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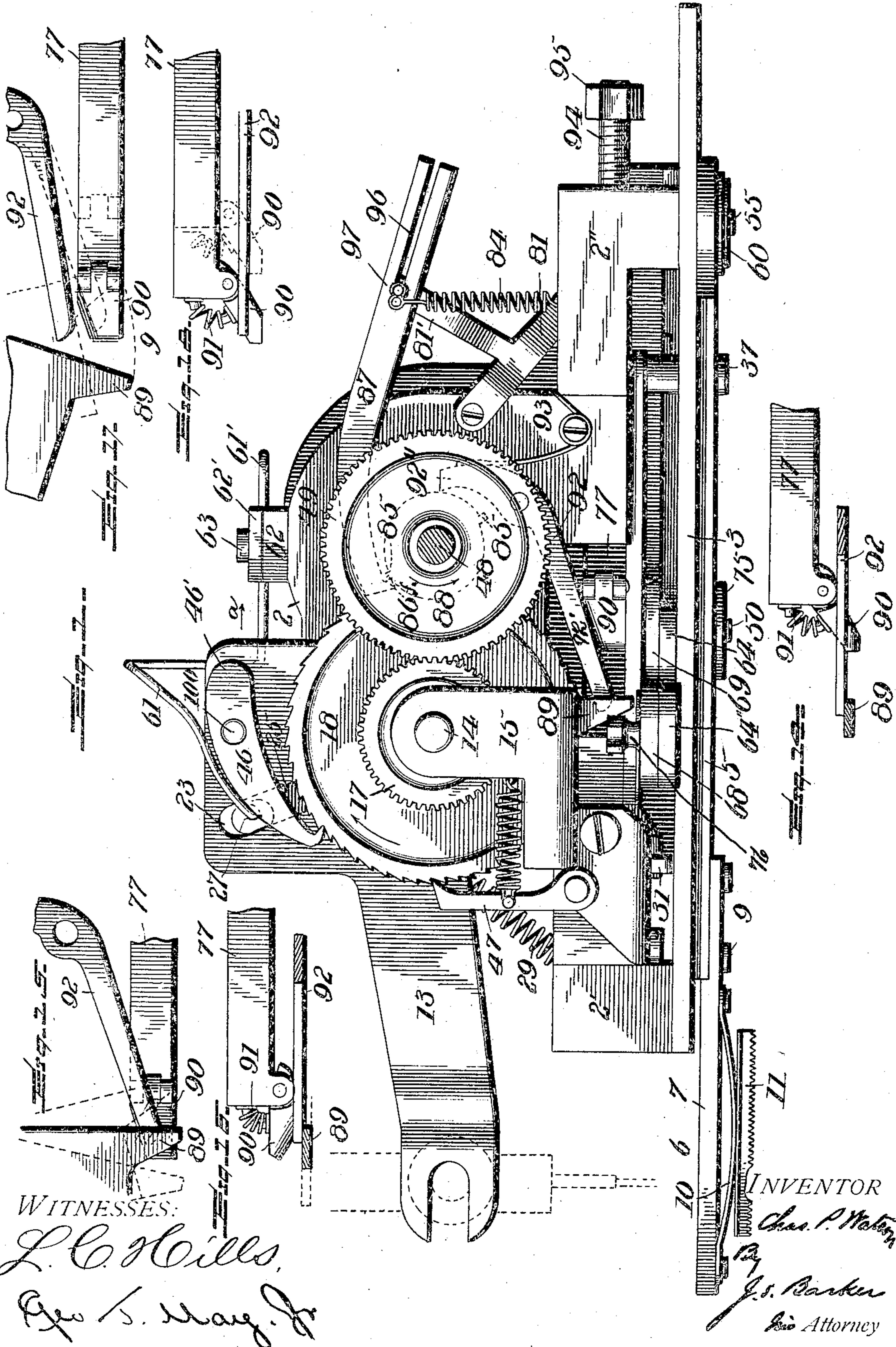
PATENTED JULY 26, 1904.

C. P. WATSON.
BUTTONHOLE STITCHING AND CUTTING DEVICE.

APPLICATION FILED JAN. 18, 1901.

NO MODEL.

8 SHEETS—SHEET 1.



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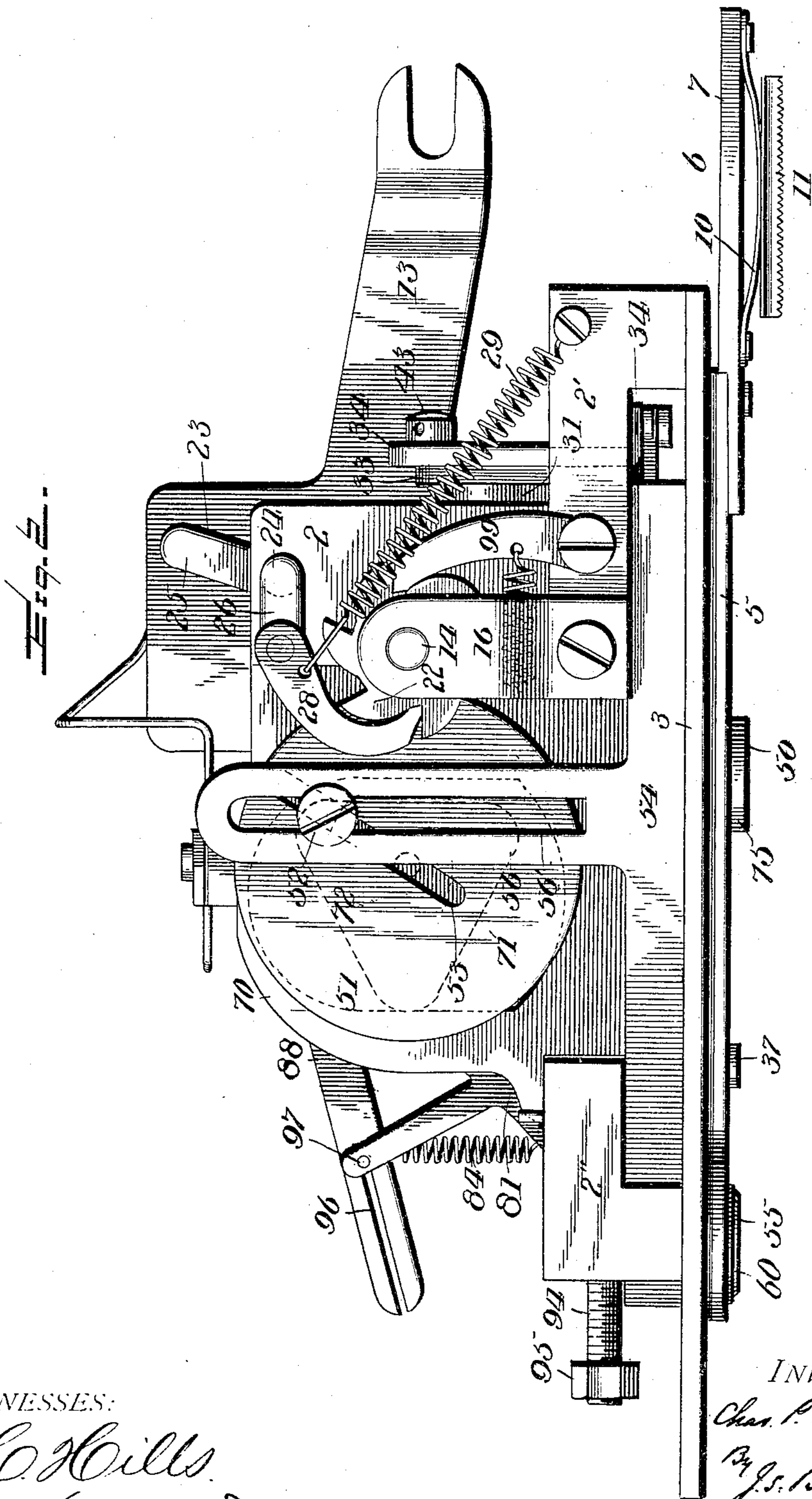
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8 SHEETS—SHEET 2.



