

(No Model.)

7 Sheets—Sheet 1.

J. A. OSTERHOUT.

MACHINE FOR CUTTING AND STITCHING BUTTON-HOLES.

No. 447,791.

Patented Mar. 10, 1891.

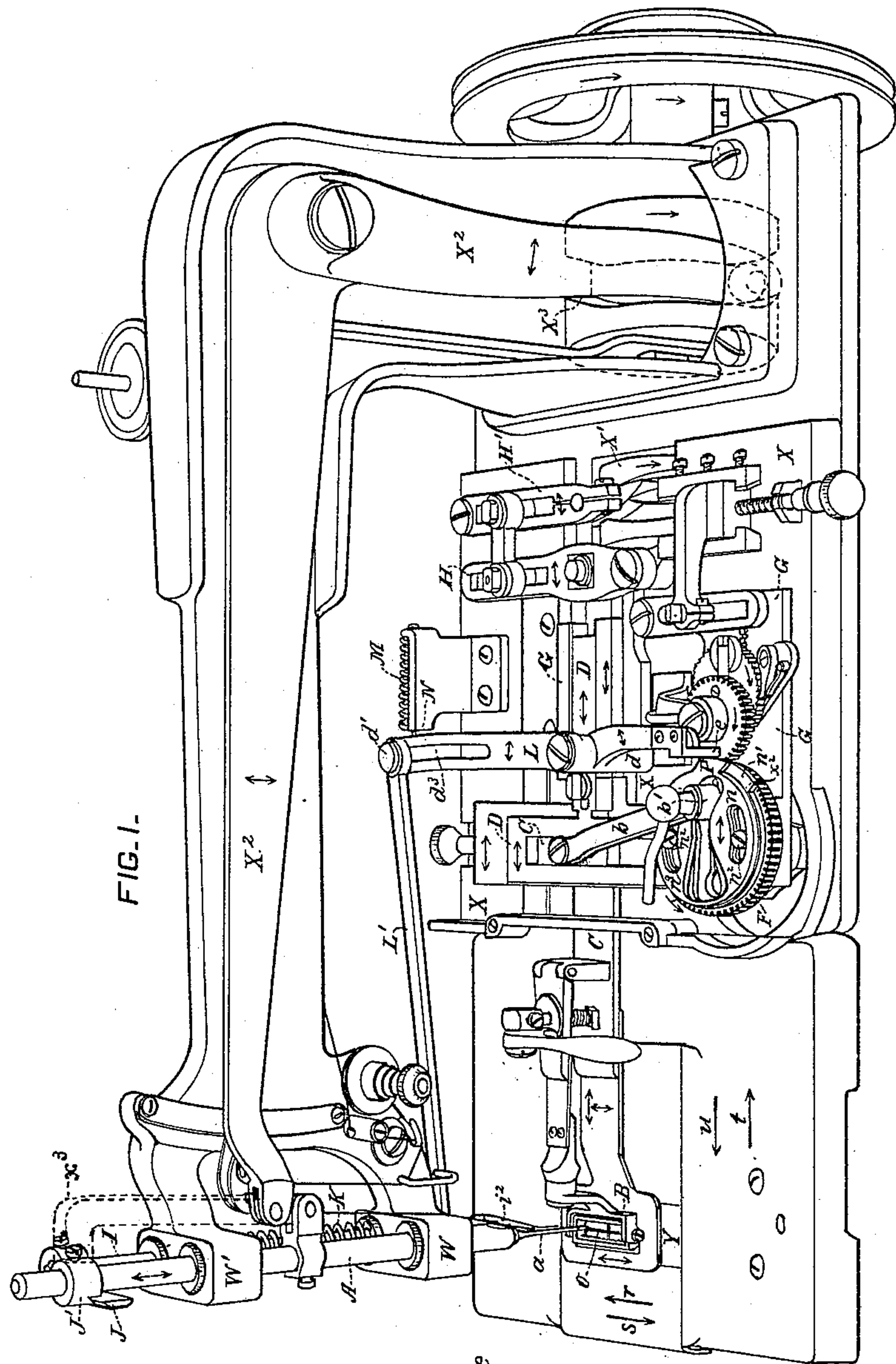


FIG. 1.

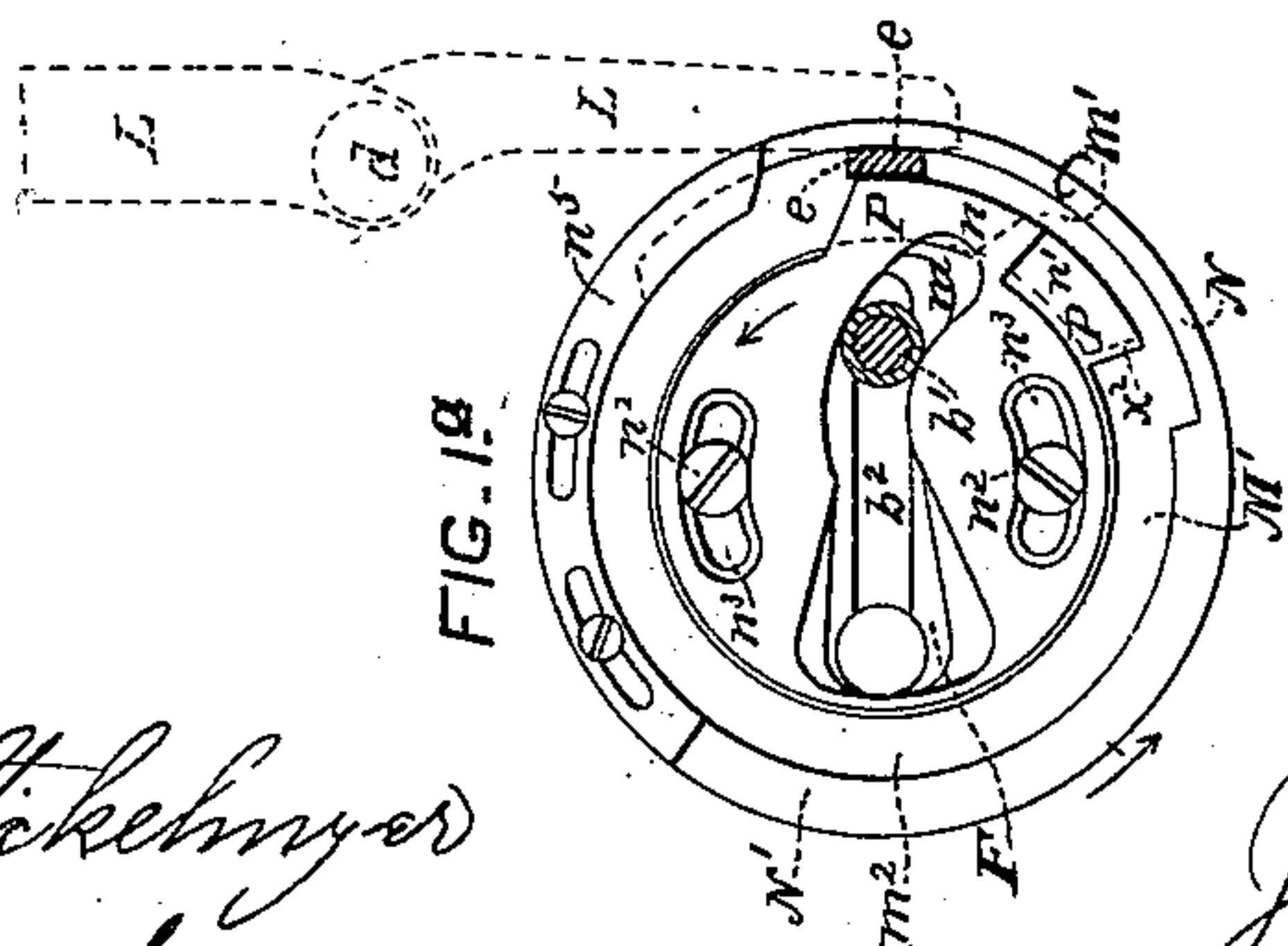


FIG. 1a.

WITNESSES:

John H. Sticklemyer
James T. Goodfellow

INVENTOR:

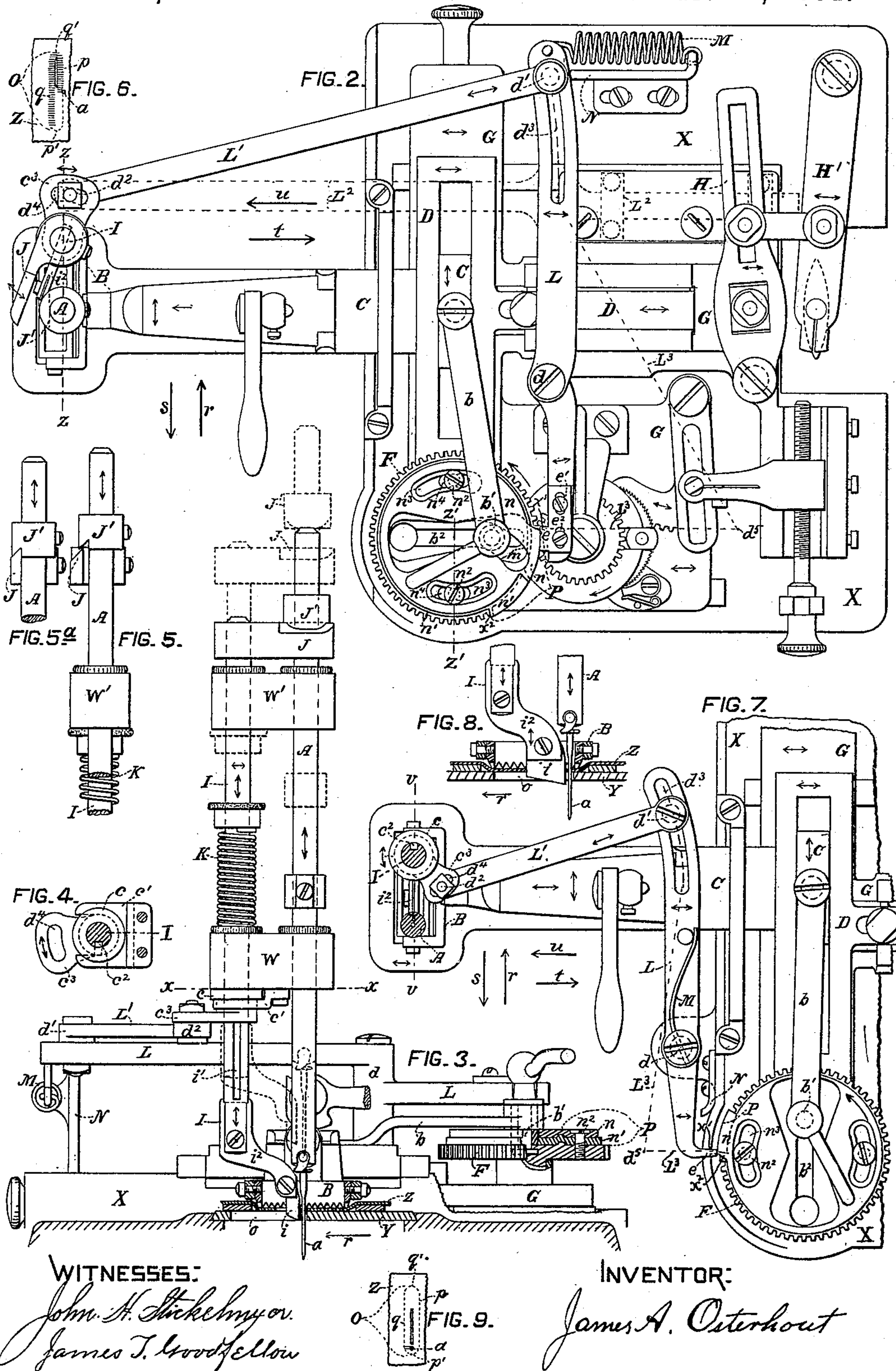
James A. Osterhout.

J. A. OSTERHOUT.

MACHINE FOR CUTTING AND STITCHING BUTTON HOLES.

No. 447,791.

Patented Mar. 10, 1891.



WITNESSES:

John H. Stickney or.
James T. Woodruff

INVENTOR:

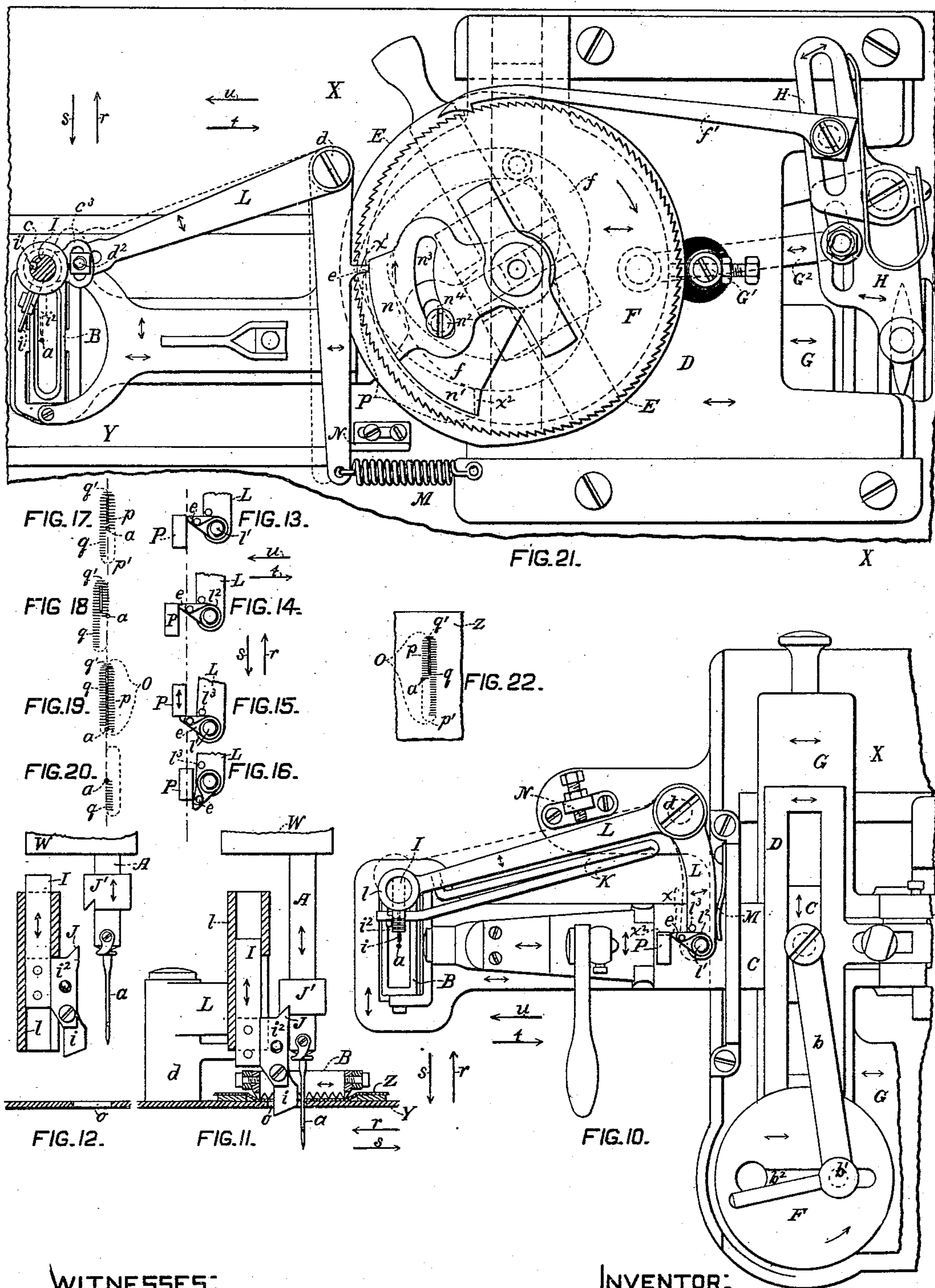
James A. Osterhout

J. A. OSTERHOUT.

MACHINE FOR CUTTING AND STITCHING BUTTON HOLES.

