

No. 629,553.

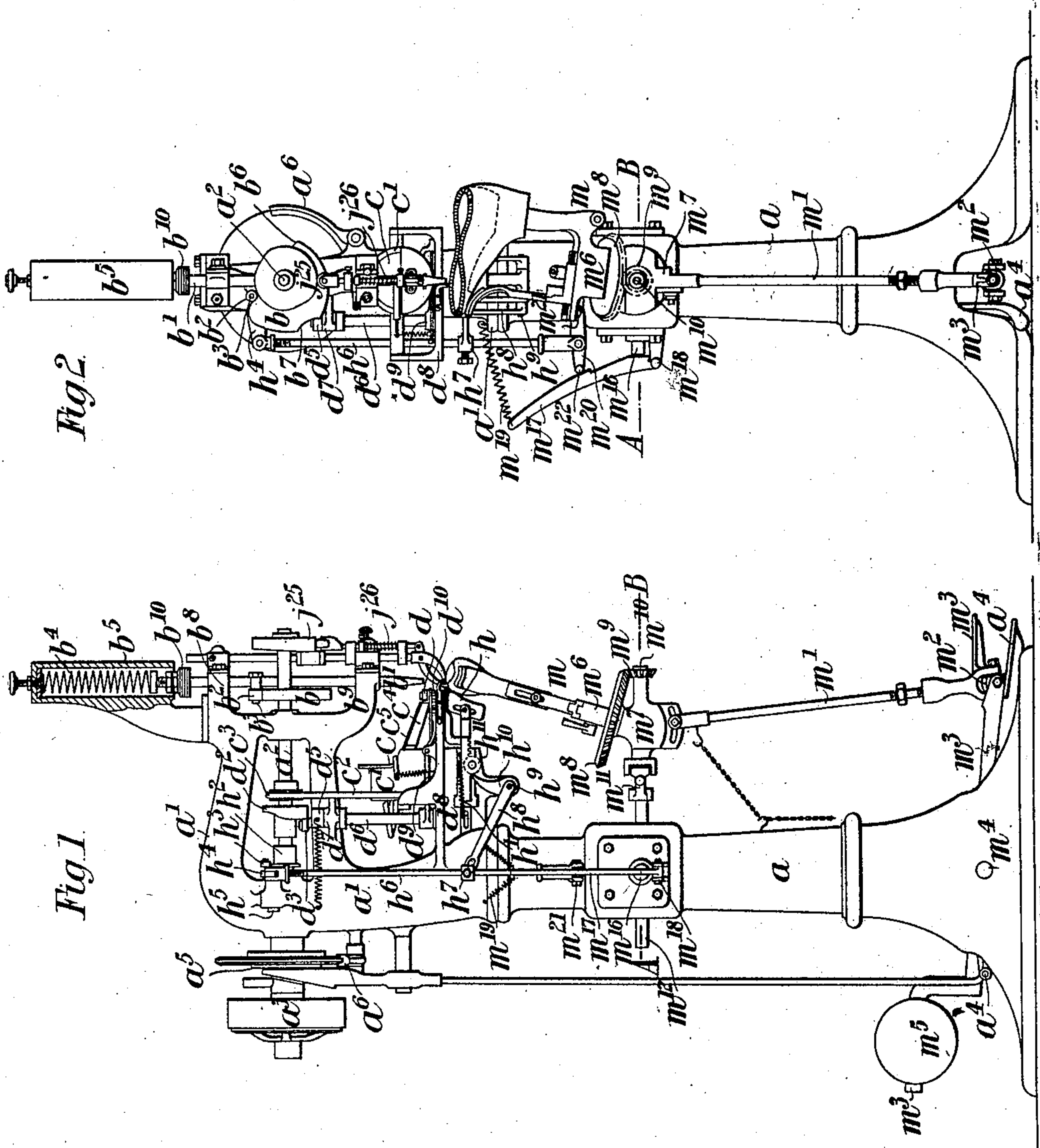
Patented July 25, 1899.

W. H. DORMAN.
LASTING MACHINE.

(Application filed Dec. 28, 1897.)

(No Model.)

5 Sheets—Sheet 1.



Witnesses.

J. D. Kingsbury

B. S. Crockett

Inventor.

William H. Dorman

By Whitaker & Brewster
attys.

No. 629,553.

Patented July 25, 1899.

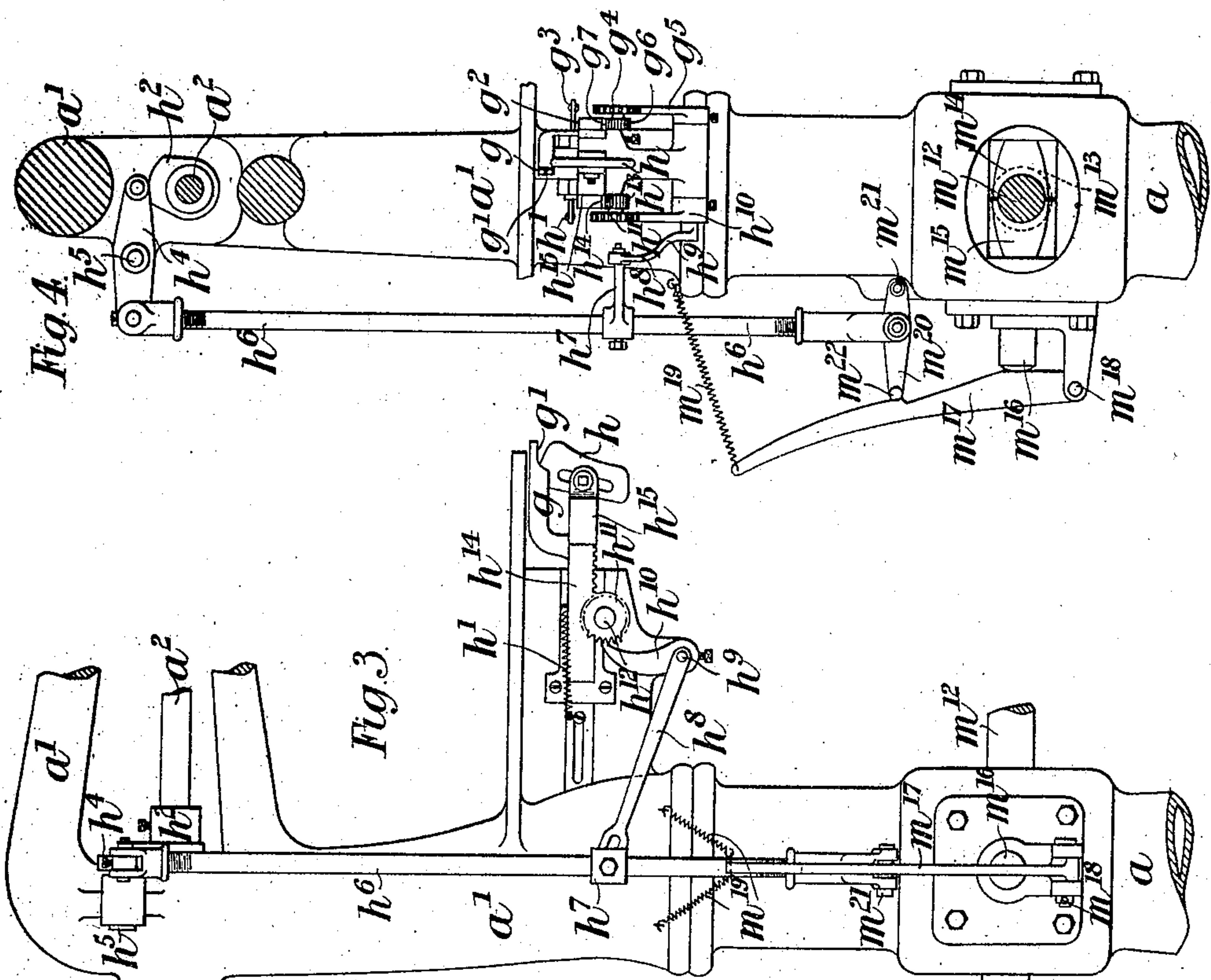
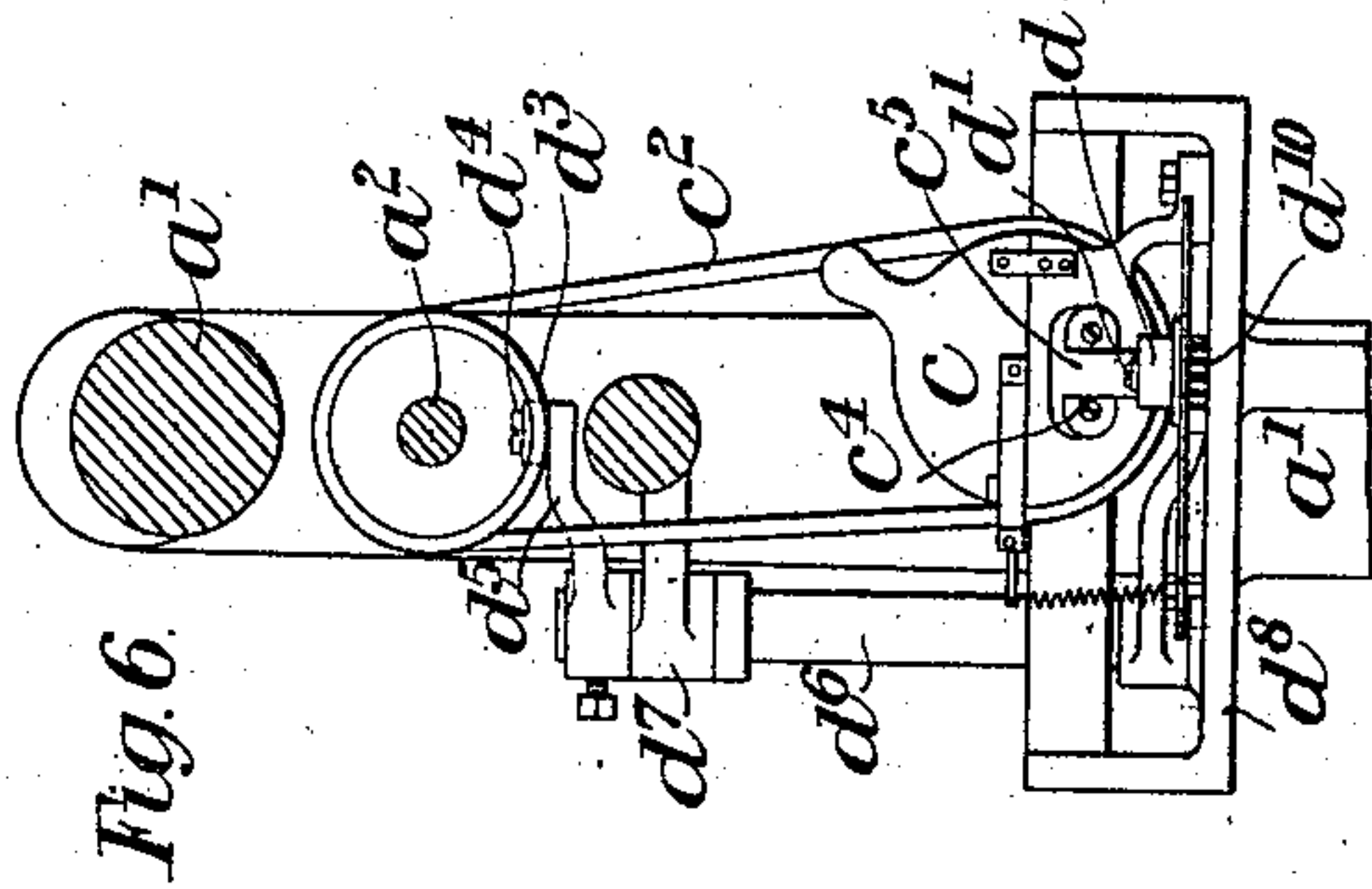
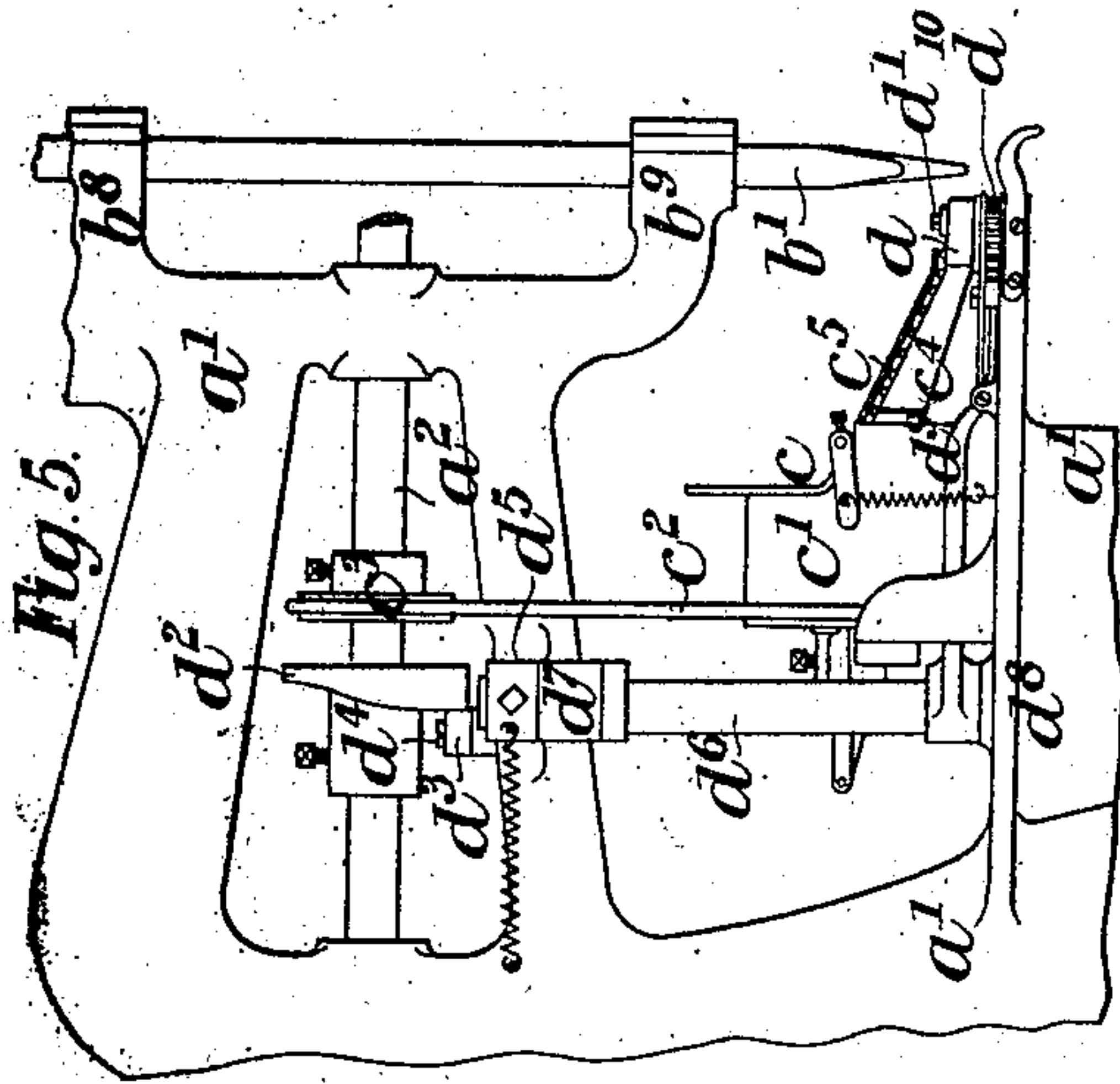
W. H. DORMAN.

