No. 626,189. Patented May 30, 1899.

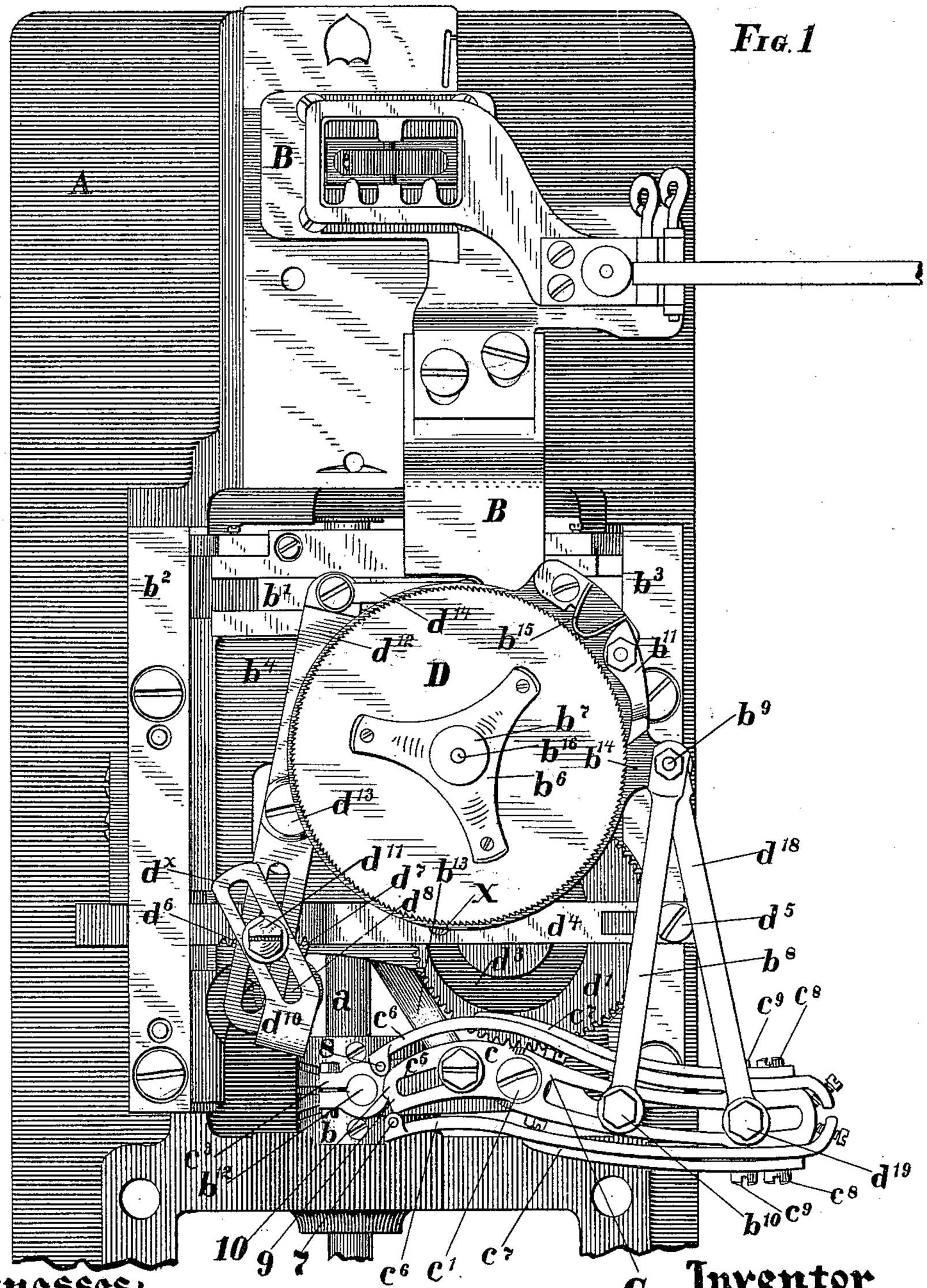
F. W. OSTROM.

BUTTONHOLE SEWING MACHINE.

(Application filed June 4, 1897.)

(No Model.) 7 Sheets—Sheet 1.

FIG. 1



Witnesses:
Eleanor F. Stoll
Grace M. Gray.

Inventor
Freelund W. Ostrom,
By Lauge & Roberts,
Attorneys

No. 626,189. Patented May 30, 1899.

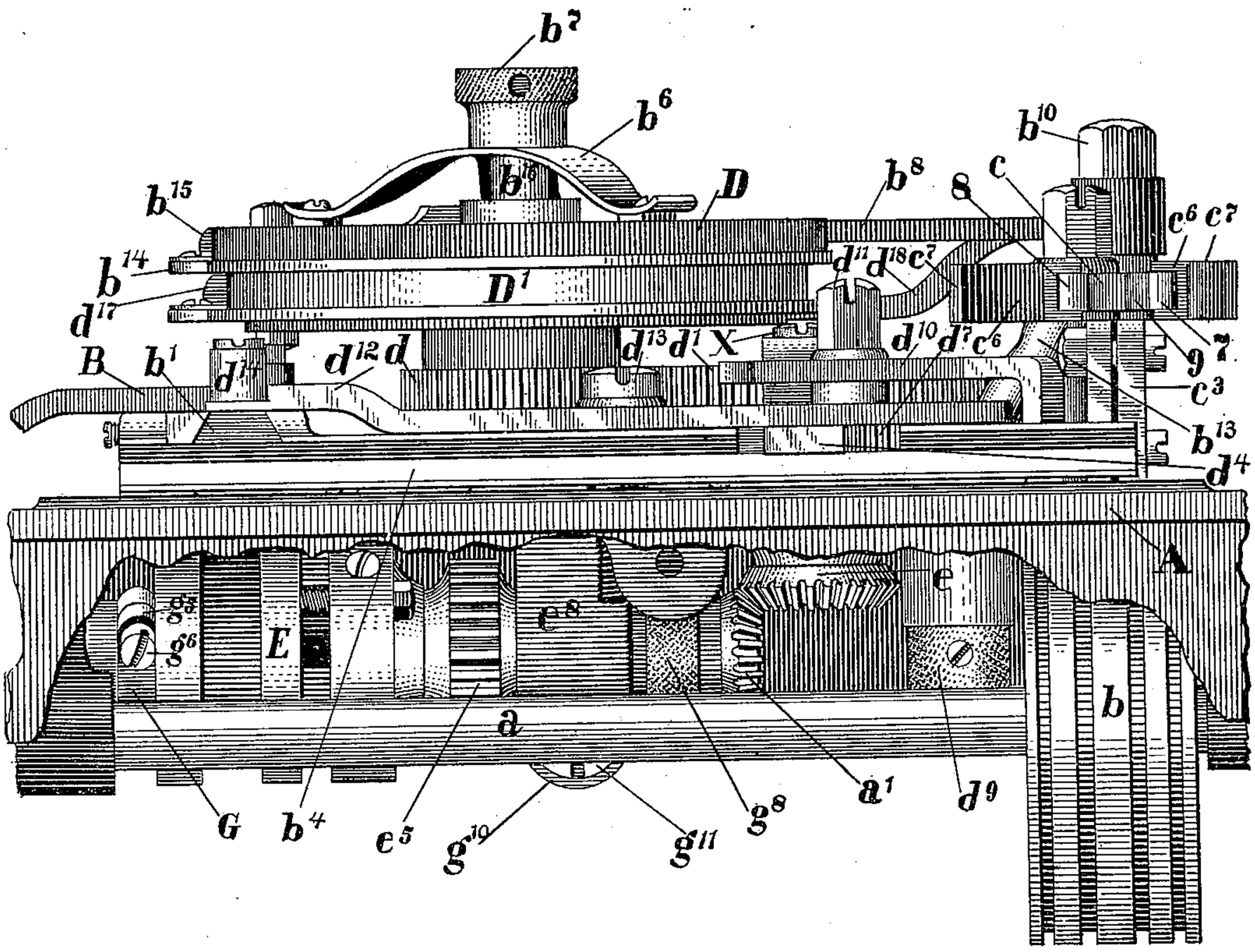
F. W. OSTROM.

BUTTONHOLE SEWING MACHINE.

(Application filed June 4, 1897.)

(No Model.) 7 Sheets—Sheet 2.

FIG. 2



Witnesses:

Eleanor F. Groll.

Jean M. Shay

Inventor

Freeland W. Ostrom,

By Langer & Roberts.

Attorneys

No. 626,189. Patented May 30, 1899.

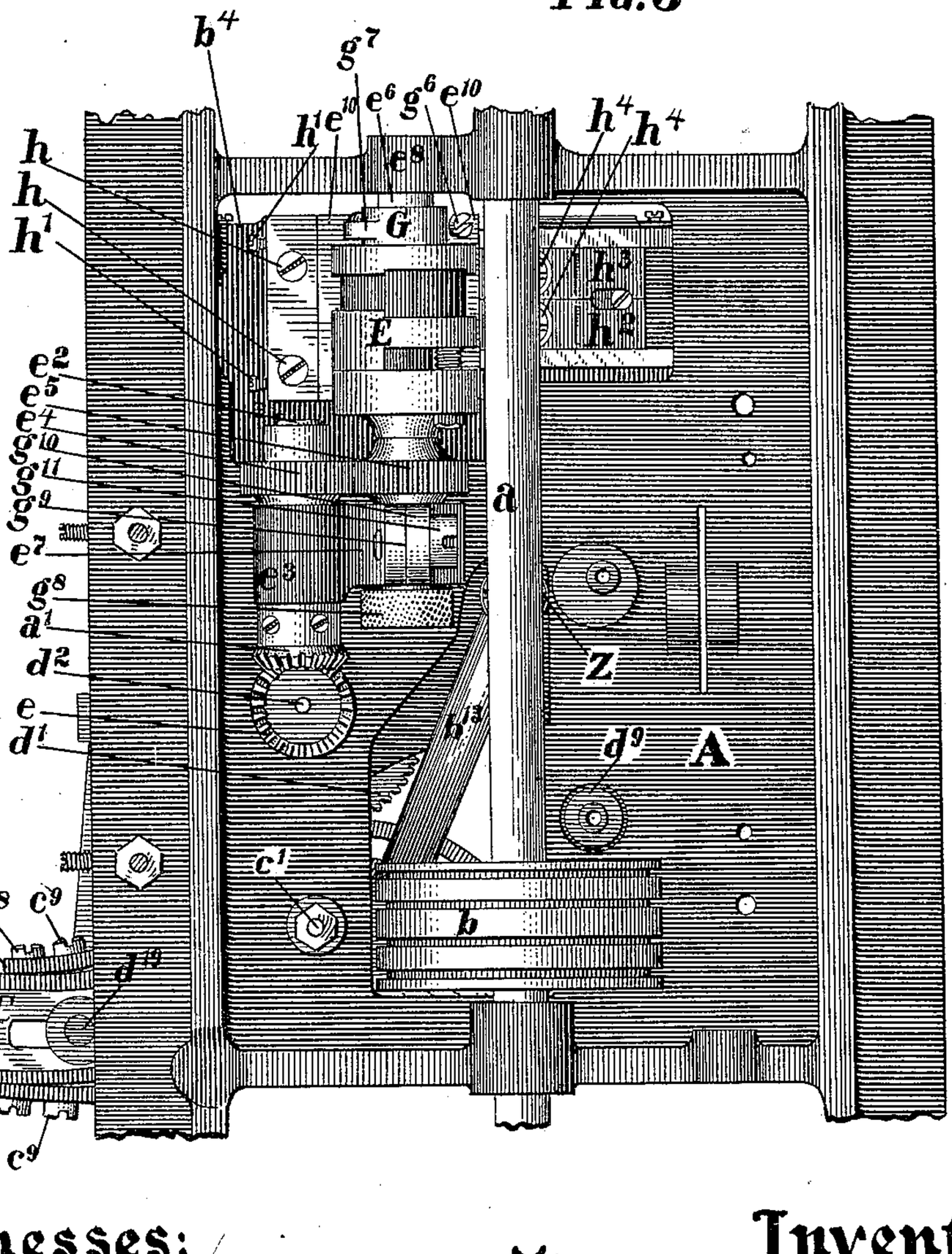
F. W. OSTROM.

