

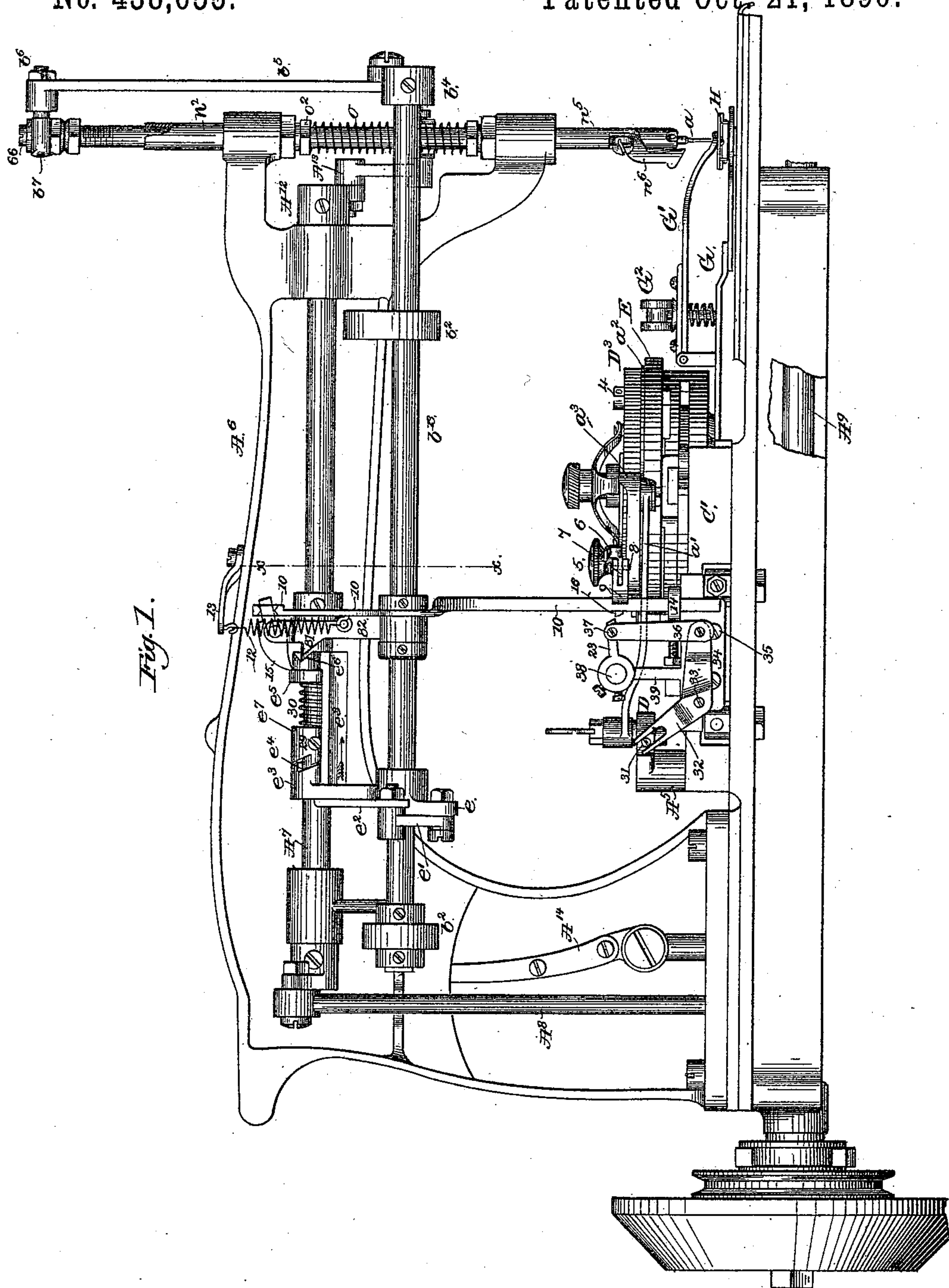
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3 Sheets—Sheet 1.

