(No Model.) 6 Sheets—Sheet 1.

J. E. KIMBALL.

NAILING MACHINE.

No. 415,672. Patented Nov. 19, 1889.

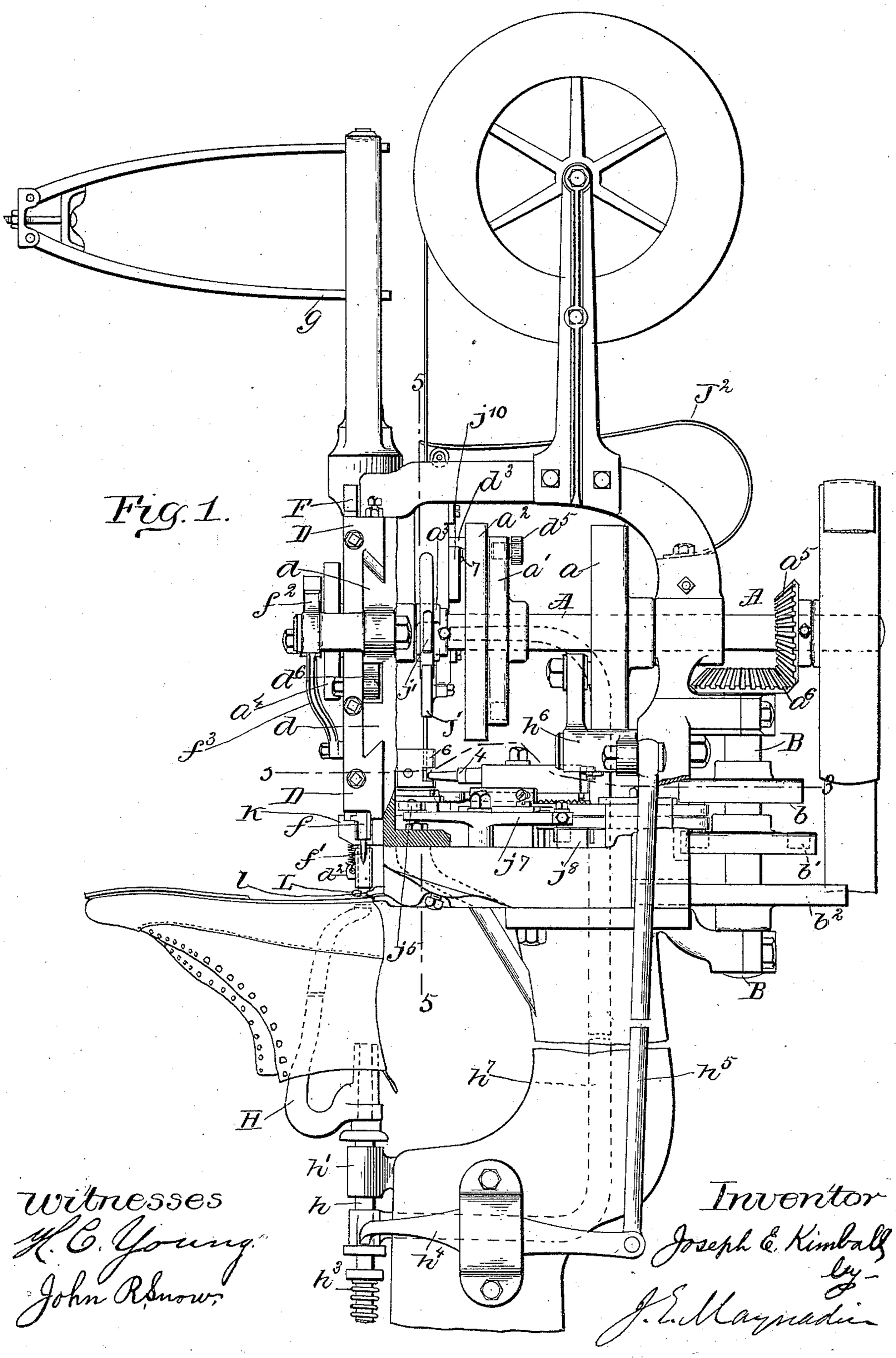

Fig. 1.