BUTTONHOLE SEWING MACHINE.

(Application filed June 4, 1897.)

(No Model.) 7 Sheets—Sheet 3.

FIG. 3



Witnesses:

Eleanor F. Groll

Grace M. Shay

Inventor

Freeland W. Ostrom,

By Lange & Roberts.

Attorneys.

No. 626,189. Patented May 30, 1899.

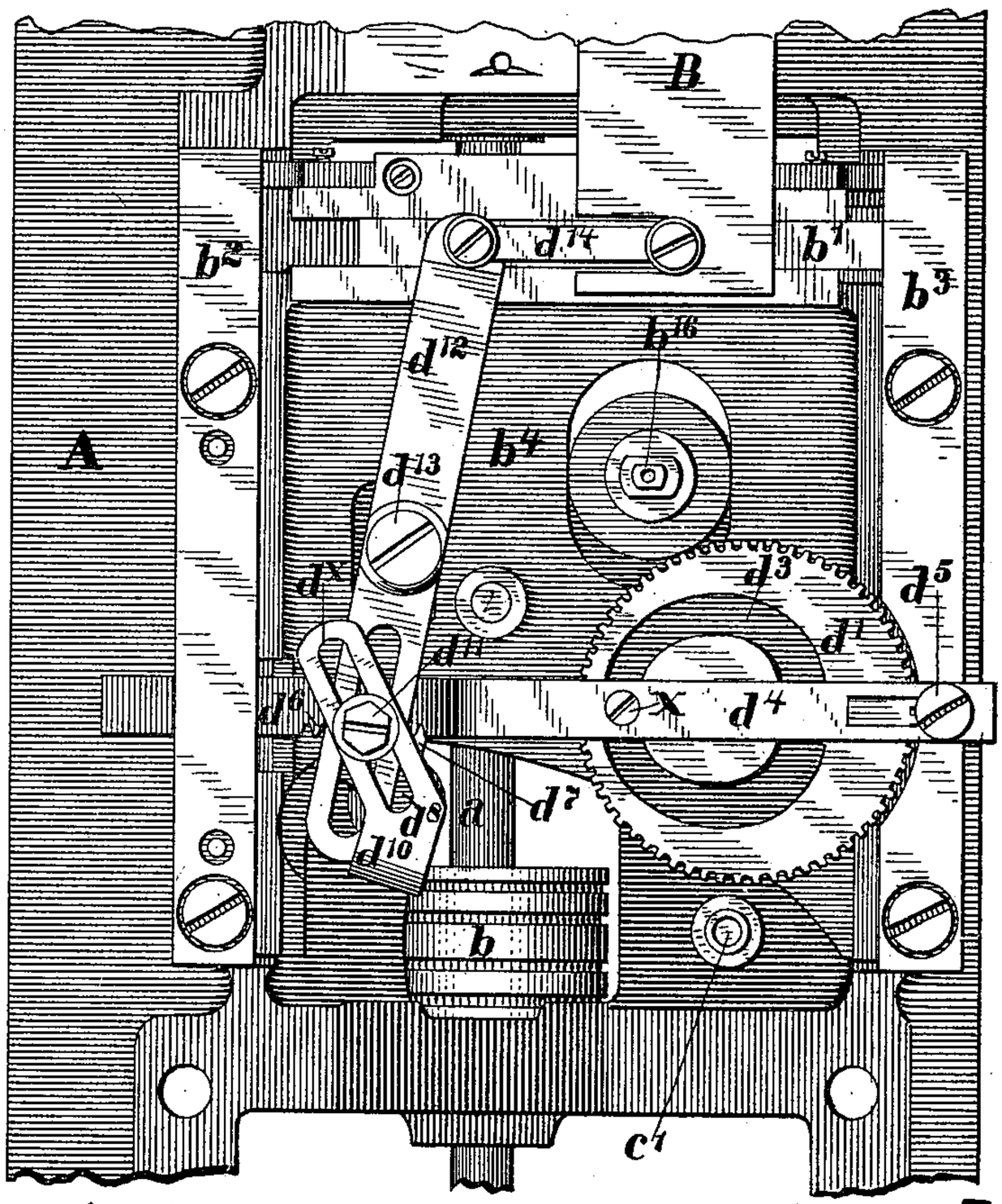
F. W. OSTROM.

BUTTONHOLE SEWING MACHINE.

(Application filed June 4, 1897.)

(No Model.) 7 Sheets—Sheet 4.

FIG. 4



Witnesses:
Eleanor L. Groll
Grace M. Shay.

Inventor
Freeland W. Ostrom,
By Lange & Roberts.
Attorneys.

No. 626,189. Patented May 30, 1899.

F. W. OSTROM.

BUTTONHOLE SEWING MACHINE.

(Application filed June 4, 1897.)

(No Model.) 7 Sheets—Sheet 5.