No. 447,791.

Patented Mar. 10, 1891.



WITNESSES:

John H. Stickney
James T. Goodfellow.

INVENTOR:

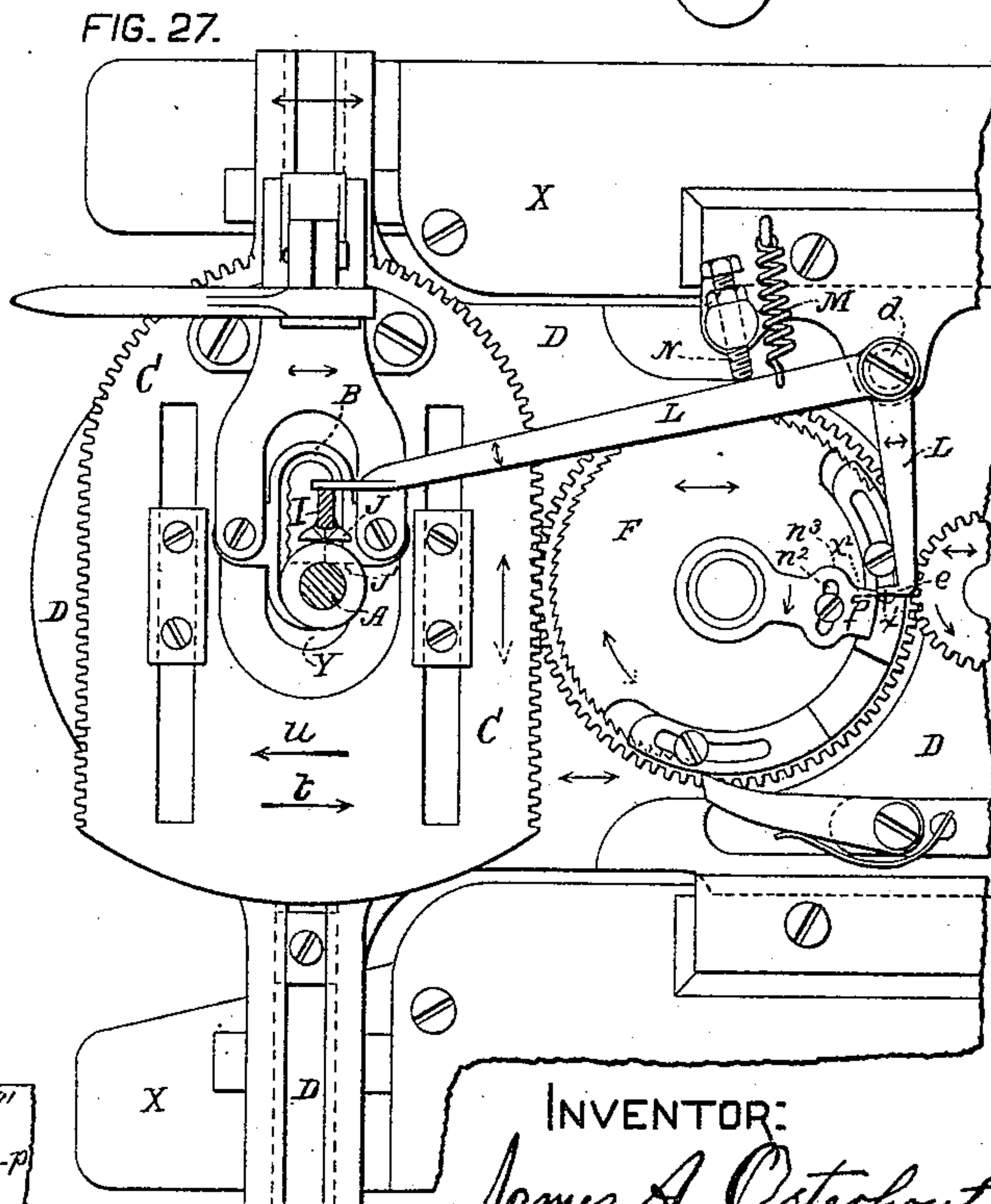
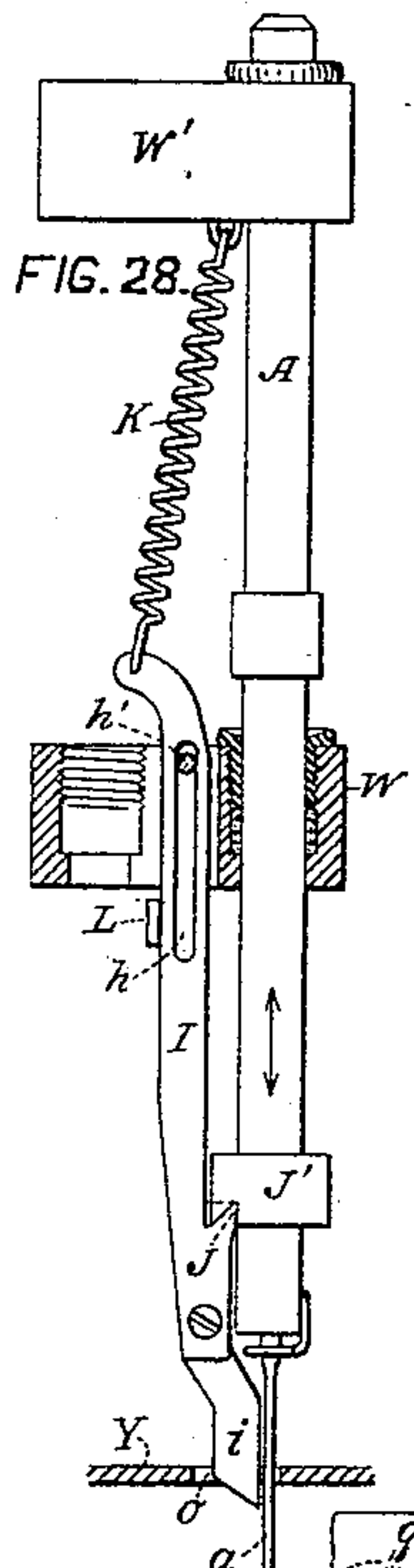
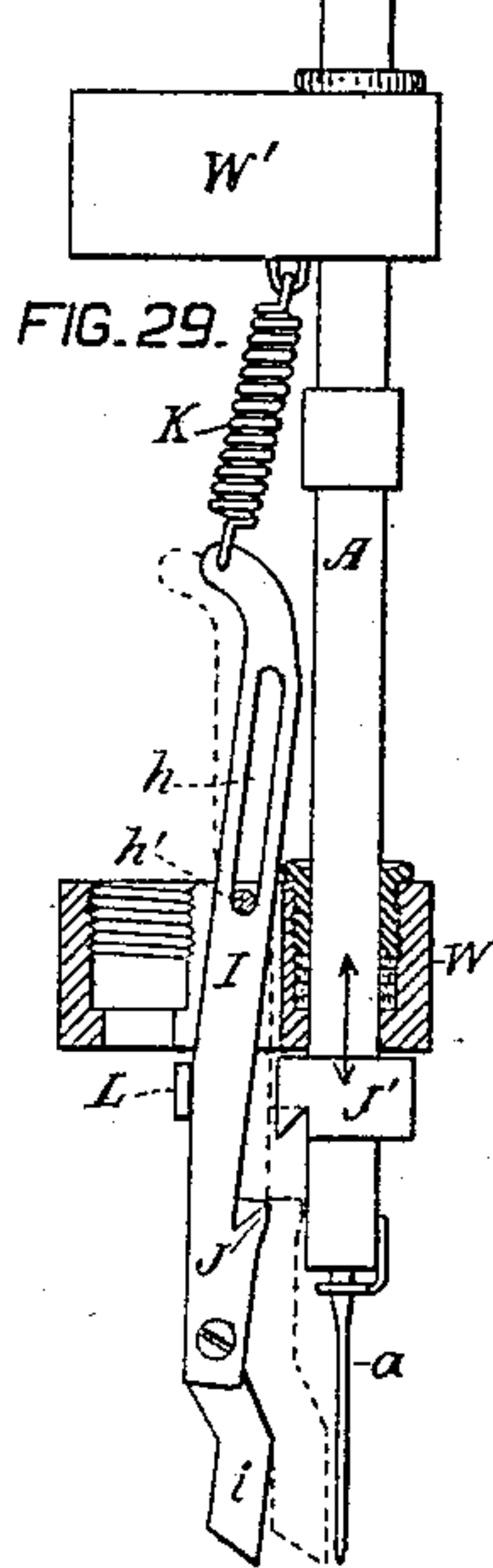
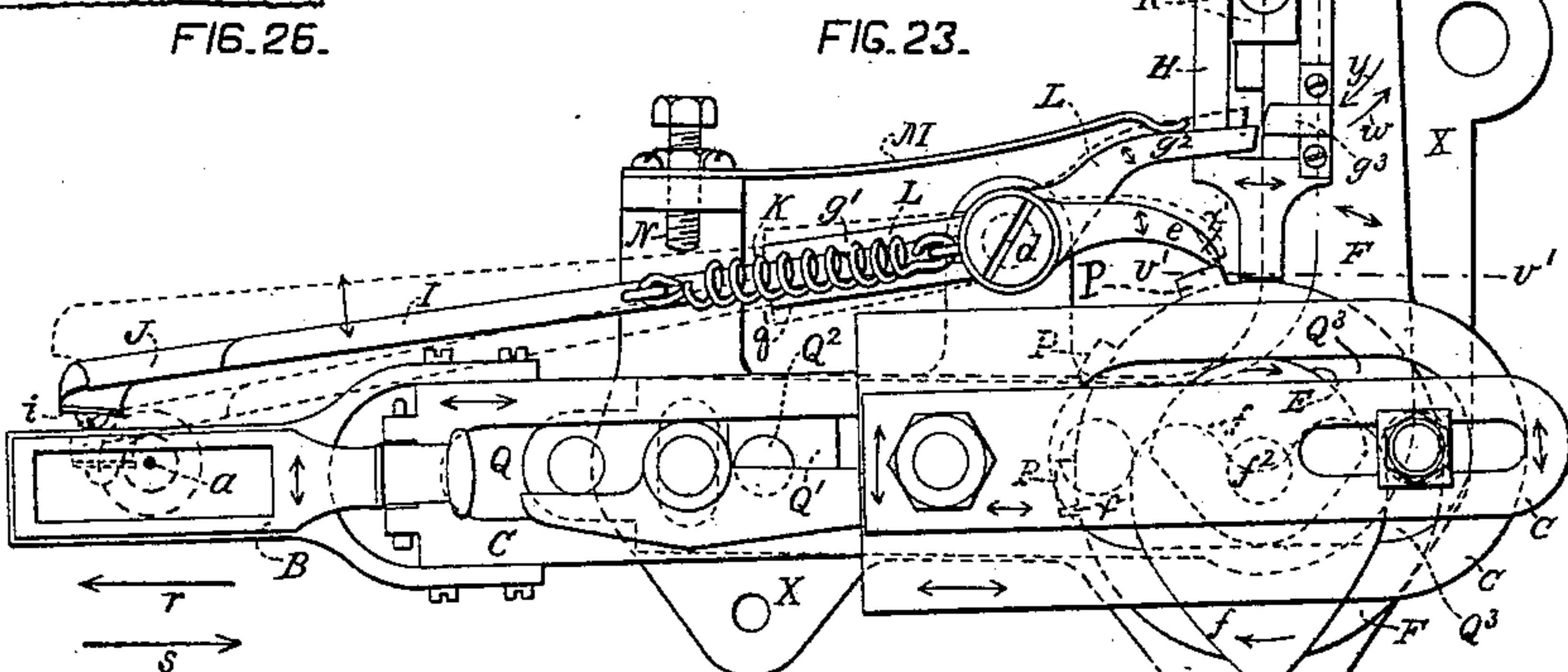
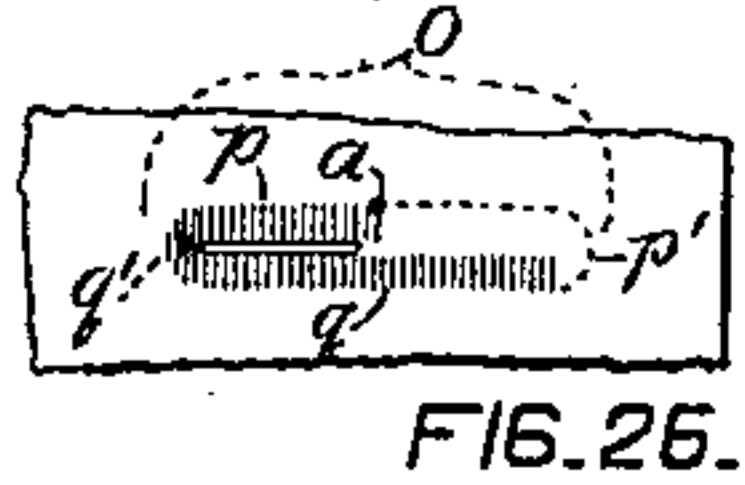
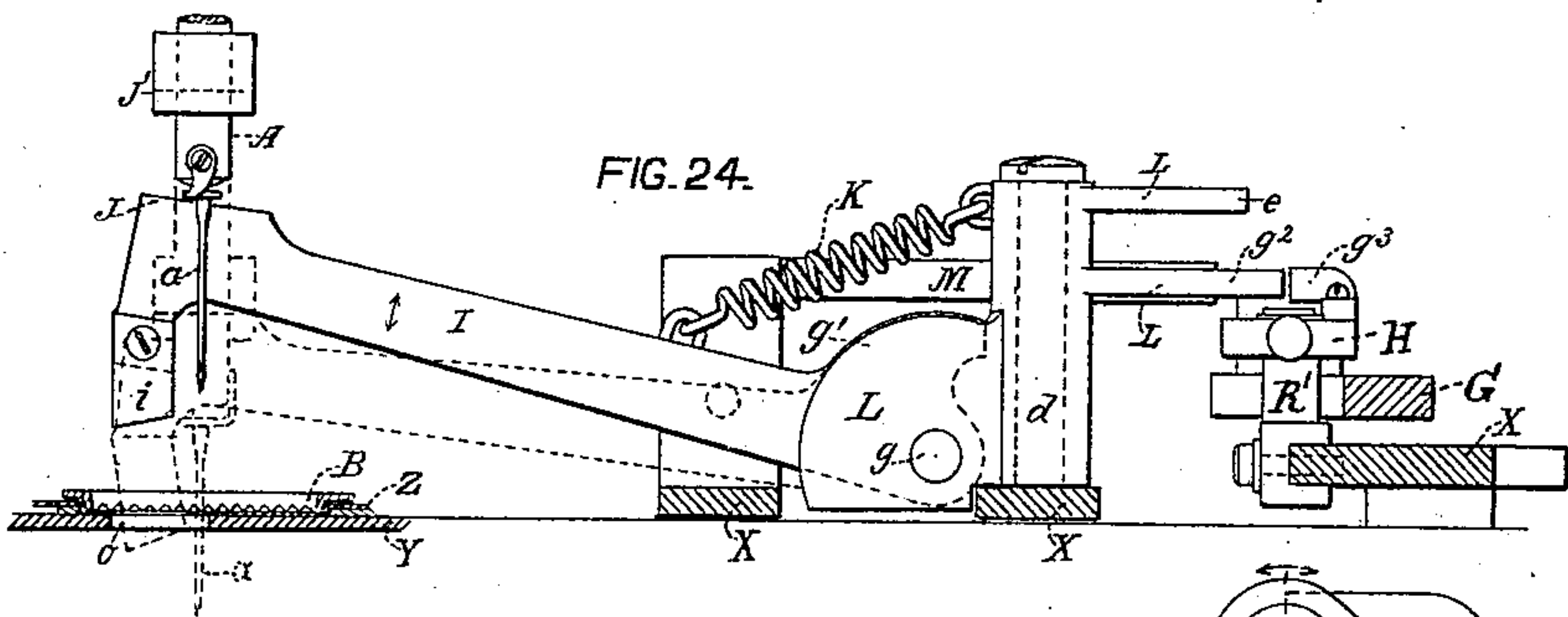
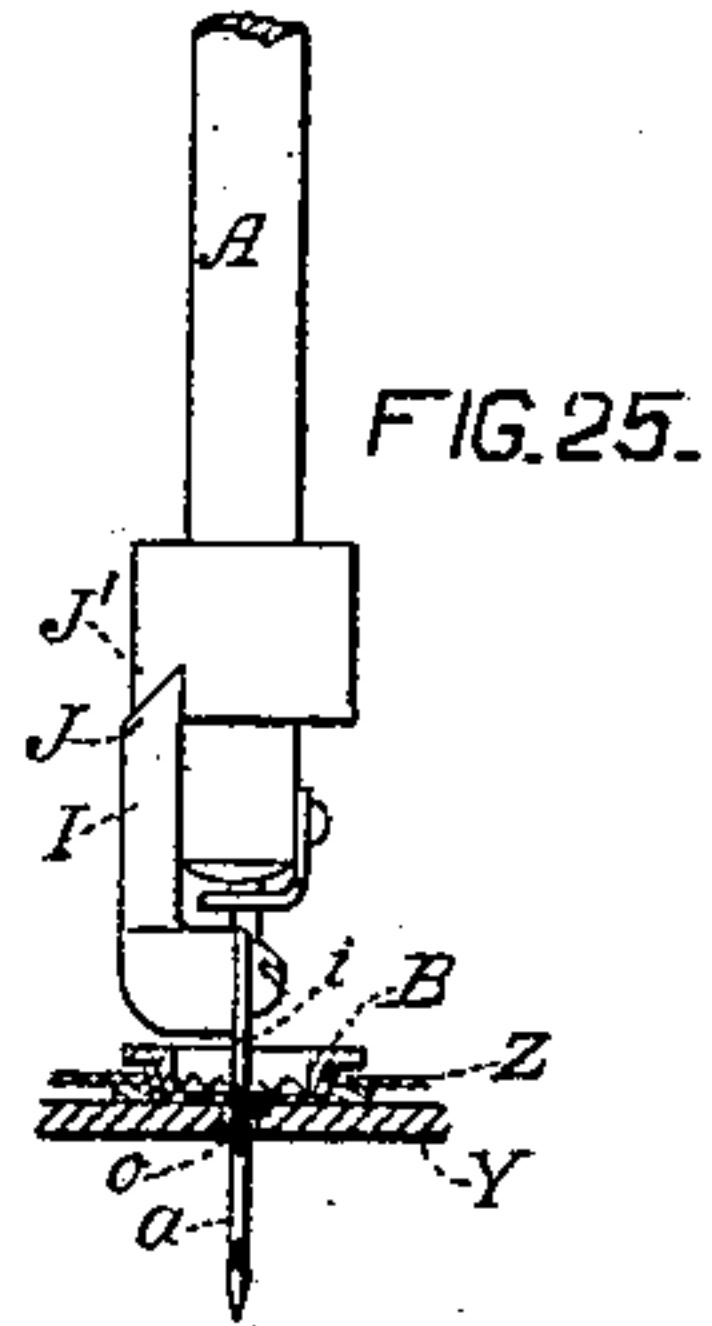
James A. Osterhout

