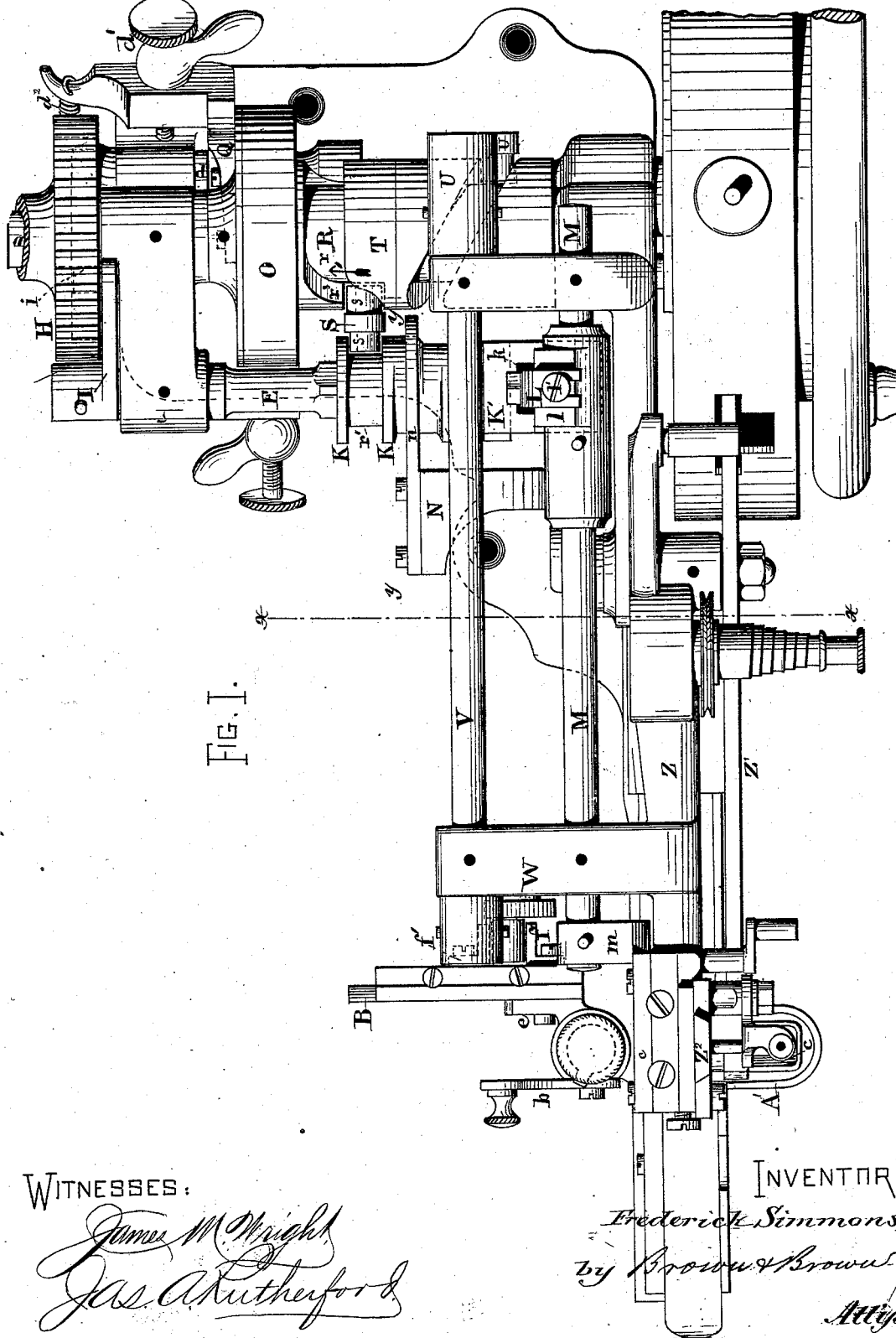


F. SIMMONS.  
Button-Hole Sewing-Machine.  