FIG. 6

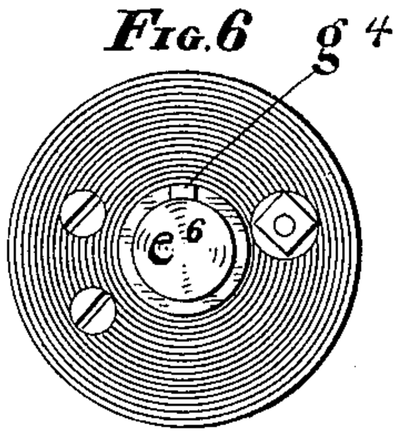


FIG. 5

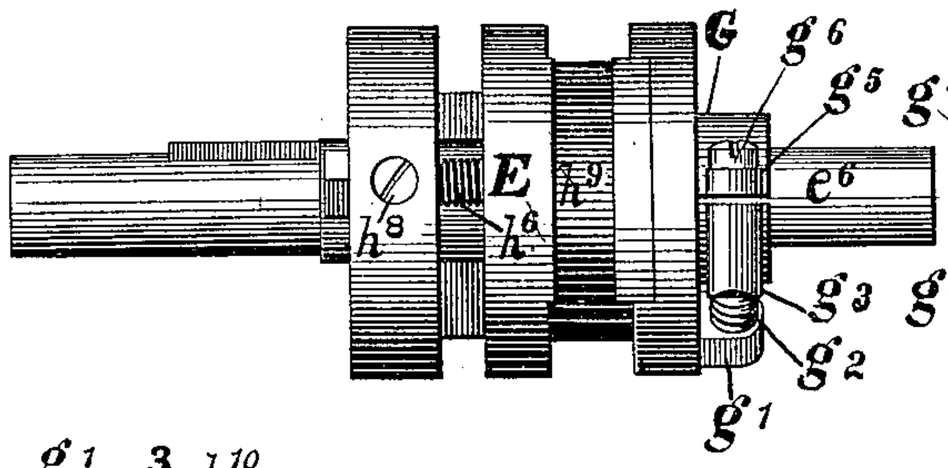


FIG. 7

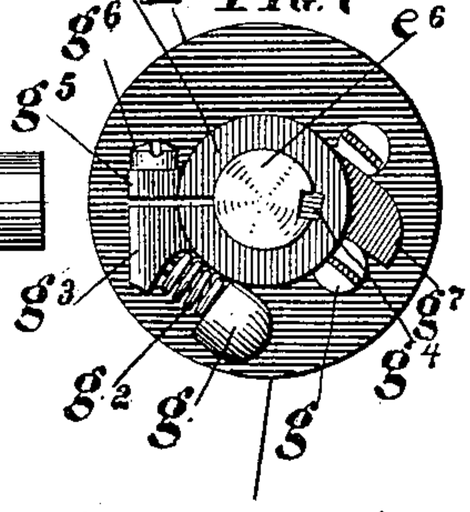


FIG. 8

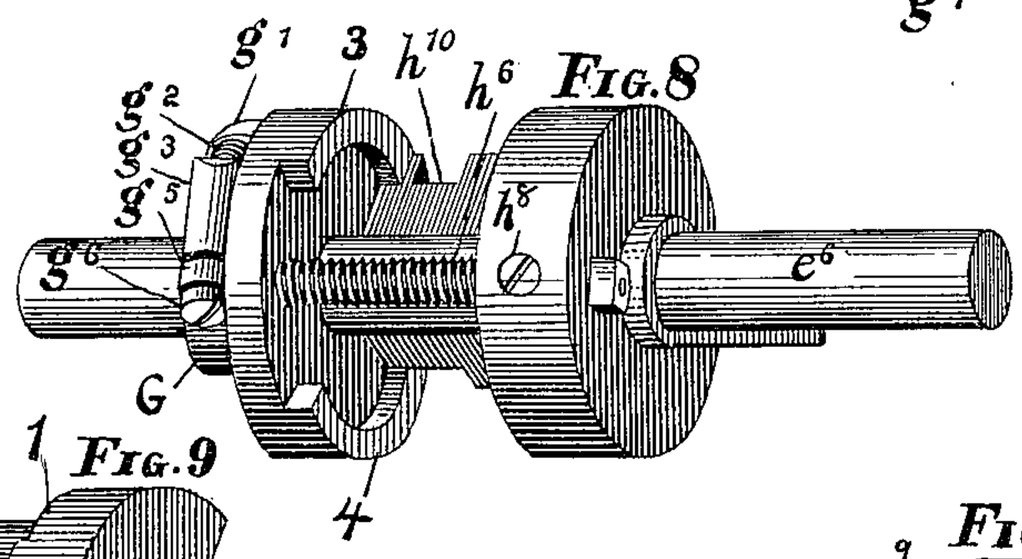


FIG. 9

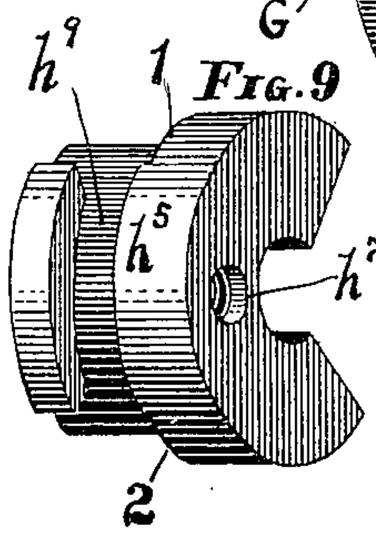


FIG. 13

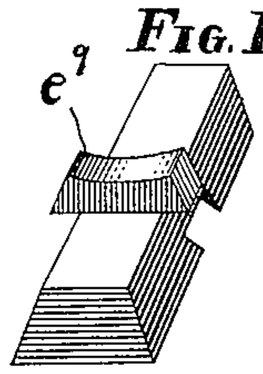


FIG. 12

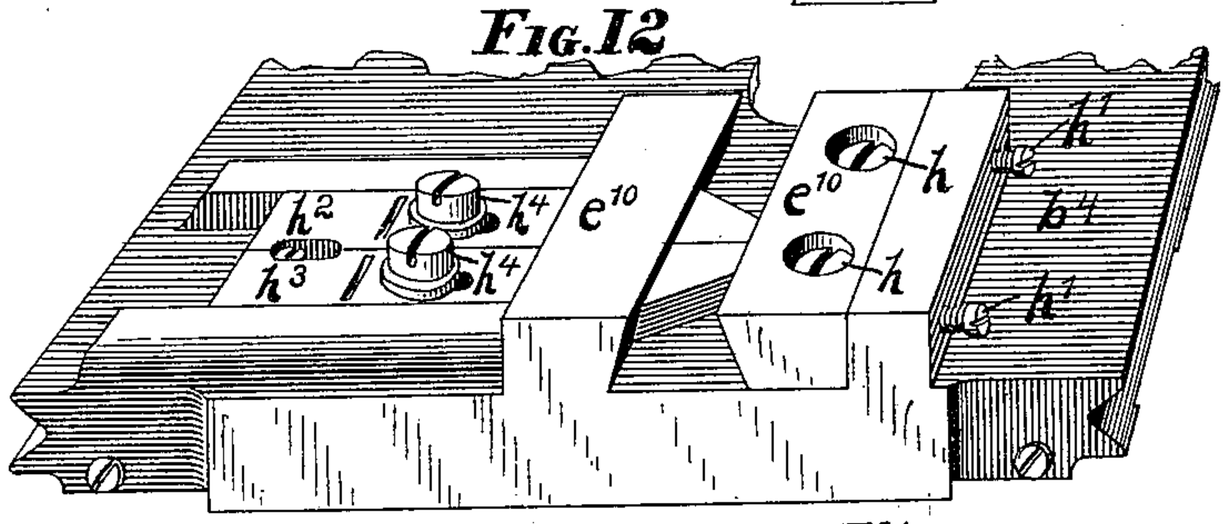


FIG. 16

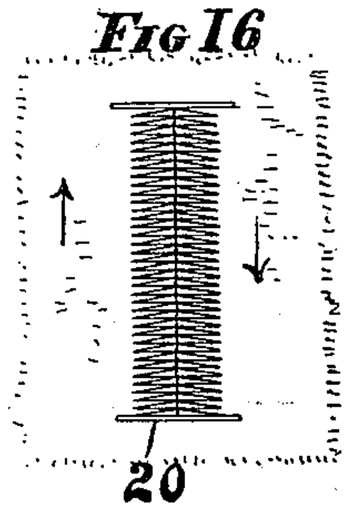
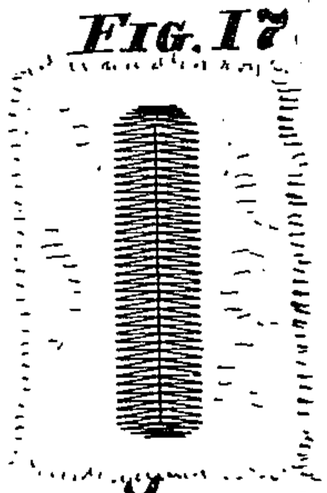


FIG. 17



WITNESSES:
Eleanor F. Groll
Grace M. Shay

INVENTOR
Freeland W. Ostrom,
BY Langer & Roberts,
ATTORNEYS.

No. 626,189. Patented May 30, 1899.

F. W. OSTROM.

BUTTONHOLE SEWING MACHINE.

(Application filed June 4, 1897.)

(No Model.) 7 Sheets—Sheet 6.

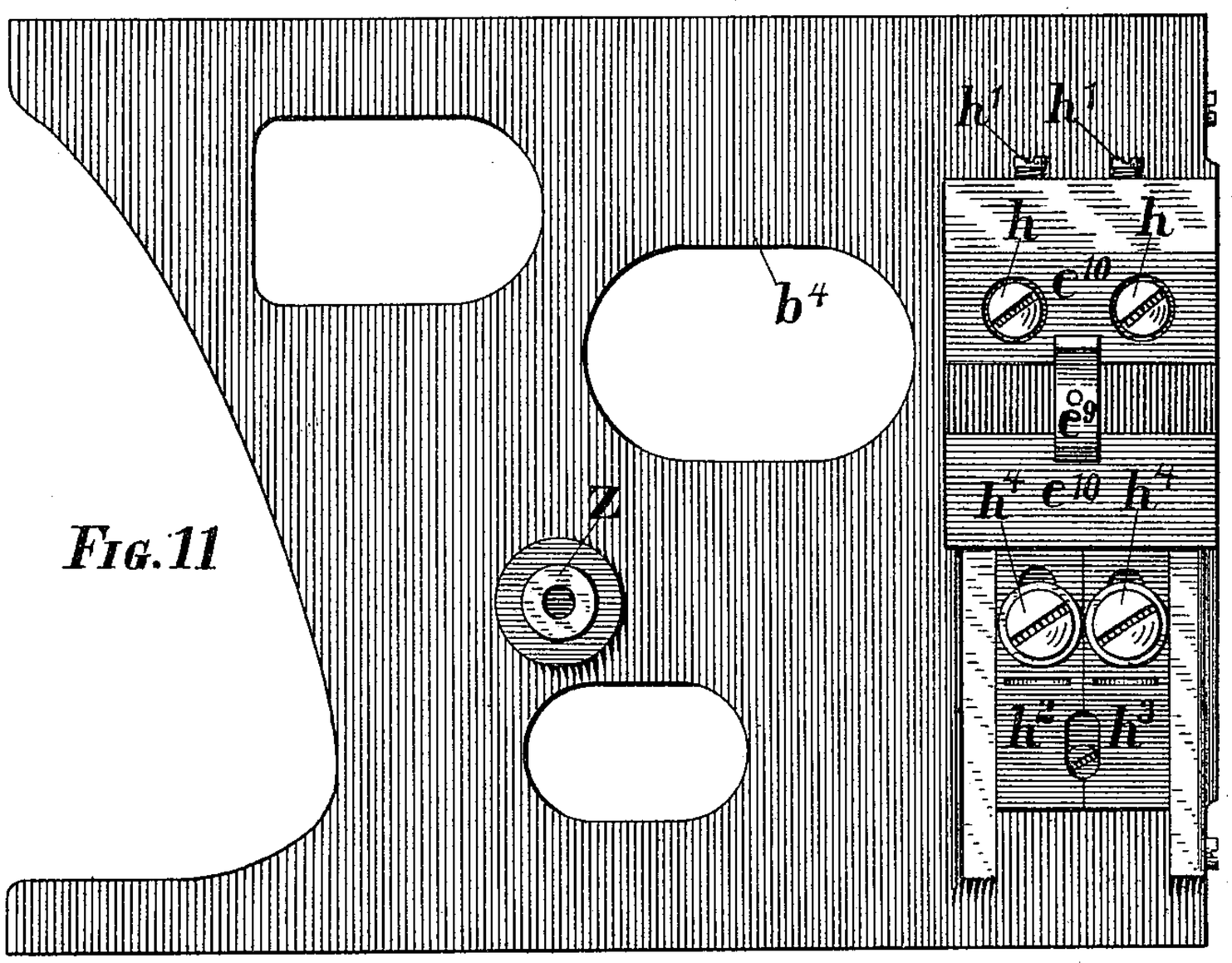


FIG. 11

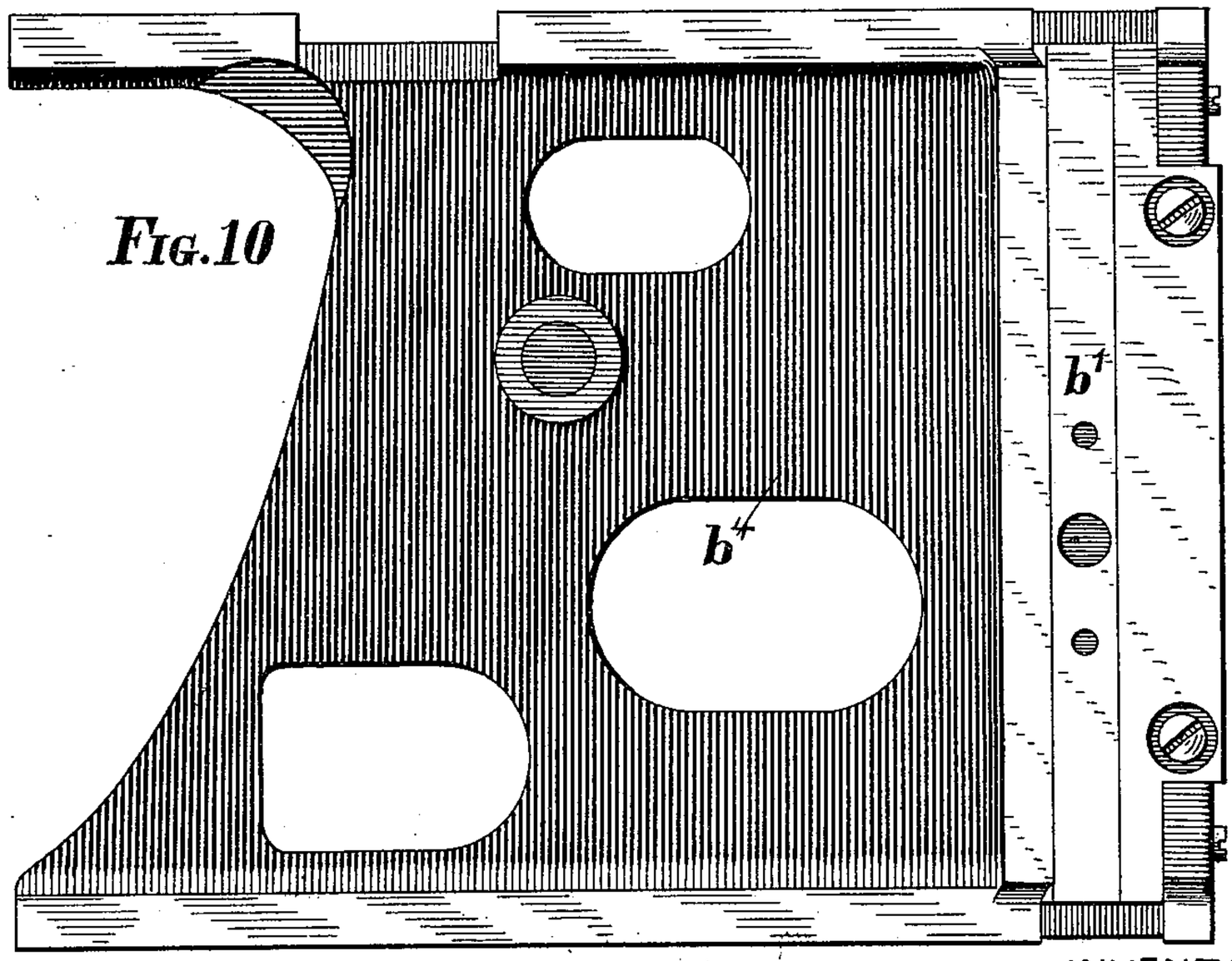


FIG. 10

WITNESSES:

Eleanor F. Groll

Grace M. Shay.