J. A. OSTERHOUT.

MACHINE FOR CUTTING AND STITCHING BUTTON HOLES.

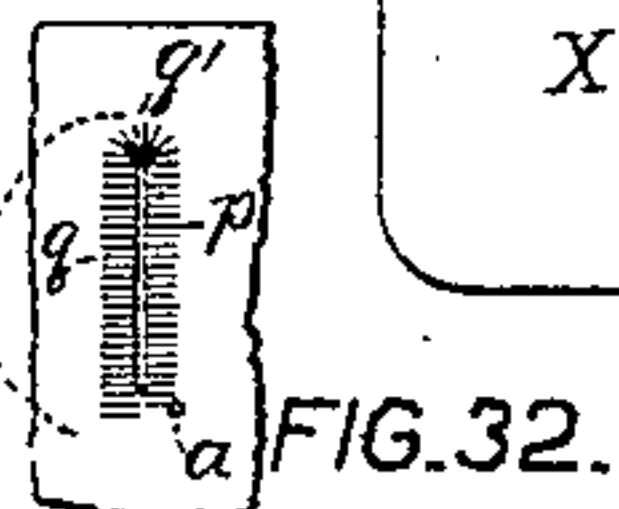
No. 447,791.

Patented Mar. 10, 1891.



WITNESSES:

John H. Dickelmyer
James J. Woodfellow



INVENTOR:
James A. Osterhout.

(No Model.)

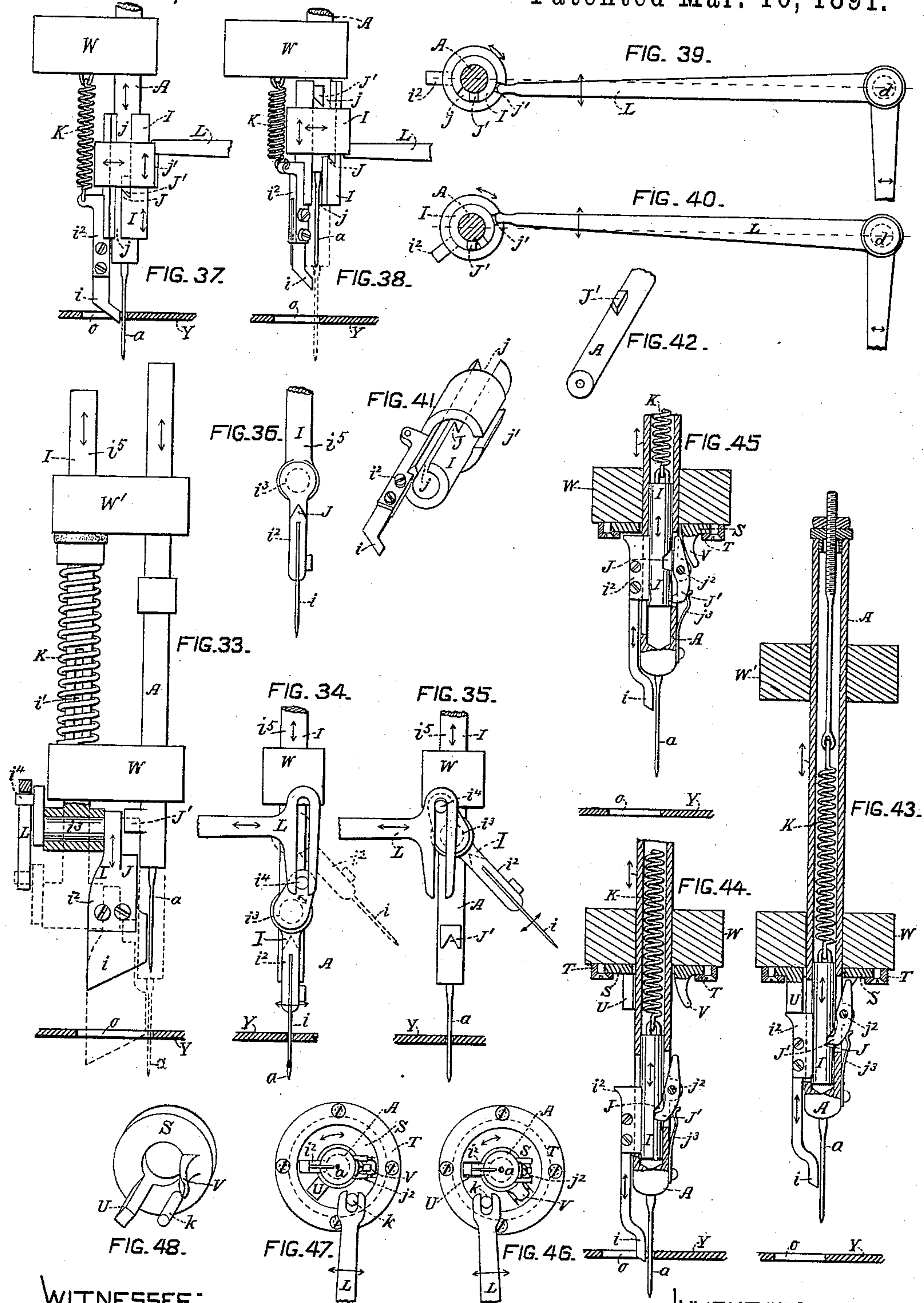
7 Sheets—Sheet 5.

J. A. OSTERHOUT.

MACHINE FOR CUTTING AND STITCHING BUTTON HOLES.

No. 447,791.

Patented Mar. 10, 1891.



WITNESSES:

John H. Stikebeyer
James T. Goodfellow

INVENTOR:

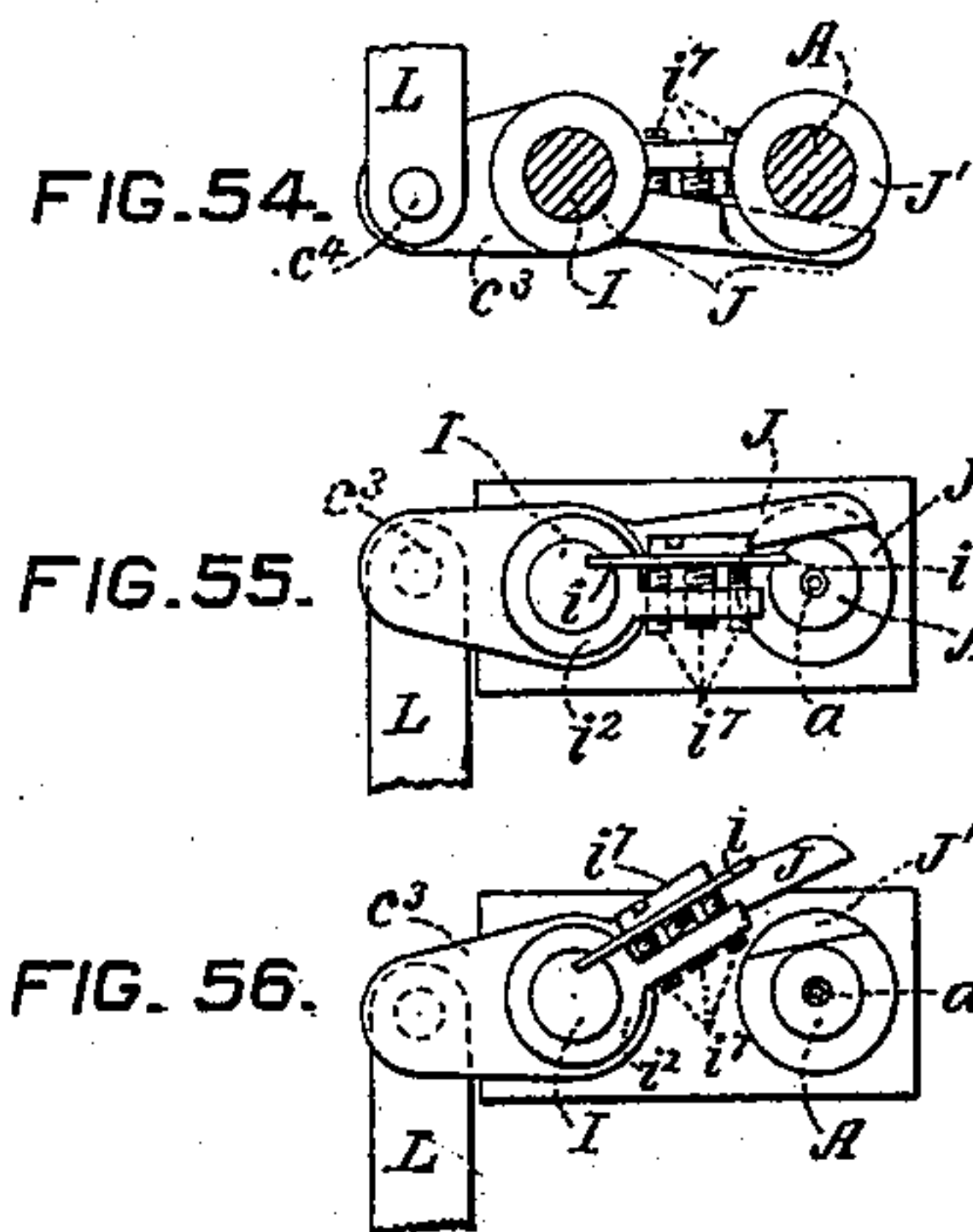
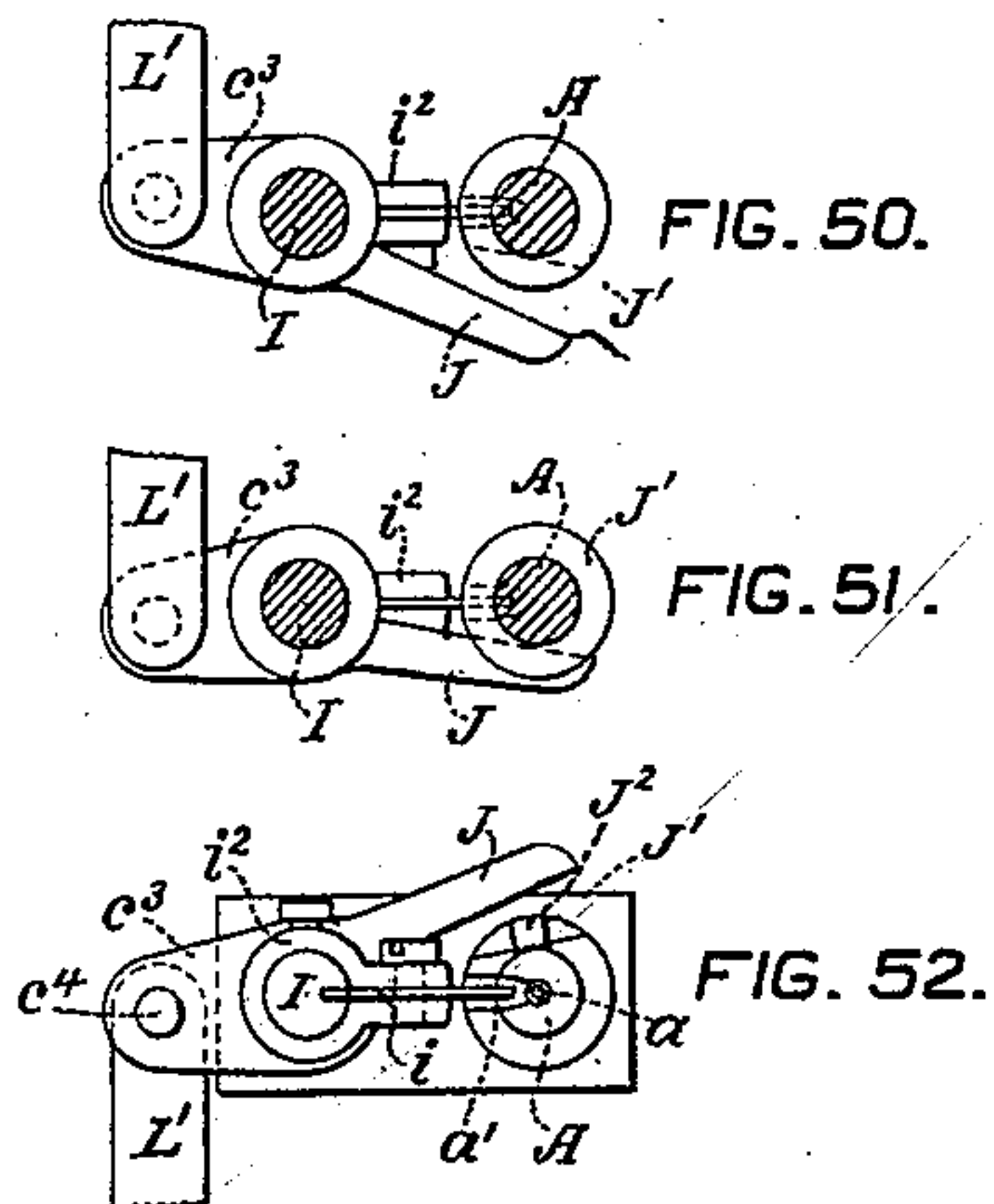
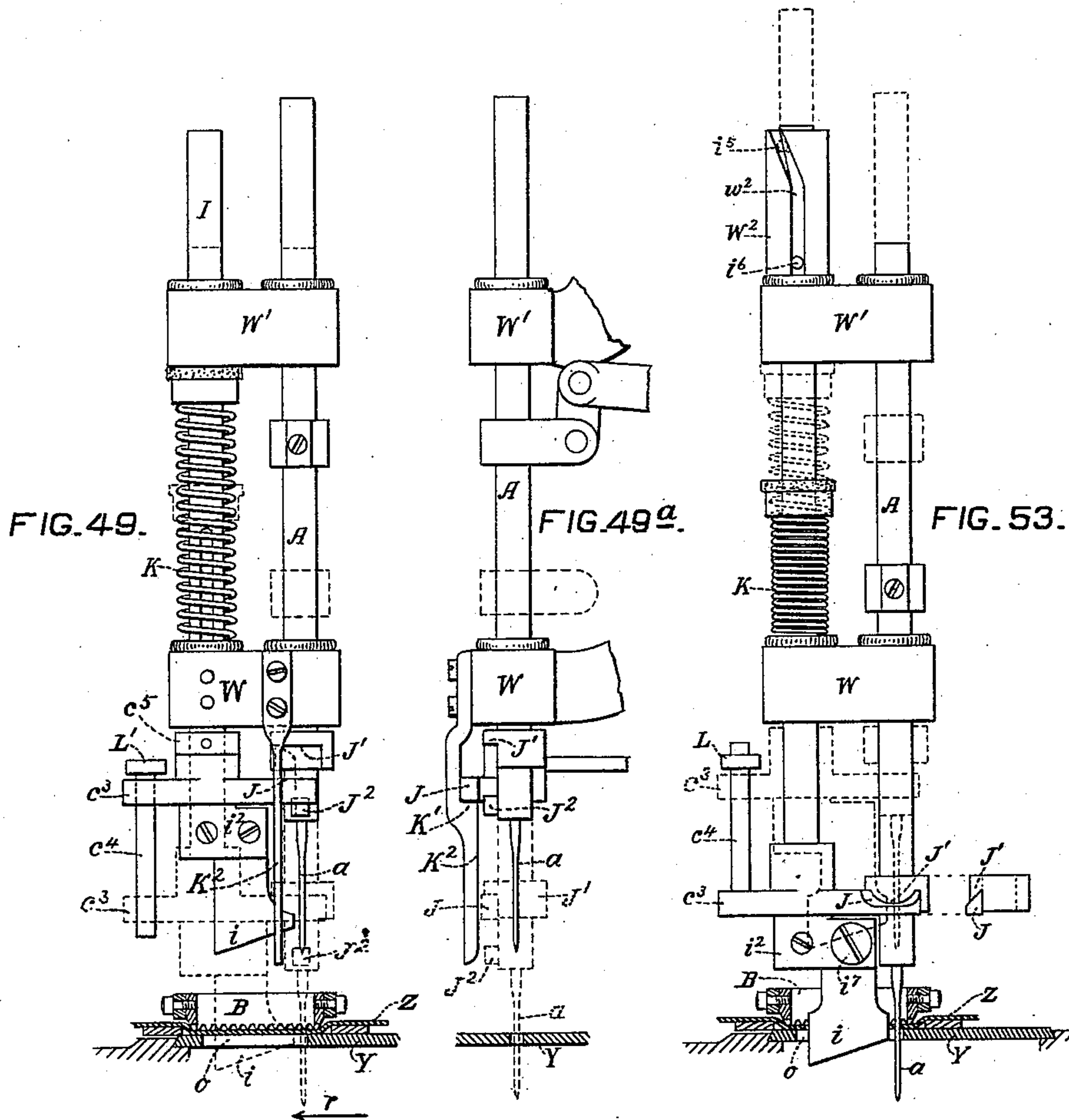
James A. Osterhout

