

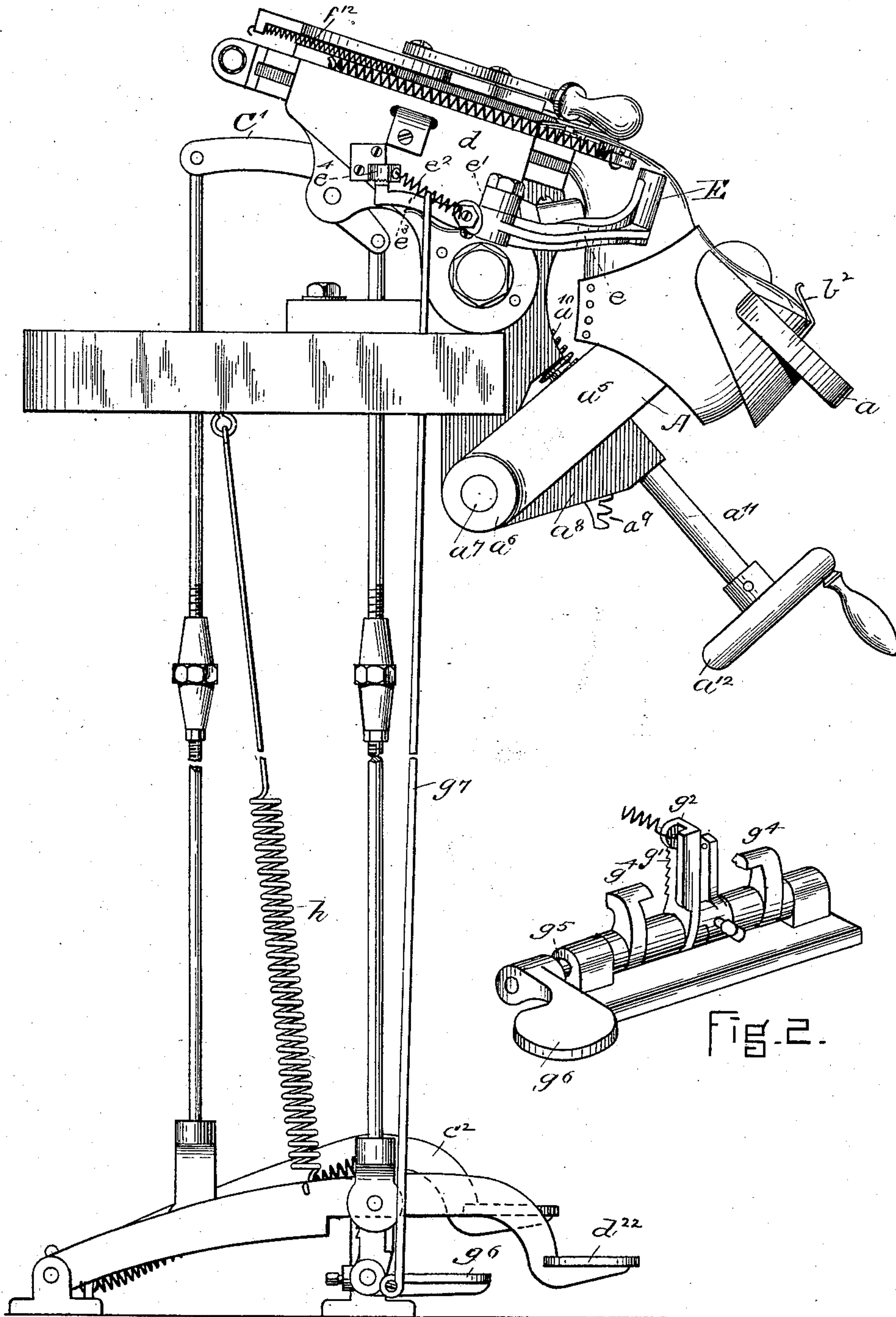
(No Model.)

4 Sheets—Sheet 1.

G. W. COPELAND, J. E. CRISP & E. F. GRANDY.
LASTING MACHINE.

No. 365,504.

Patented June 28, 1887.



WITNESSES.

J. M. Dolan.
Fred. B. Dolan.

FIG. 1.

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by their Attys Clark & Raymond

(No Model.)