INVENTOR

Freeland W. Ostrom,

BY Lauger & Roberts,

ATTORNEYS.

No. 626,189. Patented May 30, 1899.

F. W. OSTROM.

BUTTONHOLE SEWING MACHINE.

(Application filed June 4, 1897.)

(No Model.) 7 Sheets—Sheet 7

FIG. 15

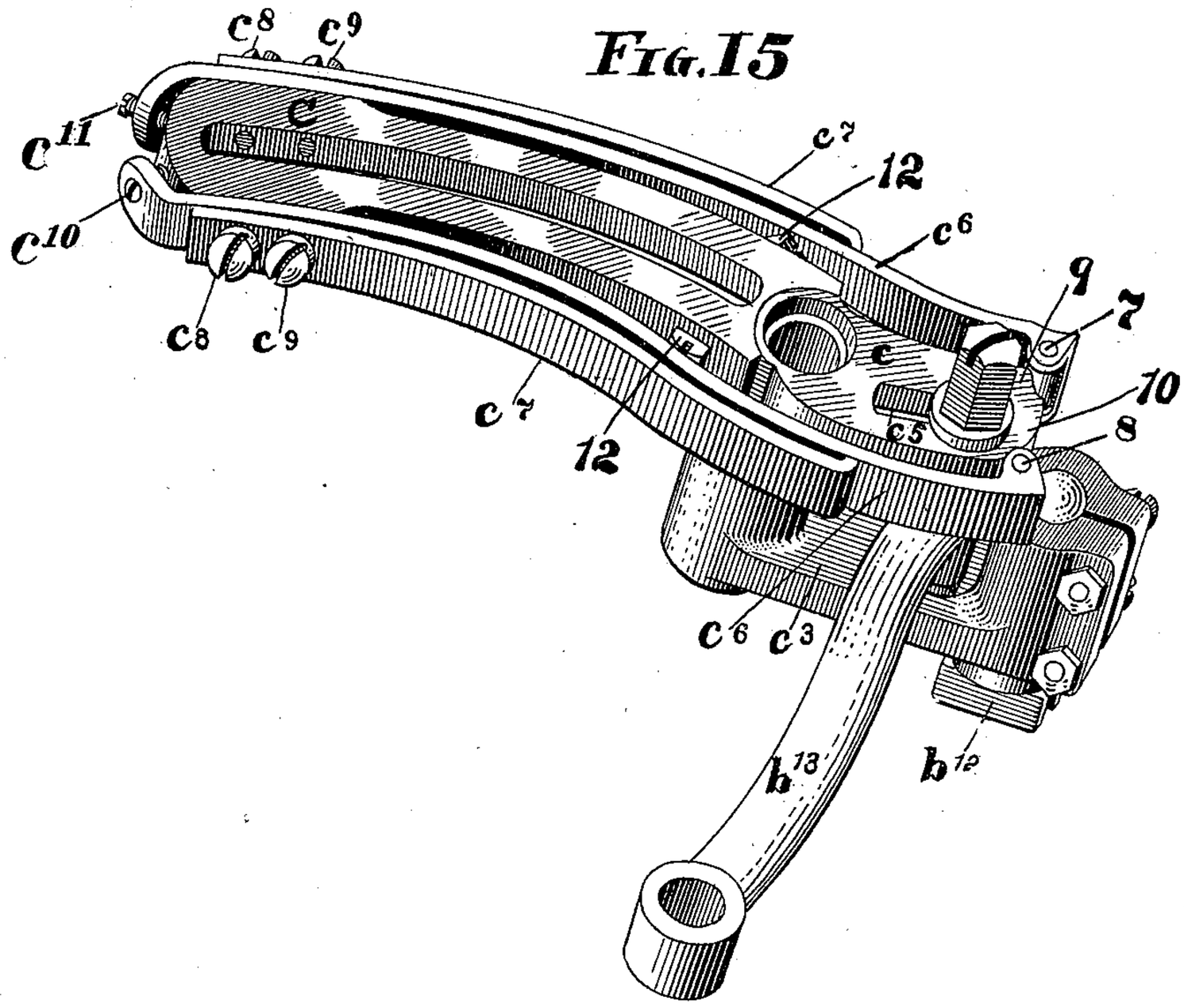
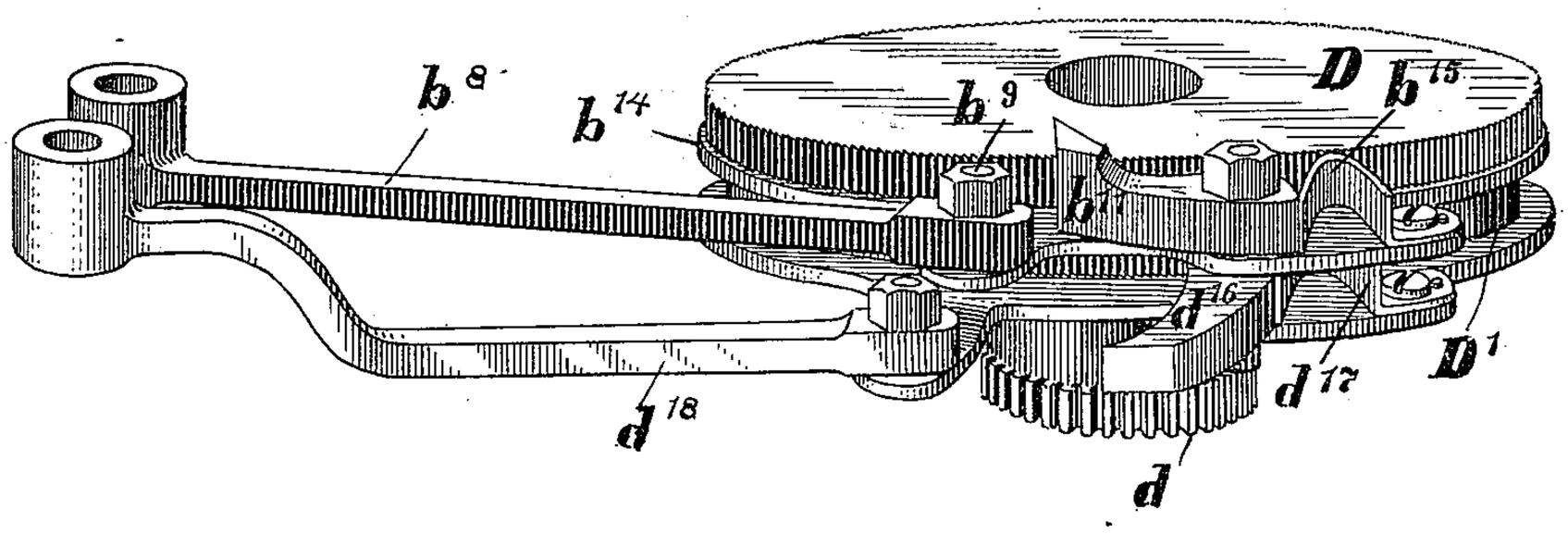


FIG. 14



Witnesses:

Eleanor F. Groll
Grace M. Shay.

Inventor
Freelund W. Ostrom.
By Lauer & Robeck,
Attorneys.

UNITED STATES PATENT OFFICE.

FREELAND W. OSTROM, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE WHEELER & WILSON MANUFACTURING COMPANY, OF SAME PLACE.

BUTTONHOLE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 626,189, dated May 30, 1899.

Application filed June 4, 1897. Serial No. 639,400. (No model.)

To all whom it may concern:

Be it known that I, FREELAND W. OSTROM, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented a new and useful Improvement in Cloth-Clamp-Actuating Mechanism for Sewing-Machines, of which the following is a specification.

The object of my invention is to provide a new and improved cloth-clamp-actuating mechanism for use in connection with suitable mechanism for overseaming buttonholes or other designs.

In the present instance I have embodied my invention in the well-known Wheeler & Wilson sewing-machine, commercially known as the "Wheeler & Wilson D^{10} sewing-machine," with buttonhole attachment, and which is illustrated and described in United States Patents Nos. 439,679 and 439,680, granted to me November 4, 1890, as assignor to the Wheeler & Wilson Manufacturing Company, of Bridgeport, Connecticut.

The primary object obtained by my invention is to give to a buttonhole, for instance, a predetermined number of bar-stitches at each end of the buttonhole irrespective of the number of side stitches at each side of the buttonhole and likewise to give a predetermined number of side stitches at each side of the buttonhole regardless of the number of bar-stitches, the whole of which is accomplished by mechanism automatically controlled and operated. Further, I have provided means whereby the number of side stitches, as well as of bar-stitches, may be varied, independent one of the other, by an easy and simple adjustment of the parts and to maintain, if so desired, a predetermined number of bar-stitches with relation to a changed or varied number of side stitches. For instance, in stitching a buttonhole an inch long it may be desired to bar each end thereof with six bar-stitches, while when it is sought to stitch buttonholes a half-inch in length it may be desirable to maintain the same number of bar-stitches at each end of the buttonhole, while the number of side stitches at each side of the buttonhole would be reduced in view of the shortened length of said buttonhole. Further, it may be desirable to maintain a given number of bar-stitches at each end of a given-sized buttonhole, while it is sought to change the number of stitches at each side of the buttonhole. My invention is specially adapted to effect these results by means of quick and simple adjustment of parts.

In connection with the foregoing my invention also includes means for predetermining the depth of the overseam-stitches, whereby in a buttonhole, for instance, the depth of side and bar stitches may be varied and predetermined, and the mechanism will then automatically stitch the same. Further, I have provided improved means whereby the position and length of the stitches forming any particular design—as, for instance, in the present case the formation of the side and bar stitches of a buttonhole—are accurately predetermined and by automatic operation of my improvements governed, and in this connection I have also provided means whereby in the stitching of the required pattern or design the transition from the stitching, say, of the short side stitches to the relatively long end stitches is accomplished without the making of mongrel stitches on the one hand and without liability of a jam or lock in the operation of the mechanism on the other.

Included in my invention as part of the mechanism through the operation of which I am enabled to provide for relatively long and short stitches—as, for instance, in the making of a barred buttonhole—I employ a vibrating lever of peculiar and novel construction through which motion is conveyed to the cloth-clamp in accordance with the form or design of the controller-cam or pattern-cam irrespective of the normal throw given to said lever by the lever-actuating mechanism. In connection with the controller-cam and vibrating lever, which are intended in the operation of my mechanism to control the crosswise movements of the cloth-clamp in the making of relatively long and short stitches, I also provide means whereby the length of such stitches may be relatively increased.

By the employment of my invention I am enabled by the use of an adjustable controller-cam and by adjustment of parts of the mechanism to stitch various designs or patterns

and to lengthen and shorten the stitches at any desired portion or portions of the predetermined cycle of stitching.

For a full and accurate understanding of my invention and of the nature and scope thereof reference is made to the following specification and claims.