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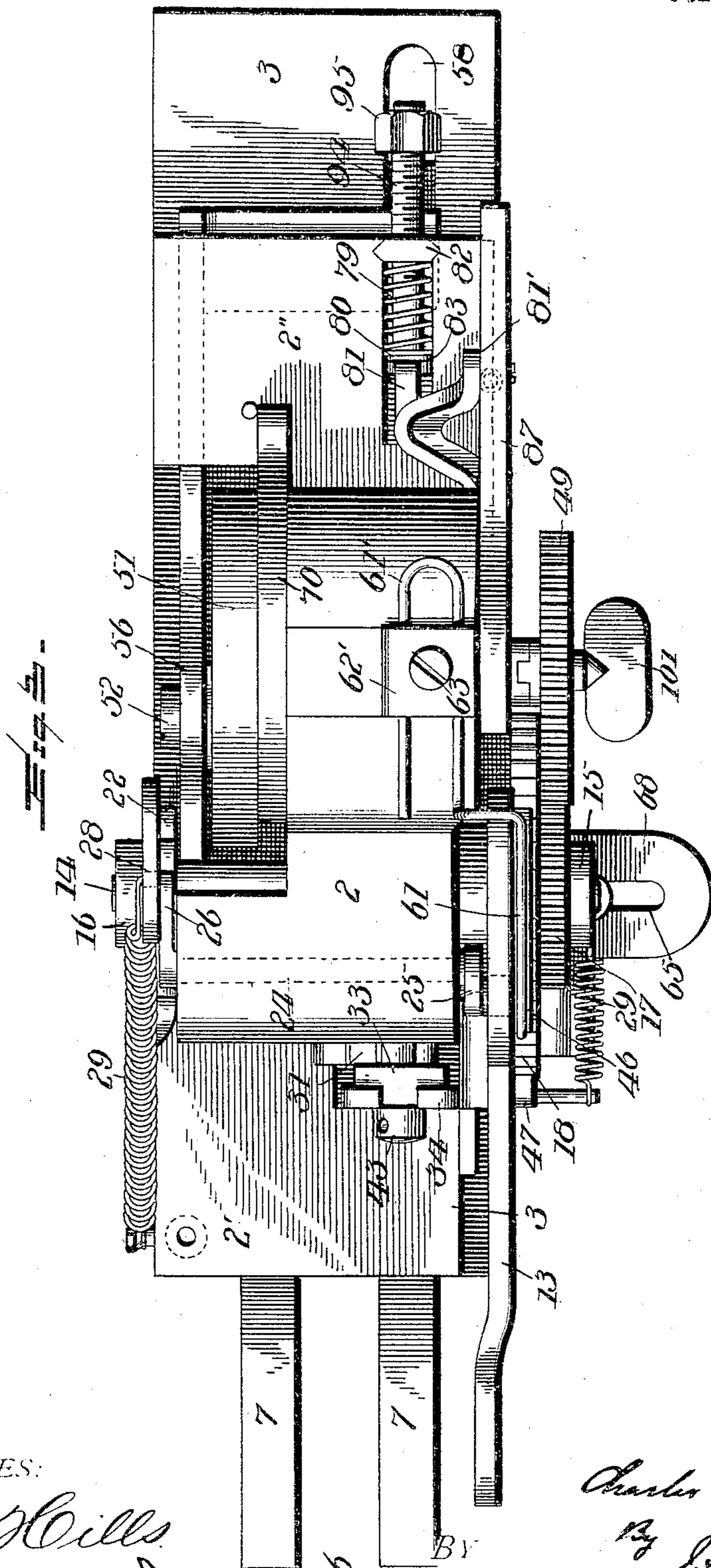
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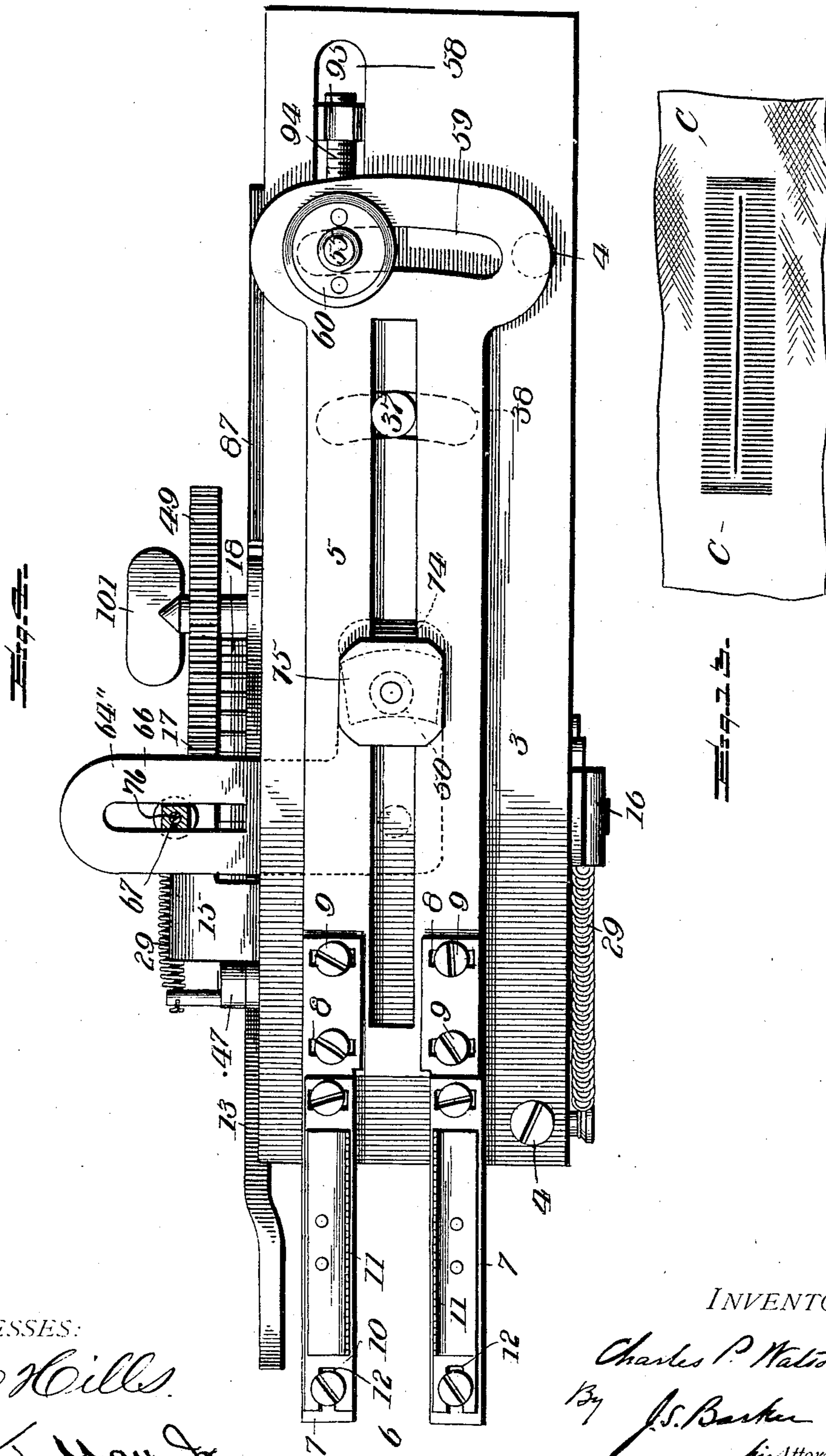
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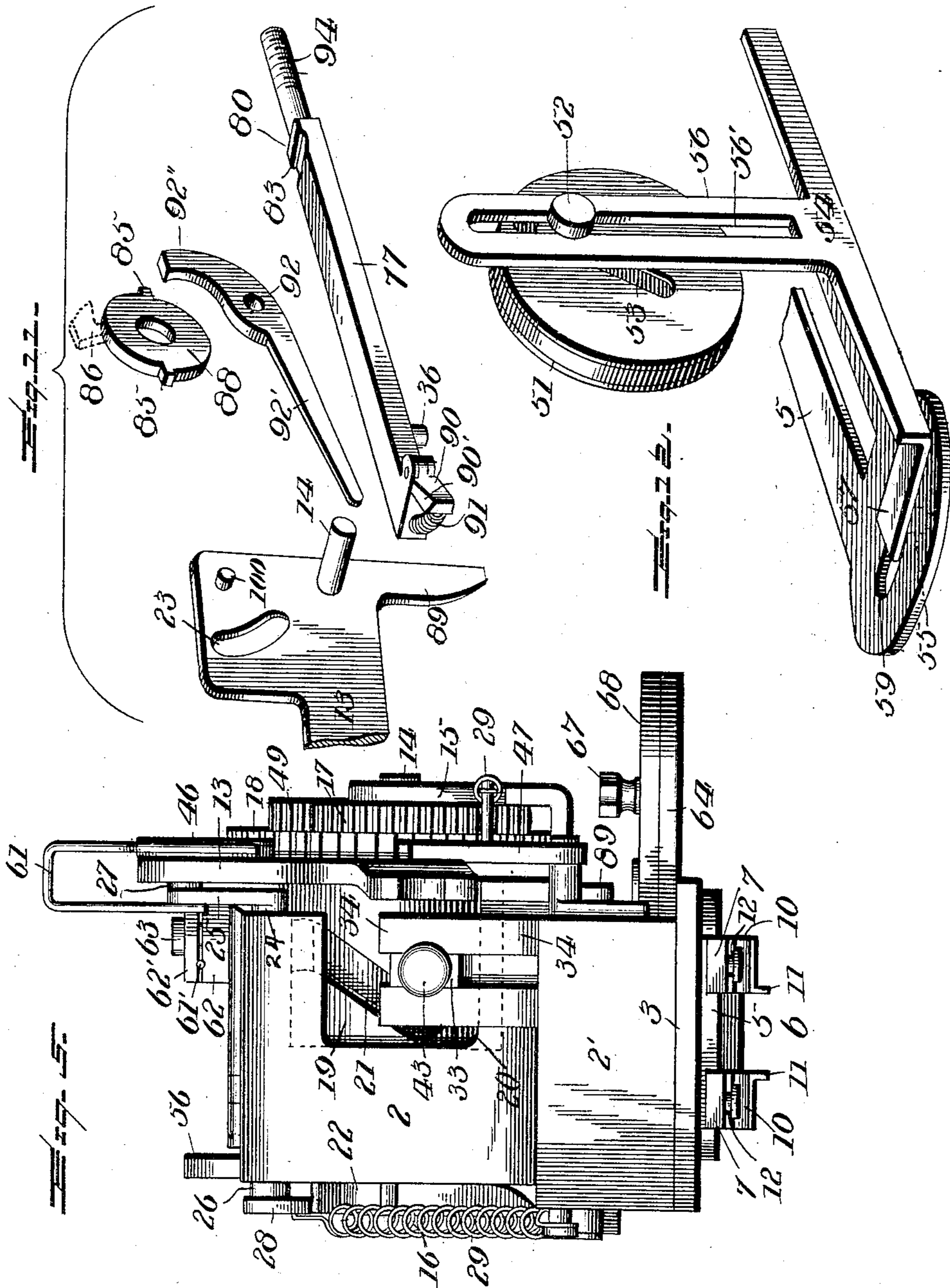
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8 SHEETS—SHEET 5.