No. 216,902. Patented June 24, 1879.

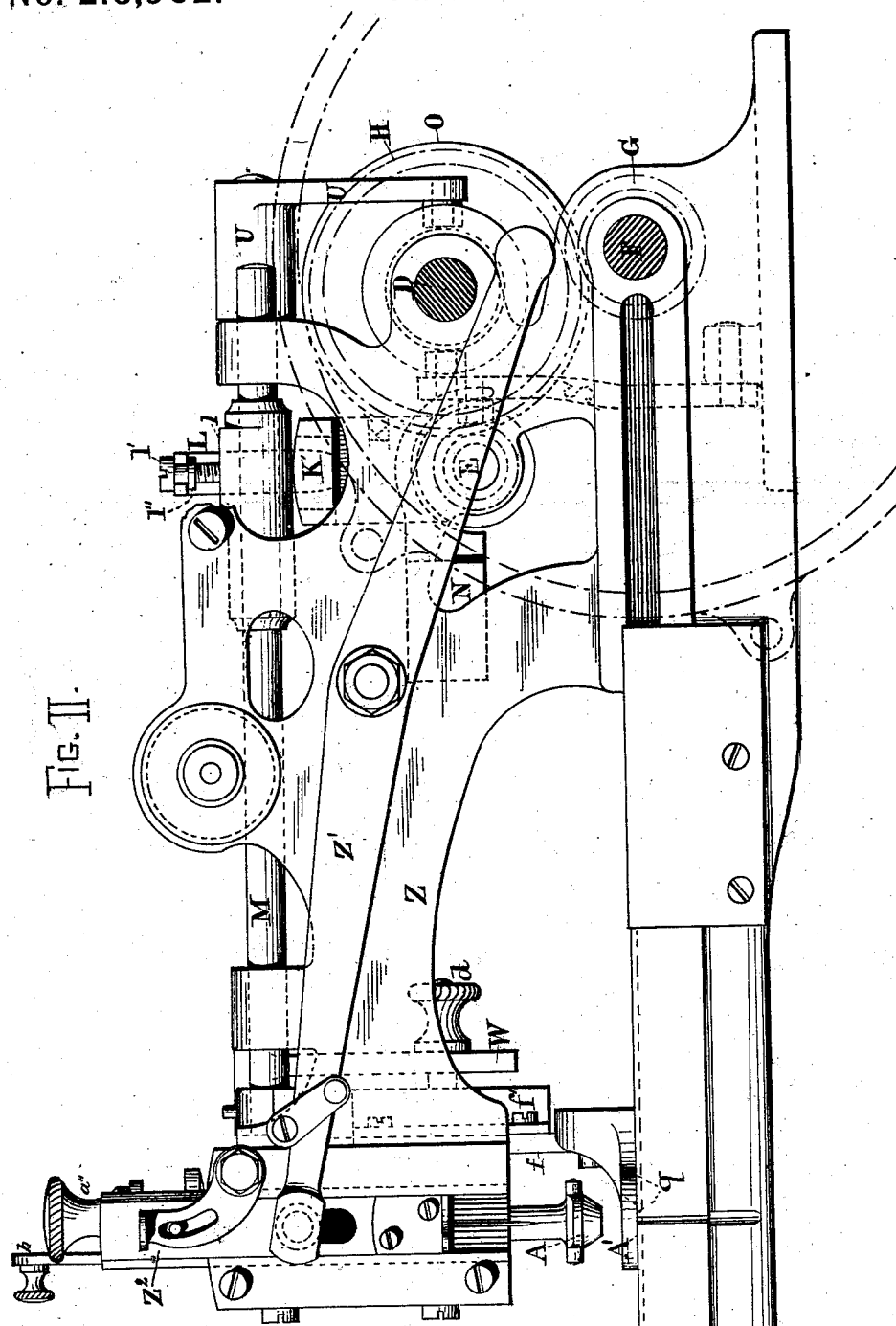


