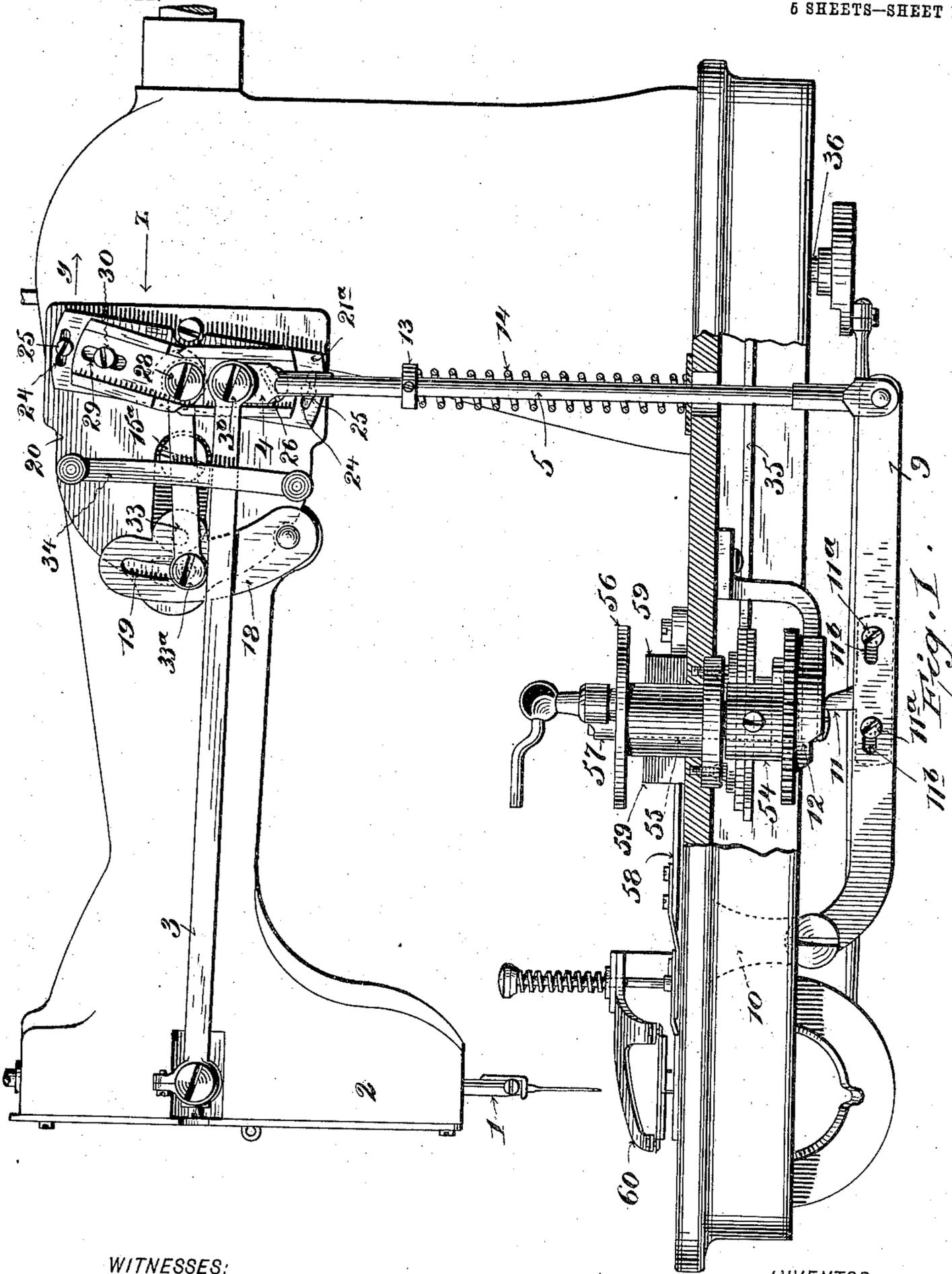
PATENTED OCT. 13, 1903.

J. T. HOGAN.
BUTTONHOLE SEWING MACHINE.

APPLICATION FILED JULY 28, 1902.

NO MODEL.

6 SHEETS—SHEET 1.



WITNESSES:

C. W. Benjamin
W. B. Moore

INVENTOR

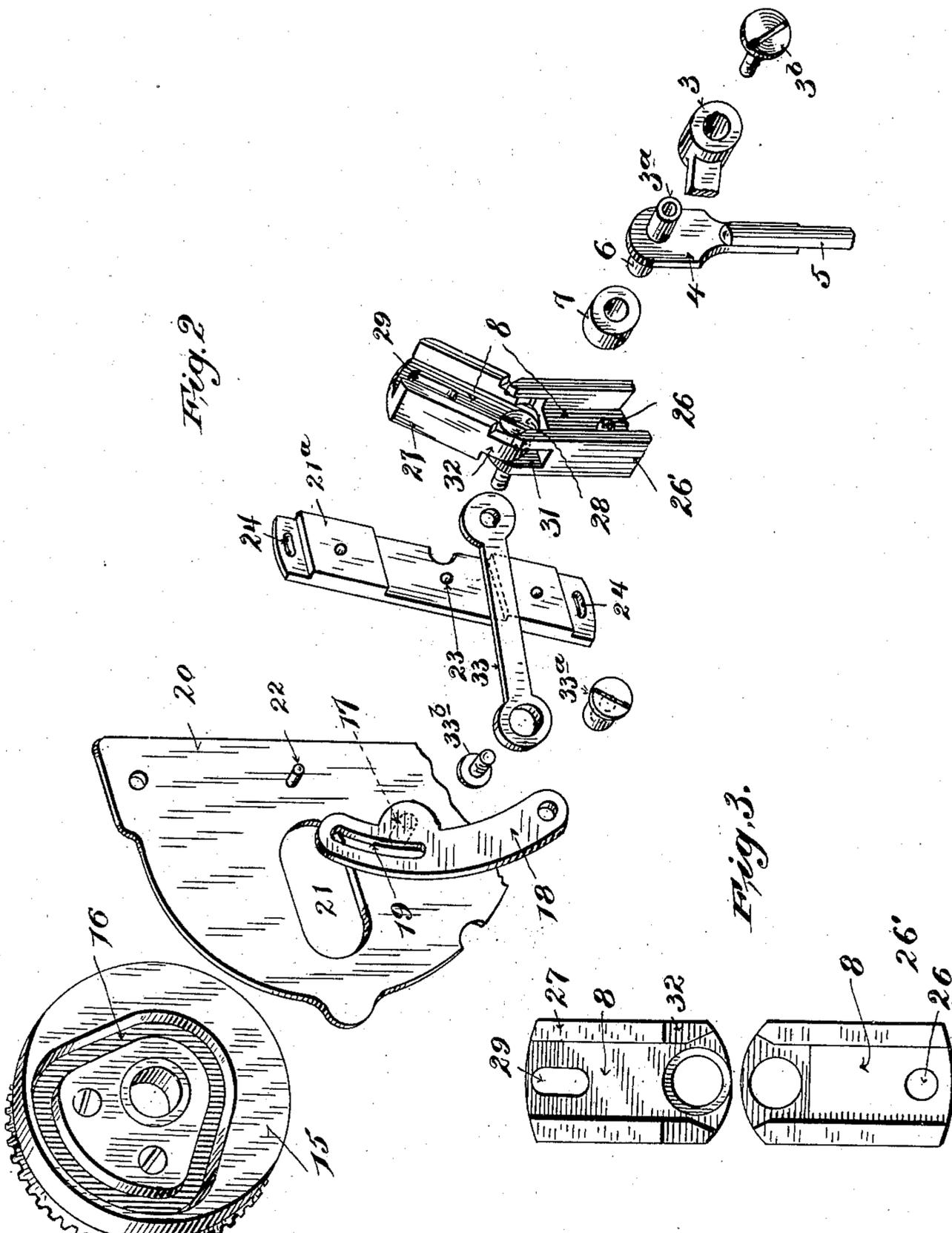
James T. Hogan
BY
W. M. Chapman
ATTORNEY

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6 SHEETS—SHEET 2.



WITNESSES:
Chas. Benjamin
W. B. Hoare

INVENTOR
James J. Hogan
 BY
Edw. M. Chapman
 ATTORNEY

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5 SHEETS—SHEET 3.

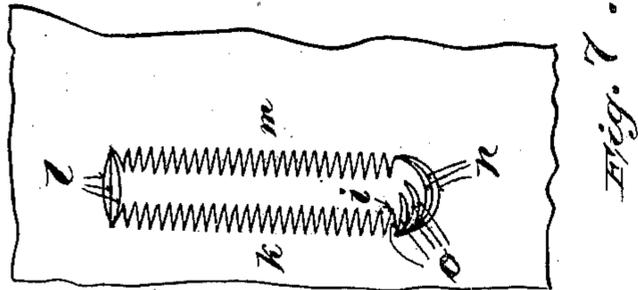


Fig. 5.

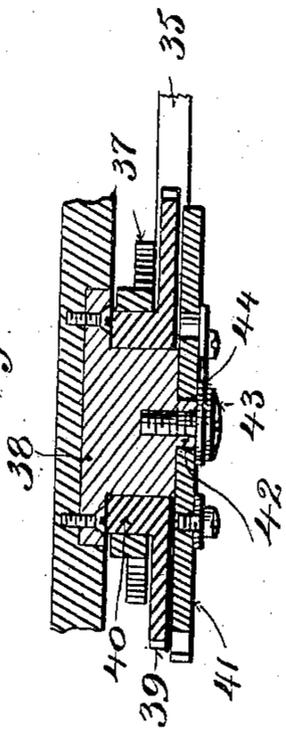
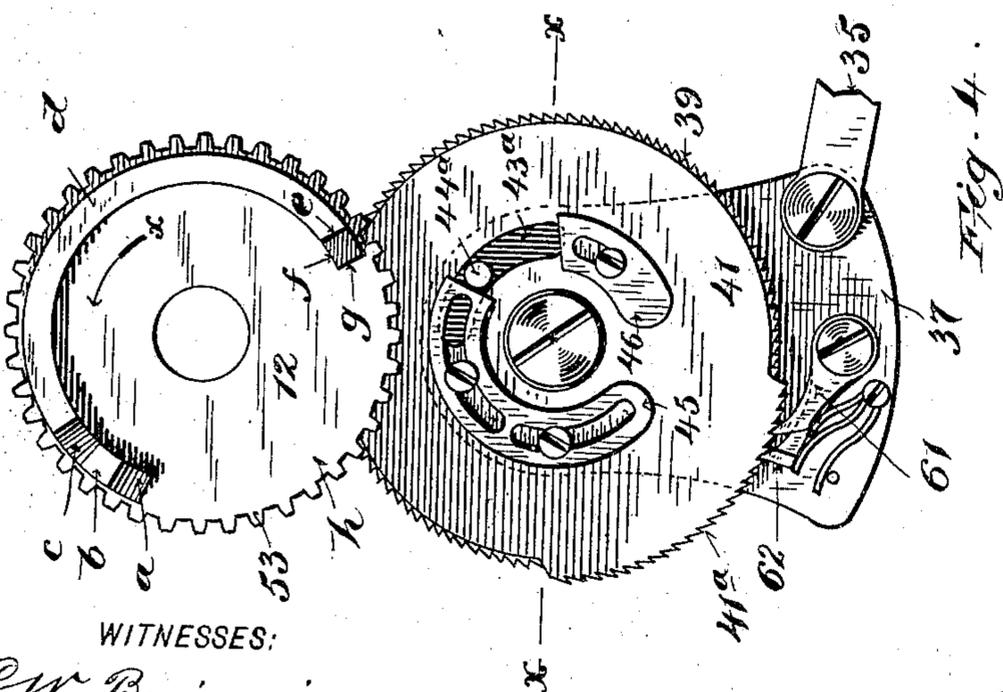
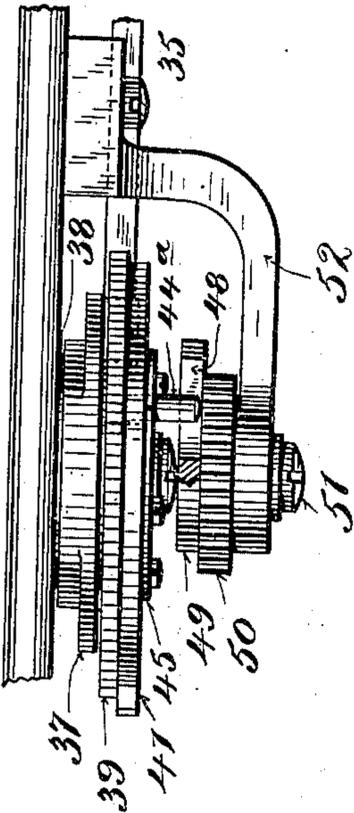


Fig. 6.