In the annexed drawings I have embodied my invention in one form of mechanism which I have shown as applied to the base-plate of the well-known Wheeler & Wilson D^{10} sewing-machine, with the arm and the usual sewing mechanism removed for clearness of illustration.

Figure 1 is a plan view of such base-plate, showing a portion of the main or driving shaft, the switch-cam, and one form of mechanism which embodies my invention. Fig. 2 is a side view of Fig. 1, showing a portion of the bed-plate broken away and the front guideway for the cloth-clamp slide-frame removed to bring to view certain mechanism to be referred to as forming part of the mechanism embodying my invention. Fig. 3 is a plan of a portion of the under side of the bed-plate with attached mechanism. Fig. 4 is a plan view of a portion of the bed-plate with the mechanism shown in Figs. 14 and 15 removed for clearness of illustration of the remaining parts to be particularly referred to. Figs. 5, 6, 7, 8, and 9 are detail views of the pattern-cam and parts thereof. Fig. 10 is a plan view of the cloth-clamp slide-frame with the clamp removed. Fig. 11 is an under side view of the cloth-clamp slide-frame with cloth-clamp removed and showing the pattern-cam follower and its adjusting devices. Figs. 12 and 13 are details to more clearly illustrate the pattern-cam follower and parts of mechanism which coöperate therewith. Fig. 14 is a perspective of parts which appear in Fig. 1 and which are removed from Fig. 4. Fig. 15 is a perspective view of the vibrating mechanism which transmits the vibratory and feed movements to the cloth-clamp-actuating mechanism. Fig. 16 shows in plan a stitched buttonhole such as made by the employment of the mechanism embodying my invention. Fig. 17 shows a form of stitched buttonhole as made on the Wheeler & Wilson buttonhole-sewing machine referred to herein.

Corresponding parts in the several figures are indicated by like letters of reference.

The bed-plate A, the main driving-shaft a, the cloth-clamp, the under member B of which is shown, the switch-cam b, the cross-slide b', to which the cloth-clamp is attached, the stationary guideway b^2, and the adjustable guideway b^3 for the cloth-clamp slide-frame b^4, the ratchet-wheel D, the friction-spring b^6, with its adjusting-nut b^7, the feed-link b^8, with its connections b^9 and b^{10}, and pawl b^{11} for engaging the ratchet-wheel D, the switch cam-follower b^{12}, (shown clearly in Fig. 15,) the connecting-link b^{13}, (see Fig. 15,) the cloth-clamp slide-frame b^4, and the vibrating lever C are common to the well-known Wheeler & Wilson D^{10} sewing-machine, with buttonhole attachment, substantially as illustrated in the drawings of the patents granted to me November 4, 1890, and numbered 439,679 and 439,680, with the exception that in the present instance the connecting-link b^{13} is adjustably connected at its rear end to an auxiliary lever c, (see Figs. 1 and 15,) new to the present invention, and fulcrumed to the usual stud c', on which is also pivoted the main vibrating lever C, which is likewise common to the said Wheeler & Wilson machine except in the particulars to be hereinafter mentioned. Referring to Figs. 1 and 14, the feed-ring b^{14}, carrying the pawl b^{11}, feed-link b^8, connections b^9 b^{10}, and spring b^{15} are also common to said Wheeler & Wilson buttonhole-sewing machine.

In the Wheeler & Wilson D^{10} sewing-machine, with buttonhole attachment, as employed in the market for years and as described in the patents above referred to motion is transmitted from the switch-cam b through the cam-follower b^{12} to a lever, corresponding generally to the lever C, to vibrate the latter. By the vibration of this lever motion is transmitted through a connecting-link, corresponding substantially to the connecting-link b^8, and a pawl, corresponding to the pawl b^{11}, to a ratchet-wheel D to give rotation to a heart-cam fast on the same spindle which carries the ratchet-wheel, and by virtue of the rotation of the ratchet-wheel and heart-cam and their proper and well-known connecting means a lengthwise reciprocation or cycle of feed movement is given to the cloth-clamp. In the present instance the construction differs from that in the well-known Wheeler & Wilson machine referred to, for herein I employ two ratchet-wheels—namely, the upper ratchet-wheel D, and mounted on the same spindle immediately below the ratchet-wheel D another ratchet-wheel D'. (More clearly shown in Fig. 2.) These ratchet-wheels D D' are made fast to each other and also to a gear-pinion d, mounted upon the same spindle below the ratchet-wheel D', said ratchet-wheels and gear-pinion being loose on said spindle. (See Figs. 2 and 14.) This gear-pinion meshes with the gear-wheel d', (see Fig. 4,) fast on the spindle d^2. (See Fig. 3.) The gear-wheel d' is provided with a cam-groove d^3, (shown partly in full lines in Figs. 1 and 4,) so that in reality the gear-wheel d', with its cam-groove d^3, constitutes a feed-cam for the cloth-clamp.

In the Wheeler & Wilson buttonhole-machine, to which reference has been made, the cloth-clamp slide-frame, which works in the guideways, carries all the cloth-feeding mechanism, and therefore such mechanism partakes of the jogging movement (or that reciprocating movement of the machine whereby the edge and depth stitches are properly placed) and its switch connections are required to jog such parts, whereas in the present instance I have relieved the cloth-clamp

slide-frame b^4 of the cloth-clamp-feeding mechanism and have secured such parts to the base-plate of the machine. Hence the spindle or stud b^{16}, (see Figs. 2 and 4,) on which are mounted the ratchet-wheels D D′ and the gear-pinion d, is secured in the bed-plate A of the machine, and the cloth-clamp slide-frame is suitably cut away to permit of the passage therethrough of said spindle and also to permit of the proper movements of said slide-frame. The same is true of the other spindles or studs to be referred to, which pass through the slide-frame and which are secured in the bed of the machine, so that the slide-frame is largely skeletonized for this purpose.

The feed-cam d' is the device which through its operation and through proper connections with the cloth-clamp gives to the cloth-clamp B the required lengthwise movement or cycle of feed movement to, for instance, provide a buttonhole with overseam-stitches. This feed-cam d' by the gear-teeth at its periphery is geared two to one with relation to the gear-pinion d, and consequently has a single revolution to two revolutions of the ratchet-wheels D D′, and, as pointed out, the motion transmitted through connections of the vibrating lever C to the ratchet-wheel D is through such gears transmitted to the feed-cam or gear d'. To trace motion from said feed-cam d' to the cloth-clamp B, the mechanism is as follows: The slide-bar d^4 at one end slides in a suitable groove or slot in the guideway b^2, as more clearly shown in Figs. 1 and 4, and at the other end is held to the slideway b^3 by a shouldered screw d^5, (see Fig. 4,) passing through an elongated slot in said slide-bar and entering the said guideway b^3. As shown in Fig. 2, this slide-bar is bent to enable it to be so secured in the machine. As shown in Figs. 1 and 4, the slide-bar d^4 is provided with gear-teeth d^6, which mesh into gear-teeth d^7 of the sector d^8 of the pivoted lever d^{10}, pivoted by the pivot-screw d^9 (see Figs. 2 and 3) to the base-plate A. The slide-bar d^4 is provided with a cam-roller (not shown) held in position by the screw X. (See Fig. 4.) The pivoted lever d^{10} has a slot $d^\times$, as shown in Figs. 1 and 4, and a suitable adjusting-stud d^{11}, the lower end of which loosely passes through a slot in the lever d^{12}, pivoted to the base-plate by a screw d^{13}, and the forward end of which lever is pivotally connected with a link d^{14}, (see Figs. 2 and 14,) which link is in turn pivoted to the cross-slide b', so that motion given to the lever d^{12} will in turn be imparted through the link d^{14} to said cross-slide, which carries the cloth-clamp. It will be observed by tracing this train of connections just described that motion will be transmitted from the feed-cam d' through the slide-bar d^4, sector d^8 of the pivoted lever d^{10}, pivoted lever d^{12}, link d^{14} to the cross-slide b', to which is attached the cloth-clamp, whereby the cloth-clamp will be given its cycle of feed movement in the overseaming of, for instance, a buttonhole such as is delineated in Fig. 16. It is apparent that adjustment of the adjusting-stud d^{11} in the slot $d^\times$ of the pivoted lever d^{10} will determine the lengthwise feed or cycle of feed movement of the cloth-clamp, so as to give it greater or less reciprocating throw. For instance, with a given throw of the cloth-clamp under the adjustment illustrated in Fig. 1 adjustment of the adjusting-stud d^{11} in a position nearer to the pivot of the lever d^{10} will give a less throw to the cloth-clamp, because, as can be seen from inspection of Fig. 1, said adjusting-screw d^{11} is then farther removed from the pivot-screw d^{13} of the lever d^{12} and nearer to the axis of the pivoted lever d^{10}, and hence there will be a lessened arc of movement of that end of the lever d^{12} to which is attached the link d^{14}.

I have now described the mechanism as employed in the present instance in illustration of my invention to give to the cloth-clamp B its lengthwise reciprocation or cycle of feed movement, which may be said to be in common with the lengthwise feed movement of the well-known Wheeler & Wilson buttonhole-sewing machine, to which I have heretofore referred, and I will now describe wherein this feed movement has been changed or modified in the present instance.

In the machine referred to by the operation of the heart-cam of that machine the cloth-clamp has a cycle of feed movement which to all intents and purposes is a straight-line movement in one direction, a sharp turn, a straight-line movement in the opposite direction, and a sharp turn to the starting-point, and such feed is practically progressive and continuous, so as to overseam a buttonhole such as is represented in Fig. 7. In the present instance the mechanism embodying my invention is adapted to overseam a buttonhole such as is represented in Fig. 6, wherein there are two straight lines or sets of stitches, one along each side of the buttonhole-slit and longer stitches crosswise of the buttonhole-slit at each end thereof to provide a so-called "straight" bar at each end of the buttonhole. In the making of such buttonhole it is desirable to provide a different feed for the making of the bar-stitches from that required for the making of the side stitches. In my invention as embodied in the mechanism here shown I have in substance two feeds independent in effect from each other, one feed controlled by certain portions of the feed-cam d' and by the upper ratchet-wheel D to make the side stitches, the other feed controlled by other portions of the feed-cam d' and by the lower ratchet-wheel D′, and in the operation of the mechanism when one feed is at work the other feed is in effect idle, and vice versa, although so far as the feed-cam d' is concerned I am enabled to make the cam-groove therein control both feeds. I have provided such mechanism so as to get a predetermined number of bar-stitches at each end of the button-