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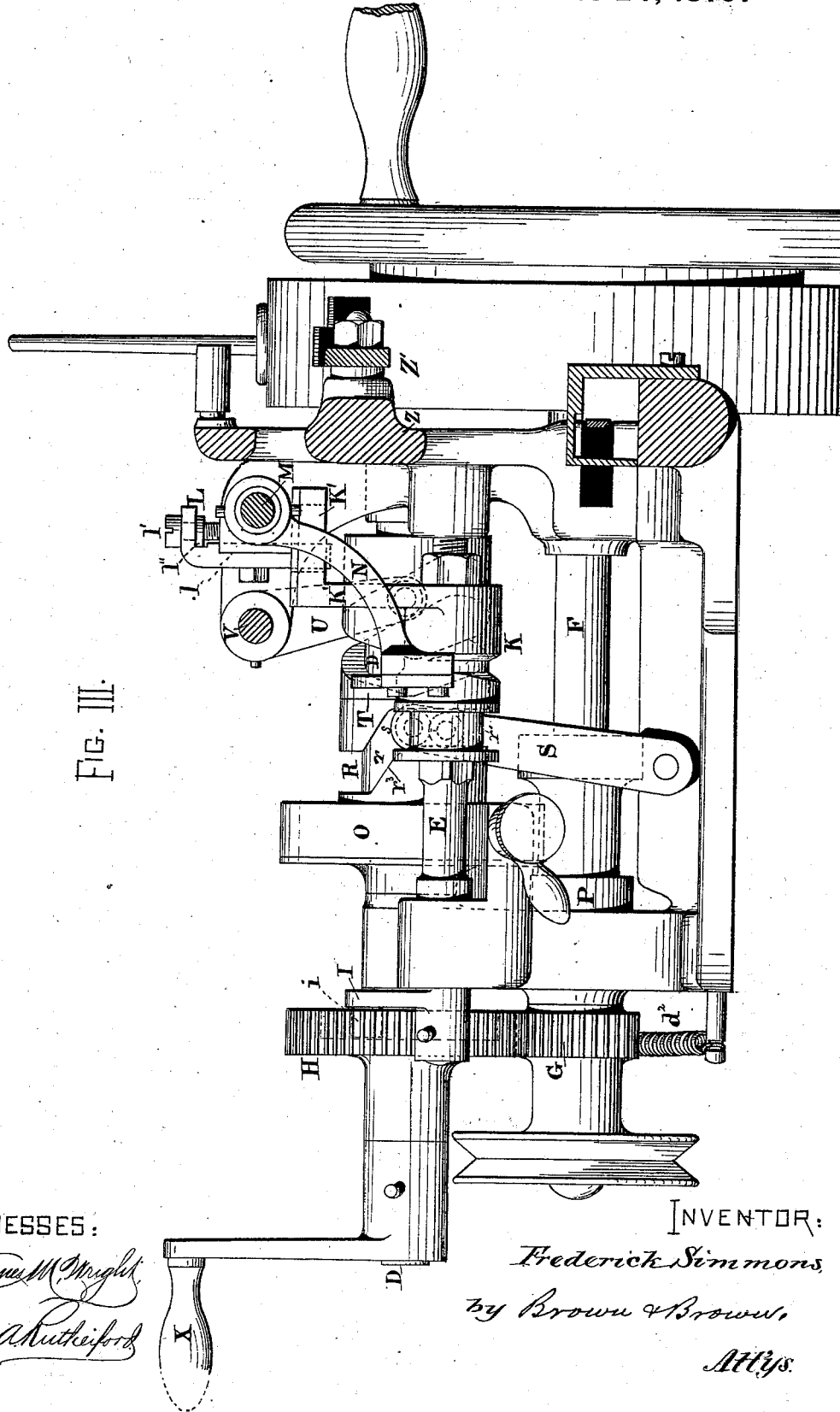
FIG. III.

WITNESSES:

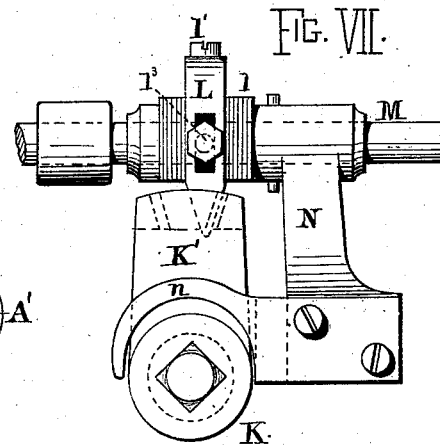
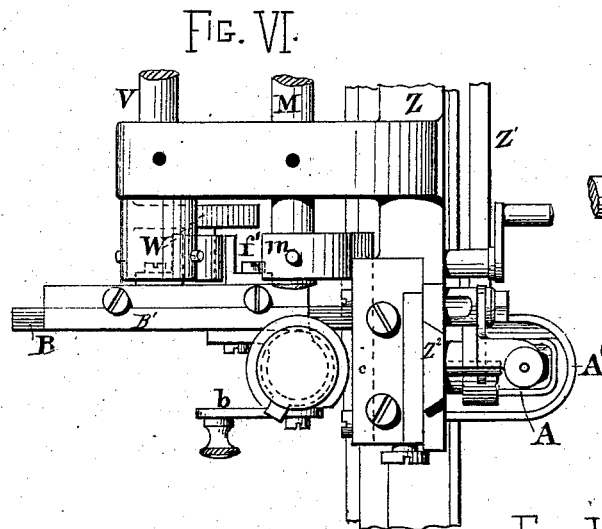
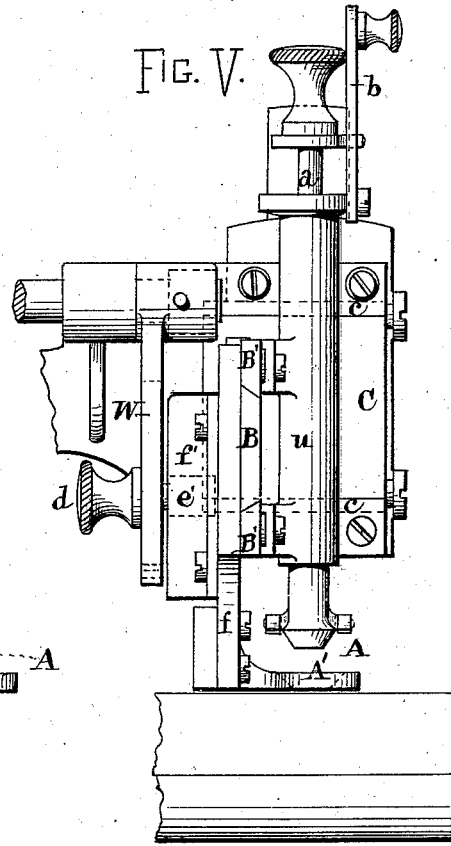
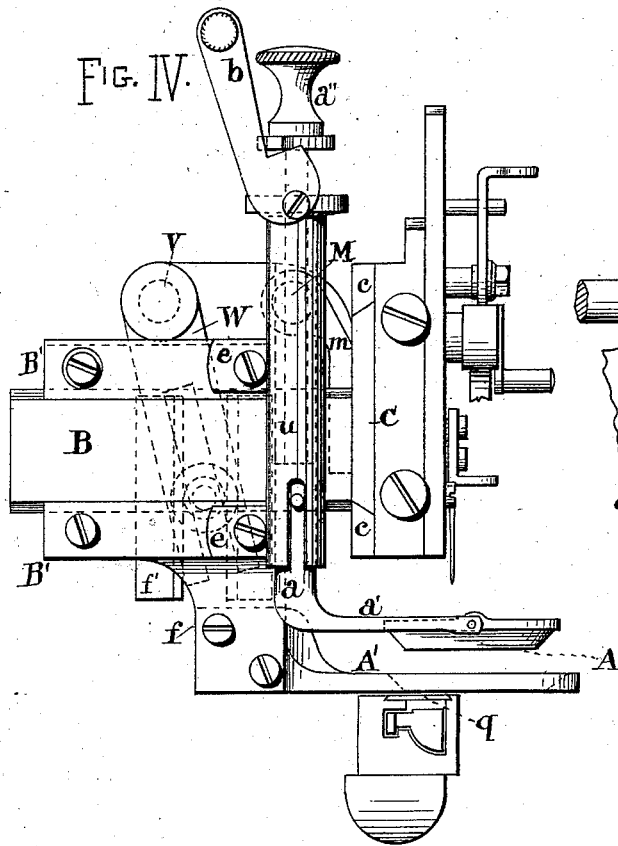
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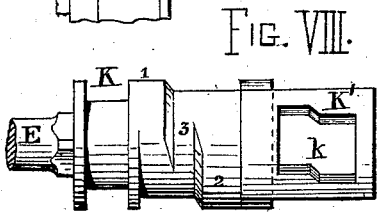