WITNESSES:

C. W. Benjamin
M. B. Hoare

INVENTOR

James T. Hogan
BY *W. M. Chapman*
ATTORNEY

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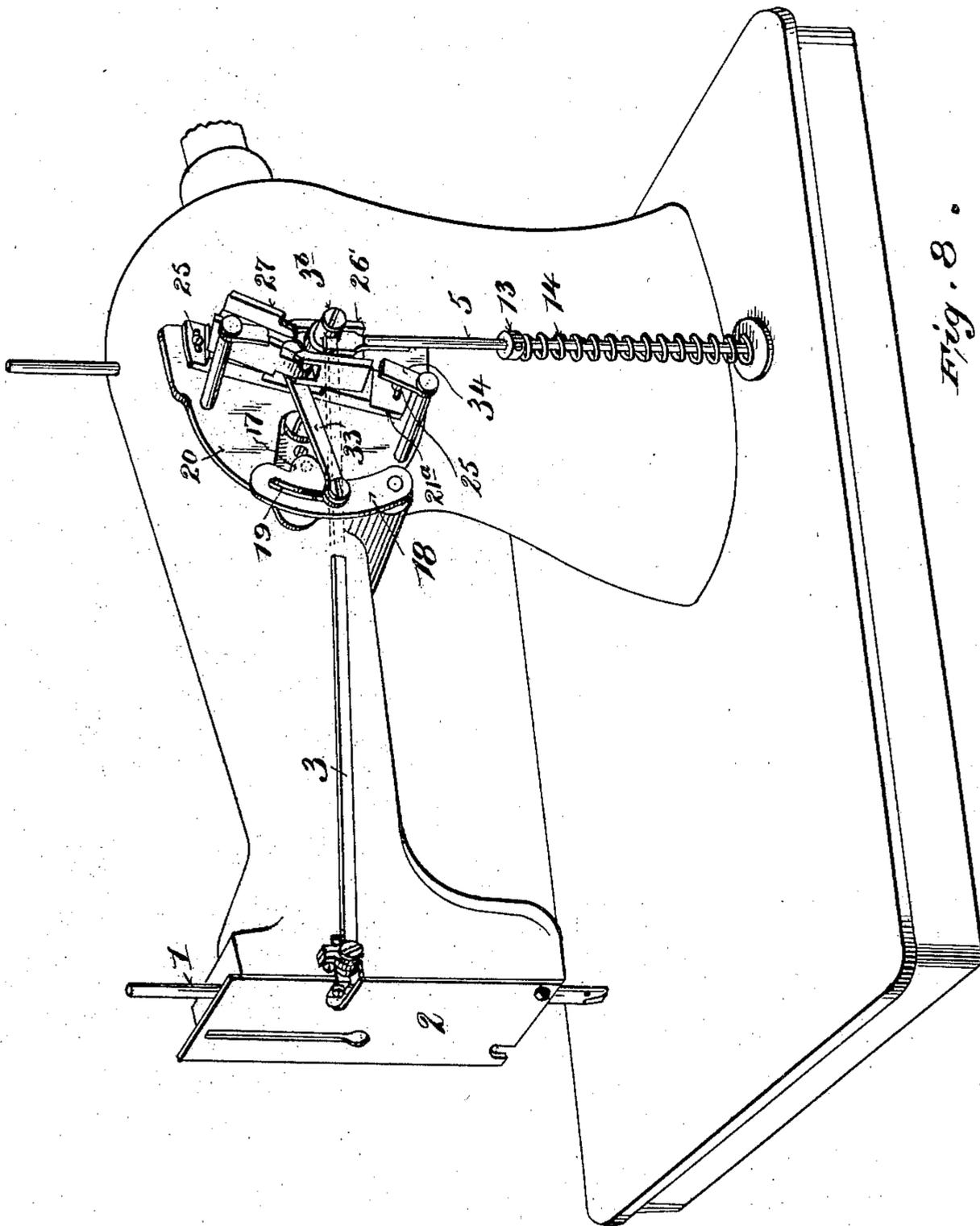


Fig. 8.

WITNESSES:

C. W. Benjamin
W. B. Hoare.

INVENTOR

James J. Hogan.
BY *W. M. Chapman*
ATTORNEY

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6 SHEETS—SHEET 5.