hole irrespective of the number of side stitches along the sides of the buttonhole, and vice versa. Further, it depends merely upon whether those portions of the cam-groove of the feed-cam d' which coöperate with the lower ratchet-wheel D' are made dead or concentric with the axis of the feed-cam d' or whether they are made slightly eccentric as to whether the bar-stitches are piled one upon another at each end of the buttonhole or are spread over a slight amount of cloth at each end thereof. By thus making the mechanism which controls the stitching of the bar-stitches independent of the mechanism to feed the cloth-clamp and the making of the side stitches I am enabled to accomplish two things. First, I can give to the buttonhole a predetermined number of bar-stitches at each end thereof irrespective of the size of the buttonhole and of the number of side stitches, and, second, I am enabled to vary the number of bar-stitches, so as to make more or less stitches constitute a bar irrespective of the size of the buttonhole and of the number of side stitches. To refer now to the mechanism by which these results are accomplished, the switch-cam b, acting on the cam-follower b^{12}, attached to the arm c^3 of the lever C, pivoted, as above referred to, on the pivot-stud c', which is made fast in the bed-plate, as shown in Fig. 3, vibrates the lever C, and such vibratory movement is, as before indicated, communicated to the upper ratchet-wheel D through the connections b^{10} b^8 b^9 and pawl b^{11}, so that a step-by-step rotary movement is imparted to the upper ratchet-wheel D to give lengthwise feed movement to the cloth-clamp through the operation of the gear-pinion d and feed-cam d', whereby said stitches are spaced. The cam-groove of the geared feed-cam d' has two eccentric or cam portions separated by two dead or concentric portions. The eccentric portions coöperate with the ratchet-wheel D and give the lengthwise feed movement back and forth of the cloth-clamp to enable the stitches to be spaced at each side of the buttonhole. The lower ratchet-wheel D', loose on the spindle on which is placed the upper ratchet-wheel D, as more clearly shown in Fig. 2, is mutilated to have ratchet-teeth on a portion only of its periphery, (see Fig. 14,) which are intended to operate in connection with a pawl d^{16} and spring d^{17}, the duplicate of the spring-actuated pawl b^{11} b^{15}, provided for the upper ratchet-wheel. The pawl and spring d^{16} d^{17} for the mutilated ratchet-wheel D' are shown in Fig. 14. The pawl d^{16} for the ratchet-wheel D' is operated by the connecting-rod d^{18}, secured in the slot in the vibratory lever C by the bolt d^{19}, whereby the pawl d^{16} for the lower ratchet-wheel D' is actuated synchronously with the pawl b'' for the upper ratchet-wheel D because of the vibration of the lever C. It is apparent that the pawl d^{16} for the mutilated ratchet-wheel D', while continously operated with the upper pawl b^{11}, is yet inactive so far as the lower ratchet-wheel D' is concerned, except when by the rotation of the upper ratchet-wheel D the toothed portion of the lower ratchet-wheel D' is brought around to said pawl D^{16}. As soon as a tooth in the mutilated ratchet-wheel D' is brought into a position to be engaged by the pawl d^{16} that pawl having a greater range of movement (due to the fact that its connecting-link d^{18} is secured in the slotted lever C at a point farther removed from the axis of said lever than is the connected rod b^8, which actuates the upper pawl b^{11}) gives rotation to both ratchet-wheels, for the reason that it will sweep over a greater number of teeth of the ratchet-wheel D' than will the upper pawl on the same stroke of the vibrating lever C, and consequently the lower pawl will take effect to give to the lower ratchet-wheel D', and hence to both, a greater rotative movement than is possible through the operation of the upper ratchet-wheel D. When the two ratchet-wheels are actuated by the pawl d^{16}, which engages the lower ratchet-wheel, the roll which enters the cam-groove of the feed-wheel d' enters the inactive or dead portions of the said cam-groove, whereby two things are accomplished—first, the activity of the cam-groove having ceased for the time being the lengthwise feed of the cloth-clamp is stopped, and, second, opportunity is given the other parts of the mechanism (to be referred to) to be so actuated as to place the longer bar-stitches at the end of the buttonhole during the cessation of lengthwise feed of the cloth-clamp.

From the foregoing it will be noted that when both ratchet-wheels are given step-by-step movements through the activity of the upper pawl b^{11} the roller which enters the cam-groove in the feed-cam d' coöperates with the eccentric portions of said cam-groove, and in consequence the cloth-clamp has a lengthwise step-by-step feed in one or the other direction, whereas when both ratchet-wheels are given step-by-step movements through the activity of the lower pawl acting in coöperation with the teeth of the mutilated ratchet-wheel D' the roller coöperating with the cam-groove of the feed-cam d' is in one or the other of the inactive or substantially inactive portions of said groove, whereby the cloth-clamp ceases to have any lengthwise movement. Hence it is apparent that so long as the lower pawl d^{16}, when in operation to turn the ratchet-wheels, gives to those ratchet-wheels a greater range of movement than can be given during the same time by the upper pawl acting upon the upper feed-wheel the lengthwise feed of the cloth-clamp is lessened or stopped, and, on the other hand, when the lower pawl (though active in that it is moved by the vibrating lever) has no effect upon the mutilated or lower ratchet-wheel, owing to the absence of teeth on portions of said lower ratchet-wheel, there can be no stoppage of the lengthwise movement in one or the other direction of the feed-clamp, because during the time the lower

pawl is inactive to effect any movement of the lower ratchet-wheel the cloth-clamp is under the domination of the upper pawl acting upon the teeth of the upper ratchet-wheel, and the roll is also under the domination of the eccentric portions of the cam-groove to give to said cloth-clamp a lengthwise movement. Thus, in effect, the mechanism presents two independent feeds, one to give lengthwise movement to the cloth-clamp and dominated by the upper ratchet-wheel with its pawl, a roller, and eccentric portions of the cam-groove of the feed-cam d', and the other which in this construction has no effect upon the cloth-clamp to feed it in any direction because of the dead or inactive portions of the cam-groove of the feed-cam d' and because the cloth-clamp at such times is under the domination of the lower or mutilated ratchet-wheel D′ and its pawl d^{16}.

The cloth-clamp-actuating device, as here illustrated, has the upper ratchet-wheel provided with teeth around its entire periphery and the second or lower ratchet-wheel only partially provided with teeth. This arrangement of the teeth on the two wheels is provided in view of the particular form of the groove in the feed-cam. It is the design of this machine that the upper ratchet-wheel, while governing the step-by-step feed movement of the cloth-clamp for the overseaming of the buttonhole, shall receive the step-by-step rotative movement given to the second or mutilated ratchet-wheel at such time as such feed-wheel is actuated to bar the buttonhole. While this construction is desirable for the particular design (see Fig. 16) used to illustrate the operation of this device, yet in overseaming some other figures or to comply with the demands of some manufacturers it might be necessary to give to the second or under ratchet-wheel a finer feed than that given to the upper ratchet-wheel. In such instance it would be necessary to make both feed-wheels mutilated ratchet-wheels—that is, where teeth were formed on part of the periphery of one wheel the other would be devoid of teeth as to such part or parts. This would permit either wheel being changed independent of the other; but constructed as shown the upper feed-wheel must always be given a shorter step-by-step feed movement than the lower. The particular manner of arranging these two wheels, as shown in the drawings, is accomplished by giving to the cam-groove of the feed-cam d' a dwell or inactive portion representing the fewest number of barring-stitches which it is proposed to put at the end of the buttonhole in combination with the coarsest feed that it is intended to be used while placing these barring-stitches, so that where more barring-stitches are desired a finer feed would be demanded for overseaming the sides of the buttonhole, thus enabling one adjustment in the vibrating lever C to follow the other without being obliged to transfer studs d^{19} and b^{10} from their respective positions as shown in the drawings.

As above pointed out, in the employment of the mechanism shown in the drawings the barring-stitches at each end of the buttonhole are laid while the cloth-clamp is under the domination of the lower ratchet-wheel D′ and the coöperating portions of the cam-groove in the feed-cam d'. To make the edge and depth stitches of the side stitching and to locate the long bar-stitches, it is essential that the cloth-clamp have a "jogging" movement at right angles to its lengthwise feed or cycle of feed movement. To obtain this movement in the present instance the following mechanism is employed:

Below the base-plate A on the lower end of the stud d^2, which carries the feed-cam d', is fixed a miter-gear e, which meshes with a similar miter-gear a', fast on the shaft e^2, held in the bearing e^3. The shaft e^2 has fast thereon at its opposite end a pinion e^4, which meshes into a pinion e^5, secured to the pattern-cam-driving shaft e^6, suitably held in bearings e^7 e^8, fastened to the under side of the bed-plate A.

E is the pattern-cam, (see Figs. 5 to 9, inclusive,) which in the present instance is provided with a cam-groove of different widths which comprises two narrow portions arranged alternately with two wider portions, each with parallel sides. The purpose of the narrow portions is to control the position of the edge and depth stitches in making the side stitching, while the wider portions are to control the length of the bar-stitches, which may be placed at each end of a buttonhole. It may be further premised that the length of the narrow portions of the cam-groove are made dependent upon those portions of the cam-groove of the feed-cam d' which coöperate with the upper ratchet feed-wheel D to give lengthwise movement to the cloth-clamp during the overseaming of the sides of the buttonhole, while the length of the wider portions of the cam-groove is dependent upon and made relative to the portions of the cam-groove of the feed-cam d' which coöperate with the lower ratchet-wheel D′, so as to dominate the cloth-clamp during the making of the bar-stitches at each end of the buttonhole. Coöperating with this pattern-cam E is a stud or follower e^9 (see Figs. 11 and 13) held in suitable guides e^{10}, attached to the under side of the cloth-clamp slide-frame b^4. (See Fig. 11.) Aside from the matter of adjustment by means such as are shown in Figs. 5, 8, 9, and 12 to get a certain amount of lost motion for purposes which will be fully explained when description of the mechanism shown in said figures is given, the cam-follower e^9 is virtually fast on the cloth-clamp slide-frame b^4, so as to act merely as a stud or pin projecting from said slide-frame to enter the cam-groove of the pattern-cam E. Thus employed it is evident that the side walls of the groove of the pattern-cam will al-

ways act as a stop to limit any reciprocation of the cam-follower in said cam-groove, whatever may be the width of the cam-groove. The cloth-clamp slide-frame b^4 is, as before stated, reciprocated in the guideways b^2 b^3, and this reciprocation is limited by the pattern-cam.