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(No Model.) 6 Sheets—Sheet 2.

J. E. KIMBALL.

NAILING MACHINE.

No. 415,672. Patented Nov. 19, 1889.

Fig. 2.

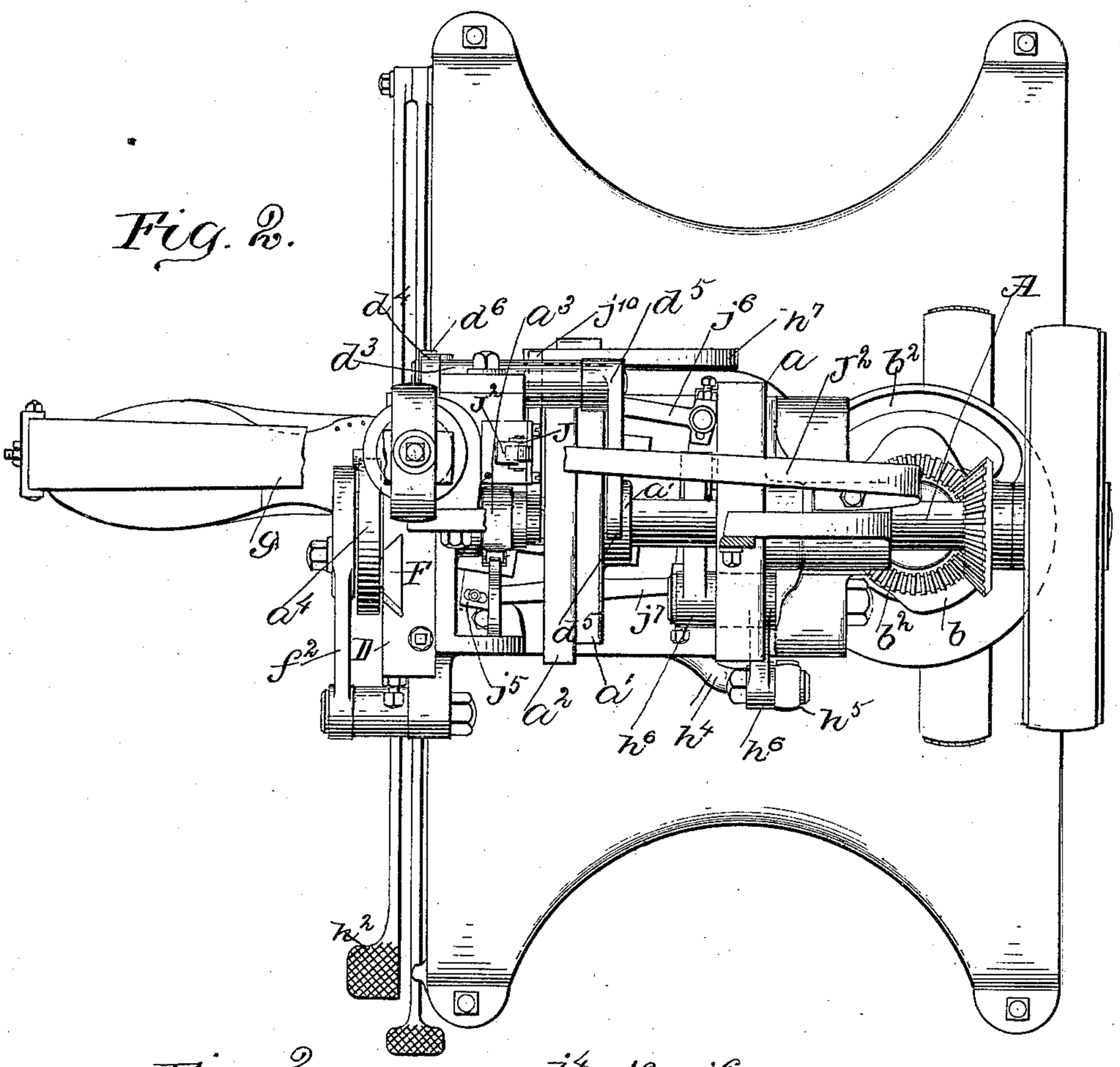
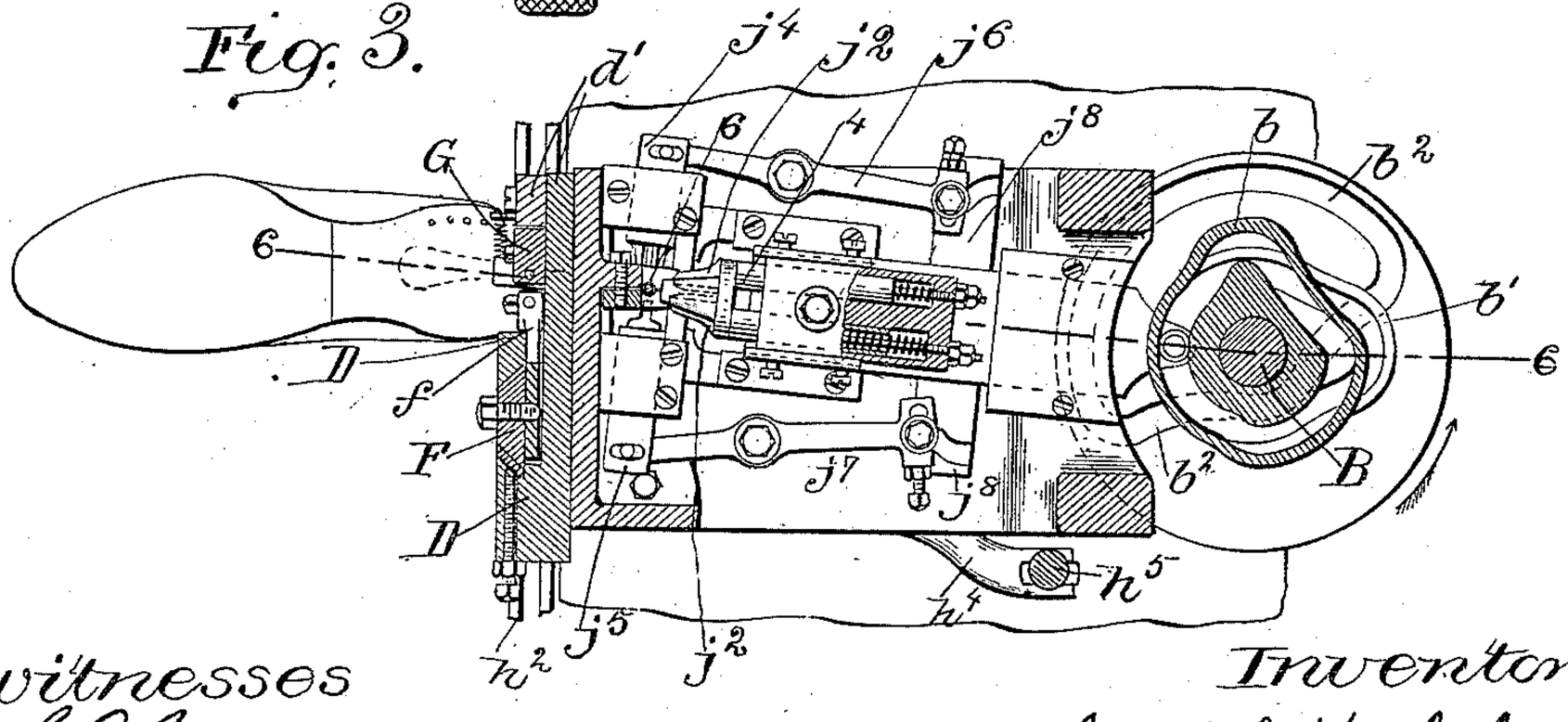


Fig. 3.