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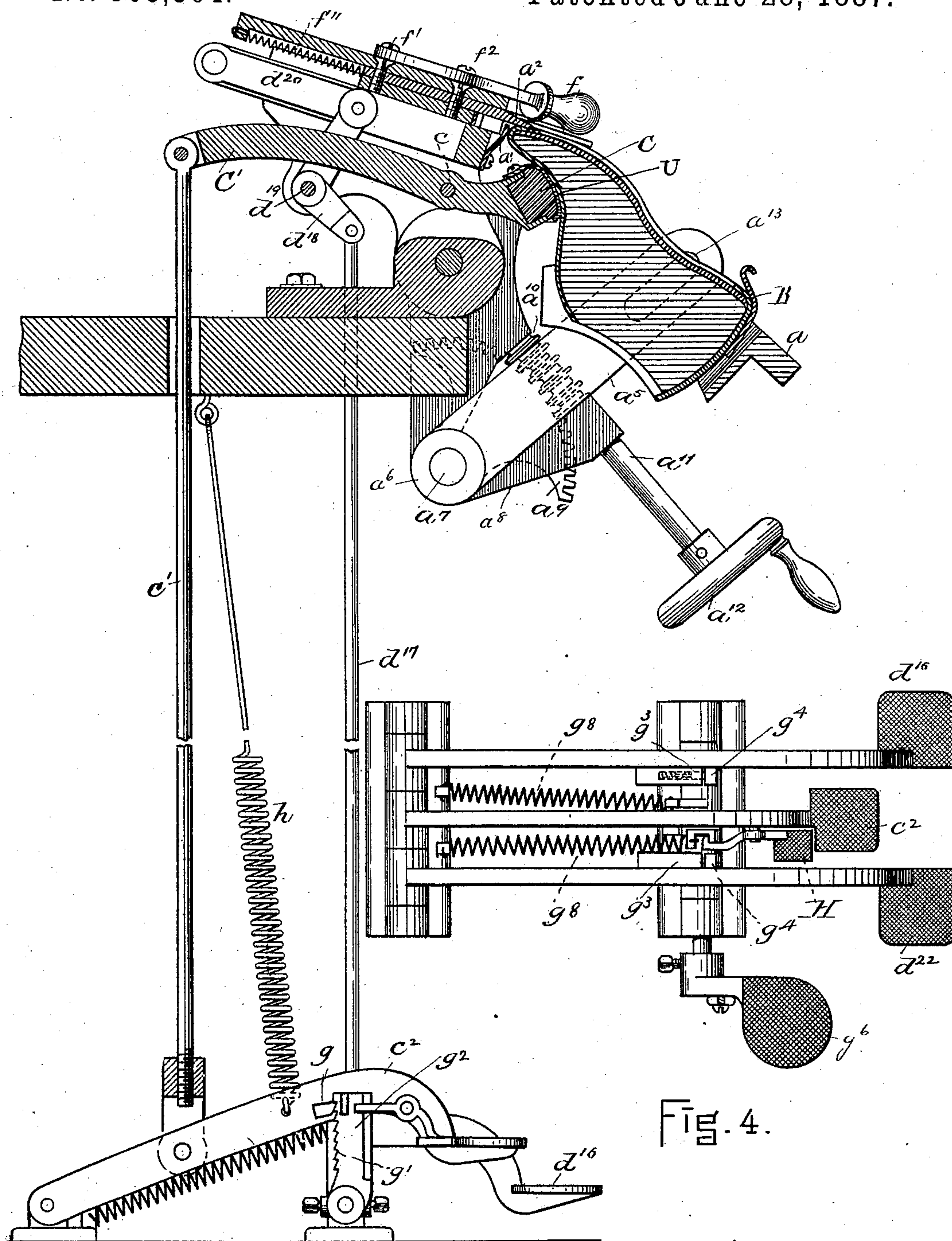


Fig. 4.

Fig. 3.