A. C. TEBBETTS & H. E. DOGGETT.  
MECHANISM FOR AUTOMATICALLY CUTTING BUTTON HOLES ON  
SEWING MACHINES.

No. 438,655.

Patented Oct. 21, 1890.



Witnesses.  
John F. C. Poirer  
Fred L. Emery

Inventors.  
Alvah C. Tebbetts  
Horace E. Doggett.  
by Lewis & Gregory Attys.

(No Model.)

3 Sheets—Sheet 2.

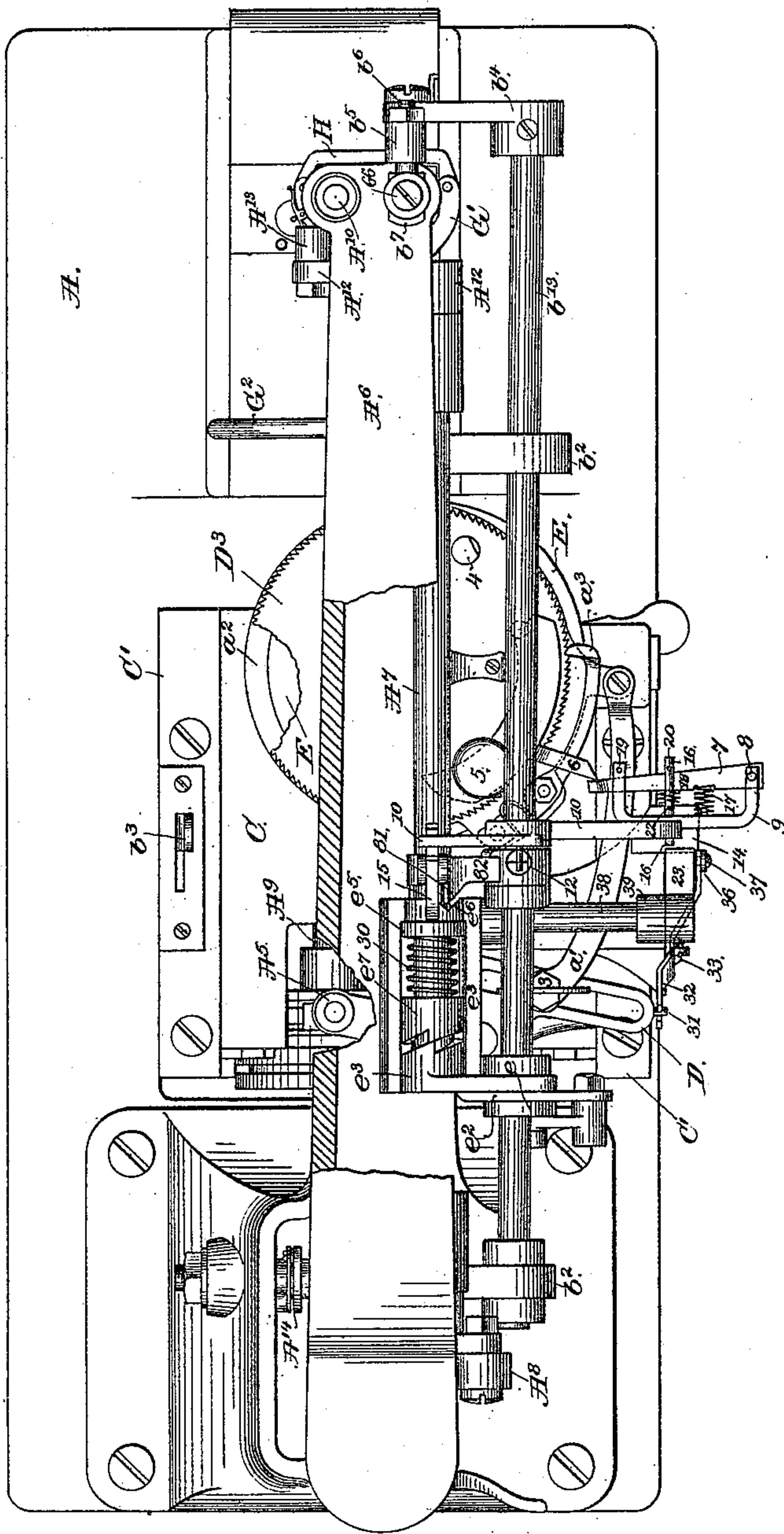
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Fig. 2



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(No Model.)