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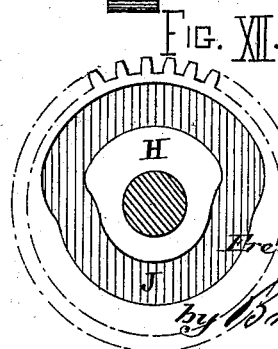
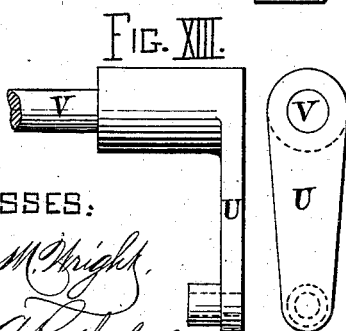
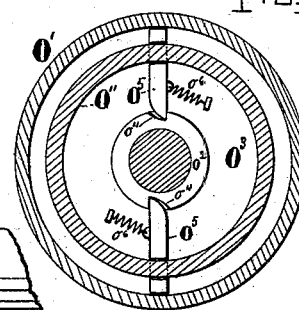
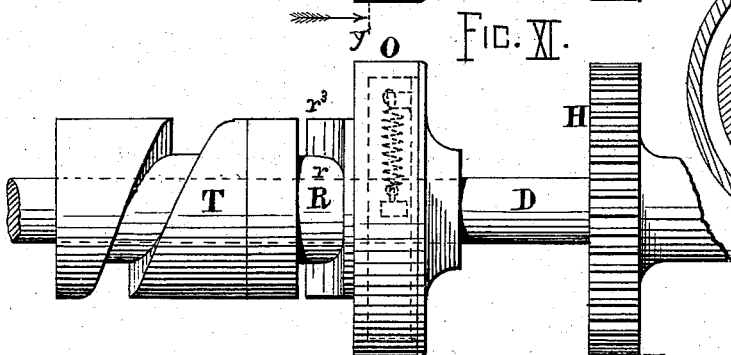
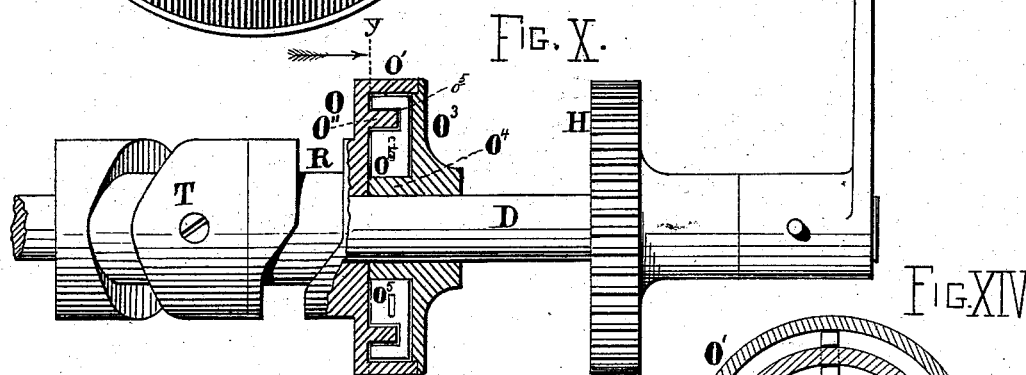
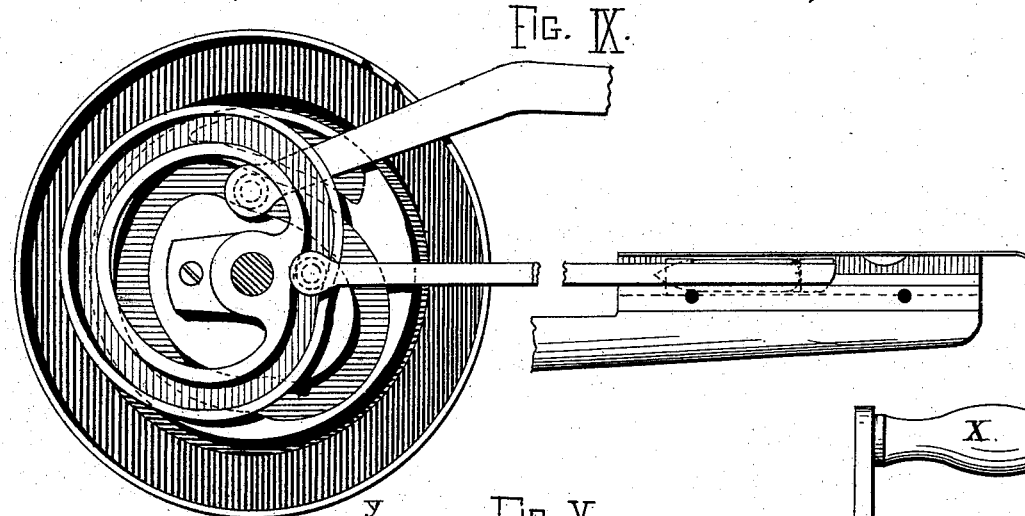
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## Button-Hole Sewing-Machine.

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# UNITED STATES PATENT OFFICE.

FREDERICK SIMMONS, OF WEBBER STREET, BLACKFRIARS ROAD, COUNTY OF SURREY, ENGLAND.

## IMPROVEMENT IN BUTTON-HOLE SEWING-MACHINES.

Specification forming part of Letters Patent No. **216,902**, dated June 24, 1879; application filed September 24, 1878.

### *To all whom it may concern*

Be it known that I, FREDERICK SIMMONS, of Webber street, Blackfriars Road, in the county of Surrey, England, have invented certain Improvements in Button-Hole Sewing-Machines, of which the following is a specification.

This invention has for its object the rapid and effective stitching of button-holes by automatic mechanism.