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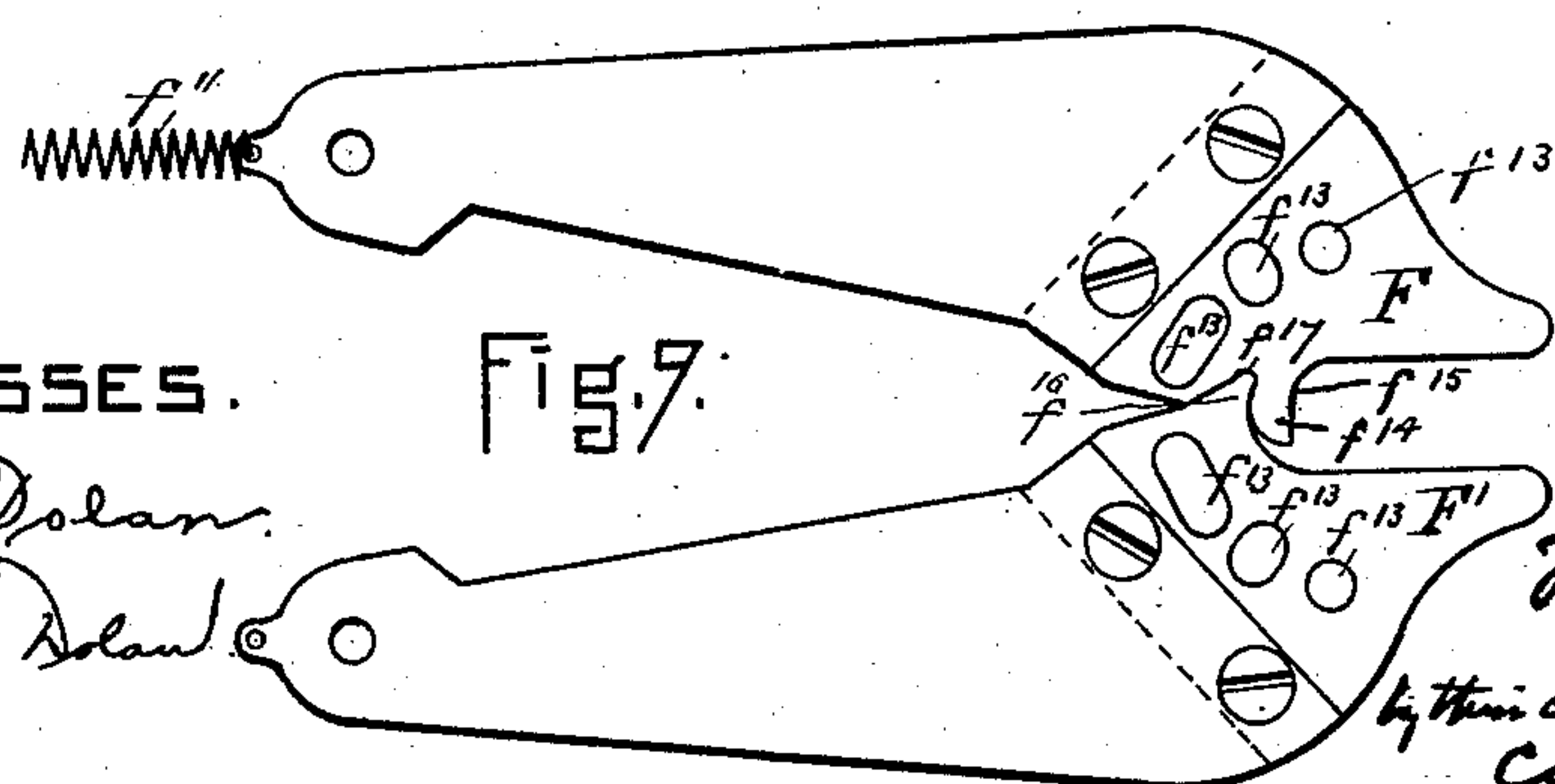
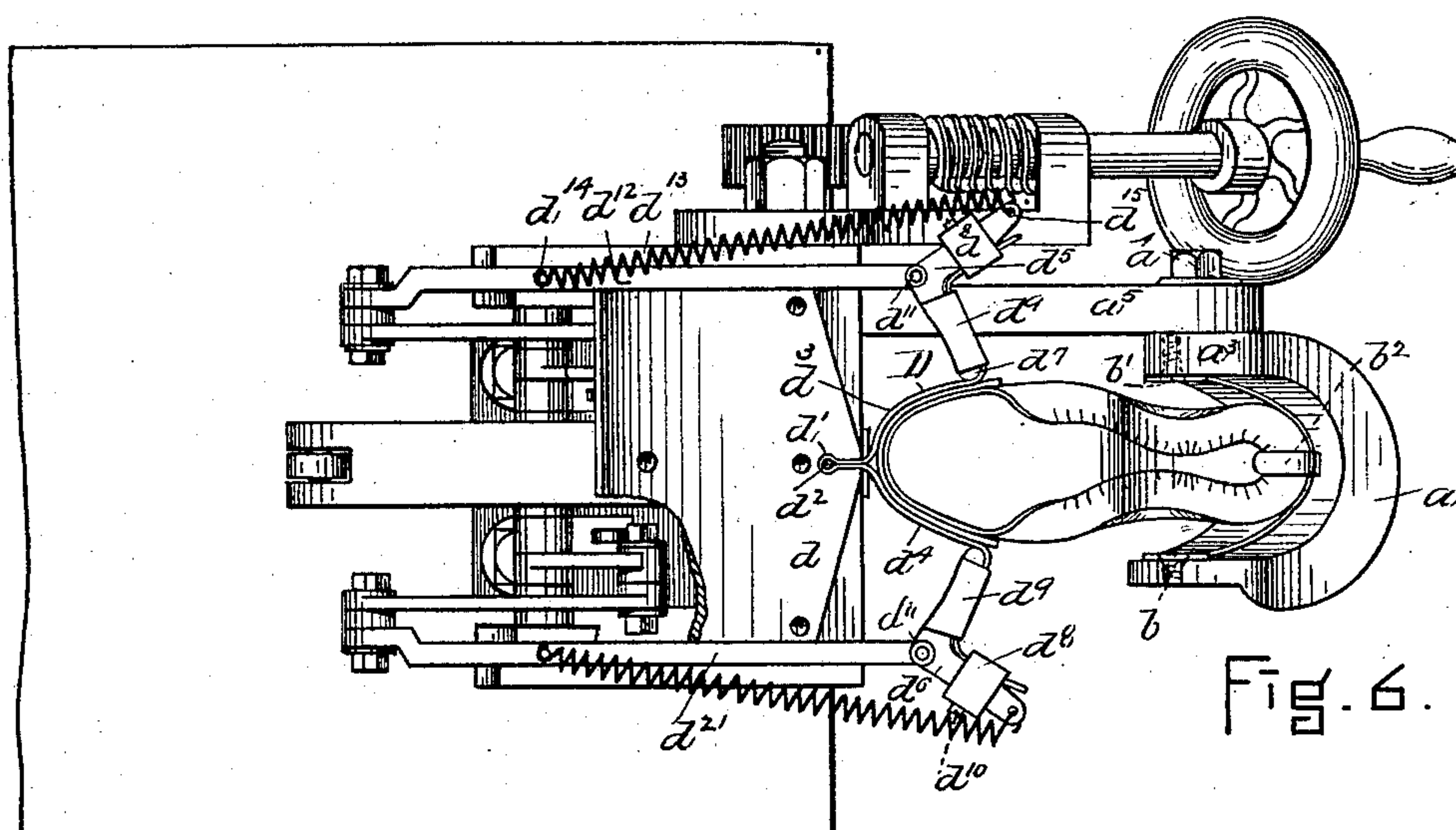
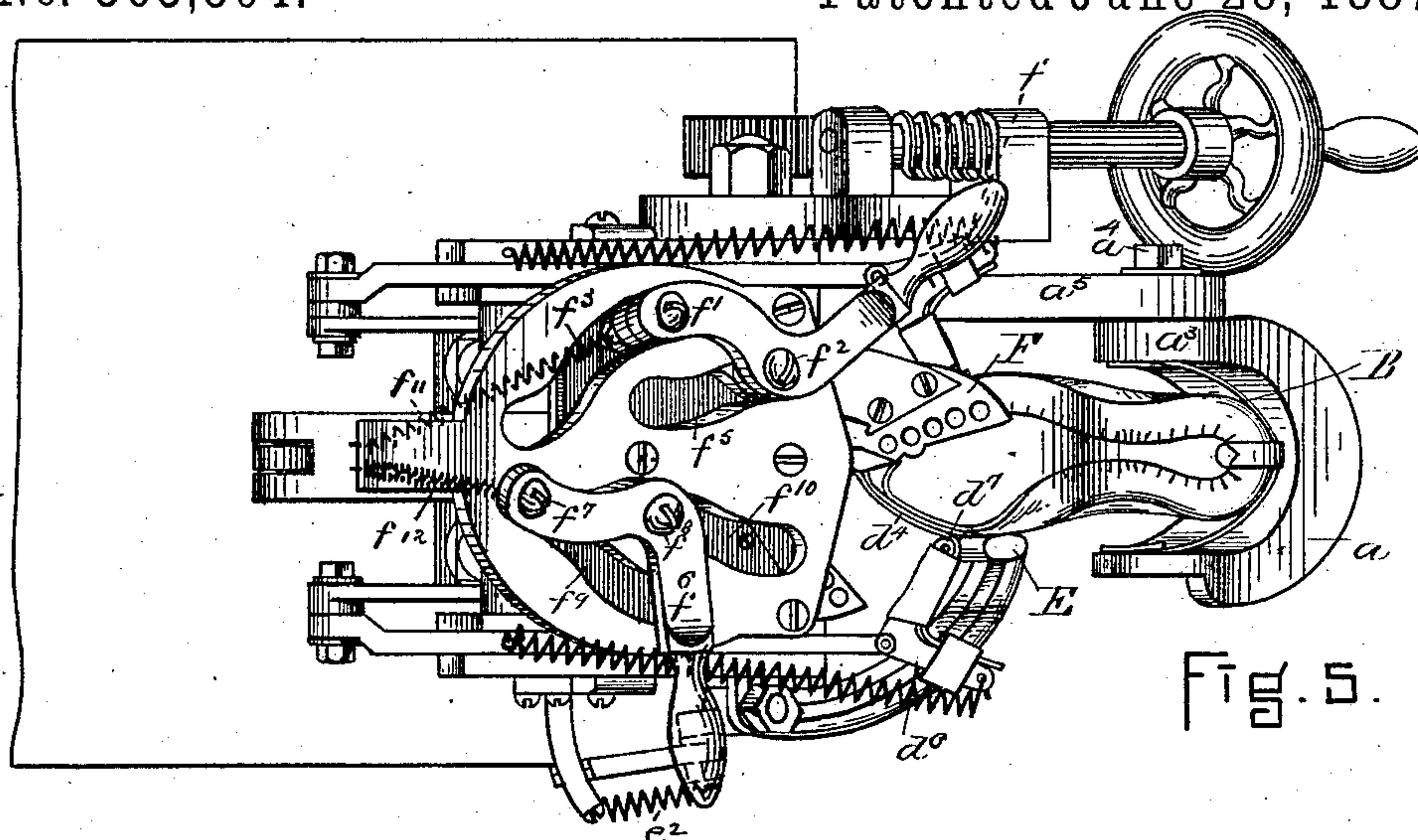
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4 Sheets—Sheet 3.