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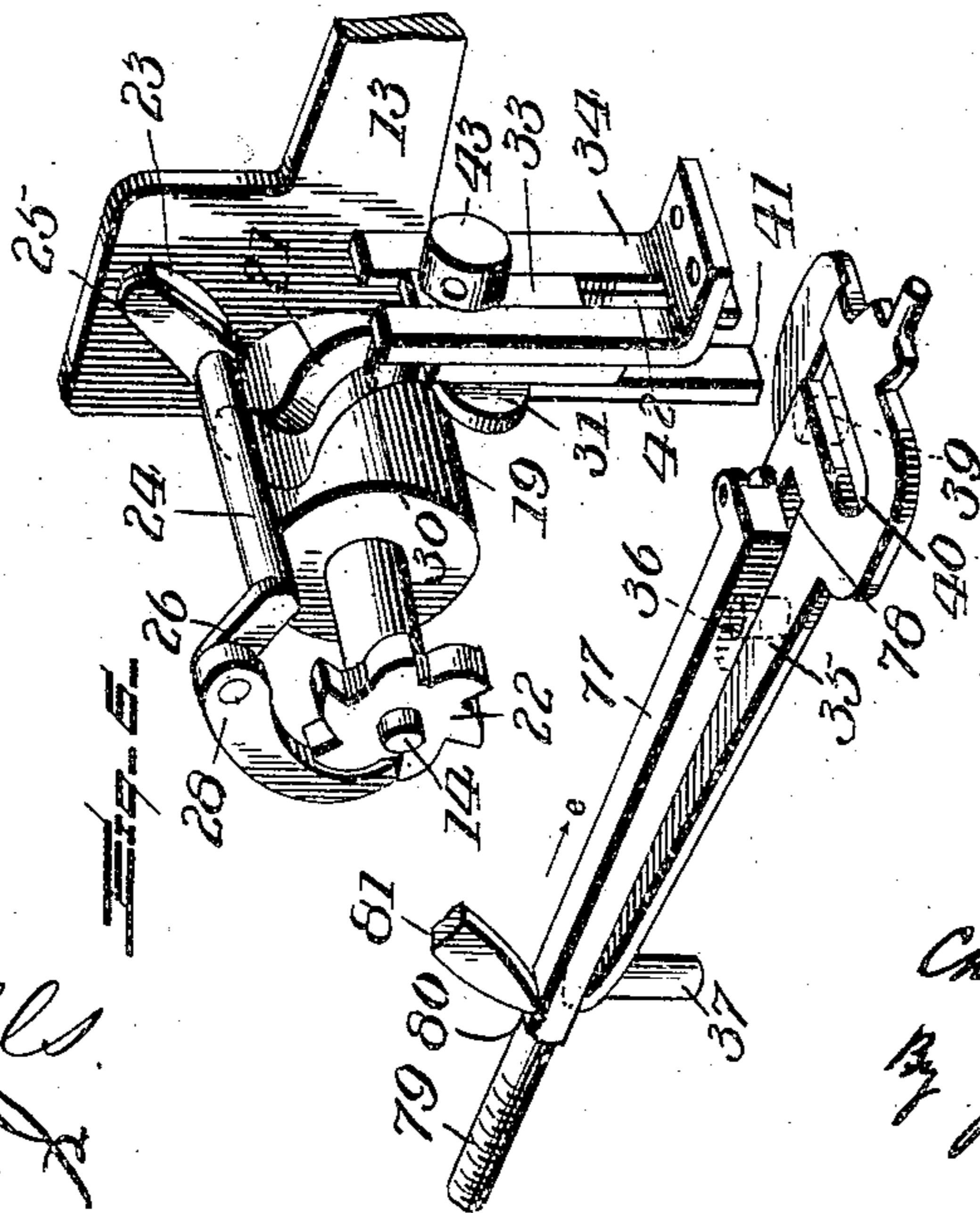
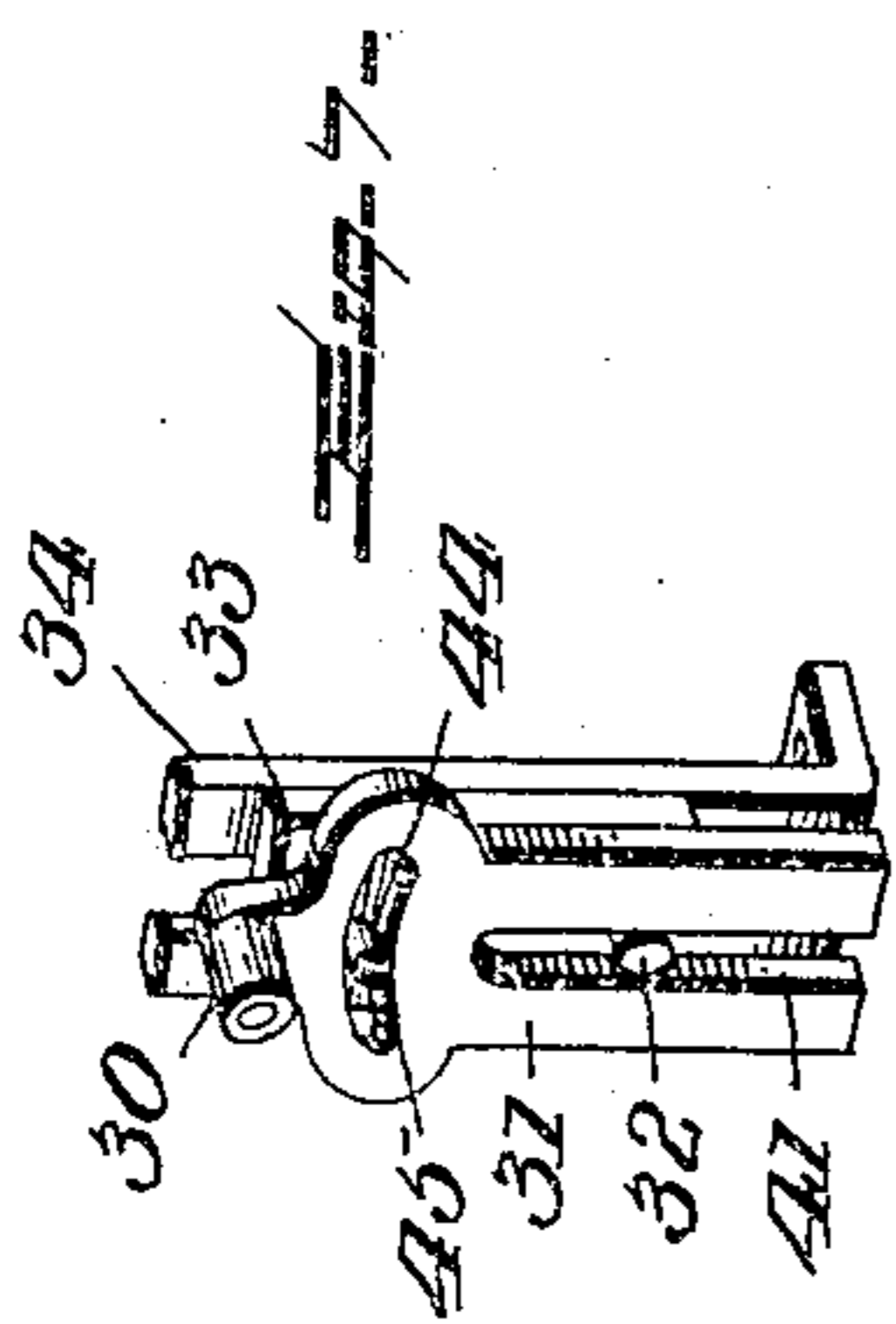
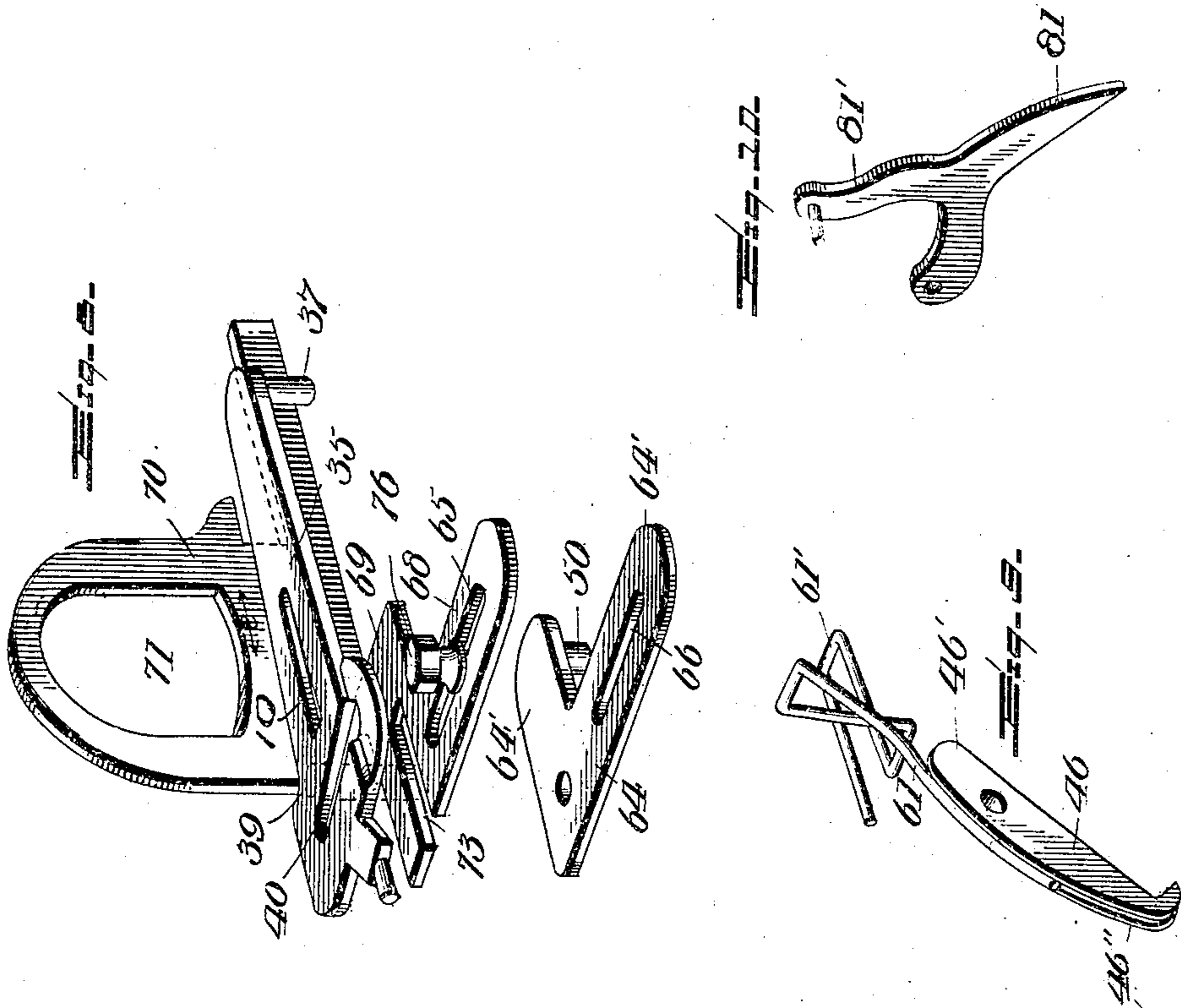
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8 SHEETS—SHEET 6.



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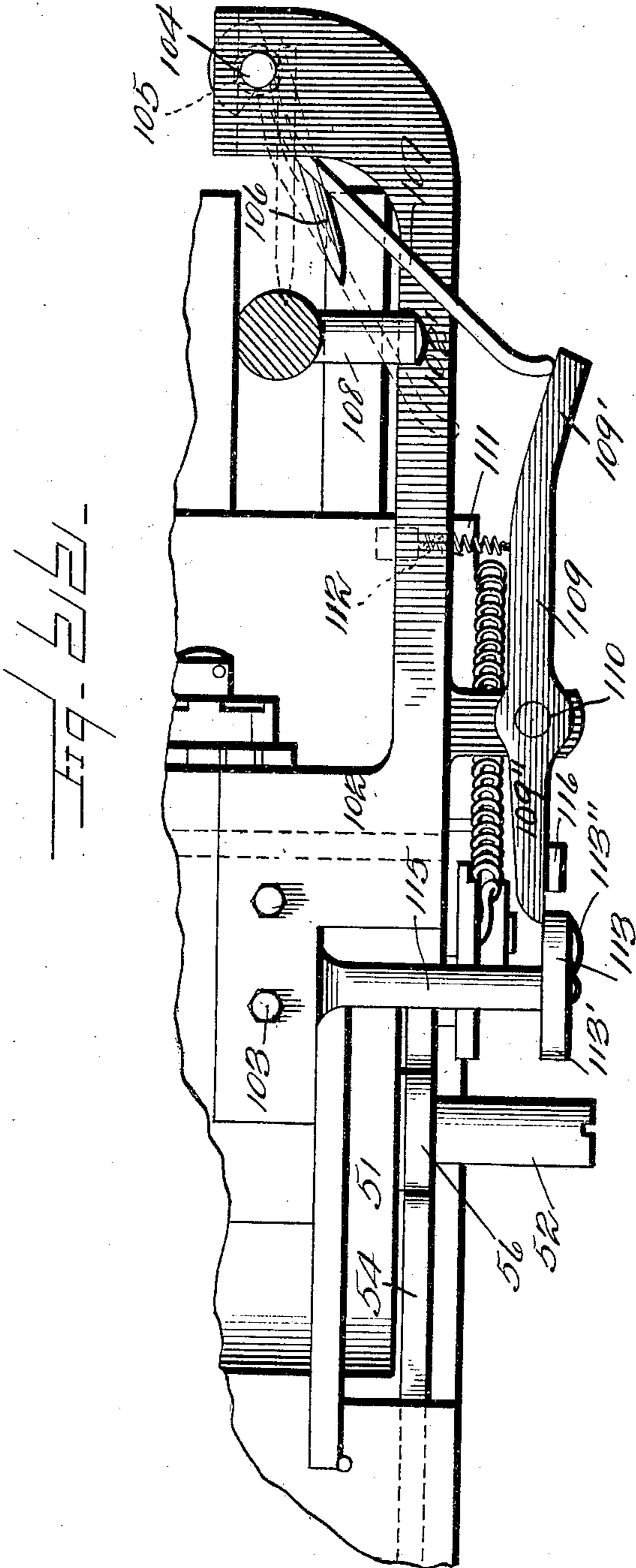
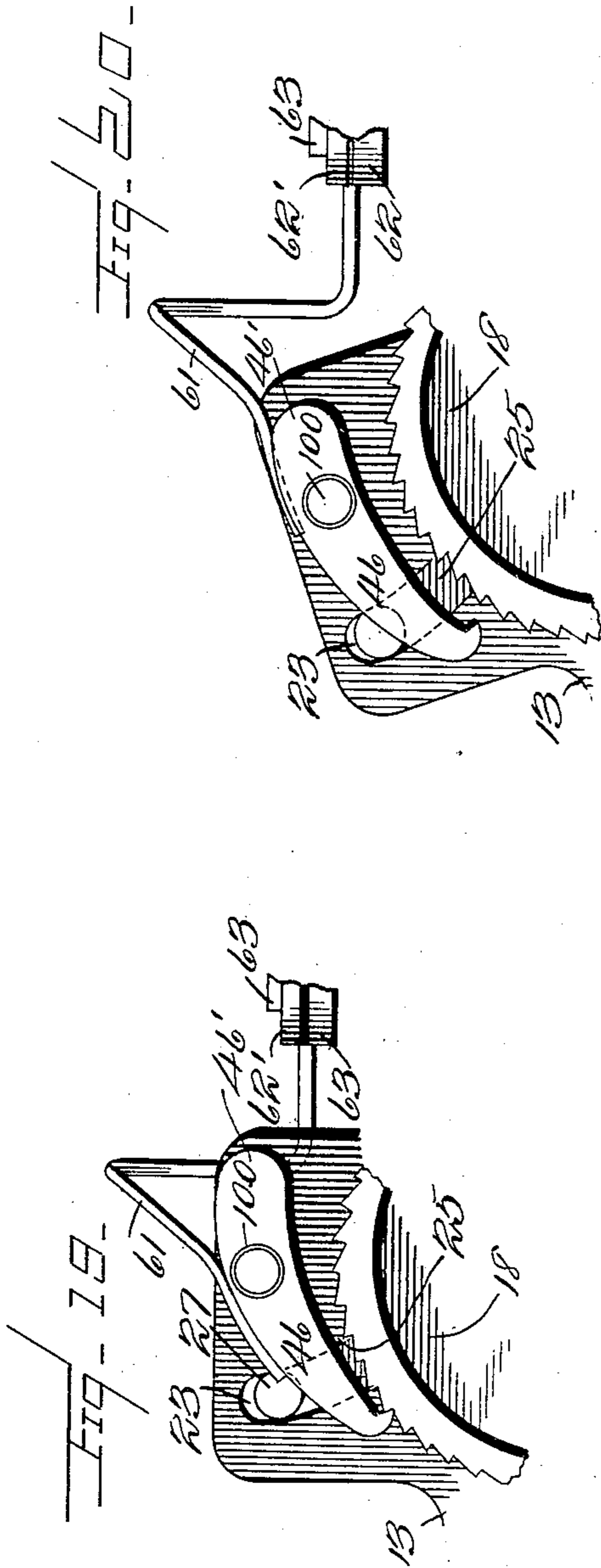
C. P. WATSON.