Witnesses
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(No Model.)

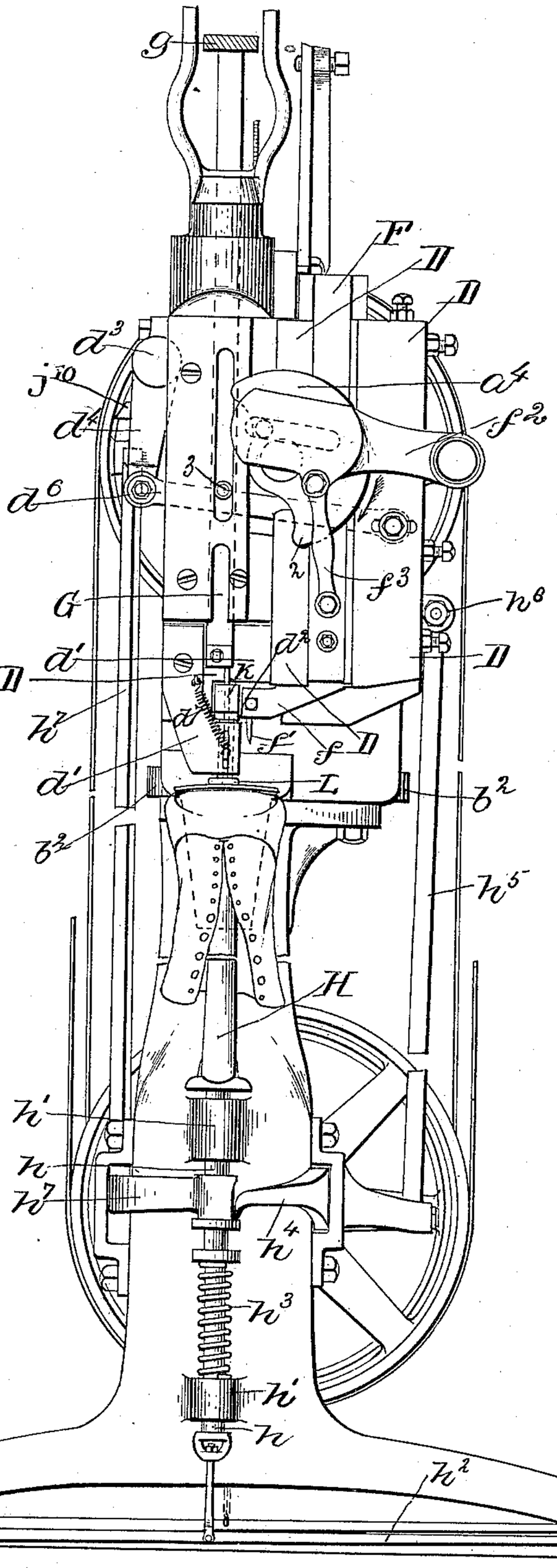
6 Sheets—Sheet 3.

J. E. KIMBALL.

NAILING MACHINE.

No. 415,672. Patented Nov. 19, 1889.

Fig. 4.



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(No Model.)