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Fig. 7.

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(No Model.)

4 Sheets—Sheet 4.

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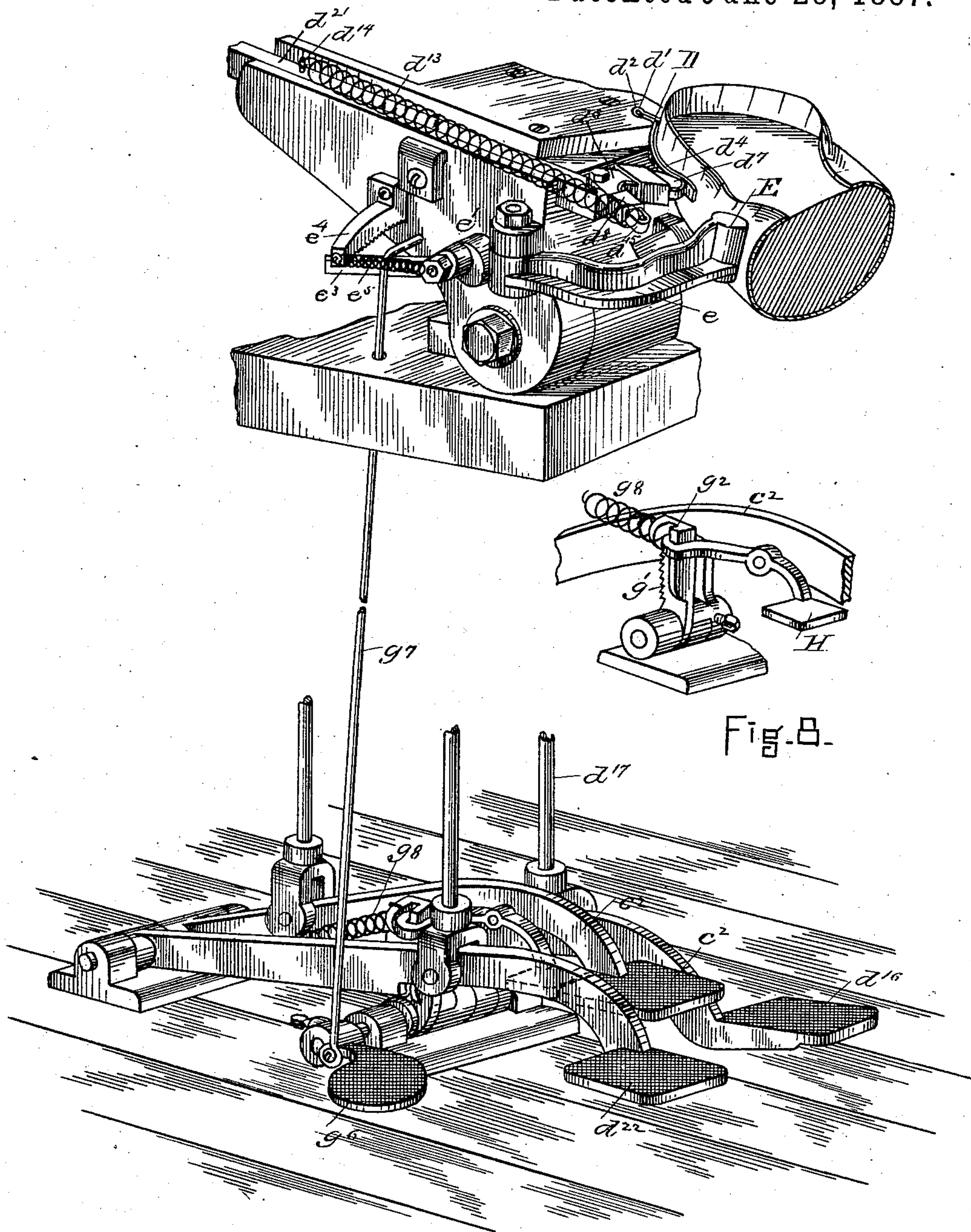


Fig. 7.