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APPLICATION FILED JAN. 18, 1901.

NO MODEL.

8 SHEETS—SHEET 7.



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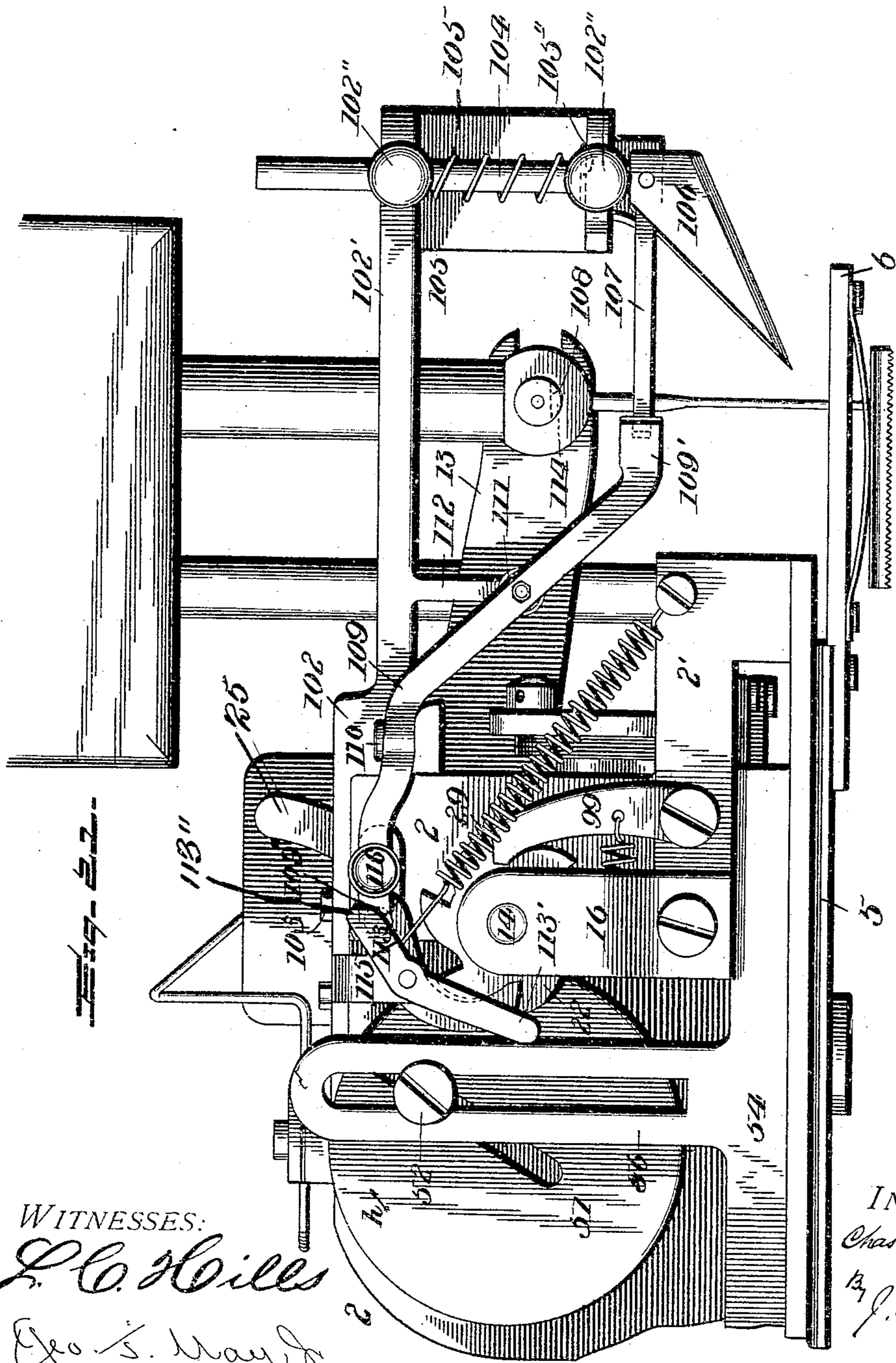
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8 SHEETS—SHEET 8.



WITNESSES:
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UNITED STATES PATENT OFFICE.

CHARLES P. WATSON, OF YORK, PENNSYLVANIA.

BUTTONHOLE STITCHING AND CUTTING DEVICE.

SPECIFICATION forming part of Letters Patent No. 766,081, dated July 26, 1904.

Application filed January 18, 1901. Serial No. 43,774. (No model.)

To all whom it may concern:

Be it known that I, CHARLES P. WATSON, a citizen of the United States, residing at York, in the county of York and State of Pennsylvania, have invented new and useful Improvements in Buttonhole Stitching and Cutting Devices, of which the following is a specification.

My invention relates to buttonhole stitching and cutting devices, by means of which the stitching around the buttonhole is produced and the slit or hole within the lines of stitching is cut; and it has for its object to improve the various sets of devices or mechanisms by which the movements necessary to be produced in a machine of this character are effected.

In the stitching of a buttonhole by means of a machine or attachment it is necessary that provision be made for a number of movements which are imparted to the fabric. There must be stitch-forming mechanism, including a reciprocating needle; but as this feature forms no part of my present invention I have not illustrated it at all in detail. There must also be a longitudinal movement of the fabric in the direction of the length of the buttonhole-slit. There must be a short transverse reciprocation or vibration of the fabric to cause proper placing of the edge and depth of stitches, there must be a lateral shifting of the fabric at the ends of the longitudinal movements above referred to in order that the fabric may be brought to such position that a line of stitches shall be made along the side of the buttonhole opposite to that side upon which the stitches were first made, and there should be a relatively long transverse reciprocation or vibration of the fabric between stitches and at the time the fabric reaches the limits of its longitudinal movements for the purpose of barring the buttonhole at the ends. All of these several movements, as well as the cutting of the fabric to form the buttonhole, are effected by means of the mechanism which constitutes my present invention, which I will now proceed to describe.

In the drawings wherein this mechanism is illustrated, Figure 1 represents a front elevation of the attachment. Fig. 2 is an eleva-

tion of the opposite or rear side. Fig. 3 is a top plan view. Fig. 4 is a bottom plan view, and Fig. 5 is a front end elevation. In the views thus far described I have for the purpose of clearness omitted all showing of the buttonhole-cutting devices. Fig. 6 is a perspective view of the devices which operate to impart to the carrier for the cloth-clamp the short transverse vibrations for forming the binding-stitches. Fig. 7 is a detail perspective view showing the means which I have devised for regulating the extent of the movements produced by the mechanism shown in the last-referred-to figure. Fig. 8 is a perspective view of the parts which impart to the cloth-clamp carrier the change movements at the ends of the buttonhole to cause the stitches to be formed on opposite sides of the buttonhole. Figs. 9 and 10 are perspective views, detached, of parts to be hereinafter referred to. Fig. 11 is a perspective view of certain of the parts which coöperate to effect a shifting of the fulcrum of the lever which imparts to the cloth-clamp carrier transverse movements in order that certain of the stitches may be lengthened for purposes of barring the buttonhole, the parts being detached and separated from each other for purposes of clear illustration. Fig. 12 is a perspective view of parts of the mechanism which coöperate to effect the longitudinal movements of the carrier for the cloth-clamp. Fig. 13 is an enlarged diagrammatic view indicating the buttonhole produced by the machine illustrated in the other views. Figs. 14, 15, 16, 17, and 18 are detail views illustrating different positions of the devices employed to restore certain parts of the barring mechanism to their normal positions, Figs. 15 and 17 being side elevations and Figs. 14, 16, and 18 top plan views, partly in section. Figs. 19 and 20 are detail views illustrating different positions of the parts whereby certain adjustments of the stitches are effected. Fig. 21 is a rear elevation of part of the apparatus, showing the cutting devices, which are omitted from the other views for purposes of clearer illustration. Fig. 22 is a top plan view of the cutting devices and part of the buttonhole attachment immediately associated therewith.

The attachment is adapted to be used upon any of the ordinary types of sewing-machines now in common use and which are built for factory or domestic use. It is to be attached
 5 to the movable bar or rod which usually carries the presser-foot, which latter of course must first be removed. The several operative and movable parts of the mechanism are supported upon and carried by a frame-piece,
 10 which I prefer to make of a single piece of metal for strength and rigidity, though of course it might be made of a plurality of parts properly united. This frame-piece is designated by the number 2, with exponents to
 15 represent its different parts. The central portion of the frame is more elevated than the end portions and is represented by 2'. The front portion of the frame is designated 2', and the rear portion 2''. A bottom plate 3
 20 is secured to the frame 2 by screws 4, being thus removable in order that access may be more easily had to certain of the operative parts of the mechanism. The cloth clamp or foot is mounted below this bottom plate 3.
 25 It consists of a lever 5, to which the various movements hereinbefore referred to are imparted, and the cloth-engaging clamp or foot carried thereby and represented as a whole by 6.

30 I will first describe the specific construction of the cloth clamp or foot which I have devised. It often happens that the fabric along one side or edge of the buttonhole is thicker than it is on the other, and much difficulty
 35 has been experienced heretofore in the use of forms of cloth-clamps now commonly employed upon buttonhole-machines and attachments by reason of the fact that the parts of such mechanism which engage with the cloth
 40 upon the opposite sides of the buttonhole are integral or rigid relative to each other, with the result that if the fabric is considerably thicker upon one side than upon the other the
 45 foot engages with the cloth with an effective degree of firmness only on the side where the cloth is the thicker, and consequently the operation of the machine is not so accurate and perfect as it should be. I therefore make the
 50 parts of my cloth clamp or foot which engage with the opposite sides of the buttonhole entirely independent of each other and each adjustable.

The foot consists of two plates 7 7, independently secured to the forward end of the
 55 lever 5. They are slotted at 8, and through these slots pass the screws 9, which unite them with the operating-lever 5. By this method of attachment the plates 7 may be adjusted toward and from each other in order to suit
 60 buttonholes of different sizes.