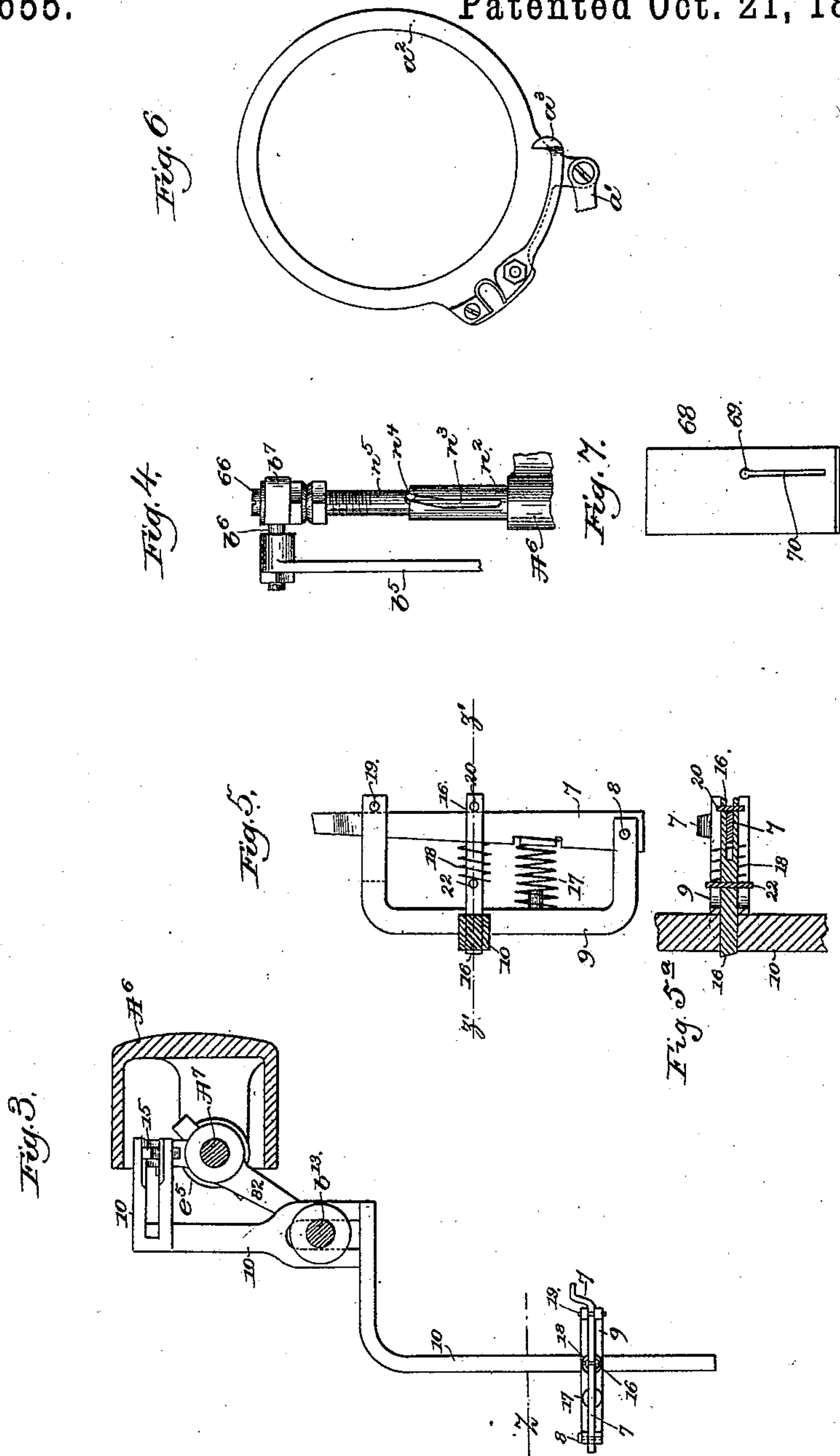
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# UNITED STATES PATENT OFFICE.