LASTING MACHINE.

(Application filed Dec. 28, 1897.)

(No Model.)

5 Sheets—Sheet 2.



Witnesses:
J. D. Kinsbury
B. W. Brock

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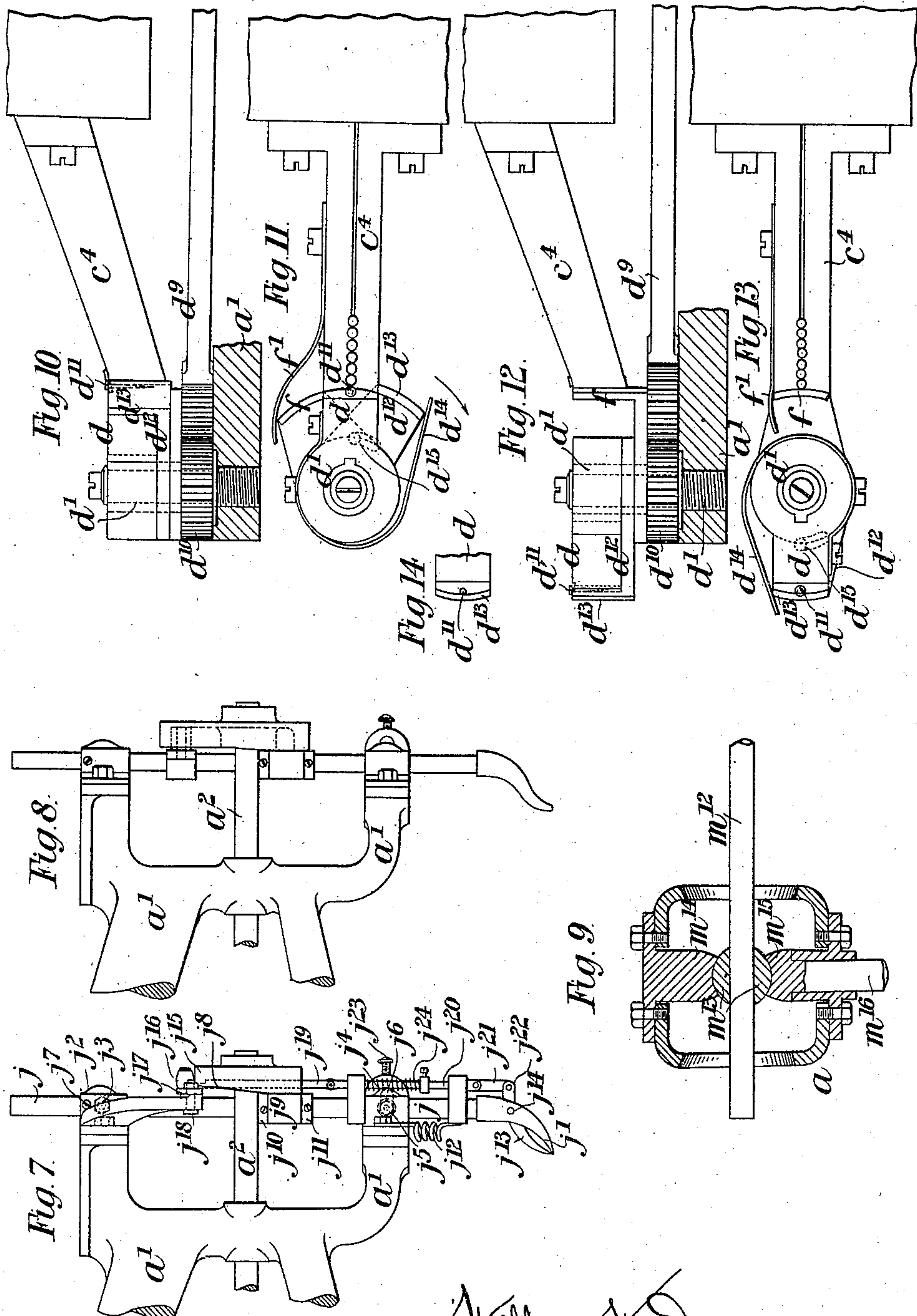
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(Application filed Dec. 28, 1897.)

(No Model.)

5 Sheets—Sheet 3.



Witnesses.

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No. 629,553.

Patented July 25, 1899.

W. H. DORMAN.
LASTING MACHINE.

(Application filed Dec. 28, 1897.)

(No Model.)