Upon the under side of each plate there is mounted a bow-shaped spring 10, to the middle of which is attached the cloth-engaging
 65 clasp 11, which is, by preference, an angular plate or bar of thin metal with a serrated

or saw-toothed edge. The spring is at one end slotted, as represented at 12, and through this slot passes one of the screws by which the spring is secured to the bar 7.

It will be seen that the cloth-engaging parts 70 11 of the cloth clamp or foot are held toward the face of the fabric with which they engage with a yielding force by the springs 10 and that each part 11 is independently mounted, so that should the fabric be thicker upon one 75 side of the buttonhole than upon the other one cloth-engaging part will yield to a greater extent than its neighbor and yet both will engage with the fabric with sufficient force and firmness to cause the proper movements. The 80 cloth-engaging serrated plate 11 is attached to the spring 10 near its middle portion only, and this permits one end of the bar to move relative to the other, so that should the fabric be thicker near one end of the buttonhole 85 than the other the cloth-engaging clamp will still accommodate itself to the fabric and hold both ends securely. It will thus be seen that the necessary adjustments for the cloth-clamp are attained by the mechanism described, the 90 cloth-engaging clamp-plates 11 being adjustable toward and from each other to suit buttonholes of different sizes and each being independently supported and yieldingly mounted in the manner described. 95

The several operative parts of the apparatus receive their motion from some operating part of the sewing-machine proper, such as the reciprocating needle-bar, and I have provided the attachment with the vibrating lever 13, 100 adapted to engage with a lug or screw upon the needle-bar. This lever is mounted upon a cross-shaft 14, which extends through the central upright portion 2 of the frame and at its ends is supported in the front bracket 15 105 and rear bracket 16, respectively. The shaft 14 has mounted upon it the following parts, which are named in order, beginning at the front side, viz: a spur-wheel 17, just inside the bracket 15, and a ratchet-wheel 18, between 110 the spur-wheel and the lever 13. These two wheels 17 and 18 are preferably secured together and arranged face to face and are loose upon the shaft 14. Next beyond the lever 13 upon the shaft is a cam-cylinder 19, mounted 115 within a recess 20, formed in the upright portion 2 of the frame and in the periphery of which is cut the curved cam-groove 21. Upon the rear end of the shaft is mounted the ratchet-wheel 22, situated between the bracket 16 and 120 the portion 2 of the frame. The cam-cylinder 19 and the ratchet-wheel 22 are fast upon the shaft or are otherwise connected, as by a sleeve, (see Fig. 6,) so that they turn together.

The cam-cylinder 19 is the part of the ap- 125 paratus from which the lateral vibrations of the cloth-clamp—those vibrations which move the cloth to cause the placing of the edge and depth stitches—are derived, and I will first describe the mechanism through which this cam- 130

cylinder is moved and then the mechanism through which motion is transmitted from the cam-cylinder to the cloth-clamp 6.

24 represents a rocking shaft mounted in the framework 2, preferably in the upper part thereof, above the cam-cylinder 19. This shaft is provided at one end with a crank-arm 25, which has a pin or wrist 27, that enters a slot 23 in the vibrating lever 13. (See particularly Figs. 1, 2, and 6.) The opposite or rear end of the rock-shaft 24 is provided with a crank-arm 26, which in turn carries a pawl 28, that is held in engagement with the ratchet-wheel 22 by a spring 29. It will be seen that at each reciprocation of the lever 13 the shaft 24 is rocked and the wheel 22 acted upon by the pawl 28 and caused to turn a partial revolution. The wheel 22, being connected with the cam-cylinder 19, the latter is partially rotated. The cam 21 is so laid off that the distance between each turn therein expressed in degrees of the circumference of the cylinder is the distance which the cylinder is turned at each reciprocation of the rock-shaft.

A stud or pin 30, projecting from a lever 31, enters the cam-slot 21. This lever is fulcrumed upon a pin 32, which is supported in a manner to be described from a standard or bracket 34, carried by the frame. The lever 31 is preferably vertically disposed, and its lower end is bifurcated or otherwise arranged so as to engage with and impart motion to a horizontally-disposed lever 35. This lever, which is situated above the base-plate 3, is arranged to vibrate about a fulcrum 36, and it is provided with a pin 37, which extends through a slot 38 in the base-plate 3 and engages with the lever 5, that carries the cloth feed or clamp.

It will be seen that the turning of the cam-cylinder 19 a step at a time operates to vibrate the lever 31 about its fulcrum 32 and that it in turn imparts motion to and vibrates the lever 35 about its fulcrum 36, and that this latter lever through the pin 37 imparts transverse vibrations to the lever 5 and the cloth-clamp, the latter parts moving about the fulcrum 50. Thus are the short transverse vibrations imparted to the cloth clamp or foot, which result in the proper placing of the edge and depth stitches.

It is desirable that the amplitude or extent of these vibrations should be capable of variation, as longer stitches should be taken in working a large buttonhole than in forming a smaller one, and I have provided means for securing this desired adjustment, and this I do by shifting the fulcrum of the lever 31. The fulcrum-pin 32 of this lever is carried by a plate or block 33, which is adjustable in the direction of the length of the lever 31. This plate or block is provided with a projecting portion, which enters and is adapted to move in a way or slot 42, formed in the bracket 34,

and a set-screw 43 is so combined therewith as that the block may be secured in the position to which it may be adjusted. The lever 31 is slotted, as represented at 41, and the fulcrum-pin 32 travels up and down in this slot as it is adjusted. By moving the plate upward the fulcrum is carried nearer to the end of the lever which engages with and is operated by the cam-cylinder, with the result that the extent of movement imparted to the lower end of the lever is increased, and this in turn increases the movements of the levers 35 and 5, and consequently the stitches along the sides of the buttonhole are longer than when the parts are adjusted to carry the fulcrum-pin 32 away from the upper end of the lever.

In order to give steadiness of movement to the lever 31, whatever be the position to which the fulcrum-pin 32 may be adjusted, I prefer to arrange a stationary pin 45, projecting from the frame 2, so that it will extend through a curved slot 44 in the upper portion of the lever, as represented in Fig. 7. The slot is of such size as to allow free movement of the lever whatever the adjustment of its fulcrum may be. The lever 35 is similarly supported and held in place by a stationary pin 39, which enters a curved slot 40 in the lever.

I will next describe those parts of the mechanism which give the longitudinal movements or progressive feed to the cloth clamp or foot, gradually moving the fabric in the direction of the length of the buttonhole as the stitches are successively placed.

46 represents a spring-actuated pawl mounted upon a pin 100, carried by the lever 13 and arranged to engage with the ratchet-teeth of the wheel 18 and move it with a step-by-step motion in the direction of the arrow *b* in Fig. 1 as the lever 13 is reciprocated. A spring-catch 47 holds the ratchet-wheel against movement in a backward direction. As has been hereinbefore stated, the spur wheel or pinion 17 is so connected with the ratchet-wheel as to turn therewith. The pinion 17 meshes with a spur-wheel 49, mounted upon a shaft 48; supported in the central upright portion of the frame. Upon the opposite end of the shaft 48 and on the rear side of the frame is a crank wheel or disk 51, provided with a wrist-pin 52, which is adjustable in a radial slot 53, formed in the face of the disk.

54 represents a sliding plate arranged below the frame of the attachment and between it and the base-plate 3. It is provided with an upright arm or standard 56, slotted at 56' to permit the wrist-pin 52 to pass through it. At its rear end the bar 54 is provided with an inward-extending portion 57, from which there projects a pin 55, that passes through a slot 58 in the base-plate 3 and engages with the cloth-clamp lever 5.

It will be readily seen that as the crank-

disk 51 is slowly rotated the bar 54 will be moved backward and forward, the extent of its movement being governed by the position of the pin 52 with reference to the axis of the disk, and that the reciprocation of the bar 54 will be imparted to the lever 5 and cloth-clamp 6, giving to them their longitudinal movements. The stud or pin 55 passes through a slot 59 in the end of the lever 5, so that the mechanism which imparts the longitudinal movements to this lever shall not interfere at all with the transverse reciprocatory movements which are imparted thereto in forming the stitches. The end of the pin 55 is screw-threaded, and a flat nut 60 engages therewith to hold the parts securely together.

As has been stated, the extent of the movement imparted to the bar 54 and through it to the cloth-moving devices may be controlled by means of the adjusting mechanism between the crank-disk 51 and the bar 54. Provision is thus made for the working of long or short buttonholes, according as the bar 54 is given a long or short reciprocation.

It is desirable in certain classes of work that the stitches should be much finer or more closely laid than in other kinds, and I make provision for this adjustment. From the foregoing description it will be understood that the extent to which the slide-plate 54 and lever 5 are moved at each reciprocation of the operating-lever 13 will depend upon the extent to which the wheel 18 is moved by the claw or pawl 46, and I provide means whereby the claw or pawl may be rendered ineffective throughout a greater or less extent of its movement, as desired.

61 represents the spring which bears upon the pawl 46 and holds it in operative engagement with the ratchet-wheel 18. The pawl is preferably formed with a heel or extension 46' to the rear of its pivot and with a groove 46'' on its upper face, in which lies the free end of the spring 61. It will be readily understood that when the end of the spring bears upon the pawl in front of the pivot it holds it toward the wheel 18 and in engagement therewith, Figs. 1 and 19, but that when the spring engages with the heel or extension 46' of the pawl the latter is thrown out of engagement with the wheel, the latter condition being represented in Fig. 20. As has been described, the pawl 46 is mounted upon the operating-lever 13, and consequently moves therewith; but the spring 61 is stationary, being secured to a support 62 on the portion 2 of the frame, and it therefore follows that the pawl moves relative to the free end of the spring which engages therewith, the spring engaging with the forward portion of the pawl when the lever 13 is raised and moving along the groove 46'' into engagement with the rearward portion of the pawl as the lever moves downward. The spring 61 is adjustable, so that it can be set in such

position as to cause its free end to engage with the forward part of the pawl throughout the entire movement of the latter, in which event the pawl is constantly in engagement with the wheel 18 and makes its longest effective stroke; but the spring may also be adjusted so that its free end passes in rear of the fulcrum of the pawl and into engagement with the heel portion 46' before the lever 13 arrives at its limit of downward movement, and as a result the pawl is turned out of engagement with the wheel 18 during a portion of its stroke, and accordingly its effective movement is lessened. The spring 61 is provided with an elongated bearing portion 61', which is adapted to lie between the support 62 and the clamp-plate 62' and be held securely by these parts when they are drawn together by a set-screw 63. By loosening the clamping means and moving the spring rearward, or in the direction indicated by the arrow *a*, Fig. 1, the free end of the spring is brought into such engagement with the pawl as to cause the latter to disengage the ratchet-wheel sooner than it would when arranged as shown in Fig. 1, with the result that the movements imparted to the wheel 18 and the parts driven therefrom are reduced.

It will be understood that other means might be employed for effecting a like operation—that is to say, a variation of the extent of movement of the slide-bar 54 and lever 5 between stitches—but that which I have shown is effective and easy of manipulation. By means of the spring 61 and its adjusting devices when arranged as shown in the drawings the pawl can be made to engage, with but a single ratchet-tooth, at each reciprocation with eight or more teeth or with any intermediate number, as may be desired.

After the row of stitches along one side of the buttonhole has been completed it is necessary to shift the cloth laterally in order that the row of stitches upon the other side shall be properly situated, and I will describe the mechanism for shifting the fabric when the ends of the lines of stitching surrounding the buttonhole are reached.