Fig. 8.

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UNITED STATES PATENT OFFICE.

GEORGE W. COPELAND, OF MALDEN, JOSEPH E. CRISP, OF SOMERVILLE,
AND EDWARD F. GRANDY, OF BOSTON, MASSACHUSETTS, ASSIGNORS
TO THE COPELAND IMPROVED LASTING AND TACKING COMPANY, OF
PORTLAND, MAINE.

LASTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 365,504, dated June 28, 1887.

Application filed March 18, 1887. Serial No. 231,347. (No model.)

To all whom it may concern:

Be it known that we, GEORGE W. COPELAND, of Malden, JOSEPH E. CRISP, of Somerville, both in the county of Middlesex, and
5 EDWARD F. GRANDY, of Boston, in the county of Suffolk, all in the State of Massachusetts, all citizens of the United States, have invented a new and useful Improvement in Machines for Lasting Boots and Shoes, of which the following is a full, clear, and exact description,
10 reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention is an improvement upon that
15 described in Patent No. 359,367, dated October 27, 1885, which describes a machine adapted to last the toe portion of the uppers of boots and shoes.

It relates especially to the jack or holding
20 device for presenting a boot or shoe to the toe-lasting mechanism; also, to an arm or abutment which is adapted to be moved against the side of the last to hold the same in position during the movement of one section of a
25 toe fitting or clamping strap or band upon the corner of the toe of the last diagonally opposite therefrom.

It also relates to the edge-folding plates and manner of operating them; also, to the toe-fitting strap or band and manner of supporting
30 and operating the same; also, to the treadle mechanism for operating various of the parts; also, to treadle-releasing devices and mechanism whereby the parts when released are
35 automatically returned to an inoperative position; also, to various details of construction and organization.

In the drawings, Figure 1 is a side elevation of the machine. Fig. 2 is a detail view in
40 perspective of a part of the mechanism for latching and unlatching the treadles, to which reference will hereinafter be made. Fig. 3 is a vertical central section of the machine, showing a last with the upper thereon jacked and
45 presented to the lasting devices. Fig. 4 is a plan view illustrating the arrangement of the various treadles. Fig. 5 is a plan view of the

machine, showing, among other things, the position of the side abutment or rest in relation to the toe-lasting devices when in operating position. Fig. 6 is a plan view taken
50 below the upper-folding plates to show the construction and operation of the devices for drawing the band or strap about the toe of the last. Fig. 7 is a view in perspective of a
55 portion of the device to further illustrate portions of its construction. Fig. 8 is a detail view, hereinafter referred to. Fig. 9 is a plan view of the folding-plates in their closed position.

The jack A comprises three principal parts—namely, the heel support or holder a , the toe-abutment a' , and the downhold a^2 . The heel-holder comprises a block in the shape of a yoke, (see Figs. 5 and 6,) which is fastened
60 upon its side a^3 by the bolt a^4 to the swinging arm a^5 . This arm is pivoted at a^6 (see Fig. 1) to a shaft, a^7 , which has bearings in the bracket a^8 , and which carries at its end upon the opposite side of the bracket a^8 the segment a^9 .
70 (See Figs. 1 and 3.) The teeth of this segment are engaged by the worm a^{10} upon the worm-shaft a^{11} , which is provided with bearings in the bracket a^8 , and has a hand-wheel, a^{12} , and the rotation of the worm causes the
75 heel-rest to be moved upon an arc of a circle in relation to the downhold a^2 . The yoke a is connected or secured to the arm a^5 to be adjustable thereon to and from its center or shaft a^7 by means of the slot a^{13} , formed in the
80 outer end of the arm shown in dotted lines in Fig. 3, and through which the fastening-bolt a^4 extends. The yoke a also carries the curved or bent spring or flexible metal band B, which is pivoted by its front ends, b b' , to the arms
85 of the yoke, so that its rear end may swing or be moved vertically in relation thereto. This metal band or strap preferably is lined upon its inner surface with leather or other suitable material, and is sufficiently thin and pliable
90 to shape itself to some extent to the rear end of the last, which with the upper is encompassed by its inner surface. The band B also carries a downhold, b^2 , which extends up-

wardly and inwardly from the upper edge, and is adapted to extend and bear upon the upper surface of the last. (See Figs. 3, 5, and 6.)

5 In the operation of jacking the shoe the heel end of the last is placed below the downhold b^2 and against the inner surface of the band B, and the last is moved forward by the movement of the yoke until the toe end is brought beneath the toe-downhold a^2 , and the end of the toe is forced against the toe-abutment a' , (see Fig. 3,) and the last is held clamped in this position by the worm-shaft.

15 A presser, C, to press the last upward against the edge-folding plates to smooth or iron out the edge of the upper upon the surface of the insole, is supported at the end of the lever C' , which is pivoted at c , (see Fig. 3,) and which is made vertically movable in relation to the downhold a^2 by the rod c' and treadle c^2 , which is adapted to be locked down by mechanism to be hereinafter described, so that the presser is held locked in any position to which it is moved until released, as hereinafter specified.