Its principal feature is a cloth-clamp and means for imparting thereto three distinct motions with reference to the stitching mechanism, one motion being a reciprocating movement at right angles to the length of the button-hole, and serving to so place the cloth that the needle will alternately enter it near one edge of the button-hole and pass between the edges in order to form the overseam. Another motion is similar in direction, but of about twice the extent of the first, and occurs when the ends of the button-hole are reciprocated under the needle, in order to form the bar which strengthens said ends; and the third is a step-by-step motion at right angles to the first and second, continuing in one direction the length of the button-hole and then taking the reverse direction, the alternately reverse movements being on slightly separated but parallel lines. This last is the feed motion, and being on slightly separated lines the two edges of the button-hole are caused to properly traverse the path of the needle.

My invention consists, first, in the combination, with the stitching devices of a sewing-machine, of a cloth-clamp secured to slides, by which it may be moved in directions at right angles to each other, a longitudinally-reciprocating bar secured to one of said slides, and mechanism for moving said bar to carry the cloth-clamp in reverse directions at right angles to the length of a button-hole, a rocking shaft adjustably connected to the other of said slides, and mechanism for rocking said shaft to move the clamp in a direction parallel with the length of the button-hole, whereby the movement of the clamp may be adapted to button-holes of different lengths; second, the combination, with the cloth-clamp and its slides, through which it is caused to move in directions at right angles to each other, of a

sliding bar connected to one of said slides and means for reciprocating said bar longitudinally, a saddle-piece projecting from said sliding bar and carrying a hook embracing a sliding cam, and mechanism for sliding and rocking said cam for varying the reciprocations of said bar, as hereinafter more particularly described; third, in the combination, with the reciprocating cloth-clamp and the sliding bar which moves the same and the rocking and sliding cam having an upward-projecting arm provided with a slotted projection, of a hook connected with said sliding bar and embracing said cam and an adjustable pointed tongue secured to said bar and adapted to have its point inserted to a greater or less extent in the slot of the projection from the arm of the sliding cam, whereby the extent of the movement of said sliding bar may be regulated.

Figure 1 is a plan view of a sewing-machine provided with my improvement. Fig. 2 is a front side elevation of the machine with its hand-wheel and the cams for operating the stitching mechanism removed. Fig. 3 is a section on line *xx* of Fig. 1. Fig. 4 is a front end elevation of the machine. Fig. 5 is a rear side view of the cloth-clamp and its immediate connections. Fig. 6 is a top view of same. Fig. 7 is a view in detail of the connections between the devices for giving the overseam-forming movements. Fig. 8 is a detail view of the sliding cam, which will be hereinafter referred to. Fig. 9 illustrates the needle and shuttle-arm operating cams of the machine to which my improvement is attached. Fig. 10 is a detached view of the cam-shaft of my improvement, showing a diametric section of the feed-wheel. Fig. 11 is a view at right angles to Fig. 10. Fig. 12 is a detached view of the cam-grooved wheel which imparts a rocking motion to the sliding cam shown in Fig. 8. Fig. 13 shows detached views of the arm which communicates motion to the feed-shaft. Fig. 14 is a section on line *yy*, Fig. 10, showing the internal construction of the feed-wheel.

The letter *Z* indicates the goose-neck of a sewing-machine; *Z*<sup>1</sup>, the needle-operating lever, and *Z*<sup>2</sup> the vertically-reciprocating needle-bar, dove-tailed or beveled at its edges, and moving in corresponding guides on the front side of the head of the goose-neck. On the rear side of

the goose-neck are horizontal dovetail guides *ee*, in which moves a slide, C. Rearwardly from this slide projects a flat arm, B, having its upper and lower edges beveled to fit a dovetailed slide, B'. To an arm, *f*, which projects downward from the inner end of this slide B' is secured the lower portion, A', of the cloth-clamp, which extends across the cloth-plate and throat-plate *q* of the machine. This portion A' is slotted longitudinally for the passage of the needle, the slots being of a size to accommodate the largest button-hole which can be stitched by the machine. To the slide B' is secured, by ears *ee*, a vertical sleeve, *u*, standing in front of the arm B, in which sleeve moves a rod, *a*, having at its lower end the laterally-projecting bifurcated portion *a'*, between the arms of which is swiveled the elongated concave clamping-piece A, the bottom of which is open or slotted from end to end. This clamping-piece A is adapted to fit in a corresponding recess, indicated by dotted lines, in the lower portion, A', of the cloth-clamp. The top of the rod *a*, which projects above the sleeve *u*, is provided with a head, *a''*, having a projecting lug, against which plays the cam-shaped end of a lifting-arm, *b*. A suitable spiral spring is arranged within the sleeve *u* to depress the rod *a* after the manner of an ordinary presser-bar. The cloth is to be placed between these two portions of the clamp, the slitted button-hole occupying a central position with respect to the slots in the two parts, and the upper part, A, is firmly pressed upon the cloth by the spring which acts upon the rod *a* within the sleeve *u*.