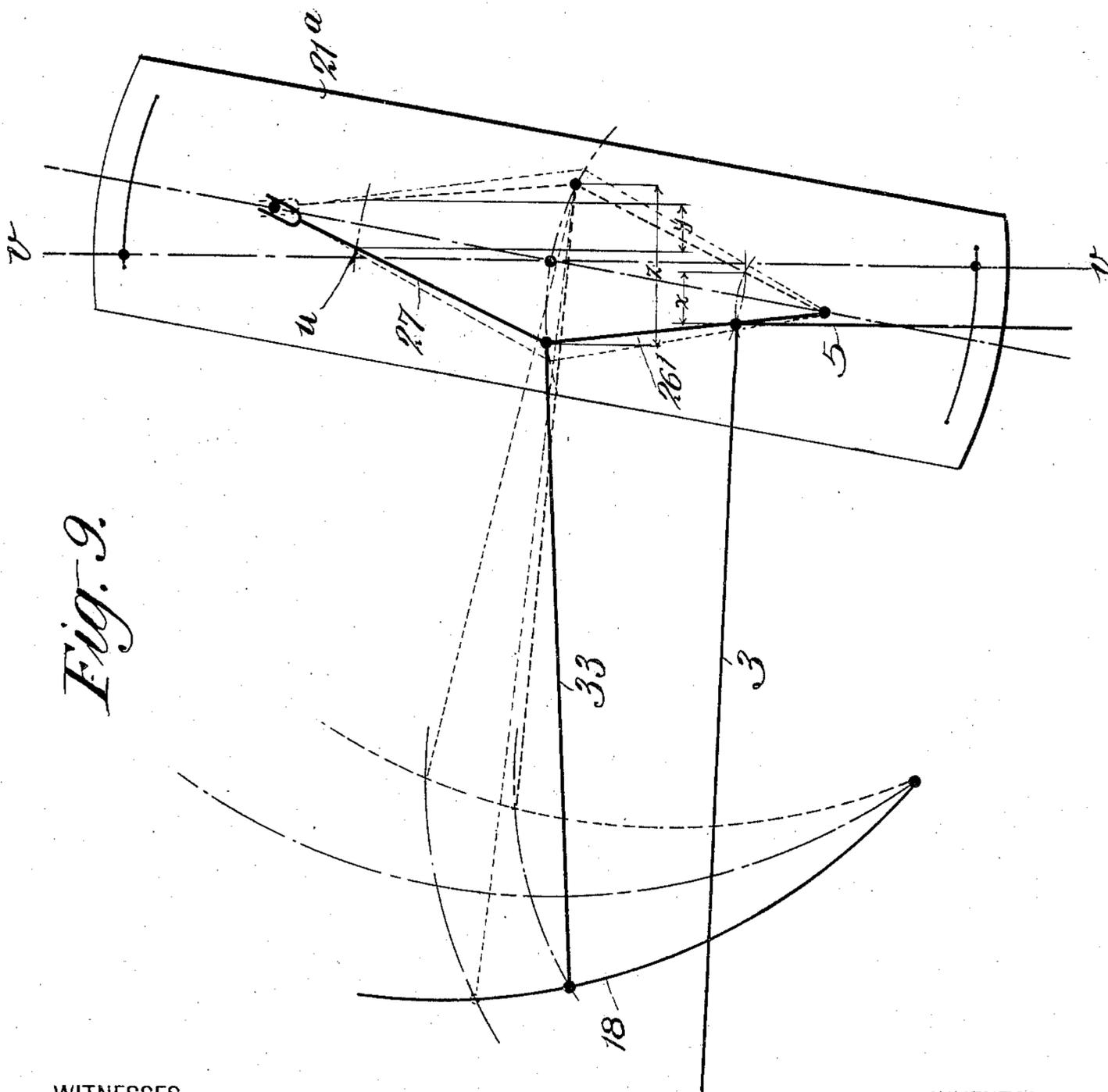


Fig. 9.

WITNESSES.

C. F. Carrington
A. J. Motter

INVENTOR

James T. Hogan
BY
Chapin Raymond Marble
his ATTORNEYS

UNITED STATES PATENT OFFICE.

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

BUTTONHOLE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 741,340, dated October 13, 1903.

Application filed July 28, 1902. Serial No. 117,231. (No model.)

To all whom it may concern:

Be it known that I, JAMES T. HOGAN, a citizen of the United States, residing in Jersey City, county of Hudson, and State of New Jersey, have invented new and useful Improvements in Buttonhole-Sewing Machines, of which the following is a description.

My invention relates to sewing-machines which are specially adapted for stitching or making buttonholes, and more particularly to that class or type of buttonhole-stitching machines which form a straight bar across the ends of the buttonhole or at right angles to the length of the latter.

The object of my invention is to provide a buttonhole-stitching machine which will be light-running, simple in structure, and consequently capable of attaining high speed, and one which will bind and bar a buttonhole rapidly and effectively and produce a buttonhole of great commercial value.

With these objects and ends in view my invention consists of the mechanism, parts, features, and combination of elements herein after described and claimed.

In the drawings forming part of this specification, Figure 1 is a side elevation of the machine, part of the bed-plate being broken away so as to show the mechanism which operates the cloth-clamp and controls the position of the end of the needle-bar-operating pitman. Fig. 2 is a detail perspective of the mechanism for vibrating the needle-bar. Fig. 3 is an elevation of the toggle-plates separated. Fig. 4 is a bottom plan of the ratchet mechanism and stepped cam. Fig. 5 is a cross-section on the line *xx* of Fig. 4, showing the means for supporting the ratchet mechanism. Fig. 6 is a side elevation of the ratchet mechanism and the means for actuating the stepped cam. Fig. 7 is a diagrammatic view of the buttonhole; and Fig. 8 is a perspective view of the machine, showing the position of the parts for beginning the buttonhole. Fig. 9 is a diagrammatic view of certain portions of the machine, showing particularly the means for transmitting lateral movement to the needle-bar and illustrating results attained from certain movements and adjustments thereof.

Primarily it is to be understood that the buttonhole-slit may be cut either before or after the stitching operation; but in this machine I prefer a cutting attachment or mechanism which will automatically make the slit substantially at the termination of the stitching operation, and in this connection it is to be noted also that a stop mechanism will be provided, so as to bring the machine to a stop at the end of each stitching and cutting operation. It is to be further noted that any form of stitch-forming mechanism may be employed, provided it involves a movable gate in which the needle-bar is caused to reciprocate vertically; also, that any suitable form of cloth-clamp may be used. None of these mechanisms, however, is shown, because it is desired to emphasize those parts which constitute the salient features of my invention and avoid confusion by showing details and parts unnecessary to a clear understanding of the same.

In this specification I will refer in describing the manner of stitching the buttonhole to the "slit" thereof, and by this term or expression I mean to be understood as referring to that portion which lies between the two series or lines of binding-stitches, and this whether a slit has been cut therein or not.