25 The toe band or strap D is operated or moved by two treadles in successive sections, one of which throws out or moves one section of it from the center of the toe about and upon one corner thereof, and the other of which moves the other section from the said center about and upon the other corner of the toe. The treadles are moved successively. The toe band or strap is fastened to the head d at the center of its length, is flexible, and it preferably comprises a thin steel spring band lined upon its outer surface with rawhide, leather, or other suitable material. The band is made thin enough to permit or enable it to conform to the curve of the vertical surface of the toe of the last, and each section is held taut while it is being moved against the surface of the last during its entire movement. This section of the band which operates upon the corner or section of the last diagonally opposite the abutment or rest E is the one which is first moved. The side abutment, E, is moved into place against the side of the last, as shown in Fig. 5, and automatically locked in that position, before the movement of the toe-fitting strap, and it serves to hold the last against the strain or part of the toe-strap diagonally opposite it, and it is moved against the surface of the last. If the abutment were not used, there would be a tendency on the part of the strap to crowd the last laterally out of a central position. The abutment or rest E has a rounded contacting surface, and is formed upon the end of a lever or arm, e , which is pivoted at e' , and is moved against the side of the last in opposition to the pressure of the spring e^2 . There is attached to the arm or lever e a pawl, e^3 , (see Figs. 1 and 7,) which rides upon the ratchet-bar e^4 , the pawl being held in contact therewith by the spring e^5 . This pawl and ratchet-bar serve to lock the abut-

ment in any position to which it may be moved by hand, and it is automatically released, as hereinafter described.

The strap or band is fastened to the head d by forming in the head a vertical round hole, d' , and a vertical recess or extension therefrom to the edge of the head of less width than the diameter of the hole, and the band is bent or curved at the center of its length to slip into this recess and hole, and a pin, d^2 , then inserted into the loop of the band in the hole, so that the band is spread or opened by the pin to fit the bore of the hole, and is thus locked firmly to the plate or head.

8 d^3 is the section of the band which is first moved or brought into contact with the corner of the last at the toe, and d^4 is the other section of the band. The outer end of the section d^3 is secured to an arm, d^5 , and the outer end of the section d^4 to the arm d^6 . These arms d^5 and d^6 are alike in all essential particulars. Each arm has a curved end, d^7 , over which the band is led to the end-holding clamping-block d^8 , passing between the outer section of the holding-plate d^9 and the front or outer surface of the arm. The clamp d^8 has serrations or teeth which are drawn against the outer surface of the band to clamp it against a serrated surface of the arm by means of a screw, d^{10} . Each arm is pivoted at d^{11} to a slide-bar, which bars are lettered d^{12} and d^{13} , and it is also connected with the slide-bar by a long coiled spring, d^{14} , which is attached at d^{15} to the slide bar and at d^{16} to the outer end of the arm, so that the spring serves to draw the outer end of the arm backward and the inner end of the arm away from the central support of the band continuously, and each section of the band is always held by or under yielding tension.

The slide-bar d^{12} is operated by the treadle d^{17} and rod d^{18} , the bent lever d^{19} , which is pivoted at d^{20} , and the upper end of which is connected by a link, d^{21} , with the end of the slide-bar d^{12} . The slide-bar d^{13} , which holds the arm d^6 , is moved by a treadle, d^{22} , which is connected with the slide-bar by a rod, lever, and link similar to those for operating the slide-bar d^{12} .

115 There are two folding-plates employed—namely, the folding-plate F and the folding-plate F'. (See Fig. 9.) Each plate is moved by a separate lever or handle—the plate F by the lever or handle f , (see Fig. 5,) which has the cam-pins $f^1 f^2$, the cam-pin f^1 entering the cam-slot f^3 , and is fastened to the inner end of the plate F, and the cam-pin f^2 entering the cam-slot f^4 , and is also fastened to the plate F. The handle f^5 , for operating the plate F', has the cam-pins $f^6 f^7$, the first of which extends through the cam-slot f^8 to the plate, and the second of which extends through the cam-slot f^9 to the plate.

The handle f is adapted to be moved backward with its plate F by means of the spring f^{11} , and the handle f^5 and its plate F' are moved

backward automatically by means of the spring f^{12} . The plates F F' have holes or perforations f^{13} , (see Fig. 9,) through which the fastening-tacks are driven, and the plate F has the arm or section f^{14} , which bears against the edge of the downhold a^2 as the plate rides out, but is shaped upon its front edge, f^{15} , so as to wipe or hold the edge of the upper away from the surface of the downhold as it moves. The other plate, F' , has a corresponding section, f^{16} , for the same purpose.

The plate F is adapted to be first moved outward to fold the upper at one corner of the toe upon the insole, and this is followed by the outward movement of the other plate, F' . These successive movements of the plates bring the recess f^{17} in the plate F in position to receive the projection f^{16} of the plate F' .

The treadles c^2 d^{16} d^{22} are adapted to be successively operated, and to be simultaneously released. This requires that they be automatically locked at the end of their operative movement. The part which is first moved after the last has been jacked is the side rest or abutment, E , which is moved by hand and automatically locked in position, as above described. The next part that is moved and locked in place, as a rule, is the ironer C . This is accomplished by the engagement of a latch, g , (see Fig. 3,) on its operating-treadle c^2 with the teeth g' of the ratchet-bar g^2 . The ironer moves the upper surface of the last into such relation with the plane of movement of the folding-plates F F' that although their movements are in opposition to withdrawing-springs they are held in place by the friction of the upper leather of the shoe against the under surface of the plates until the ironer C has been released, when the springs automatically draw the plates F F' back to their original position, or to a position from which they can again be advanced to fold the edge of the upper upon the insole, so that the release of the treadle c^2 causes the automatic release of the ironer C and of the folding-plates F F' .

The two sections of the toe-lasting strap are automatically locked upon the side of the last at the toe by their operating-treadles, the section first operated by the treadle d^{16} , and the other section by the treadle d^{22} ; and each of these treadles has a spring-latch, g^3 , (see Fig. 4,) which engages the locking-arms g^4 , and upon the release of the treadles the two sections of the toe strap or band are also returned by their withdrawing springs automatically to their original position. It is very desirable that all these parts should be released simultaneously in order that the upper and last may be quickly removed from the machine, and this is accomplished by mounting the rack-bar g^2 and the locking-arms g^4 on the shaft g^5 , (see Figs. 2 and 4,) and by providing the shaft g^5 with a limited extent or degree of rotation, whereby the ratchet-bar g^2 and locking-arms g^4 are withdrawn or moved away from the locks or latches which engage them. This