ALVAH C. TEBBETTS, OF BOSTON, MASSACHUSETTS, AND HORACE E. DOGGETT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO THE WHEELER & WILSON MANUFACTURING COMPANY, OF BRIDGEPORT, CONNECTICUT.

MECHANISM FOR AUTOMATICALLY CUTTING BUTTON-HOLES ON SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 438,655, dated October 21, 1890.

Application filed May 20, 1886. Serial No. 202,742. (No model.)

*To all whom it may concern:*

Be it known that we, ALVAH C. TEBBETTS, of Boston, county of Suffolk, and State of Massachusetts, and HORACE E. DOGGETT, of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Mechanism for Automatically Cutting Button-Holes on Sewing-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

Prior to this our invention it has been customary, as in a machine described in United States Patent No. 303,454, dated August 12, 1884, to cut a button-hole slit in the material while held in the clamp, the clamp, while the cutter is acting to cut the slit in the said material, presenting the material in such position within the path of the needle as to permit the latter in its descent to enter the material within the said clamp. In the said patent the cutter is operated by hand.

The main object of this our invention is to operate the button-hole cutter automatically and by devices independent of the needle-bar, and to carry out our invention in the best and most practicable manner we have provided the front with a rocking cutter-bar-operating shaft located parallel to the needle-bar-actuating shaft and with means whereby the operation of the cutter-bar-operating shaft and the cutter is made dependent upon the movement of a wheel or a disk which is rotated once during the stitching of each button-hole, the said wheel or disk effecting the movement of the cloth-clamp for each button-hole whatever may be its length or the number of stitches required to complete it; or, in other words, we have selected for the timing of the descent of the cutter a part of the machine which, under all conditions of adjustment, is rotated in the same time with relation to the commencement and completion of the stitching of a button-hole. In the embodiment of our invention as herein shown

the part selected is the feeding wheel or disk common to United States Patent No. 303,453.

It is essential to the perfect operation of a button-hole cutter that the cutter should descend only at the proper time and but once in cutting each button-hole; so we have devised means whereby the cutter will descend at just the proper time and but once during each complete movement of the clamp carrying the material to be stitched for the production of the button-hole.

It will be obvious that the feeding wheel or disk controlling each complete movement of the clamp holding the material, by rotating once for each button-hole, will have to travel different distances at each step of the cloth-clamp, the distance depending upon the number of stitches in the button-hole, the greater the number of stitches the less the movement of the said disk at each step of the clamp, and vice versa, and the greater the number of stitches the slower the rotation of the wheel or disk.

To insure but one movement of the cutter-bar for each rotation of the feeding wheel or disk, we have provided the machine with a tripping device having two members which, when once made to contact with each other to bring into operation the devices which couple the needle-bar-operating shaft with the cutter-bar-operating shaft to effect one single operation of the cutter-bar, immediately slip out of operative position with relation each to the other, and they cannot, by the right operation of the machine in stitching, be again brought in contact to effect the descent of the cutter-bar except as the tripping device carried by the feeding wheel or disk again arrives in operative position after the completion of another button-hole.

The cutter-bar carrying the cutting-blade is supported in the head of the machine, and is caused to descend positively at the proper time by or through a horizontal cutter-bar-actuating shaft located in the arm of the machine parallel to the needle-bar-actuating



shaft and joined by suitable connecting mechanism operatively with the said cutter-bar.