To refer now to the mechanism by which reciprocation of the cloth-clamp slide-frame b^4 is accomplished, the vibrating lever C, which, as before described, has a cam-follower b^{12} engaging with the switch-cam b to impart motion to the ratchet-wheels D D', is provided with an auxiliary lever c, (shown clearly in Fig. 15,) pivoted on the stud c' and having a slot c^5 to permit the link b^{13} to be adjustably secured to said auxiliary lever, the opposite end of which is attached, as at Z, (see Fig. 3,) to the cloth-clamp slide-frame b^4, so as to make a continuous connection between said auxiliary lever and said slide-frame. Motion is conveyed from the main vibrating lever C through the springs c^6 c^6, which in the present instance have reinforcing-springs c^7 c^7, both sets of springs being held to the vibrating lever C by the screws c^8. The screws c^9 c^9 (see Fig. 15) are adjusting-screws to adjust the springs c^7 with relation to the springs c^6 so that the latter may have more or less effect upon the auxiliary lever c, as required. Under the influence of the springs c^6 the auxiliary lever c will have, in the absence of other controlling devices, a maximum throw and will thus give to the cloth-clamp slide-frame a corresponding throw; but with the present mechanism embodying my invention it is desired that the cloth-clamp slide-frame b^4 shall have a certain amount of throw to make the side stitches and a greater throw to make the bar-stitches. Under all conditions the auxiliary lever c is intended to give to the cloth-clamp slide-frame a throw equal to the greatest throw demanded of the cloth-clamp slide-frame, and it will now be recognized that the purpose of the cam-groove of the pattern-cam E is to dominate or control the throw of the cloth-clamp slide-frame regardless of what might otherwise be the throw of such frame through the operation of the auxiliary lever. For instance, in making the side stitches of a buttonhole the auxiliary lever c through its spring connections with the main lever C will seek to give to the cloth-clamp slide-frame a throw of a length at least as great as the width of the wide portions of the groove of the pattern-cam E, whereas the cam-follower e^9 in such movement will be brought up against the side walls of one of the narrow portions of the cam-groove and will thus positively prevent the slide-frame from having a greater throw or reciprocation than that equivalent to the width of the narrow portions of the cam-groove of said pattern-cam E. The remainder of the throw will be taken up by one or the other of the springs c^6. In the same way whatever may be the throw that would otherwise be given to the cloth-clamp slide-frame b^4 in excess of the width of the wide portions of the cam-groove of the pattern-cam E in the making of the bar-stitches the cloth-clamp can only have a throw equivalent to the width of said wide portions of said cam-groove for the same reason—namely, because the cam-follower e^9 will impact against the side walls of said wide portions of the cam-groove and prevent excess of throw, and any excess will be compensated for by one or the other of the springs c^6. In this way it will be observed that the groove in the pattern-cam E will accurately and positively control the movements of the slide-frame in exact accord with the pattern of said cam-groove. Under these circumstances it is evident that pattern-cams having cam-grooves differing in design from the cam-groove of the pattern-cam E may be substituted for said pattern-cam E to overseam other designs than a barred buttonhole. It is evident that in case of such change of pattern-cam a corresponding change would be required in the cam-groove of the feed-cam d', and such substitution would also involve an incidental adjustment of the connecting mechanism.

It will be noted from an inspection of the cam-groove of the pattern-cam E that the wide and narrow grooves end abruptly with sharp right-angular corners. In connection with such pattern-cam I show in Fig. 7 an important feature of my invention. The prime member which gives vibratory and feed movements to the cloth-clamp is the switch-cam, and such cam is constructed to give movement to the various parts that actuate the cloth-clamp during a certain portion of its revolution, and during such time all parts of the cloth-clamp-actuating mechanism are in motion. In the present construction the pattern-cam is mounted upon its driving-shaft in such manner as to permit an instant change from the shorter overseam-stitch to the longer. It is evident from the manner in which all the parts are driven that all of the cloth-clamp-actuating parts are moved at the same time, and if the pattern-cam were rigidly held by the driving-shaft the follower which coöperates with the pattern-cam groove would be liable to become jammed against the end wall of the grooves unless the machine were built for a given timing of the movements of the parts and not capable of operation through adjustment. To provide against any such difficulty in the operation of the cam-follower with relation to the end walls of the grooves, I mount the pattern-cam on its driving-shaft in such a manner that it is rotated by a spring which holds it in a registered position, but capable of yielding to the resistance of the follower, and permit the follower to be moved to a position which will enable it to enter the narrow groove of the cam, and immediately after the spring will again place the pattern-cam in its registered position with relation to its driving-shaft. Referring now to the mechanism which in the present instance embodies

this part of my invention, the pattern-cam E (see Fig. 7) is loose on its shaft e^6 and is provided with a pin or stop g and with a socket g', the latter receiving one end of a coiled spring g^2, the other end being held in a similar socket g^3, fast on a split or "pinch" collar G, which is splined by the spline g^4 on the shaft e^6. The pinch-collar G is provided with the usual projecting lugs g^5 and a tightening-screw g^6, so as to enable it to be rigidly held upon its shaft e^6. Coöperating with the pin g on the pattern-cam E is a lug g^7, which is a part of collar G. Under normal conditions the pin g abuts against the lug g^7. From this construction it will be observed that motion of the shaft e^6 will be transmitted to the pattern-cam E through the collar and its spring. Now with this construction if the cam-follower e^9 should in its movement lodge against any of the end walls of the groove of the pattern-cam E excessive strain or breakage of parts will be avoided and an opportunity will be afforded the cam-follower e^9 to be released from contact with such end walls and be allowed to enter the narrow portions of the cam-groove by reason of the fact that the pattern-cam E will yield against the resistance of the cam-follower, due to the presence of the spring g^2, and the driving-shaft e^6 be permitted to advance independent of the pattern-cam E until the follower takes its position in the narrower groove, when the cam again assumes its normal position, with the pin g in contact with the lug g^7 of the collar G.

Referring now to Fig. 3, the driving-shaft e^6 for the pattern-cam E is shown as encircled by an adjustable bushing comprising a loose sleeve g^8, held in a split hanger g^9, provided with pinch-lugs and adjusting-screw g^{10} g^{11}, respectively, so that upon release of the screw g^{11} the sleeve can be adjusted in such hanger and caused to force the cam E against the collar G, and then by tightening said screw g^{11} hold the parts in said adjusted position.

Fig. 12 is a detailed view of a portion of the under side of the cloth-clamp slide-frame b^4, showing the cam-follower-adjusting slides, and the guideways for the cam-follower with the cam-follower e^9 removed therefrom. Fig. 13 is a perspective of said cam-follower e^9. To refer now to the parts in detail, e^{10} are the guideways for the cam-follower, one of which is adjustably secured in the usual manner to the slide-frame b^4 by the screw h and the screw h' to obtain adjustment to compensate for wear and the other being rigidly secured to or made a part of slide-guideway b^4.

For the purpose of varying the length of the vibratory movement of the cloth-clamp, as when it is desired to change the length of the overseam-stitch, I have provided the adjusting-plates h^2 h^3, which can be adjusted so as to permit the cam-follower e^9 to slide in its guideways e^{10}. The construction of the pattern-cam follower and the adjusting-plates h^2 h^3 is such that when in their normal position, as is shown by Figs. 5 and 11—that is, when the follower e^9 has no movement in the guideways e^{10} and when that portion of the pattern-cam shown in Fig. 9 is adjusted as shown in Fig. 5—the narrowest overseam-stitch is produced, and the motion given to the follower e^9 by the adjustment of the plates h^2 or h^3 and the adjustment of that portion of the pattern-cam shown in Fig. 9 is for the purpose of increasing the length of the overseam-stitch and for properly adjusting the edge stitch with relation to the buttonhole-slit. It will be understood that if either of the adjusting-plates h^2 h^3 is moved back from the position as shown in Fig. 12 and held in such position by the screw h^4 motion can be given to the cam-follower e^9 in its guideways e^{10} relatively to such adjusted position of said plate h^2 or h^3. Such movement of the cam-follower e^9 in its guideways e^{10} gives, in effect, a relative amount of play or lost motion between the pattern-cam E and the slide-frame b^4, whereby, in effect, through the operation of the spring-controlled vibrating auxiliary lever c the slide-frame is given a throw or reciprocation in excess of the throw which is dominated by the pattern-cam—namely, a throw equivalent to that dominated by the pattern-cam plus the throw or movement of the cam-follower in its guideways e^{10}. By such construction and relative adjustment of parts I am enabled to variably increase the length of the overseam-stitches of the buttonhole. While the mechanism so far described enables me to vary the length of the overseam-stitches, yet the edge stitches of such lengthened overseam-stitches would not be properly located with relation to the buttonhole-slit, but, on the contrary, the edge stitches at one side of the buttonhole-slit would be interlocked with the edge stitches laid along the other side of said slit, provided another pattern-cam cut to suit were not employed. To obviate the use of various pattern-cams and to provide for the proper location with relation to the buttonhole-slit of the edge stitches of overseam-stitches of increased length, the pattern-cam E is provided with an adjustable portion h^5. (See Fig. 9.) Fig. 5 is a view of the pattern-cam E complete with the adjustable portion h^5 in adjusted normal position, whereas Fig. 8 shows the cam with the adjustable portion h^5 removed, and Fig. 9 shows in perspective the adjustable portion h^5 eliminated from Fig. 8. The overseaming of the buttonhole is commenced at the end 20. (See Fig. 16.) If the cycle of feed is in the direction of the arrows, the left-hand side of the buttonhole is overseamed first by the coaction of the cam-follower and that portion of the pattern-cam E shown in Fig. 9, to be followed in overseaming the last side or right-hand side of the buttonhole by the coaction of the cam-follower and that portion of the pattern-cam shown in Fig. 8. On the other hand, if the cycle of feed movement is in the opposite direction then the right-hand side of the but-

tonhole is overseamed first by the coaction of the cam-follower and that portion of the pattern-cam shown in Fig. 8, to be followed in stitching the last or left-hand side of the buttonhole by the coaction of the cam-follower with that portion of the pattern-cam illustrated in Fig. 9. The adjustable portion h^5 (see Fig. 9) of the pattern-cam E is held in position to the remainder of the pattern-cam by means of the screw-bolt h^6, (see Figs. 5 and 8,) which passes through the portion h^5 and h^7 (see Fig. 9) and the parts maintained in the required position by the set-screw h^8, which enters an annular groove (not shown) made in usual manner in the shank of the screw-bolt h^6.

It has been pointed out that to get an overseam side stitch of increased length by relative adjustment of one of the plates h^2 h^3 (see Fig. 12) with the cam-follower e^9 and yet prevent interlocking of the edge stitches of such overseaming-stitches I provide the pattern-cam with an adjustable portion, as h^5, Fig. 9. When the adjustable portion h^5 is normally in place in the remainder of the pattern-cam shown in Fig. 8, it must be moved on and by the screw-bolt h^6 bodily to the left, (in Fig. 5,) representing a movement to the right in Fig. 8, so as to carry that portion of the pattern-cam groove which dominates the stitching of one side of the overseaming of the buttonhole (which portion of the cam-groove is h^9, formed in the adjustable portion h^5 of the pattern-cam) bodily to one side with relation to that portion of the cam-groove of the pattern-cam (cut in the part shown in Fig. 8) which dominates the stitching of the other side of the overseaming of the buttonhole. By this adjustment one side of the overseaming is always fixed and predetermined with relation to the buttonhole-slit and is governed by the complementary portion h^{10} of the cam-groove found in the fixed or stationary part of the pattern-cam shown in Fig. 8, while the other side of the overseaming is by such adjustable portion h^5 moved in effect bodily away from the fixed side of overseaming, and hence away from the buttonhole-slit, whereby the edge stitches of such latter side of overseaming are properly located with relation to the buttonhole-slit, and interlocking of the edge stitches is avoided. When this is done, the barring-stitches must have a relatively-increased length. To accomplish these results in a simple and expeditious manner by a single movement of the adjustable part h^5, I form those parts of the cam-groove of the pattern-cam which dominate the laying of the barring-stitches by walls, parts of which are in the adjustable portion h^5 and part in the fixed portion shown in Fig. 8. The walls 1 and 2 in the adjustable portion h^5 are respectively complementary to the walls 3 4 in the fixed portion shown in Fig. 8, so that in the present instance the cam-groove as a whole of the pattern-cam E is divided into two equal parts—one part in the fixed portion of the pattern-cam and the other part in the adjustable portion h^5 of said cam. Hence when the adjustable portion of the pattern-cam is moved bodily with relation to the fixed portion thereof not only is the one side of the overseaming moved or located with relation to the other side of said overseaming and with relation to the buttonhole-slit, but the portions of the cam-groove which dominate the barring are also widened out relatively to the side stitches and to cam-follower and its adjusting-plates, whereby the barring-stitches are lengthened relatively to the lengthened side stitches.