5 Sheets—Sheet 4.

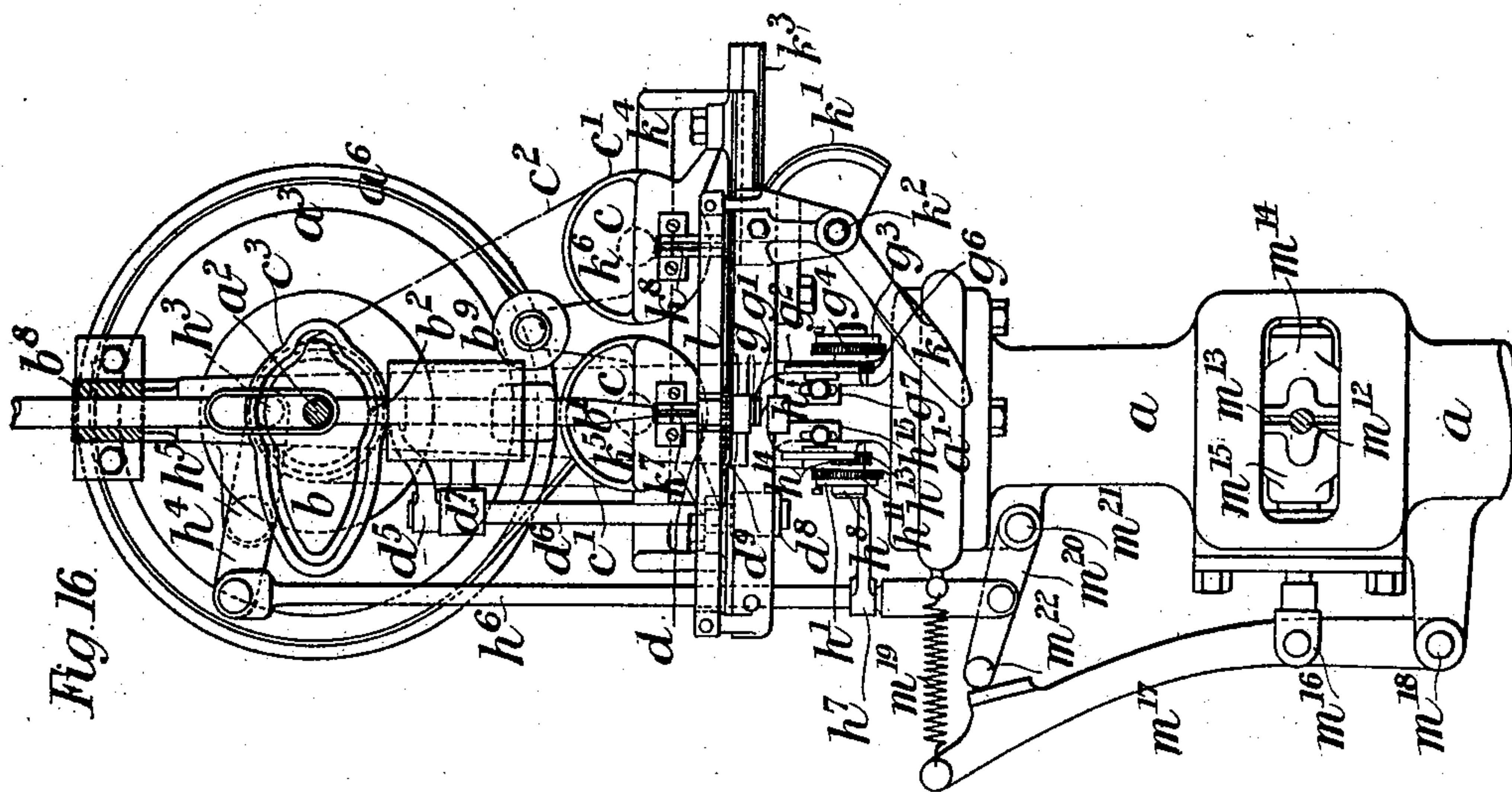


Fig. 16

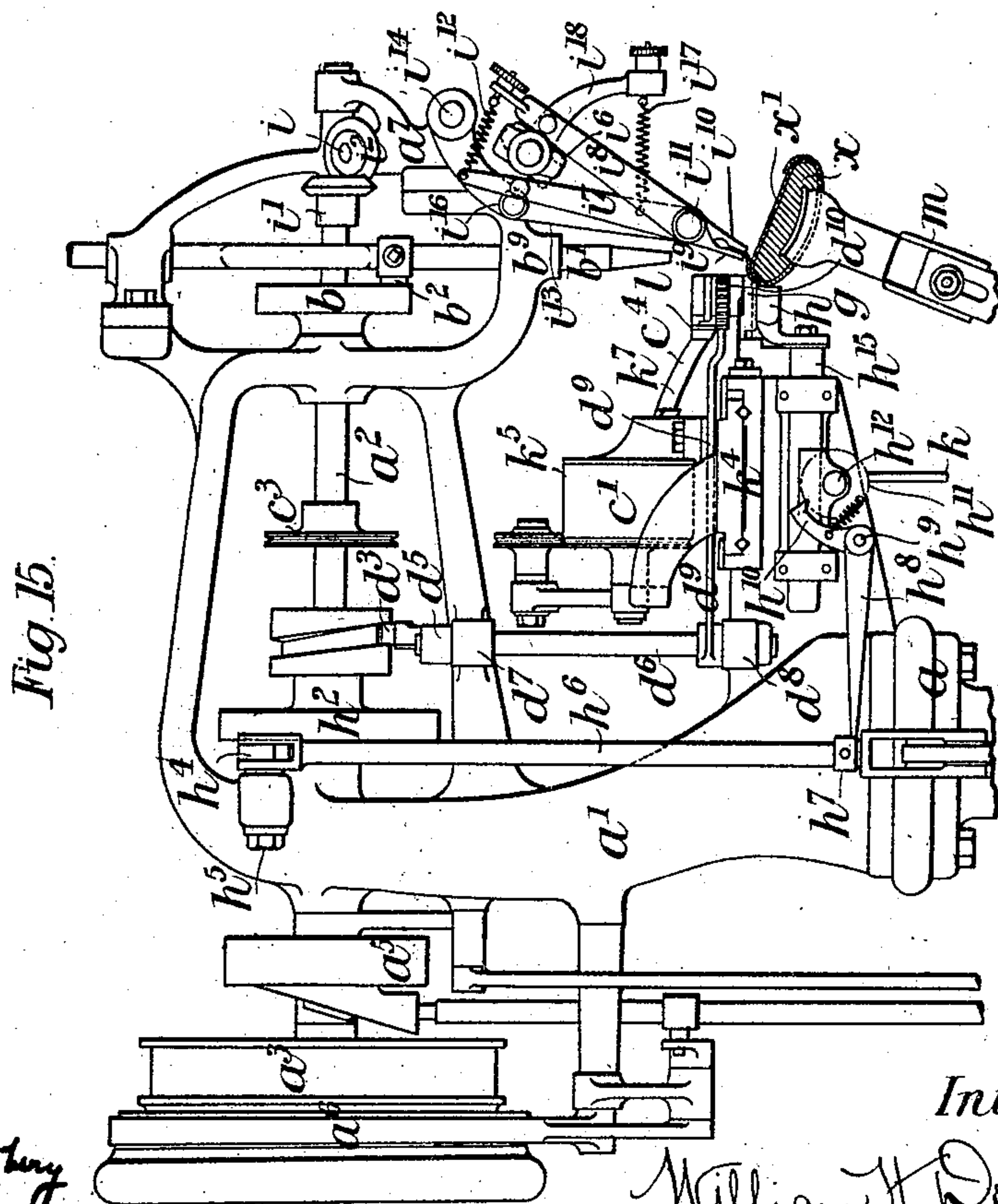


Fig. 15

Witnesses.

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LASTING MACHINE.

(Application filed Dec. 28, 1897.)

(No Model.)