J. A. OSTERHOUT.

MACHINE FOR CUTTING AND STITCHING BUTTON HOLES.

No. 447,791.

Patented Mar. 10, 1891.



WITNESSES:

John H. Stickney
James T. Goodfellow

INVENTOR:

James A. Osterhout

(No Model.)

7 Sheets—Sheet 7.

J. A. OSTERHOUT.

MACHINE FOR CUTTING AND STITCHING BUTTON HOLES.

No. 447,791.

Patented Mar. 10, 1891.

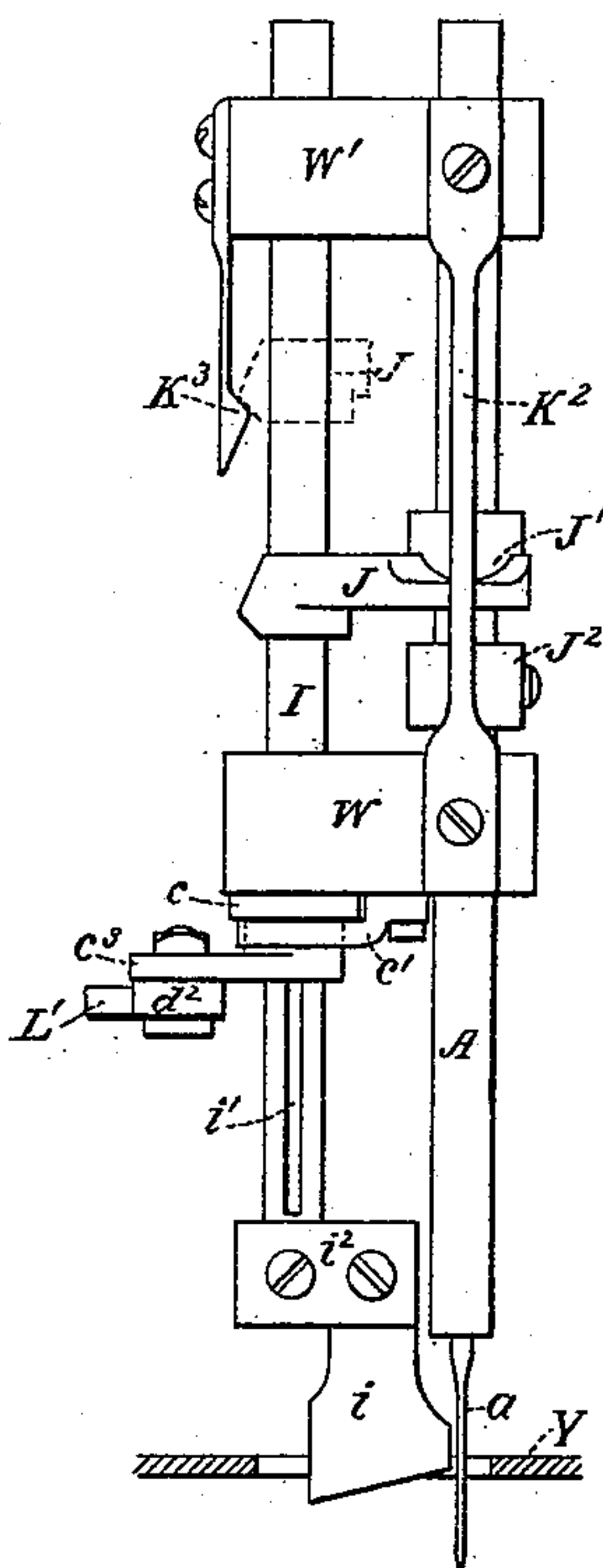


FIG. 57.

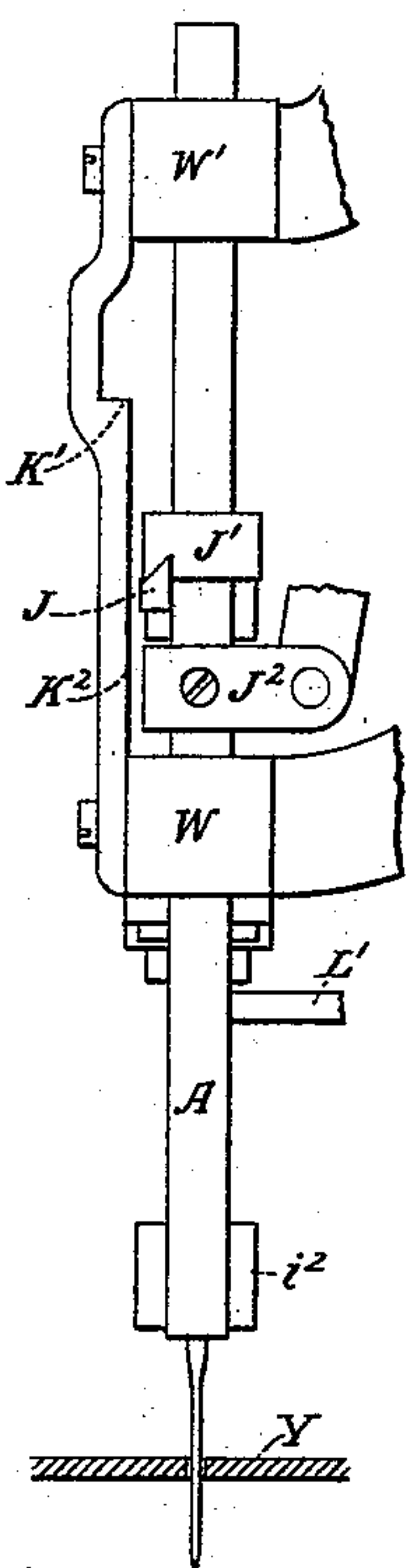


FIG. 58.

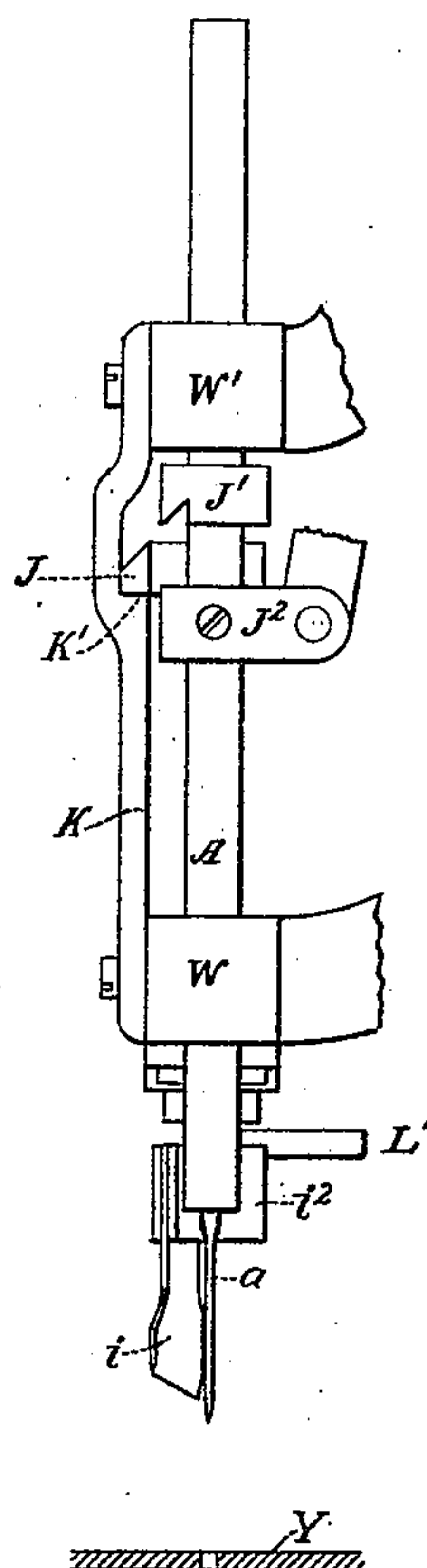


FIG. 59.

WITNESSES:

John H. Stuckelmyer
James T. Woodfellow

INVENTOR:

James A. Osterhout.

UNITED STATES PATENT OFFICE.

JAMES A. OSTERHOUT, OF TROY, NEW YORK, ASSIGNOR TO THE NATIONAL MACHINE COMPANY, OF SAME PLACE.

MACHINE FOR CUTTING AND STITCHING BUTTON-HOLES.

SPECIFICATION forming part of Letters Patent No. 447,791, dated March 10, 1891.

Application filed December 22, 1885. Serial No. 186,426. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. OSTERHOUT, a citizen of the United States, residing in the city of Troy, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements in Machines for Cutting and Stitching Button-Holes, Slits, Edges, and Perforations in Fabrics, of which the following is a specification, reference being had to the accompanying drawings.

One general object of this invention is to provide button-hole sewing-machines with practically successful cutting mechanisms which shall automatically cut a button-hole only when the machine is stitching at a predetermined portion, part, or point in the periphery of the button-hole.

Other objects and the distinguishing features of this invention are hereinafter set forth.

In the accompanying drawings I have represented such forms and modifications of my improvements applied to such portions of various button-hole sewing-machines as may suffice to further indicate the scope of my invention and its connection with such sewing-machines.