In stitching a buttonhole on my machine the binding-stitches are first placed on the left side of the slit by a combined progressive feed movement of the clamp and a vibratory movement of the needle-bar at right angles to the said feed movement, the stitching beginning at the slit of the buttonhole or adjacent that end thereof which may be referred to as the "finish" end. Then the first set of barring-stitches is formed by shifting laterally the working position of vibration of the needle-bar and simultaneously increasing its vibratory movement, together with a cessation of the feeding movement of the clamp, the increase in vibration being equal on both sides of the slit and extending to the extreme outer edge of the stitching constituting the two rows or series of binding-stitches, the beginning of the barring being at the extreme outer edge of the first series of binding-stitches and extending, as before noted, to the ex-

tre extreme outer edge of the second series of binding-stitches, two or more of such barring-stitches being piled in substantially the same place across the end of the buttonhole-slit.

5 Then the second side of the buttonhole is bound by a series of stitches produced by a progressive reverse feed of the clamp combined with a vibratory movement of the needle-bar of the same extent as the vibratory

10 movement thereof during the binding of the first side of the buttonhole, the initial stitch in the binding series being placed adjacent the slit and extending from the last barring-stitch. This binding action is the result of

15 a still further lateral shift of the working position of vibration of the needle-bar combined with a simultaneous decrease in its vibratory movement. Then the finish end of the buttonhole is barred by a series of stitches

20 piled one upon the other and produced by a cessation of the reverse feed movement of the clamp and a lateral reverse shift of the working position of vibration of the needle-bar and a simultaneous increase in the vibration

25 thereof, the increase in vibration being equal on both sides of the slit and to the same extent as that employed in producing the first bar, such bar-stitches extending from the extreme outer edge of the second series of binding-stitches to the extreme outer edge of the

30 first series of binding-stitches, the last two or more barring-stitches, however, being progressively shorter than the first several stitches made in the bar and being progressively shortened toward the first series of binding-stitches. It is to be noted that in producing the buttonhole according to my invention the working position of vibration of the

35 needle-bar is several times shifted or changed, so as to produce the binding-stitches on opposite sides of the slit or of the central line of the buttonhole and the barring equally on both sides of said slit or line—that is to say, the change or shift of the working position of

40 vibration of the needle-bar is multiplex and is in one direction or the reverse, according to which side and end of the buttonhole are being stitched.

As before noted, the clamp for holding the

50 work may be of any usual form, and the mechanism for actuating the same may be of any well-known character for giving the clamp a simple progressive feed crosswise of the bed-plate, then causing it to come to a full

55 stop, then causing it to be fed progressively in the opposite direction across the bed-plate, and again come to a full stop. It will be observed that these are simple, ordinary, and well-known movements in the art, and in consequence no details of the mechanism for producing the same have been illustrated.

The mechanism for vibrating the needle-bar 1 transversely to the buttonhole-slit consists of an ordinary pivoted gate in the head

65 2 of the machine, connected pivotally to the pitman 3, which in turn is sleeved upon a pin 3^a, carried on the elongated flattened up-

per end 4 of the vertical bar or rod 5, whose inner side carries a pin 6, acting as a journal for an antifriction-roll 7, which runs in the

70 track or guideway 8 of the members of the toggle mechanism hereinafter described. The end of the pitman is held to pin 3^a by a screw 3^b. The vertical rod 5 is connected pivotally at its lower end to a lever 9, fulcrumed to a

75 hanger 10 on the bottom of the bed-plate. Intermediate its ends the lever 9 is provided with a lug 11, adjustable by screws 11^a passing through slots 11^b in lever 9, which contacts with the stepped cam 12 for the purpose

80 of shifting the vertical rod, as hereinafter described. Said vertical rod is provided with an adjustable collar 13 and is surrounded by a coiled spring 14, one end of which rests upon the bed-plate and the other end of which is

85 confined and controlled by said collar.

A cam-disk 15 is secured to a gear and supported on a short shaft, pin, or screw 15^a in the overhanging arm of the machine and is operated by an ordinary gear from the main

90 shaft in said arm. Said cam-disk is provided with a cam-groove 16, in which runs an antifriction roll or pin 17, carried by a lever 18, journaled in the overhanging arm and longitudinally slotted at 19. A plate 20 is secured

95 to the overhanging arm and is slotted at 21 for the passage of said pin or roll 17. Said plate 20 carries a second plate 21^a, journaled centrally thereon by a pin 22, projecting therefrom and entering an aperture 23 in the

100 secondary plate, said latter plate being circularly adjustable by means of curved slots 24 and adjusting-screws 25 entering the primary plate. The secondary plate has fulcrumed thereto at 26 the member 26' of the

105 toggle mechanism, the other member 27 being pivoted to the member 26' at 28 and being longitudinally slotted at 29 for the passage of a guiding-screw 30. The toggle members 26' and 27 are provided with side flanges

110 or shoulders and constitute a guide for the friction-roll 7, carried by the pitman 3 and the vertical rod 5. The member 26' of the toggle mechanism is bifurcated at 31 on opposite sides, so as to receive the tongues 32

115 of the other member of the toggle mechanism, said parts sliding freely, so as to give ease of movement. A link 33 connects the fulcrum 28 of the toggle mechanism with the vibrating lever 18, in the slot of which the

120 other end of said link is adjustable by the clamping-screw 33^a for the purpose of changing the extent of vibration of the needle-bar. The bar 34, connected to the primary plate, extends transversely across the needle-bar

125 pitman and is provided for the purpose of preventing the end of the latter and the end of the vertical bar or rod 5 from springing away from the track or guideway 8 in the toggle plates or members.