The working parts of the machine, which communicate the requisite motions to the cloth-clamp, are attached to three shafts, one of which, F, is the driving-shaft, the second, D, is a cam-shaft, and the third, E, is a rocking-shaft.

A pinion, G, (Fig. 3, and shown in dotted lines in Fig. 2,) on the driving-shaft F gears into a toothed wheel, H, Figs. 1, 3, 10, 11, 12, mounted loosely on the cam-shaft D and in its inner flat face. This wheel has a cam-groove, J. A lever, I, fixed to the outer end of the shaft E, is provided with a stud, *i*, shown in dotted lines, which projects into the said groove J, and is thus caused to impart to the said rocking shaft E the rocking motion from whence it derives its name. Mounted upon the rocking shaft E in such a way that it must rock with said shaft, but can receive an independent endwise movement, is a sliding cam, K, Figs. 1 and 3. This sliding cam is provided with an upwardly-projecting bent arm, K', the top or horizontal portion of which is provided with a slot, *k*, having upwardly-flaring end walls, between which fits loosely the lower pointed end of a vertically-adjustable tongue, L, secured to and moving in a guide, *l*, fixed upon the sliding bar M, and this arm K' imparts, through the medium of the adjustable tongue L, an end wise-reciprocating motion to said sliding bar M, Figs. 1, 2, 3, 6, and 7, the

front end of which is secured to the slide C, which carries the respective parts of the cloth-clamp, said sliding bar M being attached to the slide C through an arm, *m*.

The tongue L is made pointed and vertically adjustable, and the end walls of the slot *k* flaring, for the purpose of regulating the length of the longitudinal reciprocations of the bar M, and consequently the length of the lateral reciprocations of the cloth-clamp. The upper portion of the tongue L is bent at a right angle, and is slotted to embrace a screw, *l'*, between its head and a shoulder, *l''*, the lower portion of said screw being tapped in the top of guide *l*.

By means of this screw it will be seen that the tongue L may be raised or lowered, and its pointed end caused to extend more or less into the slot *k*, as desired.

The vertical portion of the tongue L is provided with a longitudinal slot, through which a pin, *l'*, projects from guide *l*, the screw-threaded tip of said screw being provided with a suitable nut, as shown, by which the tongue L is secured in position.

When the wide portion of the point of the tongue L is in the slot *k* the end walls of said slot will, of course, as the arm K' vibrates, strike the tongue sooner than when only the narrower portion of the point is in the said slot, and consequently cause the tongue and the bar M to commence moving sooner and to make longer reciprocations, which are communicated to the cloth-clamp, and the lengths of the stitches formed are controlled by adjusting the screw *l'* up or down. By this sliding bar M is communicated to the slide C and cloth-clamp the lateral reciprocations, which co-operate with the stitching devices to form the overseaming and end bars of the button-hole. The reciprocating sliding bar M is caused to have the variable action necessary to communicate the proper movements to the cloth-clamp for stitching the opposite sides and barring the ends of a button-hole by a saddle-piece, N, projecting downward and outward from said bar, and provided with a curved arm or hook, *n*, Figs. 1 and 7, which bestrides the sliding cam K, and so prevents the bar from being moved too far in either direction.

A wheel, O, Figs. 1, 2, 3, 10, 11, having a peripheral flange, O', and an inner flange, O'', is fixed upon the cam-shaft D, and forms a part of the feeding mechanism. Upon the same shaft is loosely mounted a disk-wheel, O<sup>3</sup>, facing the wheel O, and having its periphery rabbeted to receive the edge of flange O', thus forming, in connection with wheel O, an inclosed box. In the periphery of the hub O<sup>4</sup> are formed longitudinal grooves *o*<sup>4</sup>, in which rest the tips of clutch-arms O<sup>5</sup>. These arms extend outward beyond, and have open slots *o*<sup>5</sup>, which embrace the inner flange, O'', of the wheel O. Spiral springs *o*<sup>6</sup> connect the clutch-arms O<sup>5</sup> with the inner face of the wheel O<sup>3</sup>. An arm, Q, projects radially from the outer

face of the wheel O<sup>3</sup> and over the periphery of a cam, P, Figs. 1 and 3, on the driving-shaft F. A screw, d<sup>1</sup>, passing through said arm has its tip resting against the lower part of the standard, in which shafts D and F have their bearings, and by means of this screw the distance of the arm from the cam may be regulated. A spring, d<sup>2</sup>, having one end attached to the end of arm Q and the other to the base of the machine, serves to hold the arm Q upon the cam.