It has heretofore been pointed out that the lever 5, carrying the cloth clamp or foot, vibrates about the fulcrum-pin 50. If this fulcrum-pin 50 be shifted transversely, the lever 5 will turn during such lateral shifting of the part 50 about the pin 37, which will temporarily serve as its fulcrum, and the movements now about to be described are effected by shifting laterally the fulcrum-pin 50. This is done without interfering with or stopping the rapid vibratory movements which are imparted to the lever for making the edge and depth stitches or the slow longitudinal movements which have just been described. The fulcrum-pin 50 is carried by and extends downward from a plate 64, which is of bell-crank-lever shape (see Fig. 8) and is fulcrumed

upon the stationary pin 39, which has heretofore been referred to in connection with the lever 35. The longitudinal axis of the arm 64' of the lever 64, which carries the pin 50, is substantially parallel with the longitudinal axis of the lever 5, so that a rocking of the lever 64 upon its fulcrum moves the pin 50 in a direction substantially transverse to the lever 5. The other arm, 64'', of the lever is slotted, as represented at 66, to receive a pin or connecting-piece 67, that unites the lever 64 with the arm 68 of a slide-plate 69. This slide-plate is formed with or has secured to it an upward-extending flange or plate 70, in which is formed a cam-shape opening 71. The flange or plate 70 extends upward between the portion 2 of the frame and the crank-disk 51 and is engaged by a cam 72, which fits within the opening 71 in the plate and serves to give motion thereto. The cam-plate 69 70 is suitably supported upon the frame so as to be moved back and forth in the directions indicated by the double arrow *c* in Fig. 8 as the shaft 48, upon which the cam 72 is mounted, is rotated. The cam is abrupt, so as to move the plate rapidly and then remain inactive until a sufficient movement of the shaft has been completed, when it will rapidly move the plate in the opposite direction. The movements of this part of the apparatus may be traced as follows: The cam 72 shifts the plate 69 70, and this in turn imparts, through the pin 67, a rocking motion to the lever 64, and this results in shifting the fulcrum-pin 50 for the lever 5 in a transverse direction and to an extent sufficient to cause the row of stitches next to be formed to lie upon the side of the buttonhole opposite to that which has already been stitched.

As several of the parts which have already been described bear a superimposed relation to each other and are arranged about the pin 39, their positions may now be stated. Next to the under surface of the frame 2 is situated the horizontally-vibrating lever 35, which gives the short transverse vibrations to the cloth-clamp. Next below the lever 35 is the plate 69, which has just been described, the flange or upward-extending portions 70 of this plate lying to the rear side of the lever 35. Next and immediately below the plate 69 and between it and the base-plate 3 is the lever 64. The pin 39 serves as the fulcrum for the lever 64 and as a guide-pin merely for the plate 69 and the lever 35, the plate 69 being slotted, as represented at 73, to allow free movements past the pin. The fulcrum-pin 50 for the lever 5 extends through an opening 74 in the base-plate 3, and a thin nut 75 is screwed onto the end of the pin to hold the lever 5 securely in place against the under face of the plate 3, the nut 60, already referred to, cooperating therewith for the same purpose.

Provision should be made for regulating the

extent of the lateral movement of the fulcrum-pin 50, so that the two lines of stitches upon the opposite sides of the buttonhole may be closer to or farther from each other, as the character of the work demands. I make provision for securing this adjustment as follows: The arm 68 of the slide-plate 69 70 is slotted, as represented at 65, and the connecting-piece 67, which connects this arm with the lever 64, is adjustable in this slot and in the corresponding slot 66 in the arm of the lever 64. A set-screw 76 or equivalent device tapped into the connecting-piece 67 holds the parts securely after adjustment has been made. It will be seen that when the connecting-piece 67 is moved inward toward the frame a greater throw will be imparted to the lever 64 than when it occupies a position farther from the fulcrum-pin 39 and that, accordingly, the distance between the rows of stitches on the opposite sides of the buttonhole will be increased.

I will now proceed to a description of the mechanism whereby the buttonhole is barred—that is to say, whereby a number of relatively long stitches are laid across the buttonhole at the ends, as represented at C in Fig. 13.

While I have described means for adjusting the length of the ordinary edge and depth stitches by means of the adjustment of the fulcrum 32 for the lever 31, it will be understood that such adjustment is not automatic, but must be performed by hand and when the machine is at rest, and that after the fulcrum 32 has been set to the desired position the length of the stitches is uniform until the position of this part has been changed. I have devised mechanism whereby when the end of the buttonhole is reached and during the time the crank of the disk 51 is passing its dead-center, so that little or no motion is being imparted longitudinally to the lever 5, the extent of the transverse vibrations of the cloth-clamp, and consequently the length of the stitches formed, is automatically largely increased until a sufficient number of such long stitches have been formed to properly bar the buttonhole, this operation being entirely automatic and independent of the adjusting mechanism for the fulcrum 32, just referred to.

It has been stated in describing the lever 35, which operates to reciprocate transversely the lever 5 of the cloth-clamp, that such lever vibrates about the pin 36 as a fulcrum. It will be readily seen that if this fulcrum-pin be shifted from its normal position to a position nearer that end of the lever which is engaged by the lever 31 then the arc through which the end of the lever carrying the pin 37 travels will be increased in proportion as the fulcrum-pin 36 is moved toward the end of the lever which is engaged by the lever 31. I have devised mechanism whereby the fulcrum-pin 36 is automatically shifted to a posi-

tion closer to the end of the lever engaged by the lever 31 than its normal position whenever the end of the buttonhole is reached and the buttonhole is to be barred.

5 The pin 36 is carried by a sliding bar 77, mounted in a recess in the lower part of the frame and preferably situated just above the lever 35. The pin extends downward into a slot 78, formed in the lever 35. A spring 79
10 is arranged between a shoulder 80 on the bar and an abutment 82 on the frame and tends to move the bar inward—that is, in the direction indicated by the arrow *e* in Fig. 6. The normal position of the bar and the fulcrum-pin which it carries is its outer or withdrawn position, being the one indicated in Figs. 3 and 6. It is normally held in this position by a pawl 81, which engages with a notch or shoulder 83 on the bar, a spring 84 serving
20 to normally hold the pawl in engagement with the bar. Should the pawl be disengaged, the spring 79 will force the bar inward, and carrying the fulcrum-pin 36 nearer to the forward end of the lever 35 the length of the
25 stitches will be increased so long as the parts remain in this position. In order to trip the pawl 81 at the time the barring of the buttonhole is to take place, I prefer to use the following devices, (see Fig. 11 and dotted lines,
30 Fig. 1:) 85 represents a tooth projecting from a disk or hub 88, mounted upon the shaft 48 and arranged to engage with the hooked end 86 of a connecting-bar 87, which is secured to an upward-extending arm 81' of the pawl
35 81. As the disk 88 is moved in the direction indicated by the arrow *f*, Fig. 1, the pin 85 comes into engagement with the end 86 of the connecting-bar and draws it inward. This movement operates to lift the pawl out of en-
40 gagement with the slide-bar 77, leaving it free to be moved inward by the spring 79. The spring 84 is preferably attached to the connecting-bar 87 between its end 86 and its point of connection with the pawl 81, so that
45 it operates to hold the pawl in engagement with the bar 77 and also to hold the end 86 of the connecting-bar in engagement with the disk 88. There are preferably two of the teeth or pins 85, situated diametrically oppo-
50 site to each other.

After the bar 77 has been released, as just described, it must be restored to normal position—that is, projected outward against the action of its spring and held by the pawl 81.
55 To effect this restoration of the bar to normal position constitutes another object of my invention, and I will proceed to describe an arrangement of mechanism whereby it may be effected.

60 The lever 13 is provided with an arm or extension 89, Figs. 1, 11, and 14 to 17 which being in constant motion while the attachment is in operation serves as a convenient part from which to take the power and motion nec-
65 essary to restore the bar 77 to normal position.

The path which this arm follows is represented by the dotted line *g* in Fig. 17. The sliding bar 77 carries a spring-latch 90, the spring 91 of which tends to force it outward into the path of the arm 89. This latch is usually held
70 inward, so that the arm moves backward and forward in front of it without engagement therewith; but when it is desirable to retract or move into normal position the bar 77 the latch is released, the spring forces it outward
75 into the path of the arm 89, and the arm on its next rearward movement moves the latch and the bar to which it is secured into position to be caught by the pawl 81. The spring-latch is normally held inward and out of the path of
80 the arm 89 by means of the arm 92' of a lever 92, Figs. 1, 15, and 16. This arm is thin and preferably in the form of a blade and is adapted to be forced downward in front of the spring-latch by means of a spring 93, as rep-
85 resented in Fig. 1. The upper portion of the spring-latch is beveled, so that the blade 92' of the lever 92 may be forced downward over the latch when the latter is held outward by its spring, this movement resulting in a move-
90 ment of the latch inward into a position out of the path of the arm 89. In order that the lever 92 shall be moved periodically in order to release the spring-latch and allow it to be projected into the path of the arm 89, I provide the
95 lever with a heel or rearward-extending arm 92'', which is arranged to be operated upon by cams or projections which serve to move the lever against the force of the spring 93. I prefer that the projections 85 should be made
100 to serve also as the cams or projections for operating the lever 92.

The operation of the barring mechanism may now be set forth. As the end of the buttonhole is being approached the projection 85
105 comes into engagement with the hooked end of the connecting-bar 87 and through it operates the pawl 81 to release the slide-bar 77. As soon as released this is moved inward by the spring 79, carrying the fulcrum 36, into
110 such position as will cause the long barring-stitches to be formed. The position of the arm 92' of the lever 92, which is engaged by the cam or projection 85, is such that it will be operated upon by the said cam at the time the
115 proper number of barring-stitches have been formed. The engagement of the cam with this arm moves the lever so as to carry the blade 92' upward and out of engagement with the spring-latch 90, Figs. 17 and 18, which im-
120 mediately springs out into the path of the arm 89, and as this engages with the latch in its rearward movement the sliding bar 77 is carried backward into its normal position, Fig. 14, to be caught by the pawl 81, thus restor-
125 ing the parts to the position for forming the ordinary edge and depth stitches. It will be understood that the projection 85 disengages the end 86 and leaves the pawl free before the lever 92 is operated to release the spring-latch.
130

There are two adjustments desirable for the barring mechanism: first, an adjustment which will determine the length of the barring-stitches, and, second, an adjustment which will determine the number of such stitches formed. The former adjustment may be secured by means which will determine the position to which the fulcrum 36 is moved when the pawl 81 releases the bar 77. I provide for this adjustment by extending the sliding bar 77 to the rear and screw-threading it, as represented at 94. A nut 95 is mounted upon this screw-threaded portion of the sliding bar and limits the extent to which it may be projected inward under the influence of the spring 79 by engaging with some stationary part of the apparatus, such as the part 2' of the frame. The other adjustment, which determines the number of barring-stitches, I effect by means which enable me to vary the amount of movement between the tripping of the pawl 81 and the movement of the lever 92. If the lever is moved very soon after the pawl is tripped, but one or two stitches will be formed, whereas if more time elapses and a greater movement takes place the number of stitches will be correspondingly increased. To effect this adjustment, I preferably slot the connecting-bar, as indicated at 96, and make the connecting-pin 97 between it and the pawl 81 adjustable in the slot. When the parts are thus constructed, the connecting-bar 87 may be moved so that its inner end will occupy different positions relative to the projections 85. When the bar is adjusted to occupy a position to the left of that indicated in Fig. 1, the projection 85 will not so soon engage therewith and operate thereupon, and consequently there will be a less movement of parts from the time of the tripping of the pawl to that of the tripping of the latch 90 than would occur when the parts are arranged as shown, and hence less barring-stitches would be formed. Should the bar 87 be adjusted in the opposite direction, the result would be that a greater number of barring-stitches would be formed, as will be readily understood.