The pitman 35, actuated in any suitable

130 manner from the vertical shaft 36 of the machine, is pivotally connected to the plate 37, which carries a double-pawl device for actu-

ating the double-ratchet mechanism. The bed-plate has secured thereto a depending stud 38, which carries the two ratchet-plates, the upper one, 39, of which has the extended hub 40 journaled on the stud and the lower one, 41, of which is journaled on a short projection 42 of said stud and is held closely against the latter by means of a headed screw 43 and an intermediate friction-washer 44. The pawl-plate 37 is journaled on the extended hub 40 of the ratchet-plate 39. The upper ratchet-plate 39 has its entire circumference toothed, while the lower ratchet-plate 41 has a portion 41^a only toothed, which portion 41^a extends beyond the teeth of the other ratchet-plate. The lower ratchet-plate has a concentric slot 43^a, through which projects a pin 44^a, fixed in the upper ratchet-plate. The lower ratchet-plate is also provided with two circularly-adjustable plates 45 46, which are caused to project more or less over the ends of said concentric slot. The pin 44^a also extends into the forked end 48 of the crank-plate 49, connected to the pinion 50, carried by the stud 51, journaled in the bracket 52, secured to the under side of the bed-plate, which pinion meshes with the gear 53, having on its under side the stepped cam for actuating the vertical rod 5, which shifts the end of the pitman 3 relative to and along the toggle mechanism. The gear 53 is provided with a sleeve 54, secured to a short shaft 55, suitably journaled in the bed-plate, and at the upper end of which shaft 55 is the slotted disk 56, to which the link 57 is clamped, which link is connected to the slide-bar 58, guided between parallel bars 59 on the bed-plate, and which slide-bar suitably supports a cloth-clamp 60 and gives the same its feed movement.

The cam 12, which operates the vertical rod 5, has two inclines *a c*, separated by an intermediate horizontal portion *b*, and at the other end of the extensive horizontal portion *d*, occupying substantially a half-circle, are two abrupt steps or shoulders *e g* and between them a short horizontal portion *f*. Extending from the second shoulder *g* to the first incline *a* is an extensive horizontal portion *h*, corresponding to the horizontal portion *d*, but located in a different plane.

The pawl mechanism consists of the short pawl 61, spring-pressed toward the lower ratchet-plate 41^a and having a contact edge which is only wide enough to engage said lower ratchet-plate, and a long pawl 62, spring-pressed toward the ratchet-plates and having a contact edge broad enough to engage both the ratchet-plates.

When the ratchet-plates are actuated, the pin 44^a, carried by one of them, actuates the pinion 50, which in turn actuates the stepped cam 12 in the direction indicated by the arrow *x* by meshing with the gear thereof.

The mechanism in the position shown in Figs. 1 and 8 will start the buttonhole by planting the first stitch adjacent the central

line thereof, as at *i*, and the progressive feed and vibratory movement of the needle-bar will produce the binding-stitches along the edge of the buttonhole-slit at *k*, such binding-stitches being produced while the lug 11 is traveling along the extensive surface *d* of the stepped cam. When the lug reaches the shoulder or abrupt portion *e*, the spring 14 causes the lug to suddenly shift to the short portion *f* and carry the end of the pitman 3 into coincidence with the fulcrum of the toggle mechanism, thus getting the full movement of said mechanism and increasing the vibration of the needle-bar and piling up several barring-stitches 1 at the first end of the buttonhole, this barring action taking place while the lug is on the said short portion *f*, said lug remaining sufficiently long on said short portion to enable two or more barring-stitches to be made or placed. Then the lug abruptly shifts over shoulder *g* to the extensive surface *h* of the cam, resulting in shifting the pitman connection, with the rod 5, to a point above the fulcrum of the toggle mechanism and curtailing the vibratory movement of the needle-bar, in which position the parts remain during the reverse progressive movement of the feed mechanism. When the last of the second series or set of binding-stitches *m* has been made, the lug will ascend the first incline *a* to the short portion *b* of the cam, which results in drawing the pitman connection into coincidence with the fulcrum of the toggle mechanism and produces a series of long barring-stitches *n* across the end of the buttonhole, such barring-stitches being placed while the lug is on said short portion *b* of the cam. When the lug traverses the second incline *c*, the pitman connection, with the rod 5, is slowly drawn below the fulcrum of the toggle mechanism, resulting in a gradual shortening of the barring-stitches, until the extensive portion *d* of the cam is again reached, at which time the buttonhole will be finished and the machine will be caused to stop by any suitable stop mechanism, as before noted. The short barring-stitches are indicated at *o*.

It is to be noted that Fig. 7 is merely diagrammatic of the buttonhole and that the barring-stitches are in reality piled across the ends of the slit, the spread arrangement in Fig. 7 being for the purpose of clearly showing the sequence and character of the stitches.

It will be observed that the adjustable connection between the vibrating lever 18 and the link 33 enables the length of both the binding and barring stitches to be regulated simultaneously or increased or diminished at will and that such regulation of the stitches, both in the bar and in the sides of the buttonhole, is proportional and is accomplished by the single adjustment—that is to say, the single adjustment regulates the length of the binding-stitches—and such adjustment necessarily entails a proportional regulation of the length of the barring-stitches. Further-

more, it is to be noted that a slight adjustment of the secondary plate 21^a to the right by swinging the same on its pivot-pin 22 in the direction of arrow *y*, Fig. 1, will result in increasing the width of the buttonhole-slit or the distance between the two series of binding-stitches, while a slight adjustment of said plate to the left or in the direction of the arrow *z*, Fig. 1, will result in decreasing the width of the buttonhole-slit or the distance between the two series of binding-stitches. The several adjustments above noted are important features of my invention, and upon them I desire to place particular stress.

Another important feature of my invention is the means for regulating the number of stitches placed in each bar. The adjustable plate 45, carried by the lower ratchet-plate 41, performs this function by controlling the amount of movement the two ratchet-plates 39 and 41 may have independently of each other—that is to say, the position of said plate 45 relatively to the concentric slot 43^a determines the time the lower ratchet-plate 41 may run independently of the upper ratchet-plate 39, the time the lug 11 may dwell on the short portions *b f* of the stepped cam, and consequently the number of barring-stitches at each end of the buttonhole. The adjustable plate 46 is for the purpose of securing an initial relative adjustment of the two ratchet-plates—that is to say, to provide for the proper operation of the ratchet-plate 41 relatively to the ratchet-plate 39.