We have herein so constructed the apparatus for actuating the cutter-bar and have so combined it operatively with relation to the cloth-clamp and the mechanism for moving the said clamp that the descent of the cutter-bar is automatically determined and effected substantially as the stitching of each button-hole is being completed, the cutter, after making its downward stroke, being speedily withdrawn to its upper position out of the way of the descending needle to avoid interference therewith.

The particular features in which our invention consists will be hereinafter more fully described and pointed out in the claims at the end of this specification.

Figure 1 is a rear side elevation of a Wheeler & Wilson machine having our improvements added thereto, a part of the frame-work being broken out to show the usual main shaft; Fig. 2, a top or plan view of Fig. 1, the overhanging arm being partially broken out to show parts below it; Fig. 3, a partial section in the line  $x x$ , Fig. 1; Fig. 4, a detail of the upper end of the cutter-carrying bar and part of the head of the machine, to be described; Fig. 5, a section of the bar 10 in the dotted line  $z$ , Fig. 3, to show the yoke and parts carried by it. Fig. 5<sup>a</sup> is a section thereof in the dotted line  $z'$ , Fig. 5. Fig. 6 is a detail of the annular pawl-carrier, and Fig. 7 a top view of the slotted throat-plate detached.

Our invention is shown as applied to a Wheeler & Wilson machine, style No. 10, the said machine being provided with a cloth-holding clamp, substantially such as shown in United States Patent No. 303,453, and with means to move it, substantially as provided for in United States Patent No. 303,557, dated August 12, 1884.

Referring to the drawings herein, the bed-plate A, the overhanging arm A<sup>6</sup>, the needle-bar-actuating rock-shaft A<sup>7</sup>, the link A<sup>8</sup> to move it, the main shaft A<sup>9</sup>, the needle-bar A<sup>10</sup>, the arm A<sup>12</sup>, attached to the shaft A<sup>7</sup>, and the link A<sup>13</sup> and take-up A<sup>14</sup> are all common to the said Wheeler & Wilson sewing-machine. The ratchet-toothed wheel D<sup>3</sup> and the feeding cam-disk E below it, the cloth-clamp composed of the members G G', foot H, and lever G<sup>2</sup>, the lever A<sup>5</sup>, having the slotted arm D, and the catch-lever b<sup>3</sup> are all substantially as in United States Patent No. 303,453, wherein like parts are designated by like letters. The parts herein shown as intermediate the feeding or cam disk E and the clamp (and for moving the said clamp) are all substantially the same as in the said Patent No. 303,557.

The wheel D<sup>3</sup> and feeding or cam disk E, rotated intermittingly by a pawl (to be described) and the devices set in motion by the feeding cam or disk to impart to the cloth-clamp its motions to carry the material clamped between its jaws under the needle  $a$ ,

are all substantially as provided for in the said patents, and the said devices, being old and not of our invention, need not be herein further described. Instead of the exact devices herein shown by which to actuate the cloth-clamp, we may employ any other suitable or well-known mechanism for producing like movements in the clamp and carrying it under the needle-bar to be stitched, as will be herein described.

Herein the slotted arm D has attached to it by a suitable screw 3 a link  $a'$ , which is jointed to a substantially annular pawl-carrier  $a^2$ , (shown detached in Fig. 6,) the said pawl-carrier being placed between the feeding or cam disk E and the toothed wheel D<sup>3</sup>.

As the pawl-carrier  $a^2$  is reciprocated, the pawl  $a^3$  mounted upon it engages the teeth of the wheel D<sup>3</sup>, and through it the stud 4, connecting it with the feeding cam or disk E, causing the latter to be rotated in unison with it.

The wheel D<sup>3</sup> at its upperside has secured to it by a screw 5 a finger or tripping device 6, herein shown as attached to the plate D<sup>3</sup>.