The matter of overseaming the right or left hand side of the buttonhole is accomplished by changing the relative position of the pattern-cam one-half a rotation with relation to the feed-cam, and for the reason that the right or left hand side of the buttonhole can be overseamed first by the shifting of the pattern-cam, as described, the cam-follower is made capable of movement to the right or left of its normal position, so that it may properly coact with the pattern-cam no matter what may be its adjusted position.

The adjusting-plates h^2 h^3 are at their inner ends, where they coöperate with the cam-follower, beveled in opposite directions. If the buttonhole is overseamed in the direction of the cycle of feed movement indicated by the arrows and adjustment is desired, the adjusting-plate h^3 is adjusted to increase the length of the overseam-stitch; if in the opposite direction the adjusting-plate h^2 is adjusted for that purpose. This motion of the cam-follower in opposite directions is made necessary, so that the variation in the length of the overseam-stitches shall be from the needle-line to the right or left, depending upon which side is overseamed first.

It has been pointed out that to reciprocate the cloth-clamp slide-frame b^4 from motion derived from the switch-cam b motion is transmitted from said cam to the main vibrating lever C, thence through the springs c^6 to the auxiliary lever c, pivoted on the main lever C, and thence by the connecting-link b^{13} to the slide-frame b^4; further, that motion transferred to the auxiliary lever c in excess of that which is permitted by the pattern-cam E to be given to the slide-frame b^4 is taken up by the spring c^6. In order to relieve the switch-cam of substantially the greater part of the strain which would otherwise be thrown upon it by the springs taking up the excess of throw, I have provided a peculiar and novel construction of parts.

Referring now to Figs. 1 and 15, the main vibrating lever C, the auxiliary lever c, and the springs c^6 are shown in normal position—namely, that position required when the needle is in the line of the buttonhole-slit and is about to descend to make an edge stitch alongside of the buttonhole-slit. In such position the springs c^6 bear equally upon the opposite sides of the free end of the auxiliary lever c,

and the parts are maintained in position the same as if the springs c^6 were rigid instead of yielding. It will be observed, too, that the free ends of the springs c^6 are each provided with an antifriction-roll 7 8, which in normal position of the parts, as shown in Figs. 1 and 15, bear upon the auxiliary lever *c* at the outermost edges of its front and back walls or surfaces where they join the outermost edges of the wall or end surface of the free end of said lever. The end wall is divided substantially into two surfaces 9 10, which are made slightly eccentric to the axis of the auxiliary lever *c* and for the following purpose: As long as the auxiliary lever is moved by the spring c^6 the parts maintain their relative position shown in Fig. 15. As soon as the auxiliary lever is prevented from further movement by the pattern-cam E (as before pointed out) and the springs continue their movement with the main lever C one of the springs c^6 (for instance, that one contiguous to the surface 10) will advance slightly or move slightly outward in the direction of the end wall of the free end of the auxiliary lever *c*, and instead of its roll 8 bearing with constantly-increasing pressure upon the auxiliary lever, (due to the continued movement of the main lever C and the stoppage by the pattern-cam of movement of the auxiliary lever,) which pressure would be thrown back upon the switch-cam, thus adding to its labors, the said roll moves down over the eccentric surface 10 with a comparatively slight pressure or strain, whereby distention of the spring is substantially avoided and the switch-cam is relieved of labor which would otherwise be thrown upon it. In the meanwhile the roll 7 of the opposite spring recedes from the free end of the auxiliary lever *c*, due to the fact that the movement of said lever has been stopped by the pattern-cam E and the roll 7, with its spring, continues its movement with the main lever C. In this connection attention is called to the adjusting-screws 11 12. When the parts are in normal position, as shown in Figs. 1 and 15, the screws 11 and 12 are so adjusted as to bring their heads up against the springs c^6 to take the pressure of said springs to such an extent that the rolls 7 and 8 merely bear upon the auxiliary lever *c* without or substantially without pressure. Under these conditions it will be observed that when the roll 7 tends to recede from the auxiliary lever (as above referred to) the elasticity of the spring carrying said roll 7 cannot interfere with such receding movement, because at such times the spring bears against the head of the adjusting-screw 12. Upon the reverse movement of the switch-cam to get a reverse movement of the slide-frame *b* the spring c^6, carrying the roll 7, becomes the active spring to move the auxiliary lever *c*, and in this instance, as before, all the parts move in unison until there is a stoppage in the movement of said auxiliary lever, when the roll 7 advances slightly, due to the continued movement of the main lever C, when said roll will move down the surface *g* to prevent distention of its spring, and the roll 8 of the opposite spring will recede from the auxiliary lever, the movement of the parts being a mere reversal of that previously described.

The springs c^6 (see Fig. 15) are adjustably secured to the main lever C by means of the screws c^8 c^9, which pass through elongated slots (not shown) in the springs c^6 and enter the lever C. To adjust the spring-rollers 7 and 8 with relation to the surfaces 9 and 10, the screws c^8 c^9 are loosened and the screws c^{10} c^{11} adjusted as required to move the spring c^6 endwise in either direction, whereupon the screws c^8 c^9 are then tightened.

In connection with my improvements in the cloth-clamp-actuating mechanism I prefer to use the stitch-forming mechanism of the well-known Wheeler & Wilson D[10] sewing-machine, substantially as shown and described in the patents granted to me and which are referred to above. The usual sewing-machine arm, carrying the stitch-forming mechanism, has been removed from the bed-plate simply to enable me to more clearly illustrate my invention as embodied in the mechanism attached to said bed-plate.

What I claim is—

1. In a buttonhole-sewing machine, stitch-forming mechanism; a cloth-clamp; mechanism, including a feed-cam, for changing the relative position of the cloth-clamp and the stitch-forming mechanism; a plurality of ratchet-feeds, each ratchet-feed operating in conjunction with some portion or portions of the feed-cam independent of the remaining ratchet-feed and of the remaining portions of said feed-cam; automatic cloth-clamp-controlling devices, including a pattern-cam, a cam-follower, and devices to permit said pattern-cam to yield to its follower; a switch-cam; and connections, including a yielding vibrator, between said switch-cam and cloth-clamp; in combination, substantially as described.

2. In a buttonhole-sewing machine, stitch-forming mechanism, a cloth-clamp, mechanism for imparting thereto a progressive feed movement, mechanism for changing the relative position of the stitch-forming mechanism and cloth-clamp, a sectional cam having in its periphery a pattern-cam groove, each section having a portion of the peripheral pattern-cam groove, and said sections capable of longitudinal movement upon the cam-shaft to permit relative adjustment of said sections, devices to relatively move said sections longitudinally upon the cam-shaft and relatively to adjust and positively hold in adjusted position the said sections thereon, mechanism for imparting to said cam a single rotation during the formation of the buttonhole, a cam-follower to enter the pattern-cam groove, and connections between said follower and cloth-clamp, in combination, whereby the location of the overseam-stitches is determined

with relation to the buttonhole-slit, substantially as described.

3. In a machine for overseaming buttonholes, stitch-forming mechanism; a cloth-clamp; mechanism for changing the relative position of the cloth-clamp and stitch-forming mechanism; and stitch-adjusting devices including a spring-governed vibrator and adjustable stops to effect the action of the springs, one independent of the other, when moved from their normal or central position, in combination, substantially as described.

4. In a machine for overseaming buttonholes, stitch-forming mechanism; a cloth-clamp; and mechanism for changing the relative position of the cloth-clamp and stitch-forming mechanism, including a yielding vibrator for said cloth-clamp and controller-springs with roller-bearings for said yielding vibrator for yieldingly reciprocating said cloth-clamp, in combination, substantially as described.

5. In a machine for overseaming buttonholes, stitch-forming mechanism; a cloth-clamp; and mechanism for changing the relative position of the cloth-clamp and stitch-forming mechanism, including a vibrator, springs having roller-bearings and adjusting devices to effect a relative adjustment between said roller-bearings and the members with which they coact; in combination, substantially as described.

6. In a buttonhole-sewing machine, stitch-forming mechanism, a cloth-clamp, mechanism for changing the relative position of the cloth-clamp and the stitch-forming mechanism, including stitch-adjusting devices for increasing or diminishing the length of the side stitches of the buttonhole and coincidently increasing or diminishing the length of the bar-stitches, so that whatever the length of the side stitches may be, the bar-stitches shall overlap them by a constant difference, in combination, substantially as described.

7. In a buttonhole-sewing machine, stitch-forming mechanism, a cloth-clamp, mechanism for changing the relative position of the stitch-forming mechanism and the cloth-clamp, including a pattern-cam shaft, a pattern-cam loose relatively to its shaft and provided with a peripheral cam-groove of varying width, a resilient connection between said cam and its shaft, a cam-follower adapted to enter and coöperate with said cam-groove, and connections for the follower with the cloth-clamp, in combination, substantially as described.

8. In a buttonhole-sewing machine, stitch-forming mechanism; a cloth-clamp; and mechanism for changing the relative position of the cloth-clamp and the stitch-forming mechanism, including an adjustable pattern-cam, a cam-follower operatively connected with said cloth-clamp and pattern-cam, adjustable connections between said cam-follower and cloth-clamp, whereby upon adjustment of said cam-follower with relation to the cloth-clamp to effect a change in the length of the overseam-stitches, relative adjustment can also be made in said adjustable cam, to properly locate the overseam-stitches with relation to the buttonhole-slit, in combination, substantially as described.

9. In a machine for overseaming buttonholes or other designs, stitch-forming devices; a cloth-clamp; mechanism including a feed-cam for changing the relative positions of the cloth-clamp and the stitch-forming mechanism; automatic cloth-clamp-controlling devices including a pattern-cam, a cam-follower, and devices to permit said pattern-cam to yield to its follower; and a plurality of ratchet-feeds, each ratchet-feed operating in conjunction with some portion, or portions, of the feed-cam independent of the remaining ratchet-feed and of the remaining portions of said feed-cam; in combination, substantially as described.

10. In a machine for overseaming buttonholes, stitch-forming mechanism; a cloth-clamp; mechanism for changing the relative positions of the cloth-clamp and the stitch-forming devices; stitch-adjusting devices including a main vibrating lever, and an auxiliary lever yieldingly connected with the main lever and positively connected with the cloth-clamp; and automatic cloth-clamp-controlling devices to control the vibration of the cloth-clamp and thus regulate the length of the overseaming-stitches irrespective of the vibration of the main lever.

11. In a machine for overseaming buttonholes, stitch-forming devices; a cloth-clamp; mechanism for changing the relative positions of the cloth-clamp and the stitch-forming devices; stitch-adjusting devices including a main vibrating lever and an auxiliary lever yieldingly connected with the main lever and positively connected with the cloth-clamp; and automatic cloth-clamp-controlling devices including a pattern-cam and cam-follower the said cam-follower being connected with the cloth-clamp whereby vibration of the cloth-clamp is transmitted to the follower and such movements are controlled by said pattern-cam; in combination, substantially as described.

In testimony whereof I have hereunto signed my name to this specification, in the presence of two subscribing witnesses, this 26th day of May, A. D. 1897.

FREELAND W. OSTROM.

Witnesses:
C. N. WORTHEN,
E. I. VAN HORN.