5 Sheets—Sheet 5.

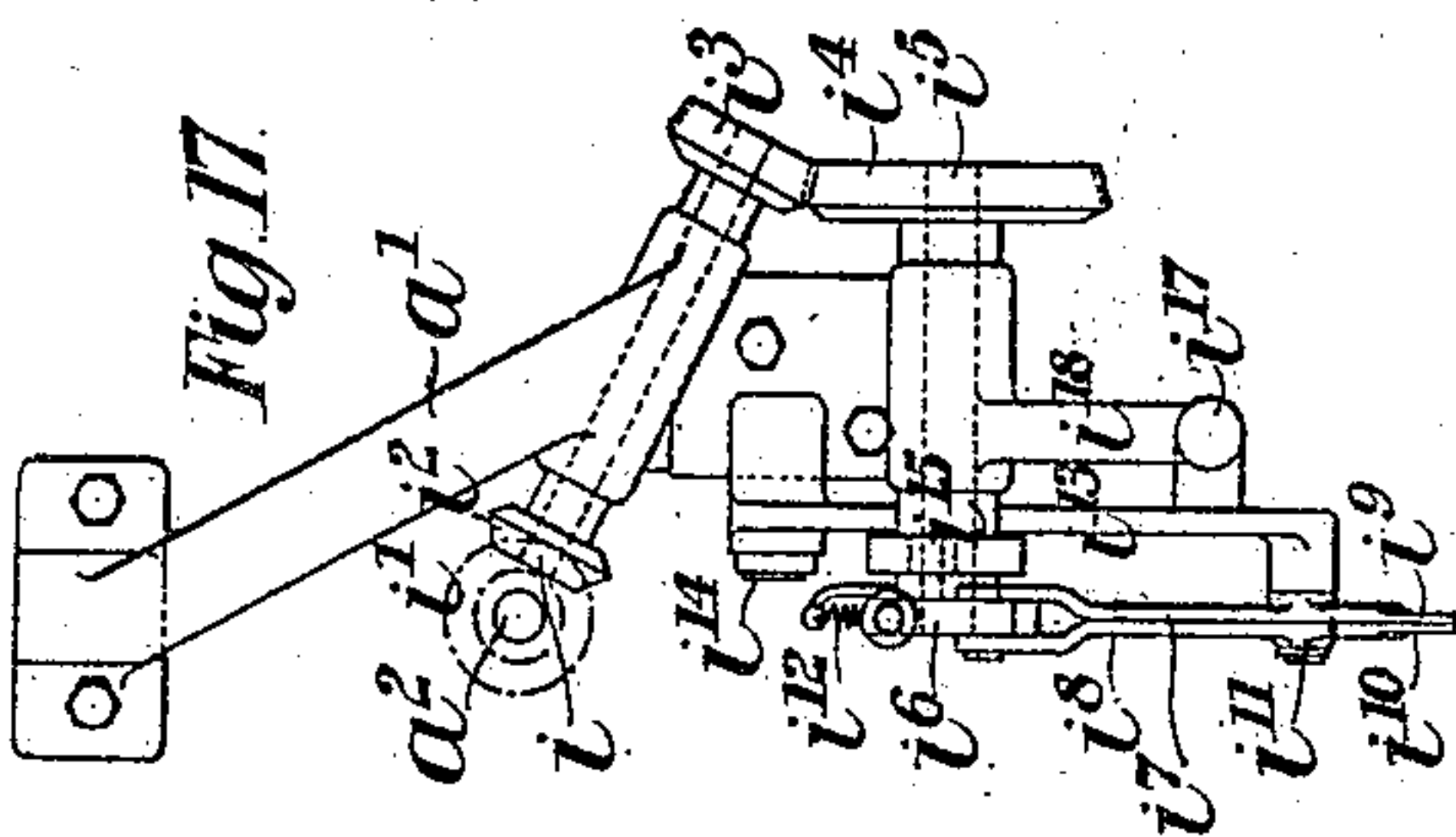
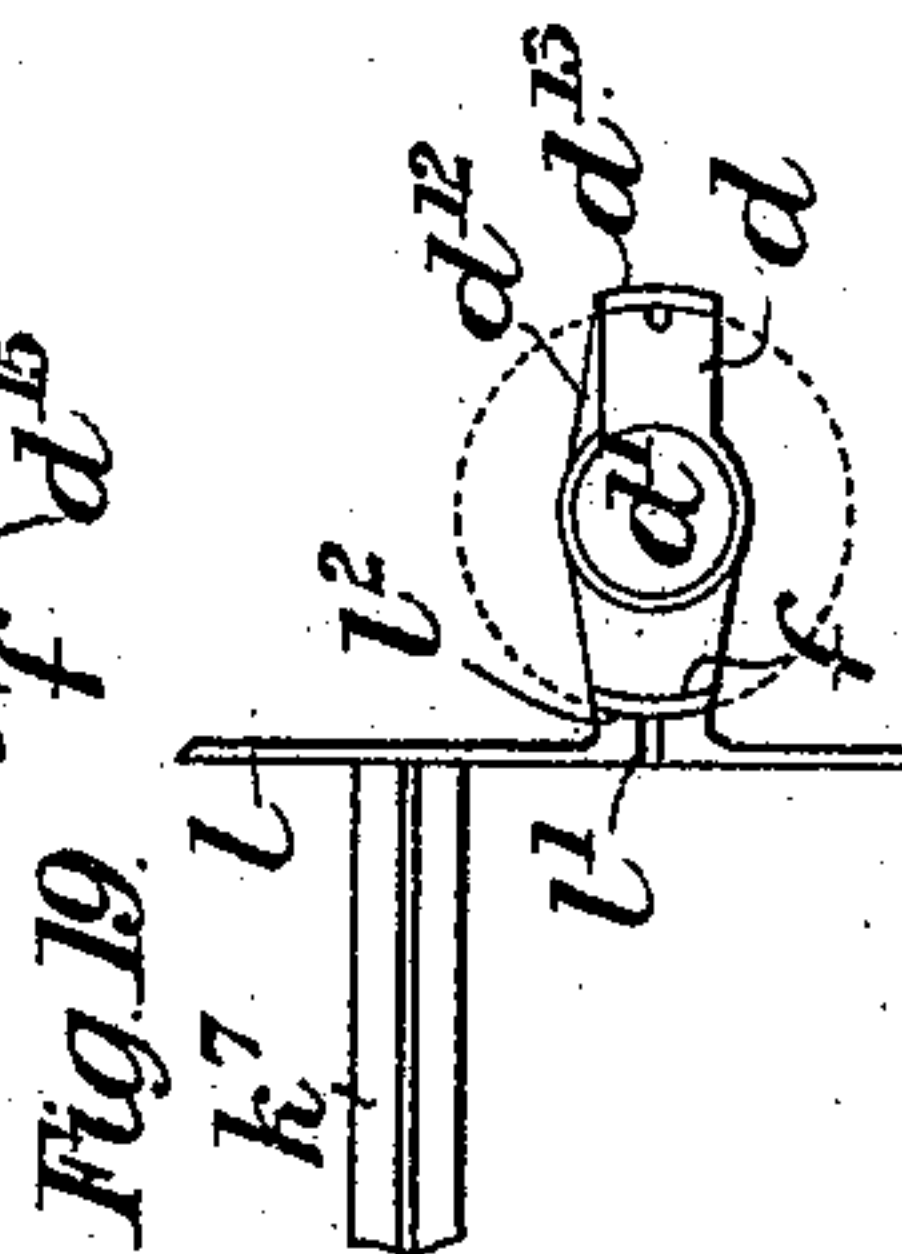
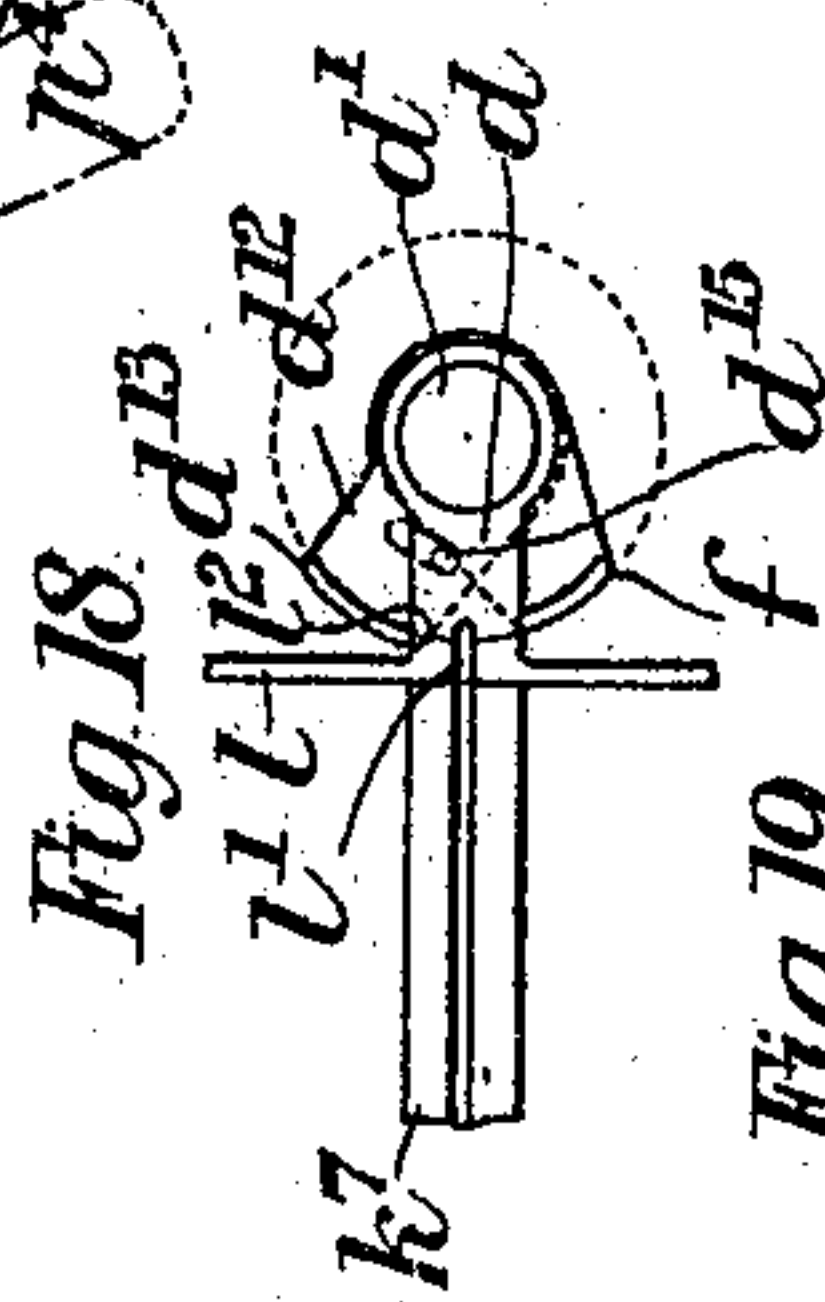
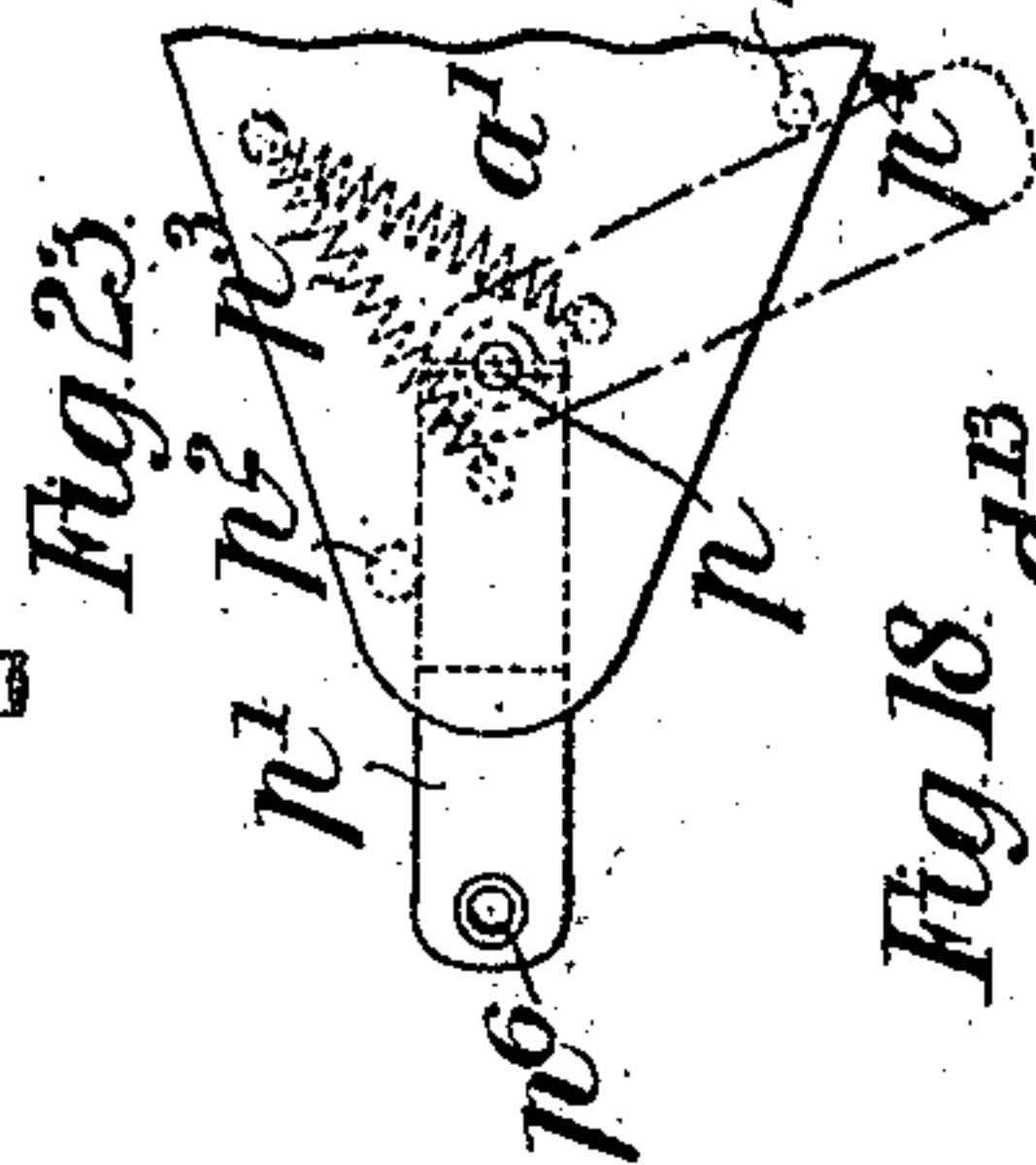