The overhanging arm A<sup>6</sup> of the machine is provided with suitable bearings b<sup>2</sup>, within which is mounted a cutter-bar-actuating shaft b<sup>13</sup>, provided at its front end with an arm b<sup>4</sup>, attached by a link b<sup>5</sup> to a stud b<sup>6</sup>, having an eye b<sup>7</sup>, which receives in it a suitable screw 66, by which to connect the said stud loosely to the upper end of the cutter-bar n<sup>5</sup>, the said bar actuated by mechanism independent of the needle-bar, having at its lower end a cutting-blade n<sup>6</sup>, the cutter-bar being surrounded by a spiral spring o, the upper end of which is acted upon by a collar o<sup>2</sup>.

The bar n<sup>5</sup> has a pin n<sup>4</sup>, which enters a diagonal groove n<sup>3</sup> in a sleeve-like bearing n<sup>2</sup>, attached to the arm A<sup>6</sup>, the said cutter-carrying bar, cutter-spring, and sleeve being substantially the same as are the parts designated by like letters in United States Patent No. 303,454, the said cutter-bar having a partial rotation as it descends and also when it ascends, as described in the said patent, the cutting-blade N<sup>6</sup> cutting a slot in the material held under the foot H, while the foot, with the material under it, is in position to be penetrated by the needle  $a$ , as provided for in the said patent.

The shaft b<sup>13</sup> is rocked to effect the descent of the cutter-carrying bar only when the button-hole slit is to be cut in the material through mechanism which will now be described, the cutter on the cutter-bar after making one downward stroke being speedily withdrawn to its upper position and thrown into a position out of the way of the descending needle to avoid being struck by the said needle or needle-bar.

The shaft b<sup>13</sup> has fast upon it an arm e, which is connected by a link e' with an arm e<sup>2</sup>, secured to one end of a clutch-box e<sup>3</sup>, surrounding loosely the needle-bar-operating shaft A<sup>7</sup>. This clutch-box is provided with a series of clutching-teeth, as at e<sup>4</sup>, and with a



shoulder  $e^5$  and a notch  $e^6$ , all shown in Fig. 1, the part of the clutch-box having the clutching-teeth  $e^4$  being attached to the shouldered part  $e^5$ , so as to move in unison with it.

5 The shaft  $A^7$  has attached to it by a screw 29 a collar  $e^7$ , having a series of teeth to cooperate with the teeth  $e^4$  of the clutch-box  $e^3$ , the said collar and teeth and clutch-box forming a clutch mechanism, the teeth of which  
10 are engaged whenever the end of the catch 15 is removed from its engagement with the shoulder  $e^5$  by the depression of the frame 10, to be described, the spring 30 at such time moving the clutch-box in the direction of the  
15 arrow upon it in Fig. 1, causing the engagement of the teeth  $e^4$  with the teeth of the hub  $e^7$ , fast on the shaft  $A^7$ , so that as the said shaft is rocked positively in moving the needle-bar down the clutch-box is caused to rotate or rock in unison with the said shaft and  
20 rock the shaft  $b^{13}$  in the direction to effect the descent of the cutter-carrying bar  $n^5$ . As the needle-bar-actuating rock-shaft  $A^7$  is turned in the direction to cause the descent of the  
25 cutter-carrying bar, the notched end  $e^6$  of the clutch-box acts upon the beveled finger 82 of a bar 82'', held in place, as herein shown, by an eye at its lower end, which embraces the shaft  $b^{13}$ , the contact of the said beveled notch  
30  $e^6$  with the said beveled projection 81 causing the clutch-box  $e^3$  to be moved in a direction opposite the arrow marked thereon (see Fig. 1) and effect the disengagement of the teeth  $e^4$  from the teeth of the hub  $e^7$  by the  
35 time that the cutter-carrying bar has reached its lowest position. As the clutch-box  $e^3$  is moved backward upon the shaft  $A^7$ , as described, the shoulder part  $e^5$  thereof acts upon and compresses the spring 30, and as soon as  
40 the said shoulder passes the end of the catch 15 the latter, through the bar 10, acted upon by the spring 12, is immediately thrown down at its forward end, so as to again lock the clutch-box in position and permit the shaft  
45  $A^7$  to be rocked to actuate the needle-bar, but without moving the shaft  $b^{13}$  or the cutter-carrying bar  $n^5$ , which derives its motion from the said shaft  $b^{13}$ .