The toggle mechanism herein described, aside from being simple, compact, and easy-running, produces some peculiarities of function upon which stress should be placed. First, the direction of change or shift in the working position of vibration of the needle-bar is alternately in opposite directions and equally from one side to the other of the buttonhole; secondly, the extent or amplitude of vibration of the needle-bar in barring is increased equally on opposite sides of the slit; thirdly, the full throw of the toggle is given when the connection of the pitman with the rod is coincident with the fulcrum of the toggle-plates; fourthly, the adjustment of the secondary plate to vary the width of the buttonhole-slit does not affect the length of the stitches nor disturb the action of the toggle mechanism, and, fifthly, during the formation of a buttonhole the change or shift of the working position of vibration of the needle-bar is of a multiplex character. These various movements and the relative adjustments of the various parts will be understood more fully with reference to Fig. 9, which is a diagrammatic representation of the mechanism for transmitting the vibratory movement to the needle-bar. Certain of the parts—such, for instance, as the lever 18, toggle-links 26 and 27, link 33, and the pitman 3—are illustrated in this diagrammatic figure by single lines only and their centers and range of movement by dots and broken lines. The pitman 3, in con-

nection with the vibrating-head carrying the needle-bar, will itself have a movement either equal or in direct proportion to any movement of the needle-bar, and hence its inner end or point of connection with the toggle-links may for purposes of this specification be considered the movement of the needle itself. In such case line *vv* will represent the central line of the buttonhole or a line passing longitudinally through the slit thereof. A vibration of the links in the manner before stated will produce a like vibration of the pitman, having an amplitude of movement and a position of such movement with respect to the line *vv*, as indicated herein by the line *x*. When the position of connection of the inner end of the pitman with the links 26 and 27 is shifted to a position common to both said links—that is to say, to a position coincident with their pivotal connection with each other—the vibration of the links will produce a vibration of the pitman equal to the line *zz*, while the shifting of the point of connection of the pitman 3 up to the point *w* on the link 27 will result in a vibration thereof equal to the line *y*. The line *y* and the line *x* are equivalents, but are on opposite sides of the central line *vv*, while the line *z* is a line extending in equal directions upon both sides of the line *vv*. A shifting of the plate 21 about its axis of rotation will result in shifting the positions of the lines *x* and *y* to a distance farther away from or nearer to the line *vv* without substantial change to the line *z*. A change of connection between the links 33 and the lever 18, however, will result in an increase of throw of the toggle-links 26 and 27, and hence a proportionate increase in the length of the lines *x*, *y*, and *z*.

It will thus be seen that I have produced a simple light-running buttonhole-machine, and one having few parts and the inherent capability of high speed, also that my machine produces a buttonhole having its ends firmly barred close to the binding-stitches, no gaps or wide spaces being left between the binding and barring stitches because the first binding-stitch of each row or series is planted adjacent the slit and the last binding-stitch of each row or series is carried practically into the bar or extended beyond the ends of the slit. Hence the buttonhole will not spread or gape at its ends.

The length of the buttonhole may be varied in this machine in a manner common in the art by adjusting the link 57 on the disk 56, thus changing the length of the feeding movement of the work clamp or holder.

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

1. A buttonhole-sewing machine comprising stitch-forming mechanism, including a vertically-reciprocating and laterally-vibrating needle-bar; mechanism for transmitting such vibratory movement, including a plurality of vibrating members and a connection

therefrom to said needle-bar; and means for shifting such connection from one said vibrating member to another.

2. A buttonhole-sewing machine comprising stitch-forming mechanism, including a vertically-reciprocating and laterally-vibrating needle-bar; mechanism for transmitting such vibratory movement, including two vibrating members connected together but permitted movements relatively of each other, and a connection therefrom to said needle-bar; and means for shifting such connection from one said vibrating member to another and to a point common to both said members.

3. A buttonhole-sewing machine comprising stitch-forming mechanism including a vertically-reciprocating and laterally-vibrating needle-bar; vibrating mechanism including a guide and means for imparting thereto a range of movement constant at all times during the operation of the machine, one point of said guide moving to and fro upon opposite sides of a straight line, another point thereof moving to and fro upon one side only of such line, and another point thereof moving to and fro upon the other side only of such line; and means connecting said needle-bar with the said vibrating mechanism, and movable along said guide to and between said points.

4. A buttonhole-sewing machine comprising stitch-forming mechanism including a vertically-reciprocating and laterally-vibrating needle-bar; vibrating mechanism including a guide and means for imparting thereto a range of movement constant at all times during the operation of the machine, one point of said guide moving to and fro upon opposite sides of a straight line, another point thereof moving to and fro upon one side only of such line, and another point thereof moving to and fro upon the other side only of such line; and means connecting said needle-bar with the said vibrating mechanism at any one of the three said points, and for automatically shifting said connection along said guide between said points.

5. A buttonhole-sewing machine comprising stitch-forming mechanism including a vertically-reciprocating and laterally-vibrating needle-bar; vibrating mechanism including a guide having a range of movement constant and uniform at all times during the sewing of a complete buttonhole, said guide including a portion which moves to and fro upon opposite sides of a straight line, another portion which moves to and fro upon one side only of such line, and another portion which moves to and fro upon the other side only of such line, and a member connecting said vibrating needle-bar with said guide; means for shifting the connection of said member along said guide to various points therein to effect changes of lateral movements of the vibrating needle-bar necessary for stitching upon opposite sides of a straight

line and upon each side only of said line independent of lateral movement of the work operated upon, and means for operating the said vibrating mechanism.

6. A buttonhole-sewing machine comprising stitch-forming mechanism including a vertically-reciprocating and laterally-vibrating needle-bar; mechanism for transmitting such lateral vibration thereto, including a guide, vibrated about a fixed axis, a support for the guide held stationary during the operation of sewing a complete buttonhole, and a member connecting the needle-bar with the vibrating guide and movable along the same; and means for vibrating the said guide to produce lateral movements of the needle-bar for stitching on either side of the buttonhole, and stitching at the end of the buttonhole, upon opposite sides of a central line passing longitudinally through the buttonhole independent of any lateral movement of the work operated upon.

7. A buttonhole-sewing machine comprising stitch-forming mechanism including a vertically-reciprocating and laterally-vibrating needle-bar; mechanism for transmitting such lateral vibration thereto, including a guide, vibrated about a fixed axis, a support for the guide held stationary during the operation of sewing a complete buttonhole, but capable of manual adjustment for different buttonholes, and a member connecting the needle-bar with the vibrating guide and movable along the same; and means for vibrating the said guide to produce lateral movements of the needle-bar for stitching on either side of the buttonhole, and stitching at the end of the buttonhole, upon opposite sides of a central line passing longitudinally through the buttonhole independent of any lateral movement of the work operated upon.