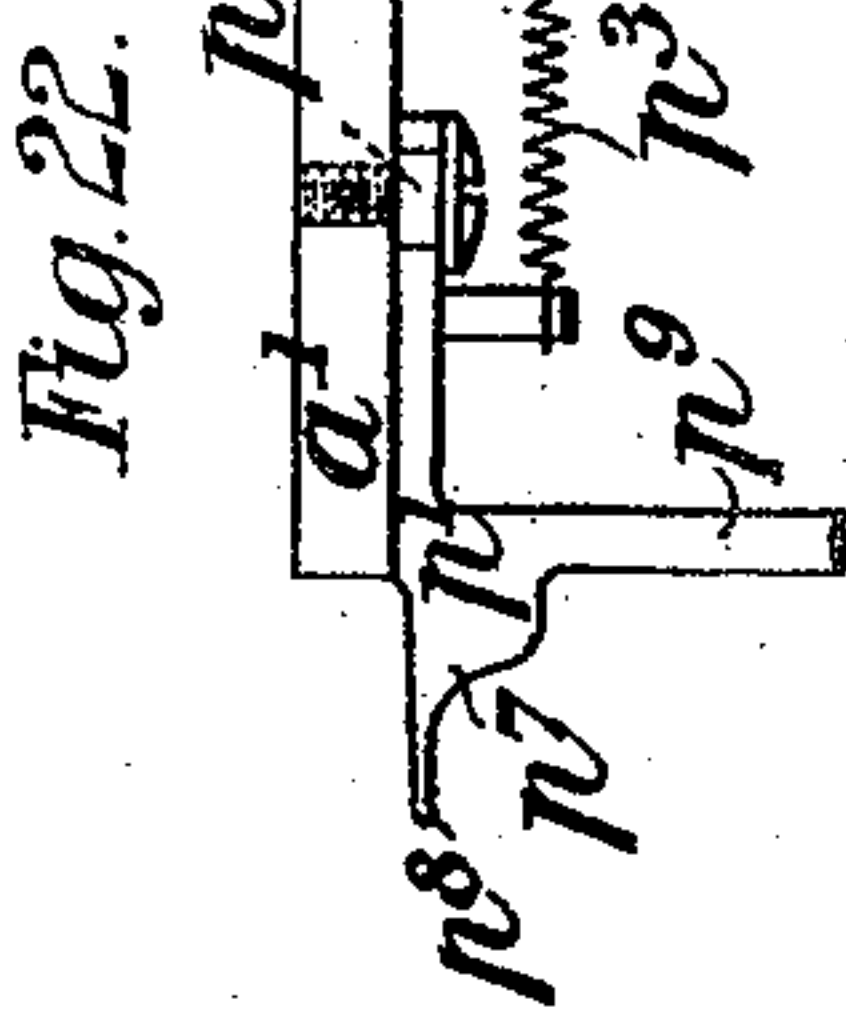
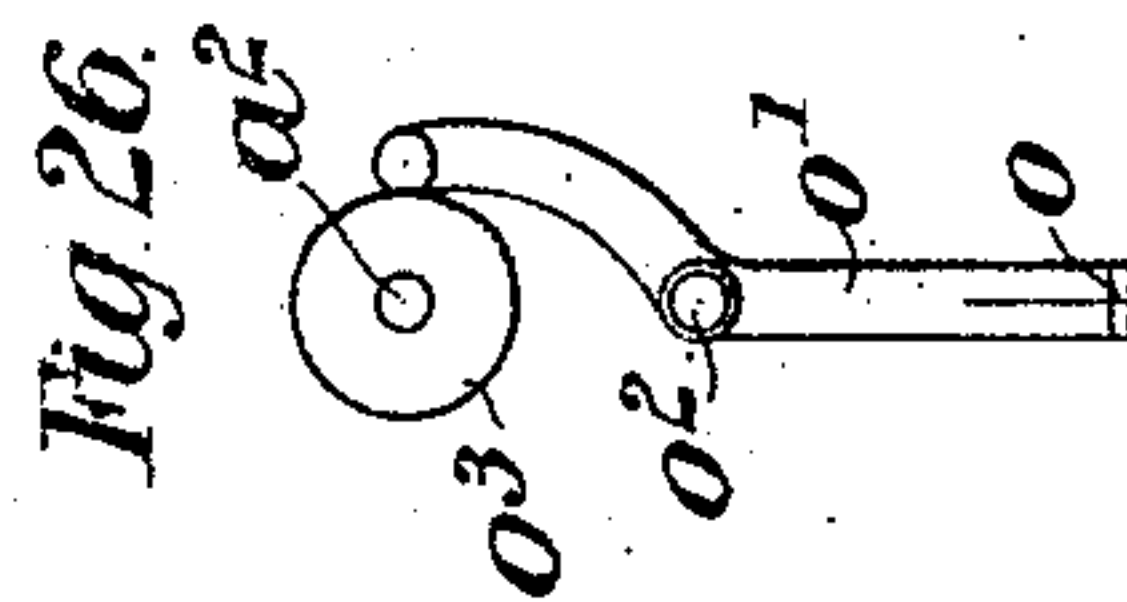
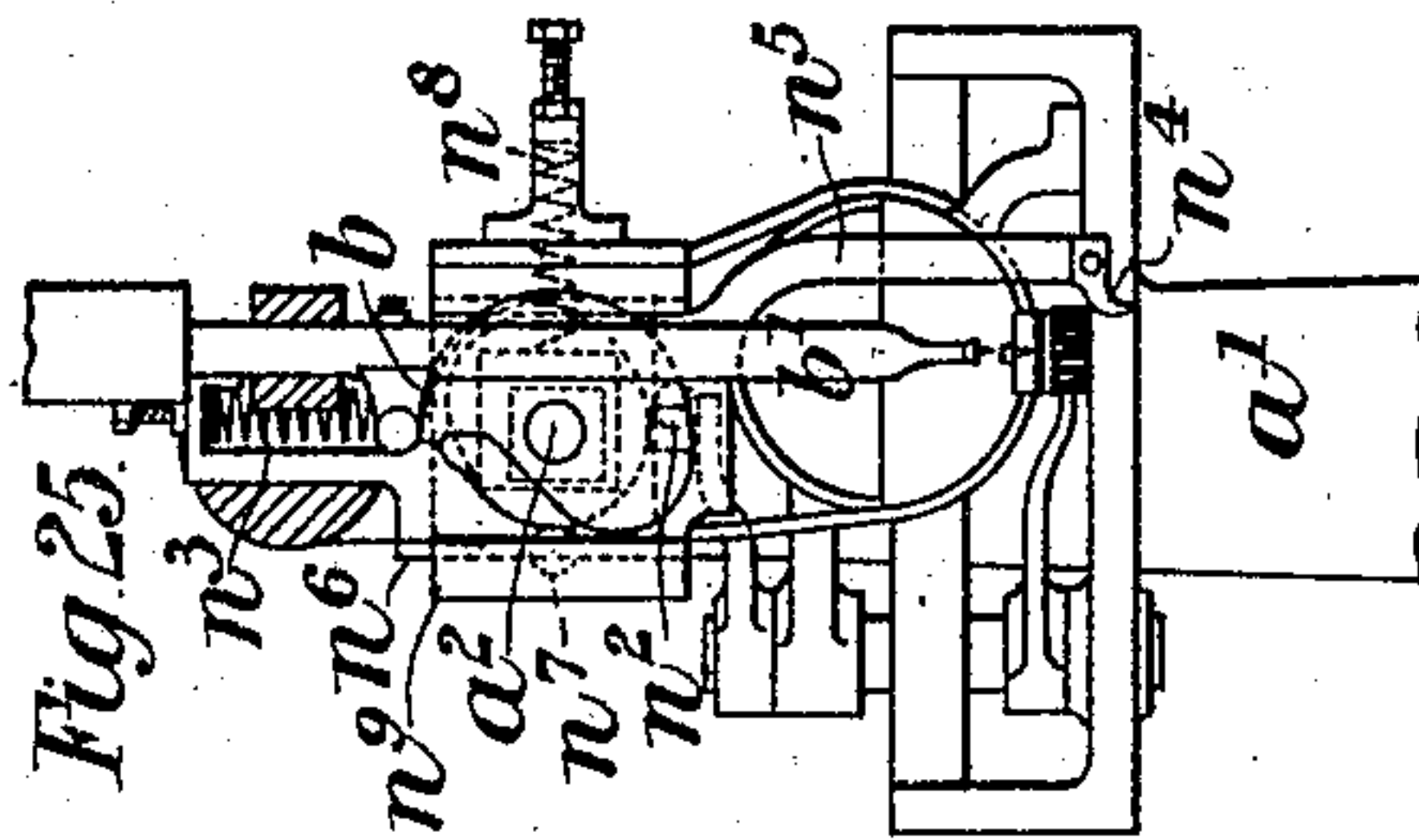
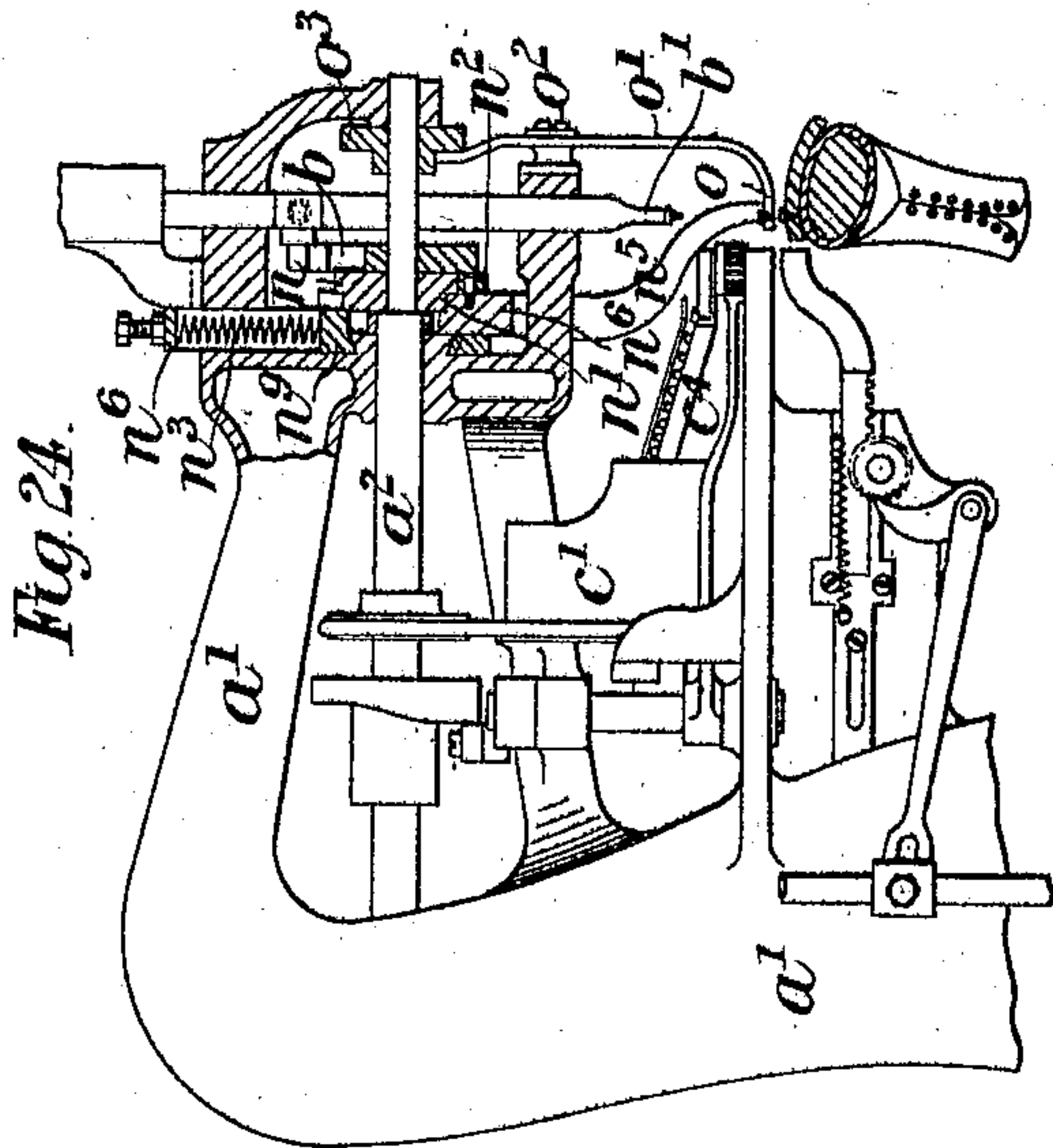