Figure 1 is a perspective view of a Wheeler & Wilson No. 7 sewing-machine with a button-hole-feeding mechanism of the kind described in United States Patent No. 252,052, dated January 10, 1882, and with one form of my invention applied thereto, and Fig. 1^a is a plan of a modified part of the same. Fig. 2 is a plan of the button-hole feeding and cutting mechanism shown in Fig. 1, and Fig. 3 presents an elevation and sections at the lines $z z$ and $z' z'$ in Fig. 2 of mechanism shown in the latter figure and viewed in the direction pointed by the arrow therein. Fig. 4 is a plan of a section at and of some parts just below the line $x x$ in Fig. 3, and Figs. 5 and 5^a are elevations of some parts shown in Figs. 1, 2, and 3 and viewed in the direction of the arrow r in the two latter figures. Fig. 6 indicates the progressed condition of the stitching and cutting of a button-hole when the feeding and cutting mechanisms are in their positions represented in Fig. 2. Fig. 7 is a plan, and Fig. 8 a partial elevation and section at the line $v v$ in Fig. 7, of a part of

the same button-hole-feeding mechanism shown in Figs. 1 and 2 with a modification of my invention applied to the same. Fig. 9 indicates the commenced condition of the stitching and cutting of a button-hole when the mechanism is in the position shown in Fig. 7. Fig. 10 is a plan of a portion of the same button-hole-feeding mechanism shown in Fig. 1 with one form of my invention applied thereto, and Figs. 11 and 12 represent sectional elevations of the same. Figs. 13, 14, 15, and 16 illustrate the action of the same button-hole-carrying mechanism upon the cutting devices at different stages in the stitching and cutting of a button-hole, which stages are indicated by the opposite Figs. 17, 18, 19, and 20. Fig. 21 shows in plan one form of my invention in connection with a button-hole-feeding mechanism for sewing-machines described in United States Patent No. 303,557, dated August 12, 1884; and Fig. 22 indicates the progressed condition of the stitching and cutting of a button-hole when the feeding and cutting mechanisms are in the positions represented in Fig. 21. Fig. 23 is a plan of a button-hole-feeding mechanism described in United States Patent No. 302,018, dated July 15, 1884, with one form of my invention connected therewith. Fig. 24 is an elevation of a portion of the same and section thereof at the line $v' v'$ in Fig. 23. Fig. 25 is an end elevation of the cutter-carrier engaged with the lower part of the needle-carrier shown in Fig. 24. Fig. 26 indicates the condition of the stitching and cutting of the button-hole when the parts are in the positions represented in Fig. 23. Fig. 27 presents a plan of a portion of a button-hole-feeding mechanism described in United States Patent No. 273,727, dated March 13, 1883, with one form of my invention connected therewith, the needle-carrier and cutter-carrier being shown in horizontal section. Fig. 28 shows the same needle-carrier and cutter-carrier in elevation and engaged with each other, and Fig. 29 represents the same in elevation and disengaged. Fig. 30 shows the same cutter-carrier alone, and Fig. 31 represents a clutch-piece which is shown fast on the needle-carrier in Figs. 28 and 29. Fig. 32 indicates the condition of the stitching and cutting of a button-hole when the parts are in

the positions shown in Fig. 27. Figs. 33, 34, 35, and 36 show in side and edge elevations a modified device whereby the cutter-carrier is adapted to be engaged with, depressed by, and disengaged from the needle-carrier. Figs. 37 and 38 are side elevations, Figs. 39 and 40 plans, and Figs. 41 and 42 isometrical views, of parts of another device for a like purpose. Figs. 43, 44, and 45 are sectional elevations of another device for the same object. Figs. 46 and 47 plans thereof as viewed from beneath, and Fig. 48 an isometrical view of a part of the same. Fig. 49 is a front elevation, Fig. 49^a a side elevation, and Figs. 50, 51, and 52 are plans, of another device for use in causing the cutter-carrier to be engaged with, actuated by, and disengaged from the needle-carrier. Fig. 53 is a front elevation, and Figs. 54, 55, and 56 are plans, of a modified device for the same purpose. Fig. 57 is a front elevation, and Figs. 58 and 59 are side elevations, of the needle-carrier and cutter-carrier shown in Figs. 1 and 3, but with a commonly-preferred means for elevating the cutter-carrier and supporting it when elevated.

Similar parts are marked by like letters in the different figures, and the directions in which some of the parts move are indicated by adjacent arrows.

A is the carrier of the needle *a*, and is movable upward and downward, as usual in sewing-machines.

B is a work-clamp, which in the descriptive portion of this specification is generally called a "work-carrier," which can be of any suitable known kind and operated by any suitable known mechanism to properly hold the work Z upon and carry or slide it along the work-supporting plate Y for the action of the sewing-machine, which can be of any suitable known kind.

In the button-hole-feeding mechanism partly shown by Figs. 1, 2, 7, and 10 and fully described in the aforesaid Patent No. 252,052 the work-carrier B is secured to the slide C, which receives a step-by-step progressive movement in the lengthwise direction of the work-carrier equal distances to and fro by the pitman *b* from the crank-wheel F, having a radially-adjustable crank-pin *b'*. The slide C is carried by the slide D, which by a concealed cam connection with the wheel F is moved and moves the slide C and the work-carrier B progressively a short distance in the direction of the arrow *u* while the work-carrier is at one end part of its lengthwise movement, and likewise in the direction of the arrow *t* while the work-carrier is at the other end part of its lengthwise movement to change the stitching from side to side of a button-hole. The slides D and C and the wheel F are all carried by the slide G, which is mounted on the fixed base X and receives by the connected levers H H' from the switch-cam X', Fig. 1, on the driving-shaft of the sewing-machine intermittent momentary to-

and-fro movements, which are received by the parts F, D, C, and B in the directions of the arrows *u* and *t*, and the wheel F is simultaneously rotated step by step, as by devices partly shown in Figs. 1 and 2.

In Fig. 1 the needle-carrier A receives upward and downward movement in the head-stocks W W' of the sewing-machine from the elbow-lever X², which is operated by the cam X³, which is fast on the same driving-shaft as the switch-cam X', and is so arranged that at one elevation of the needle-carrier all the parts B C D F G H H' are moved in one direction, as indicated by the arrow *u*, and are moved in the opposite direction, as indicated by the arrow *t* at the next elevation of the needle-carrier.

I is the carrier of the work-cutter *i*, and is adapted to be engaged with, actuated by, and disengaged from the needle-carrier A by devices which I greatly vary in construction and movement, and of which I have shown several varieties applicable to and in illustration of my invention.

In the mechanisms represented by Figs. 1, 2, 3, 4, 5, 7, 8, and 21 the cutter-carrier I is mounted to slide upward and downward in the same head-stocks W W' of the sewing-machine in which the needle-carrier A slides. The cutter-carrier is also mounted to turn to and fro horizontally in said stocks to bring it into and out of the position in which it is engaged with and depressed by the needle-carrier to cut the work. For this purpose the carrier I has a lengthwise groove *i'*, Fig. 3, and is fitted to slide through a collar *c*, which is supported by a bracket *c'*, Figs. 3 and 4, secured to the stock W, and which has an internal lug or feather at *c*², Figs. 4 and 7, fitting the groove *i'*, and has an arm *c*³, whereby the sleeve and thereby the cutter-carrier can be turned or vibrated horizontally. The cutter-carrier has a lateral arm *i*², to which the cutter *i* is fastened, and has an arm with a V-shaped or inclined clutch J, (see Figs. 1, 2, 3, 5, and 5^a,) adapted to engage with a corresponding inclined or V-shaped clutch or depressor J', that is on or secured to the needle-carrier. A spring K elevates the cutter-carrier when it is not depressed by the needle-carrier.

In Figs. 3 and 8 the needle-carrier and cutter-carrier are shown in full lines as when engaged with each other and fully depressed, and in Fig. 3 are represented by dotted lines as when fully elevated and with the cutter-carrier and clutch J in position to be engaged with the needle-carrier by the descent of the latter.

In Fig. 1 the cutter carrier is shown as fully elevated by the spring K and as while being disengaged from the needle-carrier in its ascent.

To cause the cutter-carrier to be engaged with the needle-carrier and depressed by it to cut the work at one descent of the needle-carrier and to be not engaged with the nee-

dle-carrier nor thus depressed by it at its next descent or to cause the cutter-carrier to be engaged with the needle-carrier and depressed by it to cut the work only when the work-carrier is at one end only of its momentary to-and-fro movement, I suitably connect the clutch for temporarily engaging the cutter-carrier with the needle-carrier with a suitable part of the mechanism of the sewing-machine, such as the part B, C, D, F, G, H, or H', which has a movement in one direction at one elevation of the needle-carrier or at the momentary movement of the work-carrier in one lateral direction, and which has a movement in the opposite direction at the next elevation of the needle-carrier or at the next lateral momentary movement of the work-carrier in the reverse direction.

To insure the engagement of the cutter-carrier with and its depression by the needle-carrier to cut the work at a certain part only in the progressive lengthwise movement of the work-carrier, whether in only one direction or in two opposite directions, I furnish the mechanism which imparts lengthwise movement to the work-carrier with a cutter-controller, which can be a cam, projection, or suitable part, as P, (here shown as extending from a disk having a progressive movement in harmony with the progressive lengthwise movement of the work-carrier,) and provide a mechanical connection, whereby said cam, projection, or part shall cause, control, or limit the engagement or disengagement of the cutter-carrier and needle-carrier. As the disk from which the part P extends is concentric with the axis around which said part P revolves, and the part P is operative only once in each revolution of the disk, it is obvious that the said part P will coact with such follower as may be used in conjunction with it only periodically and will be normally out of coaction therewith. It is contemplated that the cutter shall be actuated only when this part P is by the rotation of the disk from which it extends thrown into coaction with the follower that is used in connection with the said part P. Devices for these purposes are shown by Figs. 1, 2, and 3, by Fig. 7, by Figs. 10 and 11, by Fig. 21, by Figs. 23 and 24, and by Figs. 27, 28, and 29.

L is a bar or lever, which is pivoted at d to the fixed base X and in Figs. 1, 2, 3, and 7 has a rod L', which is jointed at d' to the part L and at d'' to the arm c^3 of the collar c of the cutter-carrier, so that by the proper to-and-fro turning movement of the lever L the cutter-carrier and clutch J will be turned to and fro into and out of position for engagement with the needle-carrier. A spring M constantly tends to hold the lever L against an adjustable fixed stop N, and to thereby keep the clutch J turned away from the clutch J', as shown in Fig. 2 in full lines. The end part e of the bar or lever L is arranged opposite to or in the path of the cutter-controller cam or part P on the wheel F, from which

lengthwise to-and-fro movements are imparted to the work-carrier.

In stitching button-holes in some fabrics or by some kinds of sewing-machines it is necessary or desirable to cut each button-hole before or in advance of the stitching. In some other cases it is best or desirable to cut the button-hole after or progressively in rear of the stitching. My invention is applicable to both of those cases.

In Figs. 1 and 2 the mechanism is shown adapted to cut the button-hole O after one side q , Fig. 6, has been stitched and progressively in rear of and during the stitching of the other side p .

In Fig. 2 the mechanism is shown with the work-carrier B as having completed its step-by-step movement in the direction of the arrow s and its progressive transverse movement in the direction of the arrow u , as in stitching the side q , Fig. 6, and end q' of the button-hole, and with the work-carrier in the middle of its lengthwise movement in the direction of the arrow r , as in stitching the other side p , and at the end of its momentary transverse movement in the direction of the arrow u , and with the needle perforating the fabric at the point a , Fig. 6, away from the line between the two rows of stitches, and with the cam-bearing P opposite and close to the end part e of the lever L, and with the parts J and i^3 of the cutter-carrier turned away from the needle-carrier. Then at the next elevation of the needle-carrier and the simultaneous momentary movement of the work-carrier B and bearing P in the direction of the arrow t in Fig. 2 the work-carrier will be so moved that at the end of the movement the middle line of the button-hole will be nearly under the needle, and the lever L will be so moved by the bearing P as to turn the cutter-carrier with its clutch J into such position in respect to the clutch J' of the needle-carrier, about as indicated in Fig. 5, that by the descent of the needle-carrier the clutch J will be caught by the clutch J' and brought into close and accurate engagement therewith, as in Figs. 3 and 5^a, whereby the cutter i will be brought exactly over and in line with the middle line of the button-hole. Then in the descent of the cutter-carrier with and by the needle-carrier the blade i will cut through the work Z on the throat-plate Y and pass into the cutter-receiving slot o in that plate, as shown in Fig. 3. At the next elevation of the needle-carrier and the simultaneous momentary movement of the work-carrier and the bearing P in the direction of the arrow u , those parts will take their positions shown in Fig. 2, the cutter-carrier will be elevated by the spring K, and the lever L drawn back to the stop N by the spring M, so as to turn the cutter-carrier with its clutch J away from the clutch J', as shown in Fig. 1, and so that the cutter-carrier will not be actuated by the needle-carrier in its next descent. These movements will be repeated while the bearing P

remains immediately opposite to the lever L or in position to actuate the latter.

In Figs. 1 and 2 the bearing P projects from only a part of the periphery of the wheel F, and is arranged so that it cannot actuate the lever L when the work-carrier is in its lengthwise movement in the direction of the arrow s, as in stitching the side q, Fig. 6, of a button-hole, nor when the work-carrier is in its progressive transverse movement in the direction of the arrow u, as in stitching across the end q' of the button-hole, nor while the work-carrier is in its lengthwise movement in the direction of the arrow r, excepting only after the stitching on the side p of the button-hole has progressed beyond the stitching across the end q' a distance equal to, or somewhat greater than, the width of the cutter i, nor while the work-carrier is in its progressive transverse movement in the direction of the arrow t, as in stitching across the end p' of the button-hole.

To adapt the mechanism for cutting button-holes of different lengths, for using cutters i of different lengths, and for causing the cutter-carrier to be actuated at different parts of the lengthwise movement of the work-carrier, the bearing or cam P can be made of different circumferential lengths and secured at different parts of the circumference of the wheel F; but for such purposes I commonly make the bearing P in two or more lapping parts, as n n', Figs. 1, 1^a, 2, 3, 21, and one or each part adjustable circumferentially toward and from the other on the wheel F, as by a clamp-screw or clamp-screws n², extending through slots n³ n⁴ in the parts n n', or by other suitable fastenings.

In Figs. 1, 1^a, and 2 the crank-pin b' is shown extending through a curved slot m in the part n of the bearing P, so that by the radial adjustment of the pin b' in the slot b² to increase or lessen the extent of the to-and-fro lengthwise movement of the work-carrier for button-holes of different lengths the part n will be turned by the pin b', so as to cause the proper commencement of the cutting of button-holes of different lengths by the same cutter.

In Figs. 1 and 2 the part e is adjustable on the lever L in its lengthwise direction by clamp-screws e' and slots e², whereby that lever can be caused to be actuated by the bearing P while the work-carrier is in somewhat different parts of its lengthwise movement.

In Figs. 7 and 8 the mechanism is shown with the work-carrier B at the beginning of its lengthwise movement in the direction of the arrow s, as in stitching the side q, Fig. 9, of a button-hole, and at the end of its momentary movement in the direction of the arrow u and with the needle a, Fig. 9, perforating the work in the middle line of the button-hole and with the blade i cutting the work in that line in advance of the stitching.

Then at the next elevation of the needle-carrier and the simultaneous momentary movement of the parts B and P in the direction of the arrow t the cutter-carrier will be disengaged and turned away from the needle-carrier by the turning of the lever L back against the stop N by the spring M, and at the next descent of the needle-carrier the cutter-carrier will not be depressed and the needle will penetrate the fabric away from the middle line of the button-hole. Then at the next elevation of the needle-carrier and the simultaneous momentary movement of the parts B and P in the direction of the arrow u the middle line of the button-hole will be carried under the needle and the cutter-carrier moved into position to be engaged with and depressed by the needle-carrier in its next descent, as shown by Figs. 7 and 8.

In Fig. 7 the bearing P is of such length that it can actuate the lever L only when the work-carrier is in its lengthwise movement in the direction of the arrow s and until the blade i, Fig. 8, has just cut the button-hole slit completely.

To insure the movement of the cutter-carrier into and out of its proper position for engagement with the needle-carrier, whatever shall be the length of the momentary to-and-fro movements of the parts B and P in the directions of the arrows u and t, I make the connecting-rod L', Figs. 1, 2, and 7, adjustable along or upon the lever L and arm c³, as by having the pivot connections at d' d² furnished with screw-clamps extending through slots d³ d⁴ in the parts L and c³, or by other suitable known devices.

It may be observed that by the intermittent momentary to-and-fro movements of the cam-bearing P and the part L connected with that bearing and with the cutter-carrier I, as above described and shown by Figs. 1, 2, 3, and 7, the cutter-carrier is caused to be depressed by the needle-carrier to cut the work only at alternate descents of the needle-carrier, and at only one end of the momentary to-and-fro movements of the work-carrier, and only while the cam-bearing is opposite to the finger e of the part L, and that at all other times the part L is held at rest against a stop N by a spring M.

In Fig. 1^a I have shown, as an equivalent for the spring M and stop N in connecting the part L with the cam-bearing P, the continuous groove M' for the finger e of the part L and the surrounding flange N', so that while the finger e is opposite to the bearing P and in the narrow part m' of the groove the part L must partake of all the to-and-fro movements that the bearing P then receives in the direction of the arrows u t, and so that when the follower e is in the wide part m² of the groove M' the part L will be retained substantially at rest in such position as to then prevent the engagement of the cutter-carrier with the needle-carrier. A part n⁵ of the rim

N' is shown adjustable in conformity with the aforesaid adjustability of the parts n n' of the cam-bearing.