50 The finger 6, before described as attached to the ratchet-toothed wheel  $D^3$ , forms one member of a tripping mechanism, the other member of which is the lever 7, the latter cooperating directly with the finger 6. The lever 7 is pivoted at 8 on a yoke 9, secured to  
55 the bar 10. This bar 10, of irregular shape, as best shown in Figs. 3 and 5, is normally kept elevated by a spring 12, attached to it and to a lug 13, the said bar being herein shown as guided at its lower end in a guide  
60 14, attached to a foot-plate 34, secured to one of the ways  $C'$  by screws 35. The upper end of the bar 10, bent substantially at right angles, as shown in Fig. 3, is slotted to embrace one end of the pivoted catch 15, before referred to.  
65

The yoke 9 of the bar 10 carries a dog 16, herein shown as a pin, the rear end of which

is slotted to receive the lever 7, the latter being acted upon by a spring 17, which normally keeps the rear side of the said lever 70 against a stop 19, as represented in Fig. 5, the said lever at such time also acting upon a pin 20 or other projection of the said dog to keep the beveled forward end thereof substantially within its guiding recess in the bar 10, as  
75 shown in the section, Fig. 5<sup>a</sup>. The dog 16 is surrounded by a spring 18, which is located between the lever 7 and a pin or projection 22 of the said dog.

80 The outer end of the slotted part D of the lever  $A^5$  has a pin 31, which enters a hole or slot in an elbow-lever 32, pivoted at 33 on the foot-plate 34, the said lever being attached by link 36 to a pin or screw 37 of a vibrating arm 23, attached to a rock-shaft 38, held in suitable standards or bearings 39, forming part  
85 of the said foot-plate, the said arm 23 being vibrated in unison with the lever  $A^5$  or rising and falling at each stitch. The adjacent ends of the arms 23 and dog 16 are reversely inclined or beveled, as shown in Fig. 1.  
90

95 The finger 6 is so located upon the toothed wheel  $D^3$  as to strike the free end of the lever 7 just before the completion of the button-hole or while one or more stitches have yet to be made, and the finger 6, acting upon the lever 7, pushes the same forward, as in Fig. 2, causing the beveled end of the dog 16 to be projected beyond the bar 10 in position to be caught by the vibrating arm 23 at just the  
100 time when the cutter-bar is to be depressed or when the button-hole is stitched and the material between the lines of stitching is to be cut. If the dog 16 is pressed through the bar 10 while the arm 23 is rising, the beveled  
105 end of the arm acting against the beveled end of the dog will push the latter backward, compressing the spring 18; but as soon as the end of the arm 23 rises above the end of the dog the spring 18 acts quickly and throws the dog  
110 forward, ready to be caught by the arm 23 at its next descent. When the arm 23 strikes the upper side of the dog 16, the bar 10 and its yoke 9 are caused to descend, which effects the removal of the free end of the lever 7 from  
115 contact with the finger 6, and the spring 17 immediately throws the lever 7 back against the pin or projection 19 and to the rear side of the finger 6, so that the latter cannot again strike the free end of the lever 7 until after  
120 the wheel  $D^3$  has made another rotation. The movement of the lever 7, as described, to a position back of the finger 6 prevents the possibility of the dog 16 being held forward by the lever 7 long enough to enable the arm 23  
125 to strike it twice and cause two descents of the bar 10 and two operations or descents of the cutter-carrying bar  $n^5$ . The depression of the bar 10, as described, causes the catch 15 to be turned, effecting the instantaneous  
130 release of the clutch-box and the instantaneous descent of the cutter  $n^6$ . The downward thrust of the cutter and its ascent are made to take place while the needle is descending



in the goods held by the clamp, the cutter rising before the needle-bar begins to ascend.