movement is communicated to the shaft by means of the treadle g^6 , which is fastened to the end of the shaft g^5 . The treadle g^6 also has a rod, g^7 , the upper end of which engages or extends upon the spring-pawl e^3 , (see Figs. 1 and 7,) whereby upon its downward movement to throw the ratchet and locking bars out of engagement with their latches the pawl e^3 is moved out of engagement with its ratchet, which permits the abutment to be drawn back by its withdrawing-spring, so that upon the movement of the treadle g^6 all the various operative parts are released and permitted to return to their original positions—that is, the ironer C is allowed to release the last. The last dropping permits the folding-plates to be moved back by their withdrawing-springs. Each section of the toe band or strap is drawn backward by its spring, and the abutment E is also drawn back. The shaft g^5 is, upon the removal of the foot from the treadle g^6 , returned to a position to bring the locking-bars g^2 g^4 into position to be engaged by the latches g^6 g^7 upon the treadle by means of springs g^8 . (See Figs. 4 and 7.)

To permit the ironer C to be moved up and down independently and without releasing the other devices, we employ a supplemental treadle, H , (see Figs. 4 and 8,) the end of which is adapted to engage the rack-bar g' of the treadle c^2 and move it forward or out of engagement with the ratchet-bar g^2 while the treadle C^2 is being moved up and down. The treadle c^2 is moved downward against the stress of the spring h .

The toe-lasting band may be made of separate links, like a chain, and lined or surfaced with leather, if desired.

The machine is designed to co-operate with the lasting machine described in our application of even date herewith, which is organized to last the entire upper excepting the toe, and the upper thus lasted is then presented to this toe lasting mechanism, remaining of course upon its last; and in operation the last is placed so that its back end rests against the back strap of the jack, and it is then moved forward by the back strap until the toe extends under the toe downhold and strikes against the toe-abutment, the back strap being moved by the worm to clamp the last firmly in this position, and the worm serving also as a lock to retain the last when so clamped. The side abutment is then moved by hand against the side of the last, and, if desired, the toe-ironer moved by a treadle to bring it against the bottom of the last near the toe. The operator then by a treadle draws the section of the toe-lasting band diagonally opposite from the side abutment, about the toe, from its center around the corner, and clamps the section of the upper with which it is brought in contact firmly against the surface of the last. The upper edge of this strap should not extend above the upper surface of the insole, and the band when thus strained is automatically

locked. The operator then moves by another treadle the other section of the toe-lasting strap or band, bringing the portion of the upper about the toe not operated upon by the first section of the strap or band into contact with the toe end of the last and holding it firmly thereto, the edge of the upper which is to be folded over extending upward between the inner surface of the band and outer surface of the last. The right toe-edge-folding plate is then moved into place, folding the portion of the edge of the upper over the first section of the toe-lasting strap or band upon the surface of the insole. Then the other, or left, plate is moved into position and folds the other section of the toe-edge upon the surface of the insole. The fastenings for securing the edge of the upper to the insole are then driven through the holes in the folding-plates; and if it is desired to further increase the pressure upon the edge of the upper by the plates, either while they are being closed or afterward, the ironer is forced upward by the treadle to raise the last and level of the insole. Upon the completion of the fastening of the toe of the upper to the insole the various operating devices referred to—namely, the side abutment, the toe-edge-folding plates, the ironer, and both sections of the toe-lasting strap or band—are automatically withdrawn to their original positions, so that the operator is not obliged to move them back or withdraw them, the movement of the releasing-treadle sufficing to release the latches which hold these parts in the position to which they have been moved by the operator, and permitting their withdrawing devices to return them to their original places; and this leaves for the operator only the turning of the hand-wheel of the worm to move the back strap of the jack sufficiently to unclamp the last.

It will be seen that the last is not jacked in the ordinary way—that is, it is not located upon a pin which enters a pin-hole in the heel end of the last—and that the wheel-band as applied saves time both in jacking and unjacking the last.

Having thus fully described our invention, we claim and desire to secure by Letters Patent of the United States—

1. The combination of a jack comprising the swinging arm a^5 and a movable heel strap or band, B, with the toe-abutment a' and toe-downhold a^2 , and an actuating device to force the heel-band B against the abutment a' and the downhold a^2 , substantially as and for the purposes described.

2. The combination, in a lasting-machine, of a jack comprising the stationary abutment a' and a toe-downhold, a^2 , with a heel-band, B, and devices for moving the heel-band into contact with the heel end of the last, to move the last to bring the toe of the last against the abutment and beneath the toe-downhold, and for locking the last in said position, substantially as described.

3. In a lasting-machine, the heel-band B, having the downhold b^2 , provided with an inclined under surface, as and for the purposes described.

4. The combination, in a lasting-machine, of the jack comprising the swinging arm a^5 , the yoke a , attached to said arm a^5 , the pivoted band B, attached by its forward ends to the forward ends of the yoke, the abutment a' , toe-downhold a^2 , the sector a^9 , the worm-wheel a^{10} , and its operating-shaft a^{11} , substantially as described.

5. The combination, in a lasting-machine, of a jack adapted to present the last to the lasting devices, with its upper surface inclined from the toe downward to the heel, with inclined upper-folding plates F F', having their working-edges lowermost and movable upon a downward incline, as and for the purposes described.

6. The combination of a jack for presenting the last to the lasting devices, and for holding it, with the toe-ironer C and the toe-lasting plates F F', as and for the purposes described.

7. The combination of a jack for presenting the last to the lasting devices, and for holding it, with the toe-ironer C, the arm or lever C', supporting the same, the rod c' , and treadle c^2 , substantially as described.

8. The combination, in a lasting machine, of a jack and a movable side abutment, E, adapted to be brought against the side of the last to hold the same during the operation of a portion of the lasting devices, substantially as described.

9. In a lasting-machine, a movable abutment, E, adapted to be moved against the side of the last to hold it in position during the operation of a portion of the lasting mechanism, as and for the purposes described.