Instead of having the part L pivoted at d , as a lever, it may be in the form of a T-shaped or other suitable bar mounted to slide to and fro in about the directions of the arrows u t in or on guides on the fixed base, as indicated by dotted lines at L^2 in Fig. 2.

In Figs. 10, 11, and 12 the cutter-carrier I has the wing i^2 , to which the cutter i is fastened and on which is the inclined or V-shaped clutch or depressor J, adapted to fit the clutch J' on the needle-carrier. The carrier I is fitted to slide upward and downward in the tubular slotted head l of the lever L, which is pivoted at d to the fixed part X, so as to carry the cutter-carrier into and out of its position for engagement with the needle-carrier. The spring K is secured at one end to the lever L and at the other end to the part i^2 to elevate the cutter-carrier when it is not depressed by the needle-carrier, and the spring M tends to turn and hold the lever L against the stop N with the cutter-carrier away from the needle-carrier, as shown in Fig. 12 and indicated by dotted lines in Fig. 10. The cutter controller or bearing P is fast on the work-carrying slide C, (instead of on the wheel F,) and the lever L has its finger-end e arranged to bear against the part P, pivoted at l' to the lever and furnished with a spring l^2 , which gently tends to turn and hold the finger e against the stop l^3 on the lever.

In Figs. 10, 11, and 13 the parts are represented as when the cutter-carrier is engaged with and depressed by the needle-carrier, as in cutting a button-hole, after or before the stitching of its side q , and in rear of the stitching of its side p , as indicated in Fig. 17, and when the work-carrier and the part P are in their progressive lengthwise movement in the direction of the arrow r and are at the end of their momentary transverse movement in the direction of the arrow t . At the next elevation of the needle-carrier and the simultaneous momentary movement of the parts B and P in the direction of the arrow u the spring K will elevate the cutter-carrier I, and the part P, Fig. 14, will permit the spring M to move the lever L back to the stop N, so that at the next descent of the needle-carrier the cutter-carrier will not be engaged with nor be depressed by the needle-carrier and the needle will perforate the work at a point a , Fig. 18, away from the middle line of the button-hole. At the next elevation of the needle-carrier and the simultaneous momentary movement of the work-carrier and bearing P in the direction of the arrow t the middle line of the button-hole will be brought nearly under the needle and the lever L turned by the part P into its position in Figs. 10 and 13, so that by the next descent of the needle-carrier the cutter-carrier will be engaged with and depressed by the needle-carrier to make a cut in the middle line of the

button-hole, as indicated by Figs. 10, 11, and 17. The part P will remain opposite to the finger e of the lever L, and the aforesaid movements of that lever will be repeated as the parts B and P further progress in the direction of the arrow r until the stitching of the side p of the button-hole and the cutting of its slit shall be completed, whereupon the part P will pass beyond the finger e , as shown in Fig. 15, so that the part P will not actuate the lever L when the work-holder and part P are in their progressive transverse movement in the direction of the arrow t , as in stitching across the end p' of the button-hole. Then in the movement of the parts B and P in the direction of the arrow s , as in stitching the side q , Fig. 20, of the button-hole, the part P will turn the finger e away from its stop l^3 , as shown in Fig. 16, and will not actuate the lever L while the finger e is in that position. The part P is of such length that in the latter part of its movement in the direction of the arrow s it will pass entirely beyond the finger e , which will then be turned by its spring l^2 against the stop l^3 , and will stay in that position, with the lever L against the stop N during the remainder of the movement of the parts B and P in the direction of the arrow s and while those parts are in their progressive movement in the direction of the arrow u , as in stitching across the end q' of the button-hole and until they have progressed in their lengthwise movement in the direction of the arrow r , as in stitching the side p of the button-hole a distance equal to or somewhat greater than the length of the cutter i , Fig. 11. Then the part P will have arrived opposite to the point of the finger e , as shown in Figs. 10 and 13, and will repeatedly actuate and release the lever L during the stitching of the remainder of the side p of the button-hole, as above specified.

In the button-hole-feeding mechanism partly shown in plan by Fig. 21 and fully described in the aforesaid Patent No. 303,557 the work-carrier B is secured to a slide which is moved step by step in the lengthwise direction of the work-carrier equal distances to and fro by connection with a heart-shaped cam, which is represented by dotted lines at f , and is fast on the ratchet-wheel F, which is turned step by step by a pawl f' , actuated by the lever H, which is operated by its connection with the driving mechanism of the sewing-machine. The wheel F and the said slide to which the work-carrier is secured are carried by the change-slide D, which is progressively moved a short distance in the direction of the arrow u at one end part of the lengthwise movement of the work-carrier and in the direction of the arrow t at the other end part of said lengthwise movement by the cam E, which is fast on the wheel F, and is held by spring-pressure against the stop G' on the lower slide G, which is mounted on the bed-plate X and is connected by a pitman G² to the driving-lever H, whereby momentary to-

and-fro movements in the directions of the arrows u and t are imparted to the slide D, wheel F, and work-carrier B all together.

In Fig. 21 the lever L is pivoted at d to the fixed base X, and is connected by a sliding pivot-joint d^2 to the arm c^3 of the cutter-carrier I and has a finger e to bear against the cam-bearing or cutter-controller P on the wheel F, and is shown as held by the spring M against the stop N and with the cutter-carrier (which is the same as that shown by Figs. 1, 2, 3, 4, and 5) turned away from its position for engagement with the needle-carrier, which is not shown in Fig. 21, but is shown mounted with the cutter-carrier in Figs. 1 and 3.

In Fig. 21 the lever L and the arm i^2 of the cutter-carrier are shown in full lines in the positions they were in during the stitching of the side q , Fig. 22, of the button-hole, while the work-carrier was in its progressive movement in the direction of the arrow s and during the stitching across the end q' of the button-hole, while the work-carrier was in its progressive transverse movement in the direction of the arrow t , and while the work-carrier was in its lengthwise movement in the direction of the arrow r in stitching the side p of the button-hole until the arrival of the part P opposite to the finger e , and thereafter only when the work-carrier and the part P are at the end of their momentary movement in the direction of the arrow t , whereupon the needle will perforate the work at a point a , Fig. 22, away from the middle line of the button-hole. At the next ascent of the needle-carrier and the momentary movement of the work-carrier and part P in the direction of the arrow u the middle line of the button-hole will be brought nearly under the needle and the part P will turn the lever L and thereby the arm i^2 of the cutter-carrier into their positions, (indicated by dotted lines in Fig. 21,) and thus cause the cutter-carrier to be engaged with and depressed by the needle-carrier at its next descent to cut the work. At the next elevation of the needle-carrier and the momentary movement of the work-carrier and part P in the direction of the arrow t the lever L and the arm i^2 of the cutter-carrier will be turned back by the spring M to their positions in full lines. These movements will be repeated until the stitching of the side p of the button-hole is completed and the part P has passed entirely beyond the finger e .

In the button-hole-feeding mechanism shown in plan in Fig. 23 and fully described in the aforesaid Patent No. 302,018 the work-carrier B is secured to the slide C, which receives a step-by-step progressive movement in the lengthwise direction of the work-carrier equal distances to and fro from the heart-shaped cam f , which is fast on the wheel F, which is mounted to rotate on a stud at f^2 , fast on the bed-plate X of the mechanism. The slide C has the slot Q, in which fits the

block Q', that is pivoted on the stud Q^2 and also has the slot Q^3 , in which fits the change-cam E, which is secured to the cam f and wheel F, and which by its rotation causes the progressive movement of the slide C and work-carrier B a short distance about the stud Q^2 as a center in the direction of the arrow u at one end part of the lengthwise movement of the work-carrier and in the direction of the arrow t at the other end of said lengthwise movement to gradually change the stitching from side to side of a button-hole. By suitable devices step-by-step rotary motion is imparted to the wheel F and cams f and E from the part G, which is pivoted on the fixed stud at f^2 and receives intermittent vibrations from the driving mechanism of a sewing-machine through the lever H, which is pivoted at R to the part G, and is slotted to slide on a fulcrum R' on the fixed bed-plate. The part G carries the pivot-stud Q^2 of the block Q' in the slot Q in the slide C, and thereby imparts to that slide and the work-carrier B intermittent momentary to-and-fro movements in the directions of the arrows u and t about the pivot-stud f^2 as a center.

In the mechanism shown by Figs. 23, 24, and 25 the cutter i is secured to its carrier I, which has the clutch J, corresponding to the clutch or depressor J' on the needle-carrier A, and which is in the form of a lever movable upward and downward about a pivot g , and between side guides g' on the lever L, which is pivoted at d to the base X, so as to vibrate the cutter-carrying lever I laterally into and out of its position for engagement with the needle-carrier. The spring K elevates the cutter-carrier I into its position in full lines in Fig. 24 whenever the cutter-carrier is not depressed by the needle-carrier. The spring M causes the cutter-carrier I to rest against the stop N, except when one of the projections P of the cutter-controller on the wheel F is opposite to the end e of the lever L, as shown in Fig. 23. The lever L has an arm g^2 , arranged so that it will be struck by the lug g^3 on the lever H as it moves in the direction of the arrow y , Fig. 23, and the lever L thereby turned, so as to bring the carrier I into position for engagement with the needle-carrier only when one of the projections P shall hold the lever L, with its arm g^2 , in the path of movement of the lug g^3 , as shown in Fig. 23.

In Fig. 23 the parts are arranged to cut a button-hole progressively in rear of the stitching of its side p , Fig. 26, while the work-carrier is in its lengthwise movement in the direction of the arrow r and either before or after the stitching of the side q and end q' of the button-hole.

In Fig. 23 the work-carrier is shown at the end of its momentary movement in the direction of the arrow u , with the cutter-carrier I turned away from its position for engagement with the needle-carrier with the lever H and lug g^3 at the end of their movement in

the direction of the arrow w and as when the needle perforates the work at a point a , Fig. 26, away from the middle line of the button-hole. At the next elevation of the needle-carrier and the simultaneous momentary movement of the lever H with its lug g^3 in the direction of the arrow y , and the consequent movement of the work-carrier B in the direction of the arrow t to bring the middle line of the button-hole nearly under the needle, the lug g^3 will turn the arm g^2 and lever L , and thereby the cutter-carrier I into the position where it will be engaged with and depressed by the needle-carrier at its next descent, as shown in Fig. 25. At the next elevation of the needle-carrier and the simultaneous movement of the lever H with its lug g^3 in the direction of the arrow w the cutter-carrier I will be elevated by the spring K and turned back away from the path of the needle-carrier by the spring M , and the work-carrier will be moved in the direction of the arrow u , all into their positions shown by full lines in Fig. 23. These movements are repeated only while one or another of the projections P on the wheel F remains opposite to the finger e of the lever L , and the parts P are of such length and are at such distances apart in respect to the length of the cutter i in Fig. 24 that the button-hole slit will have been completely cut when the stitching of the side p shall have been finished.

In the button-hole-feeding mechanism partly shown in Fig. 27 and fully described in the aforesaid Patent No. 273,727 the work-carrier B is secured to a slide C , which has a U-shaped toothed edge that engages with the toothed wheel F , which is properly turned part way around step by step by connections with the driving mechanism of the sewing-machine, and which imparts to the parts C and B first a step-by-step lengthwise movement, next a step-by-step semicircular movement, and next a step-by-step lengthwise movement, as in stitching the button-hole O , Fig. 32, first along its side q , next around its end q' , and next along its side p . The part C and wheel F are carried by the slide D , to which by suitable connection with the driving mechanism of a sewing-machine are imparted intermittent momentary to-and-fro movements in the directions of the arrows u and t simultaneously with the elevations of the needle-carrier of the sewing-machine to produce to-and-fro stitches during the said lengthwise and semicircular movement of the work-carrier.

In the mechanism represented by Figs. 27, 28, 29, 30, and 31 the cutter i is secured to its carrier I , which has the inclined or V-shaped clutch J , Fig. 30, corresponding to the clutch or depressor J' , Fig. 31, that is fast on the needle-carrier A in Figs. 27, 28, and 29. This cutter-carrier is in the form of a bar or lever slotted at h and movable upward and downward and laterally toward and from the nee-

dle-carrier about a pivot or fulcrum at h' in a suitable slot in the head-stock W of the sewing-machine. When the needle-carrier is elevated, as in Fig. 29, the spring K elevates the cutter-carrier and turns it away from the needle-carrier, as shown in that figure. The lever L is pivoted at d to the fixed part X , and has an arm to bear against the carrier I and a finger e to bear against the cam-bearing or cutter-controller P on the wheel F , that gives lengthwise movement to the work-carrier. The spring M holds the lever L against the stop N while the bearing P is not acting on that lever.

In Fig. 27 the parts are shown as when the stitching of a button-hole is nearly completed, with the work-carrier at the end of its momentary movement in the direction of the arrow u , with the cutter-carrier away from its position for engagement with the needle-carrier, and as with the needle puncturing the work at a point a , Fig. 32, away from the middle line of the button-hole. In such case at the next elevation of the needle-carrier and the simultaneous momentary movement of the work-carrier and bearing P in the direction of the arrow t the middle line of the button-hole will be brought nearly under the needle and the part P will move the lever L , so as to turn the cutter-carrier I into its position, (shown by dotted lines in Fig. 29,) where it will be engaged with and depressed by the needle-carrier A at its next descent to cut the work, as shown in Fig. 28. At the next elevation of the needle-carrier and movement of the parts B and P in the direction of the arrow u the lever L and the cutter-carrier will retake the positions shown by full lines in Figs. 27 and 29. These movements will be repeated until the part P has entirely passed the lever-finger e .

In carrying out my invention I adapt the cutter-carrier to be engaged with and depressed or actuated by the needle-carrier and disengaged therefrom by various other devices, of which the following are described as some examples.

In Figs. 33, 34, 35, and 36 the cutter-carrier I has its work-cutter i secured to the wing i^2 , which has a prostrate journal or rock-shaft i^3 fitting in a socket in the lower part of the carrier-stem i^5 , which is fitted to slide upward and downward without lateral or turning movement in the head-stocks $W W'$ of a sewing-machine. The part i^3 of the cutter-carrier has the V-shaped or inclined clutch J , Fig. 36, corresponding with the depressor or part J' , Fig. 35, on the needle-carrier A , and has on its shaft i^3 a crank i^4 engaged with the slotted end part of the bar or lever L , which by its intermittent momentary to-and-fro movements received from the work-feeding mechanism of the sewing-machine, substantially as hereinbefore described, will turn the wing i^2 , with its clutch J , into proper upright position to be engaged with and depressed by the needle-carrier, as shown by Figs. 33 and 34,

and laterally out of that position, as shown in Fig. 35, as the spring K elevates the cutter-carrier to its position. (Shown by full lines in Figs. 33 and 35.)

5 In the device shown by Figs. 37, 38, 39, 40, 41, and 42 the work-cutter i is secured to the wing i^2 of the carrier I, which is in the form of a sleeve fitted to be slid upward and downward and turned horizontally to and fro upon the needle-carrier A, and has a lengthwise radial slot j , which is wider in its upper part than in its lower portion, and is formed with the clutch J, Fig. 41, corresponding to the inclined or V-shaped depressor or parts 10 J' , Fig. 42, on the needle-carrier. The cutter-carrier also has the lengthwise slot j' , in which fits the end of the bar or lever L, which by its movement in one direction about its pivot d will turn the carrier I into its position in Figs. 37 and 39, where by the descent of the needle-carrier its clutch J' will engage with the clutch J of the cutter-carrier and force the latter downward to cut the work, as indicated in Fig. 37. By the movement of the lever L 25 in the opposite direction the cutter-carrier will be turned into its position in Figs. 38 and 40, where the part J' of the needle-carrier will not engage with the clutch J nor move the cutter-carrier; but will pass freely downward and upward through the narrow and wide parts of the slot j . The spring K elevates the cutter-carrier to its position in Fig. 38 when the cutter-carrier is not depressed by the needle-carrier.