It is often desirable to set the cloth-clamp by hand without operating the entire apparatus. For this purpose I provide the shaft 48 at the end which carries the spur-wheel 49 with a knob or handle 101. By means of this handle the shaft 48, which carries the cam-disk 88, the cam 72, and the crank-wheel 51, may be turned to any desired position, whereby through the connections already described the cloth clamp or foot may be caused to follow its path around the buttonhole without being transversely reciprocated. If such adjustment of the cloth-foot by hand should take place while the operating-lever 13 is in its elevated position and its arm 89 beyond the free end of the blade of the lever 92, it would happen that the blade 92' when the lever 92 was released from the projection 85

and was free to be moved by the spring 93 would find the spring-latch 90 below it in its inward position, as the bar 77 would not be moved outward or to normal position by the manual operation of the parts just referred to; but on the first reciprocation of the lever 13 its arm 89 would engage with the latch-bar 90 and force the bar 77 outward, and as the latch was being so moved the blade of the lever 92 would come into engagement with the beveled portion of the latch and force it inward, holding it out of the path of the bar 89 in its subsequent movements and until the lever 92 was again tripped.

The apparatus which I have thus described constitutes a complete buttonhole-stitching device; but for accurate and rapid work it is desirable to automatically make the incision or cut between the line of stitches which constitutes the buttonhole proper, and I will next describe the mechanism for effecting such cutting of the fabric. I preferably so time the operation of this part of the device as to cause it to operate just as the barring of the second end of the buttonhole is being effected and after both side rows of stitches have been formed. Preferably with the last barring-stitch the cutting devices are caused to operate and then the sewing-machine may be stopped and the fabric shifted to the position for forming another buttonhole.

Referring now to Fig. 21, wherein the cutting devices are shown, 102 designates a support in the form of a bracket adapted to be securely held by screws 103 to the upper portion of the central raised part 2 of the framework. It is provided with an arm 102', which extends forward above the cloth-clamp and beside the needle-bar. The forward end of this arm is provided with a pair of vertically-disposed bearings 102'', in which is mounted a rod 104, to the lower end of which is secured the cutter 106. The portion of the shaft 104 situated between the bearings 102'' is surrounded by a coiled spring 105, one end of which, 105', is secured to the shaft and the other end, 105'', to one of the bearings 102'' or to some other stationary part. The spring is arranged so as to act expansively, tending to raise the knife into the position represented in Fig. 21. It also has a torsional action which turns the knife and its shaft 104 about its vertical axis, holding it normally in an inactive position. (Represented in Fig. 21.)

107 designates an arm extending backward from the cutter 106 or from the head of the shaft 104, to which the cutter is secured, which arm is adapted to be moved into position to be engaged by a pin or other projection 108, carried by the needle-bar. When the cutter is in its normal position, being raised and turned under the action of the spring into the position just referred to, the arm 107 lies outside of the path followed by the pin 108, so that the needle-bar normally

moves without imparting any movement whatever to the cutter.

109 designates a lever pivoted upon a stud or pin 110, carried by the support 102. The lever is provided with an arm 109', which is adapted to engage with the inner end of the arm 107. A spring 111 is arranged between an arm 112, to which it is attached, and the arm 109' of the lever and tends to move it inward. The spring 111 is stronger than is the spring 105 in its torsional action and if unrestrained will move the lever 109 so that the end 109' thereof will engage with the arm 107 and move it under and into the path of the pin or projection 108 on the needle-bar, at the same time turning the shaft 104 and the cutter so that the latter is directly above the buttonhole, with its cutting edge between and parallel to the two lines of stitches. It will be seen that when in this position the needle-bar on its next descent will carry downward the cutter, causing it to sever the fabric. The projection 108 may be undercut, as represented at 114, so that when it comes into engagement with the arm 107 and moves it downward and out of engagement with the arm 109 it will be securely held against lateral movement under the torsional action of the spring 105.

The inner end or arm 109'' of the lever 109 extends rearward and is adapted to be engaged by the weighted end 113'' of a latch-lever 113, which is mounted upon an arm or bracket 115, carried by the support 102. The latch-lever 113 is provided with an arm 113', which extends into the path of the pin 52 of the crank-wheel 51. The position of the end of the lever with which the pin 52 engages is such that it is tripped or moved out of engagement with the arm 109'' of the lever 109 at the time the final barring of the buttonhole is completed.

The operation of the cutting mechanism may now be set forth. The parts being in the position indicated in Fig. 21 and the crank-wheel 51 turning in the direction of the arrow *h*, the pin 52 comes into engagement with the arm 113' of the latch-lever and moves it, carrying the weighted end 113'' thereof out of engagement with the arm 109'' of the lever 109 at the time the barring of the buttonhole is completed. The lever 109 being free from the lever 113, which serves as a latch to hold it in normal position, is moved by the spring 111, and it in turn moves the arm 107 below the projection 108 on the needle-bar, which descending causes the cutter to sever the fabric, as has been described. The cutter follows the needle-bar on its upstroke, being carried upward by the spring 105 until it comes opposite the end 109' of the lever 109. The sewing-machine should now be stopped, as the buttonhole is completed. It is necessary, however, before beginning another buttonhole to restore the cutting de-

vices to their inactive position, and this is done by pressing upon a contact-piece 116 at the end 109'' of the lever 109. This moves such end of the lever inward, and the weighted latch portion of the lever 113 immediately drops and holds the lever 109 in inactive position.

It will thus be seen that I have produced an attachment which is adapted to be used upon most of the forms of sewing-machines now in use for domestic and factory purposes; that it is exceedingly compact in structure, leaving ample free space under the overhanging arm of the sewing-machine, and that its parts are so combined and arranged as to automatically produce a buttonhole, the only operations required of the attendant after the parts have been properly adjusted being the proper placing of the cloth under the clamp and the restoring of the parts of the cutter to inactive position. After these operations have been performed the sewing-machine may be set into motion and the several operations which have been described will take place automatically and in proper sequence.

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

1. The combination with a carrier for a cloth-clamp, of a cloth-clamp comprising two independent plates, adjustable toward and from each other, means for securing said plates to the said carrier and holding them in the positions to which they may be adjusted, independent supporting-springs 10, carried by the said plates respectively, and cloth-engaging clamp-bars 11, secured to the said springs at their central parts only, substantially as set forth.

2. In a buttonhole attachment for sewing-machines, the combination with a cloth-clamp and a carrier therefor of the frame having the central raised portion 2 provided with a recess 20, a transverse shaft 14 mounted in the said upright part of the frame and extending through the recess, a cam-cylinder mounted in the said recess upon the shaft, connections between the said cam and the carrier for the cloth-clamp through which the transverse vibrations are imparted to the latter, gearing mounted upon the said transverse shaft and capable of movement independently of the cam, connections between such gearing and the carrier for the cloth-clamp through which the longitudinal movements are imparted to the carrier, the vibrating lever 13, and driving connections between the said vibrating lever and the cam and gearing, respectively, substantially as set forth.

3. In a buttonhole attachment for sewing-machines, the combination with a cloth-clamp and a carrier therefor of the frame having the central raised portion 2, a transverse rock-shaft 14 mounted therein, a cam 19 mounted upon the said shaft, connections between said

cam and the carrier for the cloth-clamp, through which the transverse vibrations are imparted to the carrier, a ratchet-wheel 22 connected with the said cam so as to turn there-
 5 with, a rock-shaft 24 mounted in the upright portion of the frame and parallel with the shaft 14, a pawl operated by the rock-shaft for engaging with the ratchet-wheel 22, the main operating-lever 13, and connections be-
 10 tween the said rock-shaft and the lever 13, substantially as set forth.

4. In a buttonhole-stitching device, the combination with a cloth-clamp of a horizontally-arranged lever constituting the carrier for the
 15 cloth-clamp, another horizontally-arranged lever connected with the said cloth-clamp carrier and arranged to impart transverse vibrations thereto, a vertically-disposed lever engaging with and arranged to vibrate the second-named horizontal lever, and means for vibrating the said vertically-disposed lever, sub-
 20 stantially as set forth.

5. In a buttonhole-stitching device, the combination with a cloth-clamp of a carrier for the cloth-clamp, a horizontally-disposed lever for imparting transverse vibrations to the said carrier, a vertically-disposed lever engaging with and operating the horizontal lever, a cam for operating the vertical lever and means for
 25 moving the cam, a movable plate which carries the fulcrum for the vertical lever, a stationary bracket or support carried by the frame of the device, and means for adjusting and securing the fulcrum-carrying plate in the
 30 said bracket or support, substantially as set forth.

6. In a buttonhole-stitching device, the combination with a cloth-clamp, of a lever which constitutes a carrier for the cloth-clamp, the
 40 said lever being provided with a single longitudinally-disposed slot, and also with a transversely-disposed curved slot arranged near its inner end, a fulcrum arranged in the said longitudinal slot about which lever is vibrated,
 45 means engaging with the lever through the transverse curved slot for moving the lever longitudinally with reference to its fulcrum, and means situated in the said longitudinal slot and arranged between the said slot and the
 50 fulcrum for imparting transverse vibrations to the lever, substantially as set forth.

7. In a sewing-machine attachment, the combination with a cloth-clamp, of a carrier therefor and means for moving the carrier,
 55 comprising a ratchet-wheel and vibrating pawl which engages with the wheel and moves it, means for imparting to the pawl regular and uniform movements, a spring bearing upon the pawl and arranged to hold it in engage-
 60 ment with the ratchet-wheel during one part of the movement of the pawl and to move it out of engagement with the wheel during another part of its movement, and means for adjusting the relations of the said spring and
 65 pawl, whereby the extent of the engagement

between the pawl and the ratchet-wheel may be varied in order to vary the effective stroke of the pawl, as substantially set forth.

8. In a buttonhole-stitching device, the combination with a cloth-clamp of the carrier for
 70 the cloth-clamp, means for giving thereto its longitudinal movements including a ratchet-wheel, a vibrating pawl 46 which engages with the ratchet-wheel, and moves it, the pawl being provided with a heel or rear extension
 75 46', a spring 61 bearing upon the said pawl, and means for adjusting the position of the spring relative to the pawl whereby the part thereof which engages with the pawl may pass
 80 on to the heel or extension portion thereof as the pawl is moved and thereby operate to throw the pawl out of engagement with the ratchet-wheel at different positions in the movement of the pawl, whereby the effective
 85 stroke of the latter may be made greater or less, substantially as set forth.

9. In a buttonhole attachment for sewing-machines, the combination of a cloth-clamp, a carrier therefor, means for moving the carrier longitudinally, a lever for vibrating it to
 90 produce the edge and depth stitches, a fulcrum about which the lever vibrates, a spring for automatically shifting the fulcrum, and means for permitting the spring to operate when the carrier reaches the end of its longi-
 95 tudinal movements, substantially as set forth.

10. In a buttonhole-stitching device, the combination with a cloth-clamp of a carrier for the cloth-clamp, means for imparting longitudinal movements thereto including a
 100 crank, a lever for imparting transverse vibrations to the carrier connected at one end to the carrier, means for vibrating the lever connected to its other end, and means for shifting the fulcrum of the lever toward the last
 105 said end thereof at substantially the same time the crank of the longitudinal-moving mechanism is passing its dead-center points, whereby the stitches are lengthened to bar the
 110 buttonhole at its ends, substantially as set forth.

11. In a buttonhole-stitching device, the combination with a cloth-clamp, of a carrier for the cloth-clamp provided with a longitudinal slot, means for moving the car-
 115 rier longitudinally, a lever for moving the carrier transversely provided with a pin which enters the longitudinal slot in the carrier, a fulcrum for the said lever, and means for adjusting the fulcrum relative to
 120 the pin which engages with the carrier whereby the stitches may be lengthened for barring the buttonhole at its ends, substantially as set forth.

12. In a sewing-machine attachment, the
 125 combination with a cloth-clamp, of a carrier therefor, a lever for imparting vibratory movements thereto, a fulcrum about which the lever vibrates, a spring for automatically shifting the fulcrum, a catch for holding the
 130

fulcrum with the spring under tension, and a trip for releasing the fulcrum from the catch, substantially as set forth.