10. In a lasting-machine, an abutment, E, adapted to be moved against the side of the last to hold it in operative position during a portion of the operation of the lasting mechanism, and a locking device for automatically locking the said abutment into operative position against the side of the last, substantially as described.

11. The combination, in a lasting-machine, of a jack, an abutment adapted to bear against the side of the last, and the section a^3 , of the toe-lasting band or strap, as and for the purposes described.

12. In a lasting-machine, a toe-lasting strap or band connected at each end with a horizontally-movable support, said horizontally-movable supports, and devices for moving them independently of each other, whereby the strap or band may be moved or brought into contact with the last, in sections, as and for the purposes described.

13. In a lasting-machine, the combination of a jack for holding the last, an abutment for bearing against one side of the last, and a toe-lasting strap or band, in two sections, adapted to be successively moved or strained against the

side surface of the last about the toe, by mechanism substantially as described.

14. The combination, in a lasting-machine, of a jack, a toe lasting strap or band, and devices, substantially as specified, for moving first a section of the strap or band upon one side of the downhold against the surface of the last, and then a portion upon the opposite side of the downhold against the surface of the last, substantially as described.

15. In a lasting-machine, the combination of a jack, a side-bearing abutment, devices, substantially as described, for automatically locking it in operative position, and mechanism for automatically returning the same to its original position upon the release of the latching or locking mechanism, substantially as described.

16. The combination of the ironer C and latching mechanism for automatically locking it in any desired position, substantially as described.

17. The combination of the ironer C, the latching mechanism for automatically latching it in any desired position, and devices, substantially as specified, for automatically returning it to its original position upon the release of the latching mechanism, substantially as described.

18. The combination of the device C, for moving the toe end of the last upward against the downhold and the lasting-plates, with said lasting-plates and springs for returning them to their original position upon the release of the upward pressure upon the last, substantially as described.

19. The combination of a toe-lasting strap or band, the slides d^{12} d^{21} , the pivoted arms d^5 d^6 , attached to said slides, supporting or carrying at their inner ends the ends of the toe-lasting strap or band, and at their outer ends springs which operate to maintain the band taut in opposition to the stress upon it as it is brought to bear against the surface of the last, substantially as described.

20. The combination of the plate having the hole d' , and a narrow slit or entrance thereto, with the flexible strap or band, the central part of which is brought together to form a bight, which is contained in said slot or hole, and which is fastened thereto by a pin driven into it and said hole, substantially as described.

21. The combination, in a lasting-machine, of a toe-lasting strap or band rigidly held at the center of its length, and having each end attached to a movable support, said movable supports, each of which is connected with an operating-treadle, and said treadles, as and for the purposes described.

22. The combination, in a lasting-machine, of a jack, the toe-lasting strap or band rigidly secured to a support at the center of its length, devices, substantially as described, for exerting a yielding draft upon each end of the

strap, treadles for operating the same, and a latching device for automatically locking each strap-moving device at the completion of its forward movement, substantially as described.

23. The combination of a toe-lasting strap or band rigidly fastened at the center of its length, a separate yielding block or arm for moving in successive order each end of the strap to draw the two sections of the straps successively to the surface of the last, with the treadles d^{16} d^{22} , adapted to be successively moved, latching devices for locking the treadles at the completion of the outward movement of the strap-holding blocks or arms, and mechanism for automatically returning the two sections of the strap to their original position upon the release of said latching or locking devices, substantially as described.

24. The combination, in a lasting-machine, of the jack or work-support, a toe-lasting strap or band, and devices, substantially as described, for moving it upon the surface of the last and for locking it in said position, devices for returning the said band to its normal or inoperative position, and unlatching mechanism for releasing the locking or latching devices which hold it in operative position, substantially as described.

25. The combination, in a lasting-machine, of a jack for supporting the last, an abutment adapted to be moved and held against the side surface of the last, the toe-lasting strap or band, or straps adapted to be moved and held against the side surface of the last, the lifting device or ironer C, the lasting-plates F F', held upon the surface of the last, as described, devices for automatically moving the abutment, the toe-lasting strap, the ironer, and the lasting-plates to their normal or inoperative position, and unlatching devices adapted to be simultaneously operated, whereby said operating parts are simultaneously released and moved to their inoperative positions, as and for the purposes described.

26. The combination, in a lasting-machine, of the operative treadles d^{16} d^{22} c^2 , for operating, respectively, the toe strap or band, and an abutment, C, the latching mechanism for automatically latching the treadles in their depressed position, the unlatching devices operated by the treadle g^6 , and a device connecting said treadle g^6 with the unlatching mechanism of the abutment E, whereby upon the movement of the treadle g^6 the various latching devices are released, substantially as described.

27. The combination of the treadle c^2 , having the latching mechanism g , the treadles d^{16} d^{22} , each having a spring latch, g^3 , the latch-bar g^2 , and locking-bars g^4 , carried by the shaft g^5 , said shaft g^5 having a limited degree of rotation, and the treadle g^6 , as and for the purposes described.

28. The combination of the lasting-plate F, having its edge shaped as specified, with the

locking-plate F' , shaped upon its working end as described, all as and for the purposes set forth.

29. The combination, in a lasting-machine, 5 of the toe-lasting plates $F F'$, a plate having the cam-grooves $f^3 f^5$ and $f^9 f^{10}$, the cam-pins $f' f^2$, which enter the cam-grooves $f^3 f^5$, the cam-pins $f^7 f^8$, which enter the cam-grooves $f^9 f^{10}$, the lever f , for moving the plate F , and the 10 lever f^6 , for moving the plate F' , substantially as described.

30. The combination of the strap d^3 , the

bent arms $d^5 d^6$, to which each end of the strap is secured by means of the clamps d^8 , with the slide-bars $d^{12} d^{11}$, and a spring connecting 15 each slide-bar with the outer end of its respective bent arm or support, substantially as described.

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In presence of—

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FRED. B. DOLAN.