35 In the device shown by Figs. 43, 44, 45, 46, 47, and 48, the cutter i is secured to the wing i^2 of its carrier I, which is fitted to slide upward and downward without lateral or turning movement in the tubular needle-carrier 40 A, and has the recess-clutch J, adapted to receive the pawl-clutch or depressor J' , which is pivoted at j^2 to the needle-carrier and is furnished with a spring j^3 , to insure the proper engagement of the pawl J' with the clutch J 45 when they are brought properly opposite to each other. When the part J' is disengaged from the clutch J and the cutter-carrier is free to rise, it will be elevated by the spring K to the position in the needle-carrier shown 50 in Fig. 45. When the cutter-carrier is thus elevated in the needle-carrier, the cutter-carrier will not be depressed by the needle-carrier far enough to make the blade i cut work on the throat-plate Y when the needle-carrier 55 descends to its lowest extent; but the cutter-carrier will be depressed by the needle-carrier so far as to cause the blade i to pass into the slot o in the throat-plate, when the cutter-carrier is depressed in the needle-carrier 60 and the pawl J' is engaged with the clutch J, and the needle-carrier descends to its lowest position, all as shown in Fig. 44.

To cause the proper engagement and disengagement of the cutter-carrier with the 65 needle-carrier, a cam-ring S, Fig. 48, is secured around the needle-carrier by a recessed ring T, fastened to the under side of the stock

W, so that the ring S can be freely turned to and fro about the needle-carrier. The ring S has a downwardly-extending stop U, Fig. 70 48, cam V, and pin k , which latter is shown in Figs. 46 and 47, engaged with the notched end of the lever L, which is to be moved to and fro, as hereinbefore described, to cause the to-and-fro turning of said cam-ring. The 75 location of the stop U in respect to the wing i^2 of the cutter-carrier and of the cam-stop V in relation to the clutch J' is such that when the cutter-carrier is elevated in the needle-carrier, as in Fig. 45, and the needle-carrier 80 is so far depressed that the top of the wing i^2 is below the level of the lower end of the stop U, and the ring S is then turned by the lever L, so as to bring the stop U over the wing i^2 , as shown in Figs. 43 and 46, the needle-carrier in its next ascent will elevate the 85 cutter-carrier by the spring K until the wing i^2 meets the stop U and is thereby retained until the needle-carrier completes its ascent, and the cutter-carrier is thereby depressed 90 in the needle-carrier until the clutch J' engages with the clutch J of the cutter-carrier and there retains the latter, as shown in Fig. 43. At the next descent of the needle-carrier the cutter-carrier will be depressed 95 by the needle-carrier, so as to cause the blade i to enter the slot o in the plate Y, as indicated in Fig. 44. When the cutter-carrier is thus held depressed in the needle-carrier by the clutch J' and the upper end part of that 100 clutch is below the level of the lower end of the cam V, by then turning the ring S from its position in Figs. 43 and 46 into its place in Figs. 44, 45, and 47, so that the stop U is not over the wing i^2 , and the cam V is di- 105 rectly over the clutch J' , the next ascent of the needle-carrier will cause the upper end of the clutch to strike against the inner side of the part V and be thereby moved inward, so as to disengage that clutch from the cutter-carrier I and thereby permit the spring K to 110 elevate the cutter-carrier to its normal position of inaction in the needle-carrier, as shown in Fig. 45.

In the device shown by Figs. 49, 49^a, 50, 115 51, and 52 the cutter i is fastened to its carrier I, which is mounted to slide up and down without lateral or turning movement in the head-stocks W W', in which the needle-carrier A slides. The cutter is arranged nearly 120 in the plane of the needle, and the needle-carrier has in its lower end part a side slot, which is shown turned bottom end up at a' in Fig. 52, to freely admit the adjacent end part of the cutter when it is kept elevated, 125 as shown in full lines in Fig. 49, and the needle-carrier is then depressed, as indicated by dotted lines in the same figure. The part J is mounted to turn to and fro on the carrier I between the part i^2 and collar c^5 , fast on the 130 carrier, and has an arm c^3 , which is jointed by a long pin c^1 to the part L', which, in Figs. 1 and 2, is connected with the cam P of the work-carrying mechanism, as hereinbefore

described. When the arm c^3 is held by the part L' in the position shown in Figs. 50 and 52, the part J is then out of the path of the lug or depressor J' on the needle-carrier and will remain supported with the cutter-carrier in its elevated position by the spring K , as shown in Fig. 49, or by the fixed seat or support K' , as represented in Fig. 49^a, while the needle plays downward and upward. When the arm c^3 is turned by the part L' into its position in Fig. 51, the part J will be thereby turned into the path of the lug J' and will be thereby depressed with the cutter-carrier to cut the work, as indicated by dotted lines. As the needle-carrier then ascends, the cutter-carrier will be elevated by the spring K or by a lug or depressor J^2 , Fig. 49^a, on the needle-carrier, and as the cutter-carrier completes its ascent the part L' will move the clutch J laterally out of the paths of the parts J' and J^2 , as in Figs. 52 and 49^a, where the clutch J and the cutter-carrier will be kept elevated by the spring K or by the support K' , as in Fig. 49^a. The guard K^2 will prevent lateral disengagement of the part J from the parts J^2 and J' , except when the part J is elevated to its seat K' .

In the device shown by Figs. 53, 54, 55, and 56, the cutter-carrier I is mounted to slide up and down in the head-stocks $W W'$, on which latter is a fixed sleeve W^2 , surrounding the cutter-carrier and having an inclined slot w^2 in which fits a pin i^6 , fast on the cutter-carrier, so that in the up-and-down movements of the cutter-carrier it is turned to and fro laterally to bring one end part of the cutter i under the needle-carrier A when the cutter-carrier is depressed, and out from under the needle-carrier when the cutter-carrier is elevated, substantially as set forth in United States Patent No. 303,454, dated August 12, 1884. I add to that construction the clutch or depressor J' , fast on the needle-carrier, and the corresponding clutch J , which is mounted to turn to and fro on the carrier I just over its wing or web i^2 , and has an arm c^3 , which is pivoted by a pin c^4 to a part L , which is to be moved to and fro by its connection with the work-feeding mechanism of the sewing-machine, as hereinbefore described. When the arm c^3 is held by the part L in the position represented by the top view in Fig. 54 and the bottom view in Fig. 55, the clutch J will then be engaged with the clutch J' by the descent of the needle-carrier, which will thereby depress the clutch J and the cutter-carrier, which in its descent will turn and place the cutter i so that it will extend under the needle-carrier and be in proper position to cut the work, as indicated by full lines in Figs. 53, 54, and 55. When the arm c^3 is held in its position, (shown inverted in Fig. 56,) the clutch J will then be disengaged and turned away from the clutch J' , and the spring K will then keep the cutter-carrier elevated, as indicated by dotted lines in Fig. 53, with the cut-

ter i turned away from under the needle-carrier, as shown in Fig. 56.

In carrying out the primary parts of my invention I generally so arrange and adjust the cutter and its carrier that they will be depressed to cut the middle line or slit of the button-hole when the needle descends in or nearly in that line, as in making the edge stitches, or when the needle penetrates the work at a distance from that line, as in making the depth stitches.

In the drawings, excepting Figs. 53, 54, 55, and 56, the cutter and its carrier are shown arranged to cut the work when the needle descends in or nearly in the middle line of the button-hole, as I commonly prefer, because in that case the cutter does not require to be readjusted in respect to its carrier, nor in respect to the needle-carrier, whenever the length of the momentary to-and-fro lateral movement of the work-carrier or of the needle-carrier is altered to produce to-and-fro stitches of different lengths.

In Figs. 53, 54, 55, and 56 the cutter i is arranged to cut the work at one side of and away from the needle a , or when the needle descends at one side of and away from the middle line of the button-hole, and is secured to the web i^2 of the cutter carrier or bar I by a blade-holder adjustably secured to said web and consisting of the clamping-screws i^7 , of which the middle one has a large head fitting against one side of the blade i , and has a screw-shank, which extends through a perforation in said blade and is screwed into or through the web i^2 , while the other ones of the screws i^7 are screwed into or through the web i^2 and against the other side of said blade, so as to clamp the blade between the head of the middle screw and the ends of the outer screws, whereby the said blade or cutter may be adjusted laterally in relation to the said cutter-bar and to the longitudinal center of the opening in the work-clamp B , and whereby the cutter can be set to properly cut the work at different distances laterally from the needle or in the plane of the needle, or when the needle descends at different distances from the middle line of a button-hole or in that line. It will be seen that in these figures B is a cloth-clamp; I , a cutter-bar; i^2 , a web connected to the lower end of the cutter-bar, and i a blade. It will also be seen that the screws i^7 constitute an independent blade-holder adjustably secured to said web i^2 . As the blade is clamped between the head of the large-headed screw and the ends of the other screws the large-headed screw is clearly an independent blade-holder, and obviously it is one which is adjustably secured to the said web i^2 .

In Figs. 57, 58, and 59 the cutter-carrier I has the cutter i and clutch J fast thereon and is mounted to be slid up and down in the head-stocks $W W'$ and to be turned to and fro laterally therein by the crank-arm c^3 ,

which is connected, as in Figs. 1, 2, 3, and 4, and as hereinbefore described, with the carrier I and with the cutter controller or cam P or its equivalent, on the work-carrying mechanism of the sewing-machine, so as to thereby move the cutter *i* and clutch J into and out of position to be depressed by the clutch-receiving part or depressor J', fast on the needle-carrier. When the cutter-carrier is elevated and is turned so that the part J is out of the part J', the part J, and thereby the cutter-carrier, will be then supported at rest by the fixed seat or part K', as shown in Fig. 59. When the needle-carrier is elevated, as in Fig. 59, and the cutter-carrier is then turned so as to bring the part J under the part J', the latter in its descent will engage with the part J and depress it and the cutter-carrier to cut the work, as shown in Figs. 57 and 58. As the needle-carrier then ascends the projection or elevator J², which is fast on the needle-carrier, will engage with the part J and will elevate it and the cutter-carrier, and as their ascent is about being completed they will be turned laterally by reason of their aforesaid connection with the cam P, so as to disengage the part J from the parts J² and J' and land the part J on the support K'. The fixed guard K² will prevent lateral disengagement of the part J from the part J² in their ascent until the part J is elevated to its seat or support, as K'. The cutter-carrier when thus elevated can be held up by a spring catch or support K³, as indicated in Fig. 57, so as to be easily released therefrom and depressed by the part J' bearing down on the part J when the latter is in the descending path of the former.

In applying my invention to various button-hole sewing-machines I have the cutter *i* long enough to cut the whole length of a button-hole at one stroke or at a few strokes and the cutter controller or cam part P so short and the part *e* of the bar or lever L so narrow as to cause the cutter-carrier to be engaged with and depressed by the needle-carrier only once or a few times while the cam P is passing the part *e*, or I have the cutter of any desired less length and the parts *e* and P, or one of them, of corresponding greater extent, as illustrated by the drawings, so that the cutter-carrier will be engaged with and depressed by the needle-carrier a greater number of times to progressively cut the work while the part P is passing the part *e*.

In Figs. 33, 49, 53, and 57 the cutter *i* is long enough to cut the whole length of a moderately-short button-hole at one stroke, and such a long cutter can be secured to and used with each cutter-carrier shown in the other figures. When such a long cutter is used, the part *e* of the bar or lever L and the cam or part P should each be reduced to a suitable size or tooth, somewhat as indicated at *x'* *x*³ in Figs. 2, 7, 10, 21, 23, and 27. In such case when the parts are properly adjusted with the part *e* in the path of the part P the latter in and by its

step-by-step progressive movement will at the proper part of the progressive lengthwise movement of the work-carrier come in contact with the part *e*, and may thereby move the bar or lever L, so as to cause the cutter-carrier to be engaged with and depressed by the needle-carrier to cut the work only once and only when the work-carrier is at the proper end of its momentary to-and-fro movement. If desired, in that case the lever L may be shaped about as indicated by the dotted line L³ in Figs. 2 and 7 and pivoted at *d*⁵ in those figures.

As an equivalent for having the depressor or part J' fast on, secured to, or carried by the needle-carrier, the part J', or any equivalent part for receiving the part J, can be fast on, secured to, or carried by a part which moves downward and upward in harmony with the needle-carrier. For instance, in Fig. 1 the part J' can be detached from or free to be moved along the part A and secured, as by a connection indicated by dotted lines *x*³ to the arm X², which moves upward and downward in harmony with the needle-carrier, and in such case would serve as an equivalent for the needle-carrier A in depressing the cutter-carrier.

It is evident that in the sewing-machine represented by Fig. 1 the needle-carrier A, its operating-lever X², its operating-cam X³, and the rotary shaft to which that cam is fastened, are parts of the actuating mechanism of the sewing-machine and of the needle-actuating mechanism of the sewing-machine and reciprocate, vibrate, or rotate in harmony with each other, so that the depressor for the cutter-carrier may be connected with and operated by any one of those parts or any equivalent therefor in whatever button-hole sewing-machines my invention shall be applied to.

As regards my invention, the needle-carrier and the cutter-carrier, or either one of them, can be mounted to move downward and upward in either a vertical, perpendicular, inclined, or curved course in respect to the surface for supporting the work, as in previously-made sewing-machines and work-cutters therefor.

Of the hereinbefore-described methods of stitching and cutting button-holes, the method which consists in making a row of to-and-fro stitches from one end part of a button-hole progressively and uninterruptedly entirely around the button-hole and cutting the button-hole slit only after or in rear of the formation of the stitches on the side last stitched and when making a stitch or stitches is a subject of a division of this application filed May 16, 1888, Serial No. 274,053.

I claim as my invention—

1. In a button-hole sewing-machine, the combination, with its stitch-forming and work-moving mechanisms, of a work-cutter and its carrier normally elevated, a depressor which ordinarily does not depress the cutter-carrier and cutter, a cutter-controller connected to

and moving with the said work-moving mechanism, and connections between the said cutter-controller, cutter-carrier, and depressor, whereby the latter is temporarily caused to depress the cutter-carrier and cutter, substantially as set forth.

2. In a button-hole sewing-machine, the combination, with its stitch-forming and work-moving mechanisms, of a work-cutter and its carrier normally elevated, a depressor which is operated by the needle-actuating mechanism of the sewing-machine, and which ordinarily does not depress the cutter-carrier and cutter, a cutter-controller connected to and moving with the said work-moving mechanism, and connections between the said cutter-controller, cutter-carrier, and depressor, whereby the latter is temporarily caused to depress the cutter-carrier and cutter, substantially as set forth.

3. In a button-hole sewing-machine, the combination, with its stitch-forming and work-moving mechanisms, of a work-cutter and its carrier normally elevated, a depressor which is operated by the needle-carrier of the sewing-machine, and which ordinarily does not depress the cutter-carrier and cutter, a cutter-controller connected to and moving with the said work-moving mechanism, and connections between the said cutter-controller, cutter-carrier, and depressor, whereby the cutter-carrier and cutter are temporarily depressed by the said depressor, substantially as described.

4. In a button-hole sewing-machine, the combination, with its stitch-forming mechanism, work-clamps, and mechanism including a rotary feed device for operating the work-clamp, of a work-cutter and its carrier normally elevated, a depressor which ordinarily does not depress the cutter-carrier and cutter, a cutter-controller connected to and rotating with the said rotary feed device, and connections between the said cutter-controller, cutter-carrier, and depressor, whereby the said depressor is temporarily caused to depress the cutter-carrier and cutter, substantially as set forth.