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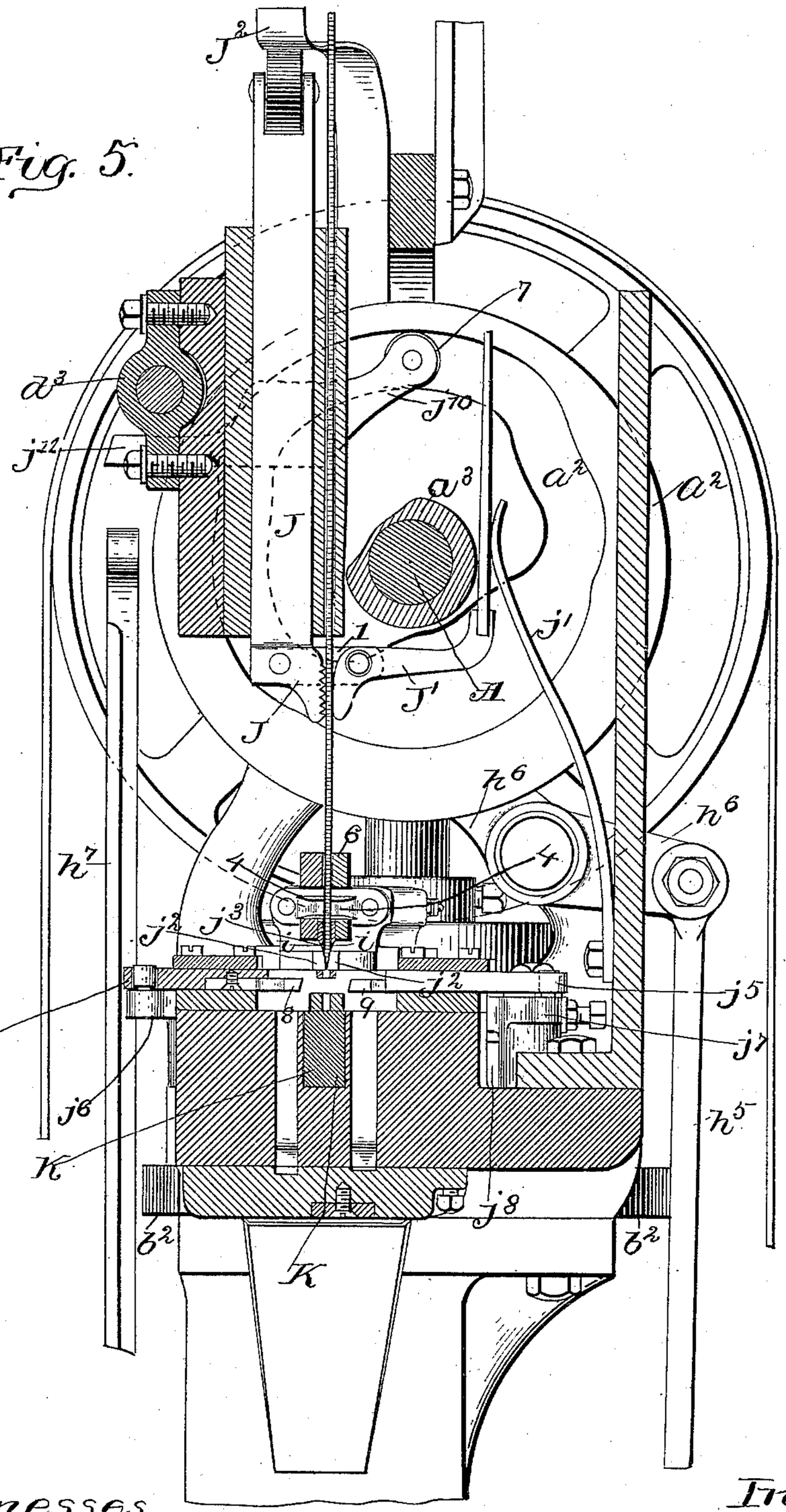
J. E. KIMBALL.

NAILING MACHINE.

No. 415,672. Patented Nov. 19, 1889.

Fig. 5.



Witnesses
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(No Model.) 6 Sheets—Sheet 5.

J. E. KIMBALL.

NAILING MACHINE.

No. 415,672. Patented Nov. 19, 1889.