The cutter-bar-actuating shaft  $b^{13}$  and its operative connections with the cutter-carrying bar  $n^5$  and the needle-bar-operating shaft constitute a depressor or depressing mechanism for causing the descent of the cutter at the moment when a button-hole is to be cut, and, although this is the depressor or depressing mechanism which I prefer to employ, I do not wish to be understood as limiting myself thereto.

In practice the machine will be provided with a suitable lever to release the catch-lever  $b^3$  and automatically stop the machine, as provided for in the Patent No. 303,453, herein referred to.

This invention is not limited to the precise mechanism herein shown by which to actuate the cutter-carrying rock-shaft and the cutter-bar, and it includes as within its scope any equivalent mechanism for moving the cutter-actuating rock-shaft from another moving shaft of the machine, forming a part of the train of mechanism for actuating the stitch-forming devices, to thereby impart to the cutter-carrying bar one single stroke for each button-hole slit to be cut, the said cutter-carrying bar being actuated positively and its time of operation being governed by the position of a wheel or feeding cam or disk, which controls the movement of the cloth-clamp, so that the said cutter-bar is operated in the proper time no matter what may be the number of stitches required for the completion of the button-hole or the character of the hole to be made.

The cloth-plate has applied to it a throat-plate 68, having a needle-hole 69 and a slot 70, in which descends the cutter  $n^6$ .

We claim—

1. A sewing-machine containing the following instrumentalities, viz: stitch-forming devices, a slotted throat-plate, a cloth-clamp, a rotating wheel or cam for reciprocating the latter beneath the needle to enable the button-hole to be worked by the stitch-forming mechanism, a cutter-bar reciprocating in the head of the machine adjacent to the needle-bar of the stitch-forming mechanism, a cutter carried by the said cutter-bar, a needle-bar-operating shaft, a cutter-bar-operating shaft, both located above the bed-plate of the machine, the cutter-bar-operating shaft being normally held out of action, connecting devices between the said cutter-bar-operating shaft and the said needle-bar-operating shaft,

whereby the needle-bar-operating shaft may operate the cutter-bar-actuating shaft at desired intervals, a tripping mechanism by which the connecting devices between the needle-bar and cutter-bar actuating shafts may be operatively connected, and a rotating device moving in unison with the clamp-operating cam or wheel to operate the said tripping mechanism at the proper time to cause the cutter-bar and cutter carried by it to descend and cut a button-hole beneath the needle when the stitching of the said hole is nearly or wholly completed, substantially as described.

2. A sewing-machine containing the following instrumentalities, viz: a needle-bar, an operating-shaft therefor located above the bed-plate, a cutter-bar separate from and independent of the said needle-bar, a cutter carried by said cutter-bar, a slotted throat-plate, a cutter-bar-operating shaft also located above the bed-plate and near the needle-bar-operating shaft, connecting devices between the said shafts, which connecting devices are normally held out of action, a cloth-clamp, a cam or wheel for operating the latter, tripping mechanism for throwing said connecting devices into action to connect the said two shafts when desired in order that the needle-bar-operating shaft may intermittently actuate the cutter-bar-operating shaft, and a rotating device moving in unison with said clamp-operating cam or wheel for actuating said tripping mechanism at the proper time, substantially as described.

3. The combination, with the needle-operating shaft  $A^7$ , having the toothed hub  $e^7$ , the cutter-bar-operating shaft  $b^{13}$ , the cutter-bar and cutter connected with the latter shaft, the toothed clutch-box  $e^3$  connected with the said shaft  $b^{13}$ , the spring 30, the cloth-clamp and its feeding-disk, a projection or finger 6, rotating in unison with said feeding-disk, the catch 15, the bar 10, spring-pressed lever 7, spring-pressed dog 16, supported by said bar 10, the vibrating arm 23, and operating mechanism for the latter, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ALVAH C. TEBBETTS.  
HORACE E. DOGETT.

Witnesses:

G. W. GREGORY,  
C. M. CONE.