8. A buttonhole-sewing machine comprising stitch-forming mechanism including a vertically-reciprocating and laterally-vibrating needle-bar; mechanism for transmitting such lateral vibration thereto, including connected links mounted upon a support held stationary during the operation of sewing a complete buttonhole; means for vibrating the said links; and means adjustable from one said links to the other connecting same with the said needle-bar.

9. In a buttonhole-sewing machine, the combination with stitch-forming mechanism including a vertically-reciprocating and laterally-vibrating needle-bar, of mechanism for transmitting such vibratory movement including an adjustable supporting-plate, toggle-links carried thereby by pivotal connection therewith toward their outer ends, said links pivoted together at their inner ends, and means adjustable with respect to said toggle-links connecting same to said needle-bar; and means for vibrating said links.

10. In a buttonhole-sewing machine, the combination with stitch-forming mechanism including a vertically-reciprocating and lat-

erally-vibrating needle-bar, of mechanism for transmitting such vibratory movement including a plate adjustably supported about an axis of rotation, toggle-links having their
 5 outer ends pivoted thereto at points on opposite sides of said axis of rotation, said links pivotally connected together at their inner ends, and a pitman adjustable with respect to said toggle-links, connecting same with the
 10 said needle-bar; and means for transmitting a vibratory movement to said links.

11. In a buttonhole-sewing machine, the combination with stitch-forming mechanism including a vertically-reciprocating and laterally-vibrating needle-bar, of mechanism for transmitting such vibratory movement including a vibrating element and a pitman in connection with said needle-bar, toggle-links connected together at their inner ends and to
 15 said moving element, said pitman deriving motion from the said toggle-links and having means for adjusting it to various positions in connection therewith, and an adjustable support to the outer ends of the said links.

12. In a buttonhole-sewing machine, the combination with stitch-forming mechanism including a vertically-reciprocating and laterally-vibrating needle-bar, of mechanism for transmitting such vibratory movement including a vibratory element, toggle-links connected thereto, a pitman in connection with said needle-bar and deriving motion from said
 20 toggle-links, said pitman having means for adjusting it to various positions of connection with said toggle-links from a point common to both said links to points on either side thereof, a support for said toggle-links, and means permitting adjustment of said support but holding same stationary during the
 25 normal operation of the machine.

13. In a buttonhole-sewing machine, the combination with stitch-forming mechanism including a vertically-reciprocating and laterally-vibrating needle-bar, of mechanism for transmitting such vibratory movement including a plate adjustably supported about an axis of rotation, toggle-links having their
 30 outer ends pivoted thereto at points on opposite sides of said axis of rotation, said links pivoted together at their inner ends, a pivoted lever, means for imparting thereto a constant degree of movement, a link connecting said toggle-links with said pivoted lever and capable of adjustment with said pivoted lever
 35 to various points toward and away from the axis of its pivotal support, and a pitman adjustable with respect to the said toggle-links connecting same with the said needle-bar.

14. A buttonhole-sewing machine comprising a stitch-forming mechanism including a vertically-reciprocating and laterally-vibratory needle-bar; means for actuating the same including a toggle mechanism having two relatively movable members, a pitman connecting the same with the needle-bar, and
 40 means for shifting the pitman connection with the toggle mechanism from one said

member to the other in order to change the amplitude of vibration of the needle-bar.

15. A buttonhole-sewing machine comprising a stitch-forming mechanism including a vertically-reciprocating and laterally-vibratory needle-bar; means for actuating the same including a toggle mechanism having two relatively movable members, a pitman connecting the same with the needle-bar, means for varying the movement of the toggle mechanism, and means for shifting the pitman connection with the toggle mechanism from one said member to the other in order to change
 45 the amplitude of vibration of the needle-bar.

16. A buttonhole-sewing machine comprising a stitch-forming mechanism including a vertically-reciprocating and laterally-vibratory needle-bar; means for actuating the same including a toggle mechanism having two relatively movable pivoted members, the pivots thereof arranged in a line inclined relatively to the line of movement of the needle-bar, a pitman connecting the same with the needle-bar, and means for shifting the pitman connection with the toggle mechanism from one said member to the other in order to change the amplitude of vibration of the needle-bar and also the working position of vibration
 50 thereof.

17. A buttonhole-sewing machine comprising a stitch-forming mechanism including a vertically-reciprocating and laterally-vibratory needle-bar; means for actuating the same including a toggle mechanism, a pitman connecting the same with the needle-bar, means for shifting the pitman connection with the toggle mechanism relative to the latter in order to change the amplitude of vibration of the needle-bar; and means for adjusting the toggle mechanism so as to vary the distance between successive lines of stitches.

18. A buttonhole-sewing machine comprising a stitch-forming mechanism including a vertically-reciprocating and laterally-vibratory needle-bar, means for actuating the same including a toggle mechanism having two relatively movable members, a pitman connecting the same with the needle-bar, and means for shifting the pitman connection with the toggle mechanism from one said member to the other; and means for maintaining said connection between the toggle mechanism and pitman.

19. A buttonhole-sewing machine comprising a vertically-reciprocating and laterally-vibratory needle-bar; means for actuating the same including a toggle mechanism having two relatively movable members, and a pitman connecting the latter with the needle-bar; and means for shifting said connection relative to said toggle mechanism from one said member to the other including a rod, a cam for actuating the same in one direction and a spring for actuating the same in the opposite direction.

20. A buttonhole-sewing machine comprising a vertically-reciprocating and laterally-

vibratory needle-bar; means for actuating the same including a toggle mechanism having two relatively movable members, and a pitman connecting the latter with the needle-
5 bar; and means for shifting said connection relative to said toggle mechanism from one said member to the other including a rod, a lever supporting said rod and carrying a lug, a cam, and means for regulating the period

of contact between said lug and certain portions of the cam.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JAMES T. HOGAN.

Witnesses:

CHAS. MCC. CHAPMAN,
M. B. HOARE.