Fig. 20.

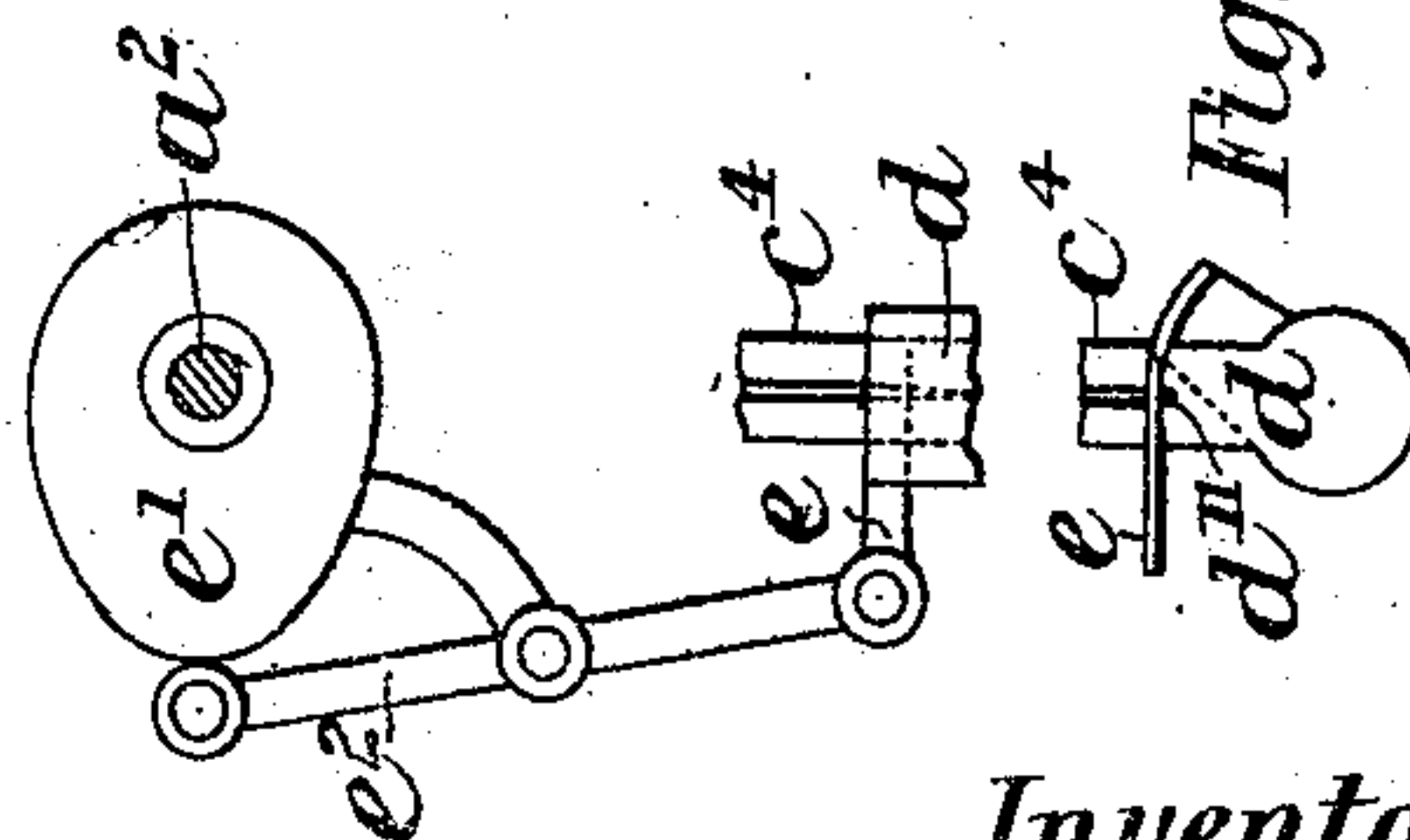


Fig. 21.

Witnesses:
J. D. Kingbury
B. W. Brockwell

Inventor:
William H. Dorman
By Whitaker & Trowell atty.

UNITED STATES PATENT OFFICE.

WILLIAM HENRY DORMAN, OF STAFFORD, ENGLAND.

LASTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 629,553, dated July 25, 1899.

Application filed December 28, 1897. Serial No. 664,028. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HENRY DORMAN, a subject of the Queen of Great Britain, residing at Stafford, England, have invented
5 new and useful Improvements in Nailing and Lasting Machines for Shoes, (for which I have obtained a patent in Great Britain, No. 23,363, dated December 6, 1895,) of which the following is a specification.

10 My invention is for improvements in machines for putting nails of various sizes into shoes, from hobnails to lasting tangles or tacks; and it consists of the following features—that is to say:

15 The tacks are put into a hopper and pass from it down a chute. At the termination of the chute is placed a reciprocating nail-carrier consisting of an arm which makes a semirevolution about a pivot and each time takes a
20 nail from the end of the chute and carries it around until it is just under the hammer. There are suitable shutters actuated at suitable times which respectively shut up the end of the chute when the carrier leaves it
25 and shut the nail into the carrier. When the nail arrives underneath the hammer, the carrier stops, and the hammer, which is magnetized, descends close to the head of the nail, which is attracted to it, and immediately rises
30 again, lifting the adhering nail clear out of the carrier, which at once returns to fetch another nail. As soon as the carrier is out of the way the hammer descends, with the nail, and drives it into the shoe, which is held in a
35 suitable position below.