5. In a button-hole sewing-machine, the combination, with a stitch-forming mechanism, a work-clamp, and mechanism including a rotary feed device for operating the work-clamp, of a work-cutter and its carrier normally elevated, a depressor operated by the needle-actuating mechanism of the sewing-machine, a cutter-controller connected to and rotating with the said rotary feed device, and connections between the said cutter-controller, cutter-carrier, and depressor, whereby the cutter-carrier and cutter are temporarily depressed by the said depressor, substantially as set forth.

6. In a button-hole sewing-machine, the combination, with a stitch-forming mechanism, a work-clamp, and mechanism including a rotary feed device for operating the work-clamp, of a work-cutter and its carrier nor-

mally elevated, a depressor operated by the needle-carrier of the sewing-machine, a cutter-controller connected to and rotating with the said rotary feed device, and connections between the said cutter-controller, cutter-carrier, and depressor, whereby the cutter-carrier and cutter are temporarily depressed by the said depressor, substantially as described.

7. In a button-hole sewing-machine, the combination, with a stitch-forming mechanism, a work-clamp, and mechanism for operating the work-clamp, of a depressor operated by the actuating mechanism of the sewing-machine, a work-cutter, its carrier, means to elevate the cutter-carrier, and means to support it when elevated and disconnected from said depressor, a cutter-controller connected to and moving with the mechanism for operating the work-clamp, and connections between the said cutter-controller, cutter-carrier, and depressor, whereby the cutter-carrier is temporarily connected with and depressed by the said depressor and is thereupon elevated and disconnected from the depressor, substantially as described.

8. In a button-hole sewing-machine, the combination, with its stitch-forming mechanism, work-clamp, and mechanism for operating the work-clamp, of a depressor connected with and operated by the needle-carrier of the sewing-machine, a work-cutter and its carrier, means to elevate the cutter-carrier, and means to support it when elevated and disconnected from said depressor, a cutter-controller connected to and moving with the mechanism for operating the work-clamp, and connections between the said cutter-controller, cutter-carrier, and depressor, whereby the cutter-carrier is temporarily connected with and depressed by said depressor and is thereupon elevated and disconnected therefrom, substantially as described.

9. In a button-hole sewing-machine, the combination, with a stitch-forming mechanism, a work-clamp, and mechanism for operating the work-clamp, of a depressor and an elevator operated by actuating mechanism of the sewing-machine, a work-cutter and its carrier, a support for the cutter-carrier when elevated and disconnected from said depressor, a cutter-controller connected to and moving with the said mechanism for operating the work-clamp, and connections between the said cutter-controller, cutter-carrier, depressor, and elevator, whereby the cutter-carrier is temporarily connected with and depressed and elevated by said depressor and elevator and is thereupon disconnected from said depressor, substantially as set forth.

10. In a button-hole sewing-machine, the combination, with a stitch-forming mechanism, a work-clamp, and mechanism for operating the work-clamp, of a depressor and an elevator connected with and operated by the needle-carrier of the sewing-machine, a work-cutter and its carrier, a support for the cut-

ter-carrier when elevated and disconnected from said depressor and elevator, a cutter-controller connected to and moving with the mechanism for operating the work-clamp, and connections between the said cutter-controller, cutter-carrier, depressor, and elevator, whereby the cutter-carrier is temporarily connected with, depressed, and elevated by and disconnected from said depressor and elevator, substantially as described.

11. In a button-hole sewing-machine, the combination, with its stitch-forming mechanism, work-clamp, and mechanism for operating the work-clamp, of a work-cutter and its carrier normally elevated, a depressor operated by actuating mechanism of the sewing-machine and ordinarily disconnected from the cutter-carrier, a cutter-controller connected to and moving with the mechanism for operating the work-clamp, and connections between the said cutter-controller, cutter-carrier, and depressor, the same being constructed and arranged so as to cause the cutter-carrier and cutter to be connected with and depressed by the said depressor to cut a button-hole when the sewing-machine is stitching at one side only of the button-hole, substantially as set forth.

12. In a button-hole sewing-machine, the combination, with its stitch-forming mechanism, work-clamp, and mechanism for operating the work-clamp, of a work-cutter and its carrier normally elevated, a depressor operated by actuating mechanism of the sewing-machine and ordinarily disconnected from the cutter-carrier, a cutter-controller connected to and moving with the mechanism for operating the work-clamp, and connections between the said cutter-controller, cutter-carrier, and depressor, the same being constructed and arranged so as to cause the cutter-carrier and cutter to be connected with and depressed by the said depressor to cut a button-hole in rear of the stitching when the sewing-machine is stitching at one side only of the button-hole, substantially as described.

13. In a button-hole sewing-machine, the combination, with its stitch-forming mechanism, work-clamp, and mechanism for operating the work-clamp, of a work-cutter and its carrier normally elevated, a depressor operated by actuating mechanism of the sewing-machine and ordinarily disconnected from the cutter-carrier, a cutter-controller connected to and moving with the mechanism for operating the work-clamp, and connecting mechanism between the said cutter-controller, cutter-carrier, and depressor, the same being constructed and arranged so as to cause the cutter-carrier and cutter to be connected with and depressed by said depressor to cut a button-hole when the sewing-machine is stitching at one side only of the button-hole and the needle of the sewing-machine is at one edge only of the row of to-and-fro stitches, substantially as described.

14. In a button-hole sewing-machine, the

combination, with its stitch-forming mechanism, work-clamp, and mechanism for operating the work-clamp, of a work-cutter and its carrier normally elevated, a depressor operated by actuating mechanism of the sewing-machine and ordinarily disconnected from the cutter-carrier, a cutter-controller connected to and moving with the mechanism for operating the work-clamp and connecting mechanism between the said cutter-controller, cutter-carrier, and depressor, the same being constructed and arranged so as to cause the cutter-carrier and cutter to be connected with and depressed by said depressor to cut a button-hole in rear of the stitching when the sewing-machine is stitching at one side only of the button-hole and the needle is at one edge only of the row of to-and-fro stitches, substantially as described.

15. In a button-hole sewing-machine, the combination, with a stitch-forming mechanism, a work-clamp, and mechanism for operating the work-clamp, of a cutter-carrier normally elevated, and an attached cutter of suitable length to cut a button-hole at one insertion, a depressor operated by actuating mechanism of the sewing-machine, a cutter-controller connected to and moving with the mechanism for operating the work-clamp, and connections between the said cutter-controller, cutter-carrier, and depressor, the same being constructed and arranged so as to cause the cutter-carrier and cutter to be depressed by the said depressor to cut a button-hole when the sewing-machine is stitching at or near one end part of one side of the button-hole, substantially as set forth.

16. In a button-hole sewing-machine, the combination, with a stitch-forming mechanism, a work-clamp, and mechanism for operating the work-clamp, of a cutter-carrier normally elevated and its attached cutter of suitable length to cut a button-hole at one insertion, a depressor operated by actuating mechanism of the sewing-machine, a cutter-controller connected to and moving with the mechanism for operating the work-clamp, and connections between the said cutter-controller, cutter-carrier, and depressor, the same being constructed and arranged so as to cause the cutter-carrier and cutter to be depressed by the said depressor to cut a button-hole in rear of the stitching when the sewing-machine is stitching at or near one end part of one side of the button-hole, substantially as set forth.

17. In a button-hole sewing-machine, the combination, with its stitch-forming mechanism, work-clamp, and mechanism for operating the work-clamp, of a cutter-carrier normally elevated and its attached cutter of suitable length to cut a button-hole at one insertion, a depressor operated by actuating mechanism of the sewing-machine, a cutter-controller connected to and moving with the mechanism for operating the work-clamp, and connecting mechanism between the said cutter-

controller, cutter-carrier, and depressor, the same being constructed and arranged so as to cause the cutter-carrier and cutter to be depressed by said depressor to cut a button-hole when the sewing-machine is stitching at or near one end part of one side of the button-hole, and the needle is at one edge only of the row of to-and-fro stitches, substantially as described.

18. In a button-hole sewing-machine, the combination, with its stitch-forming mechanism, work-clamp, and mechanism for operating the work-clamp, of a cutter-carrier normally elevated and an attached cutter of suitable length to cut a button-hole at one insertion, a depressor operated by actuating mechanism of the sewing-machine, a cutter-controller connected to and moving with the mechanism for operating the work-clamp, and connecting mechanism between the said cutter-controller, cutter-carrier, and depressor, all constructed so as to cause the cutter-carrier and cutter to be depressed by said depressor to cut a button-hole in rear of the stitching when the sewing-machine is stitching at or near one end part of one side of the button-hole and the needle is at one edge only of the row of to-and-fro stitches, substantially as described.

19. In a button-hole sewing-machine, the combination, with its stitch-forming mechanism, work-clamp, and mechanism for operating the work-clamp, of a cutter-carrier normally elevated and an attached cutter arranged to descend with its cutting-edge in a plane at one side of the needle a distance equal to the length of the depth stitches back from the edge of the button-hole, a depressor operated by actuating mechanism of the sewing-machine, a cutter-controller connected to and moving with the mechanism for operating the work-clamp, and connecting mechanism between the said cutter-controller, cutter-carrier, and depressor, the same being constructed so as to cause the cutter-carrier and cutter to be depressed by the said depressor to cut a button-hole only when the needle is at one side of the button-hole and is laterally away from the edge thereof, as in making a depth stitch, substantially as set forth.

20. In a button-hole sewing-machine, the combination, with the stitch-forming mechanism, work-clamp, and mechanism for operating the work-clamp, of a work-cutter and its carrier normally elevated and furnished with means by which the cutter is secured to its carrier and is adjustable thereon laterally in relation to the work-clamp and to the needle of the sewing-machine, a depressor operated by actuating mechanism of the sewing-machine, a cutter-controller connected to and moving with the mechanism for operating the work-clamp, and connections between the said cutter-controller, cutter-carrier, and depressor, whereby the cutter-carrier and cutter are temporarily caused to be depressed

by the said depressor to cut the work, substantially as described.

21. In a machine for stitching button-holes, the combination, with a stitch-forming mechanism, a work-clamp, and mechanism for operating the latter, of a cutter, a cutter carrier or bar, a depressor operated by the needle-bar-actuating mechanism, a cam or device rotating in unison with the clamp-operating cam or disk, and connections between the said rotating cam or device and depressor, whereby the cutter is thrown into action.

22. In a machine for stitching button-holes, the combination, with a stitch-forming mechanism, a work-clamp, and mechanism for operating the latter, of a cutter-bar sliding vertically in the head of the machine and entirely disconnected from the needle-bar thereof, a cutter of suitable length to cut an entire button-hole at a single stroke, a slotted throat-plate through which the said cutter can descend, a depressor operated by the needle-bar-actuating mechanism to cause a descent of the cutter-bar and cutter as a button-hole is being completed, a cam or device rotating in unison with the feed cam or disk for the clamp, and connections between the said rotating cam or device and depressor, whereby the latter is thrown into action to operate the cutter.

23. The cloth-clamp to hold the material, a cam forming part of the mechanism for moving the cloth-clamp, the needle-bar, its attached eye-pointed needle and stitch-forming mechanism complementary thereto, the cutter-bar, its attached cutter or blade having its cutting-edge offset for a distance equal to the length of the depth stitches back from the edge of the button-hole slit, the cam, and intermediate mechanism between the cutter-bar and the said cam, whereby the cutter or blade is made to descend and cut the material step by step along the first half or side of the button-hole in advance of the stitching, the cutting taking place at the time that the needle is operating to form the depth stitches along the first half or side of the button-hole slit.

24. In a machine for stitching button-holes, the following instrumentalities, viz: a needle-bar having an eye-pointed needle and stitch-forming mechanism complementary thereto, a cloth-clamp to hold the material to be stitched and cut, a cutter-bar and attached cutter or blade having its cutting-edge offset or located at one side of the needle equal to the depth stitching back from the edge of the button-hole, and means to actuate the cutter-bar to cause it to descend and cut the material step by step after the first side of the button-hole has been stitched, the blade descending through the material while the needle is making the depth stitch in the material back from the edge of the slit.

25. The needle-bar having a projection, the cloth-clamp feeding-cam and cutter-bar controlling cam moving in unison with it, com-

bined with the cutter, the cutter-carrying bar having a projection and a rod or link intermediate the said bar and cam, with means to move the bar in opposition to the cam, whereby the position of the cutter or blade of the cutter-carrying bar may be determined by the said cam and the cutter-bar be reciprocated at the proper times.

26. In a button-hole-stitching machine, the combination, with a cloth-clamp, the vertically-reciprocating cutter-bar and the web connected to its lower end, of a blade and independent blade-holder adjustably secured to the said web, whereby the said blade may be adjusted laterally with relation to the said cutter-bar and to the longitudinal center of the opening in the cloth-clamp to enable the edge of the blade to be adjusted centrally with relation to the stitching constituting the sides of a button-hole.

27. A clamp to hold and feed under the needle the material to be overstitched to make a button-hole, a reciprocating needle-bar, an attached eye-pointed needle to penetrate the fabric at the point where the edge of the button-hole is to show and at a slight distance therefrom, as when the depth stitch is being formed, and a slotted throat-plate, combined with a cutter-bar and its attached cutter, the acting edge of which is parallel to the line of overstitching constituting the edge of the button-hole, the said cutter being located at one side the said needle, but at a distance therefrom equal to the width of the depth stitches for the overstitching at each side of the button-hole, whereby when the needle is in position to penetrate the fabric in the production of a depth stitch the cutter may be thrown down to sever the material or fabric between the line of edge stitches.

28. The combination, with a button-hole

sewing-machine, of a cutter, a cutter-carrier, a cam from which motion is transmitted to the cutter-carrier to depress the cutter, and mechanism whereby the depression of the cutter from the cam will be produced but once and after the stitching of the greater part of a button-hole, substantially as specified.

29. The combination, with a button-hole sewing-machine, of a cutter and cutter-bar, a cam operated by said machine, a cam-follower and connections between the same and said cutter, whereby the cutter is depressed by said cam, and mechanism whereby the cam and follower, which remain normally—that is, during the stitching of the greater part of a button-hole—out of coaction, are thrown into coaction to depress the cutter once, and at the end of such single stroke of the cutter their coaction automatically stopped, substantially as specified.

30. The combination, with a button-hole sewing-machine, of a cutter and cutter-bar, a cam operated by said machine, a cam-follower, which cam and follower are normally out of coaction, connections between the follower and cutter, whereby the cutter is depressed by said cam, a tripping device operated by the work-clamp operating cam or device, whereby the cam and follower are thrown into coaction, and means whereby the coaction of said cam and follower is stopped after a single stroke of the cutter, substantially as specified.

In testimony whereof I hereunto set my hand, in the presence of two subscribing witnesses, this 18th day of December, 1885.

JAMES A. OSTERHOUT.

Witnesses:

CHAS. A. LLOYD,

JAMES T. GOODFELLOW.

It is hereby certified that in Letters Patent No. 447,791, granted March 10, 1891, upon the application of James A. Osterhout, of Troy, New York, for an improvement in "Machines for Cutting and Stitching Button-Holes," errors appear requiring correction, as follows: In line 40, page 1, the reference letter *t* should be inserted after the word "arrow;" in line 131, page 3, "Fig. 1" should read *Fig. 2*; in line 13, page 5, the words "or depressor" which follow the word "clutch" should be stricken out and inserted after the word "clutch" in line 14, same page, and in line 17, page 9, the word "depressor" should read *elevator*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 24th day of March, A. D. 1891.

[SEAL.]

CYRUS BUSSEY,
Assistant Secretary of the Interior.

Countersigned:

C. E. MITCHELL,
Commissioner of Patents.