Now, when the shaft F is rotated, the cam P will lift the arm Q, causing wheel O<sup>3</sup> to make a partial rotation, and the grooves in the hub of wheel O<sup>3</sup> will cause the inner ends of the clutch-arms to move in the same direction, and the slotted portions of said arms to clutch the inner flange, O'', and draw forward the wheel O, thus communicating a partial rotation to cam-shaft D. A cam, R, on the cam-shaft D imparts, through the medium of the cross-head s (one end of which is in the groove r and the other in a recess, r<sup>1</sup>, of the sliding cam,) of a rocking lever, S, the endwise motion to the sliding cam K on the rocking shaft E, and so regulates the throw of the reciprocating sliding bar M, which is attached to the slide C of the cloth-clamp, which gives the stitch or barring motion. For instance, while the cloth-clamp is traveling in the proper direction to carry the button-hole, so that the edge nearest the shafts will be stitched, the hook embraces the portion of sliding cam K having the protuberance 1, which prevents the bar M from carrying the presser-foot beyond the proper lateral movement. When the end of the button-hole is reached the cam R will be carried around to such position that a bend, r<sup>3</sup>, in the groove r of said cam will cause the cross-head s and sliding cam to shift outward in the direction of arrow 1, Fig. 1, so that the hook will embrace the small part, 3, of the sliding cam, when the cloth-clamp can make greater lateral reciprocation to form the bar at one end of the button-hole. When this bar is completed the cam R will have so turned that the cross-head s will be out of the bend or curve of the groove r, and in a straight circumferential portion of said groove, causing the sliding cam to shift still farther in the direction of arrow 1, causing the hook n to embrace that portion of the sliding cam having the protuberance 2, where it will remain until the opposite edge of the button-hole is stitched. When this edge is stitched another bend in groove r similar to and diametrically opposite the bend r<sup>3</sup> will cause the cross-head to shift the sliding cam inward, or in a direction opposite to that indicated by arrow 1, and the hook n will again embrace the small part, 3, of the sliding cam until the other end of the button-hole is barred, as was the first. An-

other cam or endless screw, T, the groove in which forms a regular right and left handed screw, is also fixed on the cam-shaft D. A short arm, U, furnished with a pin or stud, takes into the groove in the screw-cam T, and gives a rocking motion to a bar, V, at the other end of which is another short arm, W, Figs. 1, 2, 4, 5, and 6, which is slotted and furnished with a thumb-screw, d, and nut and runner e'. This runner is placed between two guides, f' f', on the slide B' of the presser-foot, the runner being made adjustable by means of the nut, so that a button-hole of any desired length may be indicated.

An arm and handle, X, Figs. 3, 10, 11, is keyed or fixed to the cam-shaft D, for the purpose of setting the cloth-clamp in any desired position by turning the shaft D.

Having now set forth the nature of the said invention and explained the manner of carrying the same into effect, I wish it to be understood that I claim—

1. The combination, with the stitching devices, of cloth-clamp, composed of parts A A' and its slides B and C, the sliding bar M, the mechanism for reciprocating said bar longitudinally, the shaft V, mechanism for rocking said shaft, and adjustable devices connecting said shaft to slide B, whereby the extent of the movement of the clamp may be regulated, substantially as described.

2. The combination, with the cloth-clamp and the slides upon which it is caused to move in directions at right angles to each other, of the sliding bar M and means for reciprocating the same longitudinally, saddle-piece N, carrying hook n, the sliding cam K, and mechanism for sliding and rocking said cam, substantially as described.

3. The combination, with the longitudinally-reciprocating cloth-clamp, of the sliding bar M, tongue L, saddle-piece N, carrying hook n, sliding cam K, having arm K', slotted to receive said tongue, and the devices, substantially as described, for operating said sliding bar and cam, for the purpose set forth.

4. The combination, with the cloth-clamp and its slides, of the connected sliding bar M, saddle-piece N, carrying hook n, the sliding cam K, the oscillating arm carrying cross-head s, rotary cam R, rocking shaft V, adjustably connected to the cloth-clamp, the cam and intermediate connections communicating motion to said shaft, the stitching mechanism of a sewing-machine, and mechanism by which motion is communicated to all of said moving parts from a common prime motor, substantially as described.

Dated the 27th day of July, 1878.

FREDK. SIMMONS.

Witnesses:

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BARNABAS RUOS.