I employ various gages for determining the position of the shoe while in the machine—an edge-gage, against which the edge of the boot rests. This edge may sometimes be the
40 edge of the sole or sometimes the corner formed where the upper overlaps the insole, or, again, it may be the “feather” of the boot, or even the edge of the “top piece.” This edge-gage overlies the edge, so as to form a ledge against which the boot can be pressed
45 upward and has a face more or less at right angles to it, against which the boot may be pressed sidewise, and is made of different shapes and is adjustable in different directions to suit the different kinds of work to be
50 done. It is sometimes used fixed and sometimes is allowed to slide in and out under the

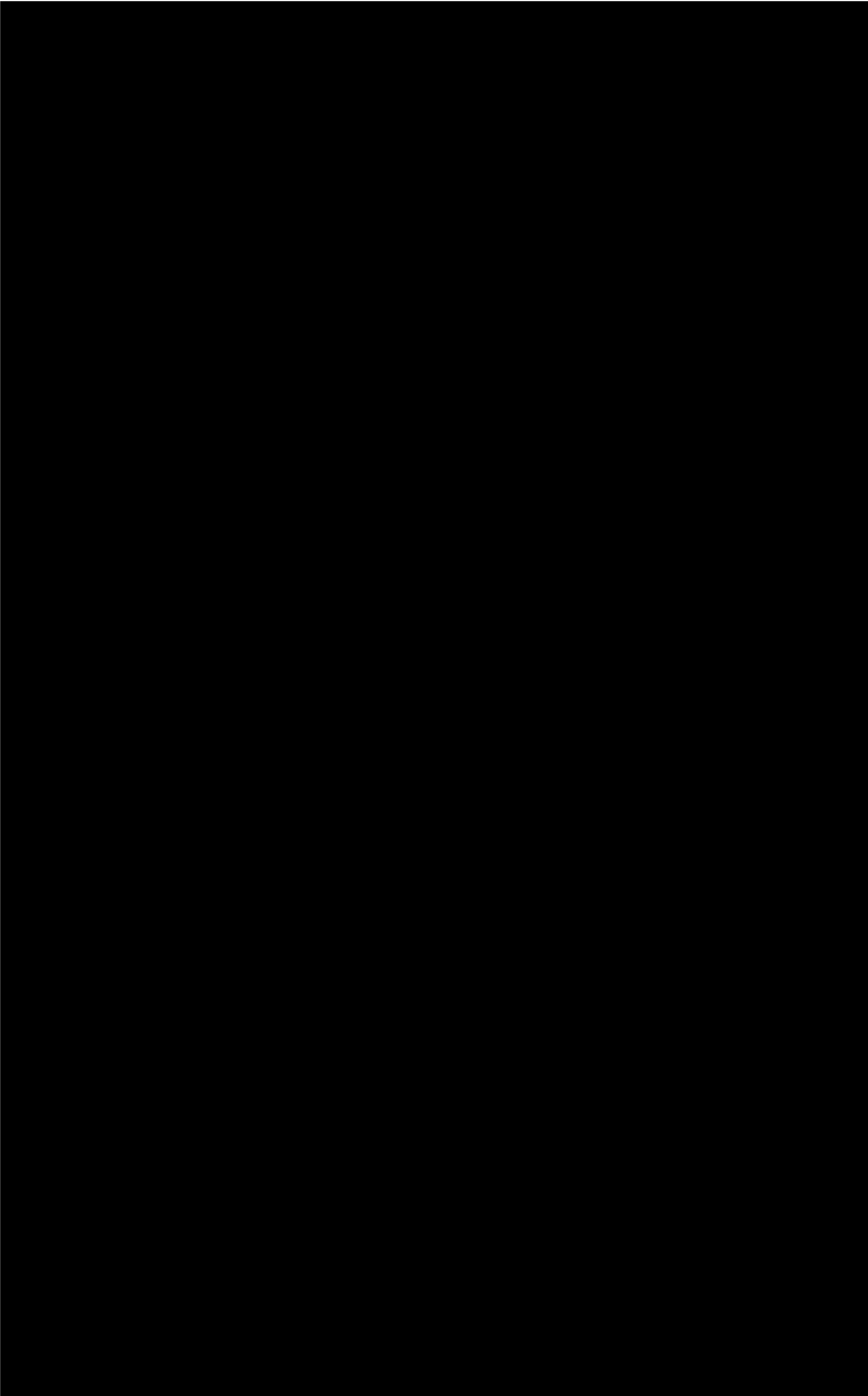
control of a spring and is locked fast just before and during the time the upper is being pulled up (if the boot is being lasted) and the
55 nail is being put in. A gage is also used against which the side of the boot rests. This gage is on a slide and under the control of a spring and is locked at the necessary times. A gage is occasionally used that takes into the
60 channel on the insole and assists in guiding the work; also, a gage that takes onto the surface of the sole or insole and assists in determining the angle at which the boot is presented to the machine. These gages are adjust-
65 able and may be used fixed or with a slight duly-timed lifting movement to facilitate the movement of the shoe.

The surface gage is sometimes required to have in addition an up-and-down movement
70 governed by a spring, and said gage is locked at the requisite times.

The gages are not all necessarily employed at one time, but are made use of as occasion may require to suit the various kinds of work
75 to be done.

The boot is carried upon a frame commonly known as a “jack,” of which there are many varieties in use. The jack is supported upon a post which rests in a “hook-joint” upon a
80 treadle or lever, by means of which the boot is held up against the gages above mentioned with such a degree of force as may be desired and by means of which it may be readily disengaged when the operation is completed.
85 The jack sometimes has a slight up-and-down movement, or at least the boot is periodically released from pressure against the gages, so that its movement may be facilitated.

My invention also consists, in conjunction
90 with the above, of a pair of mechanical pincers actuated by the machine, which is used to lay hold of and draw the upper over the last. The pincers are adapted to grip different thicknesses of material and to exert a de-
95 gree of drawing strain upon the upper, variable at pleasure. The action of the pincers in drawing the upper over the last exercises a considerable force, and in order to resist this and so relieve the operator of the necessity of
100 pressing heavily against the boot I provide a locking-bar which is connected to the jack or jack-post by a hook-joint and passes through a cup and ball mounted in the column on



them and bring the bottom tack truly vertical and insure its being in its proper position in the notch d^{11} before the arm d moves away. This divider e may be operated by a cam e' and lever e^2 from the shaft a^2 .

For the purpose of sealing the open end of the chute c^4 while the arm d is away, I provide another shutter-arm f , also loose upon the pivot d' and having an end like the arm d , but without the vertical notch d^{11} . The arm f lies against the arm d on the opposite side to the arm d^{12} , and when the arm d moves away the arm f follows it, moved by the pressure of the spring f' into the place just vacated by the arm d and shuts the end of the chute c^4 until pushed away again by the returning arm d .

So that the boot may be properly presented relatively to the hammer b' and other parts, I provide an edge-gage g , which has a horizontal notch g' , against which the edge or corner where the upper turns over on the insole may be pressed by the operator and which furnishes a guide for him in feeding along the boot. This gage g may be used fixed and made adjustable vertically and horizontally or it may be mounted upon a slide g^2 , carried in the frame a' and held forward by a spring g^3 , being retained in any position to which the operator may have pushed it while manipulating the boot by a ratchet-wheel g^4 and pawl g^5 , connected by a pinion g^6 and rack g^7 with the slide g^2 , the pawl being unlocked at suitable times by the operation of the machine, the arrangement somewhat resembling that described in the specification of a British patent granted to me, No. 11,437, A. D. 1895. I may provide also a gage h , which is similarly mounted and operated, having a spring h' which bears it forward against the upper, yielding when the operator presses upon the boot, the gage being locked by the machine previously to the driving of each tack, and, if desired, before the gripping movement of the pincers, hereinafter described, takes place, by the operation of a cam h^2 , which is mounted on the shaft a^2 and acts on a roll h^3 and lever h^4 , mounted on a pivot h^5 in the frame a' , the lever being jointed to a rod h^6 , which carries an arm h^7 , engaging a lever h^8 , mounted on a shaft h^9 in the frame a' , the shaft h^9 also carrying a pawl h^{10} , which engages the teeth of a ratchet-wheel h^{11} . The ratchet-wheel h^{11} is mounted on a shaft h^{12} , also carried in the frame a' and having mounted upon it a pinion h^{13} , gearing in a rack h^{14} upon the slide h^{15} , which is free to move in the frame a' and carries the gage h . The movement of the surface gage is precisely similar, but is in a vertical instead of a horizontal direction and is not illustrated.

One form of surface gage which is used in going around the seat of the heel is illustrated in Figs. 22 and 23. It is mounted beneath the portion a' of the frame on a pivot p and stands when in use in the position p' , being

held against the stop p^2 by the spring p^3 . When turned horizontally, so as to be out of use, into the position p^4 , it lies against the stop p^5 . The tacks are driven through the hole p^6 and the shoe is held up under the hollow p^7 against the teeth p^8 . The handle p^9 is for turning the gage into or out of position.

When it is desired to give to any of the gages a slight duly-timed lifting movement to facilitate the movement of the shoe, the arrangement is the same in principle as that described in the specification of a British patent granted to C. F. Gardner, No. 2,591, A. D. 1885, and therein illustrated in Figs. 2, 3, and 15 for giving a movement to "the horn N."