13. In a buttonhole-stitching device, the combination with a cloth-clamp of a carrier for the cloth-clamp, a lever for imparting short transverse vibrations thereto to form the stitches, a fulcrum-pin for the said lever, a bar which carries the said fulcrum, means which tend to move the bar in one direction, positively-operating mechanism for moving the bar in the opposite direction, means for holding the bar with the fulcrum in position to form the normal stitches, and means for tripping the said holding devices to allow the bar to be moved into position to cause an abnormal lengthening of the stitches, substantially as set forth.

14. In a buttonhole-stitching device, the combination with a cloth-clamp of the carrier for the cloth-clamp, a lever engaging therewith for imparting transverse vibrations thereto to form the edge and depth stitches, a fulcrum about which the lever moves, a slide-bar carrying the said fulcrum, a spring operating upon the said bar and tending to move it into abnormal position carrying the fulcrum into position to cause the lengthening of the stitches for barring the buttonhole, a catch for holding the bar in normal position for producing the edge and depth stitches, means for automatically releasing the catch and permitting the spring to move the bar, and means for restoring the bar to normal position to be again held by the catch, substantially as set forth.

15. In a buttonhole-stitching device, the combination with a cloth-clamp of a carrier for the cloth-clamp, a lever for moving the carrier laterally to form the edge and depth stitches, a movable fulcrum for the lever, a movable bar carrying the said fulcrum, means for automatically moving the bar to shift the position of the fulcrum to cause the stitches to be lengthened, a moving part of the device such as the arm 89, a movable contact-piece carried by the fulcrum-carrying bar arranged to be moved into the path of the said moving part of the device which will then operate to move the latch-bar into normal position, and means for holding the said contact-piece out of the path of the moving part of the device until the desired number of stitches have been formed, substantially as set forth.

16. In a buttonhole-stitching device, the combination with a cloth-clamp of a carrier for the cloth-clamp, a lever for moving the carrier laterally to form the stitches, a movable fulcrum for the said lever, a slide-bar carrying the said fulcrum, means for holding the slide-bar and its fulcrum in position to cause the ordinary edge and depth stitches to be formed, means for automatically releasing the said bar and moving it into position to cause the barring-stitches to be formed, a

constantly-moving part of the device, a latch carried by the fulcrum-carrying slide-bar arranged to be moved into the path of the said constantly-moving part, which will then operate to move the bar into normal position, and means for holding the latch out of the path of the said constantly-moving part until the desired number of barring-stitches has been formed, substantially as set forth.

17. In a buttonhole-stitching device, the combination with a cloth-clamp of the carrier for the cloth-clamp, means for moving the carrier longitudinally, a lever for moving the carrier laterally to form the stitches, a movable fulcrum for the said lever, a bar carrying the said fulcrum, means for holding the bar and its fulcrum in position to cause the ordinary edge and depth stitches to be formed, means arranged to automatically release the fulcrum-carrying bar and to move it into position to cause the barring-stitches to be formed, such means being operatively connected with the mechanism which gives to the carrier its longitudinal movements and arranged to operate when the carrier reaches the respective ends of its longitudinal movements, a vibrating part of the device, such as the arm 89, and a latch or contact-piece carried by the fulcrum-carrying bar arranged to be moved into the path of the constantly-moving part which will then operate to move the bar into the desired position after the barring-stitches have been formed, substantially as set forth.

18. The combination, with a cloth-clamp, of a carrier therefor, means for imparting to the carrier regular lateral vibrations to form the overseam-stitches, means for intermittently varying the extent of such vibrations to form transverse barring-stitches of a greater length than the overseam-stitches, and means for varying the relative duration of the operation of the last said mechanism, whereby the number of transverse barring-stitches relative to the number of the overseam-stitches may be varied, substantially as set forth.

19. In a buttonhole mechanism for sewing-machines, the combination with a cloth-clamp, of a carrier therefor, means for imparting thereto lateral movements to form the regular edge and depth stitches, means for imparting to the carrier the regular progressive or longitudinal movements, means for increasing the extent of the lateral movements of the carrier to form longer stitches when the carrier reaches one end of its longitudinal movement, and means whereby the number of such lengthened stitches may be varied relative to the number of the edge and depth stitches, substantially as set forth.

20. In a buttonhole-stitching device, the combination with a cloth-clamp of a carrier for the cloth-clamp, a lever for laterally vibrating the same, a movable fulcrum for the lever, means for automatically shifting the fulcrum into an abnormal position to cause an

increase in the length of the stitches, means for holding the fulcrum in normal position, automatically-controlled means for releasing the fulcrum and allowing it to be moved into its
 5 abnormal position, automatic means for restoring the fulcrum from its abnormal to its normal position, and adjusting devices for varying the relative time which elapses between the successive operations of the said automati-
 10 cally-controlled devices, whereby the number of lengthened stitches which are formed may be varied, substantially as set forth.

21. In a buttonhole-stitching device, the combination with a cloth-clamp of a carrier for the cloth-clamp, a lever for imparting thereto short transverse vibrations, a slide-bar carrying the fulcrum-pin for the lever, a spring which tends to move the slide-bar into an abnormal position, a catch engaging with the
 15 slide-bar for holding it in normal position, an automatically-operated trip for releasing the catch when the barring-stitches are to be formed, a mechanism for restoring the slide-bar to normal position to be held by the catch
 20 after the desired number of barring-stitches have been formed, substantially as set forth.

22. In a buttonhole-stitching device, the combination with a cloth-clamp of a carrier for the cloth-clamp, means for imparting thereto
 30 its longitudinal movements including a shaft 48 carrying a projection 85, a lever arranged to impart transverse vibrations to the carrier, a slide-bar carrying a movable fulcrum for the said lever, a spring which tends to move
 35 the bar and its fulcrum into abnormal positions to cause lengthened stitches to be formed, a catch for holding the slide-bar in normal position, a trip for moving the catch to release the slide-bar having a portion arranged
 40 to be engaged by the aforesaid projection on the shaft 48, and automatically-operated means for restoring the slide-bar to normal position after the desired number of lengthened stitches has been formed, substantially as
 45 set forth.

23. In a buttonhole-stitching device, the combination with a cloth-clamp of a carrier for the cloth-clamp, a lever for imparting thereto the short transverse vibrations to form the
 50 edge and depth stitches, a movable fulcrum for the said lever, automatically-controlled means for shifting the fulcrum to an abnormal position, whereby the length of the stitches formed is increased, automatically-controlled
 55 means for restoring the fulcrum to its normal position after the desired number of lengthened stitches has been formed, and adjusting devices for varying the relative length of time between the successive operations of the
 60 said automatically-operating devices whereby the number of lengthened stitches produced may be varied, substantially as set forth.

24. In a buttonhole-stitching device, the combination with a cloth-clamp of a carrier for the cloth-clamp, means for imparting thereto

its longitudinal movements including a shaft, such as 48, carrying a projection 85, a lever arranged for imparting the short transverse vibrations to the carrier, a slide-bar carrying the fulcrum for the lever, a spring for mov-
 70 ing the slide-bar into an abnormal position, a catch device 81 for holding the slide-bar in normal position, a trip device comprising a bar 87 having an end arranged to be engaged with and operated by the projection 85 on
 75 the shaft 48, for releasing the trip, an adjustable connection between the trip and the said bar 87 whereby the timing of the tripping operation may be varied, and automati-
 80 cally-operated means for restoring the slide-bar to normal position, substantially as set forth.

25. In a buttonhole-stitching device, the combination with a cloth-clamp of a carrier for the cloth-clamp, a lever for moving the carrier
 85 laterally to form the edge and depth stitches, a slide-bar carrying the fulcrum for the lever, means for holding the slide-bar and its fulcrum in normal position, means for moving the same into an abnormal position to cause
 90 lengthened stitches to be formed, a spring-latch carried by the fulcrum-carrying slide-bar, a retaining device for holding the spring-latch retracted, means for operating the said retaining device to release the spring-latch
 95 when the desired number of lengthened stitches has been formed, and a vibrating part, such as the arm 89, into whose path of movement the spring-latch is projected when released, substantially as set forth.
 100

26. In a buttonhole-stitching device, the combination with a cloth-clamp of a carrier for the cloth-clamp, the means for imparting thereto its longitudinal movements including
 105 a shaft, such as 48, provided with a projection, a lever arranged to impart short transverse vibrations to the carrier, a slide-bar which carries the fulcrum for the said lever, means for holding the slide-bar and its fulcrum in normal position to cause the ordinary
 110 edge and depth stitches to be formed, means for automatically releasing the slide-bar and moving it into position to cause lengthened stitches to be formed, a spring-latch or contact-piece carried by the said slide-bar, a mov-
 115 able arm arranged to hold the spring-latch in a retracted position, and arranged to be operated by the projection on the said shaft 48 in order to release the latch, and a vibrating arm 89 arranged to engage with the spring-
 120 latch when it is released, and to move the slide-bar back to normal position, substantially as set forth.

27. In a buttonhole-stitching device, the combination with a cloth-clamp of a cloth-
 125 clamp carrier, means for imparting thereto its longitudinal movements including a shaft, such as 48, provided with a projection, such as 85, a lever arranged to impart the short transverse vibrations to the carrier for form-
 130

ing stitches, a slide-bar carrying a movable fulcrum for the lever, a spring which tends to move the slide-bar and its fulcrum into an abnormal position to produce lengthened
 5 stitches, a catch for holding the slide-bar in normal position, a trip for the catch consisting of a bar 87 arranged to engage with and be operated by the projection on the shaft 48, a spring-latch carried by the slide-bar, a lever
 10 92 having one arm arranged to hold the spring-latch in retracted position and another arm adapted to be operated by a projection on the said shaft 48 to move the lever and release the spring-latch, and a constantly-moving
 15 arm 89 arranged to engage with the spring-latch when it is released and to move the slide-bar into normal position, substantially as set forth.

28. In a buttonhole-stitching device, the
 20 combination with the reciprocating needle-bar, the cloth-clamp and means for moving the latter, of a cutter, a vertically-disposed shaft to which the cutter is secured, a spring connected with the shaft and arranged to hold
 25 it and the cutter in an elevated position, and arranged also to turn the cutter into an inoperative position, a projecting piece connected with the shaft which carries the cutter arranged to be moved into position to be acted
 30 upon by the needle-bar, and means operated by the mechanism for moving the cloth-clamp for moving the said projecting piece into position to be acted upon by the needle-bar, substantially as set forth.

35 29. In a buttonhole stitching and cutting device, the combination with the reciprocating

needle-bar, the cloth-clamp, and the mechanism for moving the cloth-clamp, of a cutting device, means which tend normally to hold the cutting device in an inoperative position, a spring-actuated lever arranged to move the cutting device into position to be actuated by the needle-bar, and a latch device arranged to be operated by the mechanism which moves the cloth-clamp, for holding
 45 the said lever from operating the cutter until the cloth-clamp-moving mechanism has arrived at a predetermined position, substantially as set forth.

30. In a buttonhole-stitching device, the
 50 combination with a reciprocating needle-bar, the cloth-clamp and the mechanism for moving the latter, of a cutting device, a projecting piece connected therewith arranged to be moved into position to be operated upon by
 55 the needle-bar, means for normally holding the cutting device in inoperative position with the said projecting piece out of the path of the movement of the needle-bar, a lever 109 arranged to engage with the said projecting
 60 piece and to move it in position to be operated upon by the needle-bar, a spring for operating the said lever, and a latch-bar, adapted to be operated by a moving part of the mechanism for operating the cloth-clamp and arranged
 65 to hold the lever 109 against operation until the latch-bar is tripped, substantially as set forth.

CHARLES P. WATSON.

Witnesses:

JOHN N. LOGAN,
 OBE. CULLISON.