To pull the upper over onto the insole, I provide pincers actuated by the machine and in one form, as shown in Figs. 15 and 17, constructed as follows: A shaft i is carried in the frame a' and operates, through gears i' i^2 i^3 i^4 , a shaft i^5 , which is also carried in the frame a' and carries a cam i^6 , which operates at the proper time between the arms i^7 i^8 of the pincers, so as to open the jaws i^9 i^{10} about the pivot i^{11} , which jaws are afterward closed upon the edge of the upper by the spring i^{12} . The pivot i^{11} is carried by an arm i^{13} , which hangs from another pivot i^{14} in the frame a' . A second cam i^{15} on the shaft i^5 acts upon a roll i^{16} , mounted on the arm i^{13} , so as to swing the pincers in at the proper times toward the machine against the tension of a spring i^{17} , which is carried by an arm i^{18} of the frame a' , and when released by the cam i^{15} the arm i^{13} is pulled outward by the spring i^{17} , so as to draw the upper, which has been previously gripped by the jaws i^9 i^{10} , over the edge of the last x and insole x' . This arrangement may be reversed and the cams made to close and pull on the pincers, while the springs open the jaws and return the pincers after the pull. Another construction of pincers is that shown in Fig. 7, in which I provide a vertical bar j , which carries at its lower end the lower jaw j' of the pincers and is retained in place by an upper eyepiece j^2 , mounted on its pivot j^3 in the frame a' , and by a lower eyepiece j^4 , carried by its stem j^5 in a slot j^6 , also in the frame a' . A set-screw j^7 allows of the bar j being set up and down in the eyepieces j^2 and j^4 . A face-cam j^8 on the shaft a^2 acts upon a roll j^9 , retained upon the bar j by collars j^{10} j^{11} , so as to move the jaw j' inward, and a spring j^{12} serves to move it outward. The upper jaw j^{13} of the pincers is mounted on a pivot j^{14} in the lower jaw j' and is operated by an edge-cam j^{15} , which acts on a roll j^{16} and lever j^{17} , which is mounted on a pivot j^{18} in the frame a' and is jointed by a curved bar j^{19} to a rod j^{20} and link j^{21} , connected to the pincer-lever j^{22} . The jaw j^{13} is closed upon the boot-upper by the cam j^{15} pulling up the rod j^{20} , and a boot-upper is pulled over the last or insole by the spring j^{12} acting upon the bar j , which movement may be limited by an

adjusting-screw j^{23} , against which the bar j takes. A spring j^{24} opens the jaw j^{13} when released by the cam j^{25} .

In the form of pincers illustrated in Figs. 1 and 2 the cam j^{25} opens the pincers-jaws, while the spring j^{26} closes them when released.

The presser-foot illustrated in Fig. 8 and which may be used in lieu of pincers is for the same purpose as and acts in a similar manner to that described in the specification of a British patent granted to me, No. 7,494, A. D. 1895.

If the machine is intended to use either of two lengths of tack at will, two cylinders and chutes are employed, the arrangement being very similar to that described in the specification of a former British patent granted to me, No. 18,374, A. D. 1894. The operator by means of a handle k (see Figs. 15 and 16) and quadrant k' , mounted on a pivot k^2 in the frame a' , slides the rack k^3 , frame k^4 , and cylinders k^5 k^6 to the right or left, according as he wishes to bring either the one or the other of the chutes k^7 k^8 into position to supply tacks to the tack-carrier.

To prevent the tacks running out of the ends of the chutes k^7 k^8 when removed from opposite the carrier, I provide a horizontal flat-sided bar l , Figs. 15, 16, 18, and 19, against which the ends of the chutes slide and by which the open ends of the chutes are sealed. This bar is a fixture and has a narrow cross-slot l' formed in it for the passage of the tacks just where the carrier operates, and a hollow l^2 is formed in one side of the bar l , having the same radius of curvature as the end of the carrier-arm d , so that the latter can enter and leave properly. When a chute, as k^7 , is placed exactly coinciding with the slot l' , the tacks can pass to the carrier; but in all other positions the chutes k^7 k^8 are sealed by the flat side of the bar l .

The boot and last may be carried upon a jack, which may be of any suitable construction, or may be held to the machine by hand.

In order that the pulling action of the pincers may not have to be resisted by the operator, I provide an arrangement which locks the jack immovably in any position in which the operator chooses to place it prior to the action of the pincers and hammer taking place. The jack m , Figs. 1 and 2, is mounted on a post m' , carried by a hook-joint m^2 on a treadle-lever m^3 , which is mounted on a pivot m^4 in the column a , and the whole is balanced by a weight m^5 . The upper portion m^6 of the jack m is free to be turned around upon the lower portion m^7 , and a wheel m^8 is provided on the portion m^6 and turns with it. The wheel m^8 gears into a pinion m^9 , which is mounted on a shaft m^{10} , carried in the portion m^7 of the jack and connected by a second hook-joint m^{11} to a shaft m^{12} , (see also Figs. 3, 4, and 9,) which passes through a split ball m^{13} in the column a . The split ball m^{13} is carried in a pair of cups, the one, m^{14} , being fixed to the column a and the other, m^{15} , be-

ing provided with a stem m^{16} , which passes out through the column side and is acted upon by a locking-lever m^{17} , which is pivoted on a pin m^{18} to the column a and drawn inward by springs m^{19} , so as to grip fast the cups m^{14} m^{15} upon the split ball m^{13} and the ball upon the shaft m^{12} , so that the latter can neither revolve, swing, nor slide and the jack becomes immovably fixed. The jack is unlocked by the action of the cam h^2 and rod h^5 , described in connection with the gage h . The rod h^5 is jointed to a lever m^{20} , mounted on a pivot m^{21} in the column a , its end m^{22} , when thrust down by the rod h^5 , taking on the locking-lever m^{17} and thrusting the same outward against the resistance of the springs m^{19} , releasing the cups m^{14} m^{15} and ball m^{13} , so as to leave the shaft m^{12} free either to revolve when the jack is revolved, swing when the jack is swung sidewise, or slide when the jack is moved to or from the column.

If the machine is intended to be used for driving nails into soles or top pieces either for attaching them to the boot or for increasing the wearing properties thereof, the aforesaid or other suitable jack may sometimes be used or a horn or stump may be employed in any usual manner. During the feeding movement of the work, which may be performed by an awl in a manner somewhat similar to that described in the specification of a British patent granted to me, No. 17,407, A. D. 1894, the jack or horn may be drawn down by a cam-and-ratchet movement like that described in the specification of the said British patent granted to C. F. Gardner, No. 2,591, A. D. 1885, and already referred to. The pincers are dispensed with, as may also be the jack-locking arrangement. The gages which bear upon the edge of either the sole or the top piece to regulate the distance in from the edge at which the nails shall be driven may be simply adjustable in an ordinary manner or may have the locking movement previously described applied to them. Figs. 24, 25, and 26 illustrate the arrangement. The shaft a carries the cams n n' . The former by the roll n^2 and spring n^3 gives an up-and-down or piercing movement to the awl n^4 , which is carried on the arm n^5 of the slide n^6 , and the latter, n' , by the roll n^7 and spring n^8 gives a to-and-fro feeding movement to the slide n^9 , which is mounted in the main frame a' and carries the aforesaid slide n^6 . The magnetized hammer b' is operated, as before described, by the cam b , and the cylinder c' , chute c^4 , and nail-carrier all operate as already explained. The magnetized hammer b' carries down the adhering nail through a split nose-piece o , which centers the nail and opens to allow of the passage of the nail-head, the nose-piece o being carried upon a lever o' , which is mounted on a pivot o^2 in the frame a' and is operated so as to move to and fro under the hammer and away from the advancing awl n^4 by the cam o^3 upon the shaft a^2 .

The specific construction of the jack or

work-support is not herein claimed, but will form the subject-matter of another application.

Having now particularly described and as-
 5 certain the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a nailing-machine, the combination
 10 with a tack-hopper and a chute, of a reciprocating carrier having a vertical face provided with a tack-receiving notch, an arm carried by said carrier, having a limited movement with respect thereto, a shutter on said arm adapted to engage the vertical face of the car-
 15 rier to hold the tack in said notch and a spring interposed between the carrier and said arm, substantially as described.

2. In a nailing-machine, the combination
 20 with a tack hopper and chute, of a reciprocating carrier having a vertical face provided with a tack-receiving notch, a shutter carried by said carrier adapted to engage said vertical face to hold a tack in said groove, said shutter having a limited movement with re-
 25 spect to the carrier, a spring interposed between the carrier and said shutter, a movable shutter located in the path of said carrier, and adapted to close the end of said chute, and a spring for holding said shutter nor-
 30 mally over the end of the chute but permitting it to yield when engaged by the carrier, substantially as described.

3. In a nailing-machine, the combination
 35 with the tack hopper and chute, of a reciprocating carrier having a vertical face provided with a tack-receiving notch and a shutter carried by said carrier and having a limited movement with respect thereto, for engaging the said vertical face of the carrier and re-
 40 taining a tack in said notch, a spring interposed between said carrier and said shutter, a divider adapted to pass between the carrier and the chute to force a tack into said notch, and means for operating said divider sub-
 45 stantially as described.

4. In a nailing-machine, the combination
 50 with a plurality of independent hoppers, each provided with a chute and means for moving said hoppers and chutes laterally, of a stationary closing-bar engaging the ends of said chutes, said bar having a delivery-slot adapted to form a continuation of one of said

chutes when alined therewith and a movable carrier adapted to receive tacks from said delivery-slot, substantially as described.

5. In a nailing-machine, the combination
 55 with a vertically-movable magnetic hammer, of a reciprocating device for bringing a single tack beneath said hammer, means for depressing the hammer and raising it, to allow
 60 it to attract the tacks, means for withdrawing the carrier and means for depressing the hammer to drive the tack, substantially as described.

6. In a nailing-machine, the combination
 65 with a vertically-movable magnetic hammer, of a tack hopper and chute, a reciprocating carrier adapted to carry tacks singly from said chute to a position beneath the hammer, mechanism for partially depressing the ham-
 70 mer to allow it to attract the tacks, mechanism for withdrawing the carrier, and mechanism for depressing the hammer to drive the tack, substantially as described.

7. In a nailing-machine, the combination
 75 with a vertically-movable magnetic hammer, of a tack hopper and chute, a reciprocating carrier having a vertical face provided with a recess to receive the shank of a tack, a shutter for engaging said face and holding
 80 the tack in said recess, means for swinging said carrier beneath the magnetized hammer, means for partially depressing said hammer and again raising it to remove the tack from the carrier, means for withdrawing the
 85 carrier from beneath the hammer and means for depressing the hammer to drive the tack, substantially as described.

8. In a nailing-machine, the combination
 90 with the vertically-movable magnetic hammer, of a depressing-spring therefor, a tack-carrier for bringing a tack beneath said hammer, mechanism for retracting said carrier out of the path of the hammer, an operating-
 95 cam for said hammer, having grades for partially lowering said hammer and raising it to permit the hammer to pick up a tack from said carrier, and a shoulder to permit the hammer to be depressed to drive the tack, substantially as described.

WILLIAM HENRY DORMAN.

Witnesses:

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