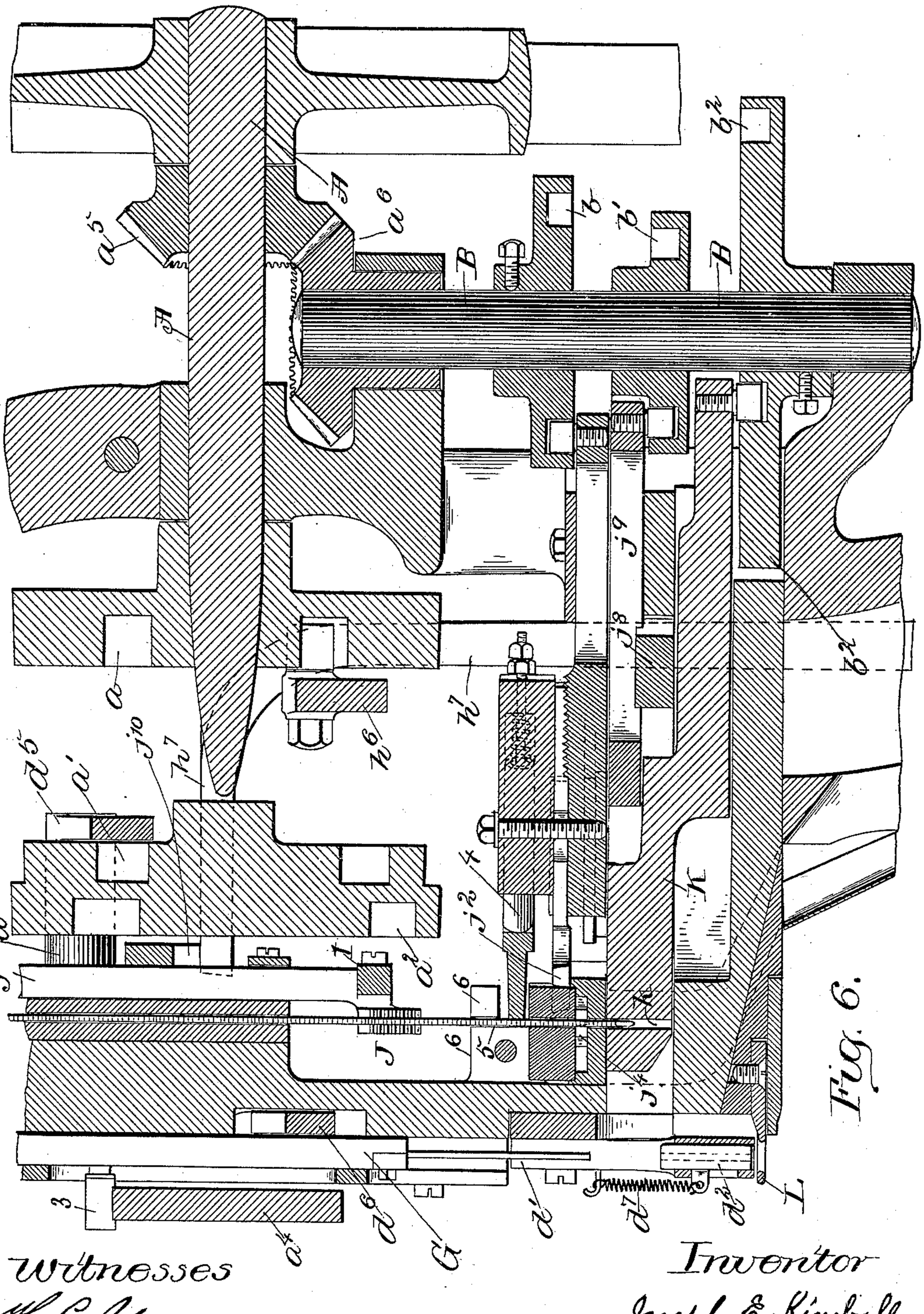

Fig. 6.

Witnesses
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(No Model.) 6 Sheets—Sheet 6.

J. E. KIMBALL.

NAILING MACHINE.

No. 415,672. Patented Nov. 19, 1889.

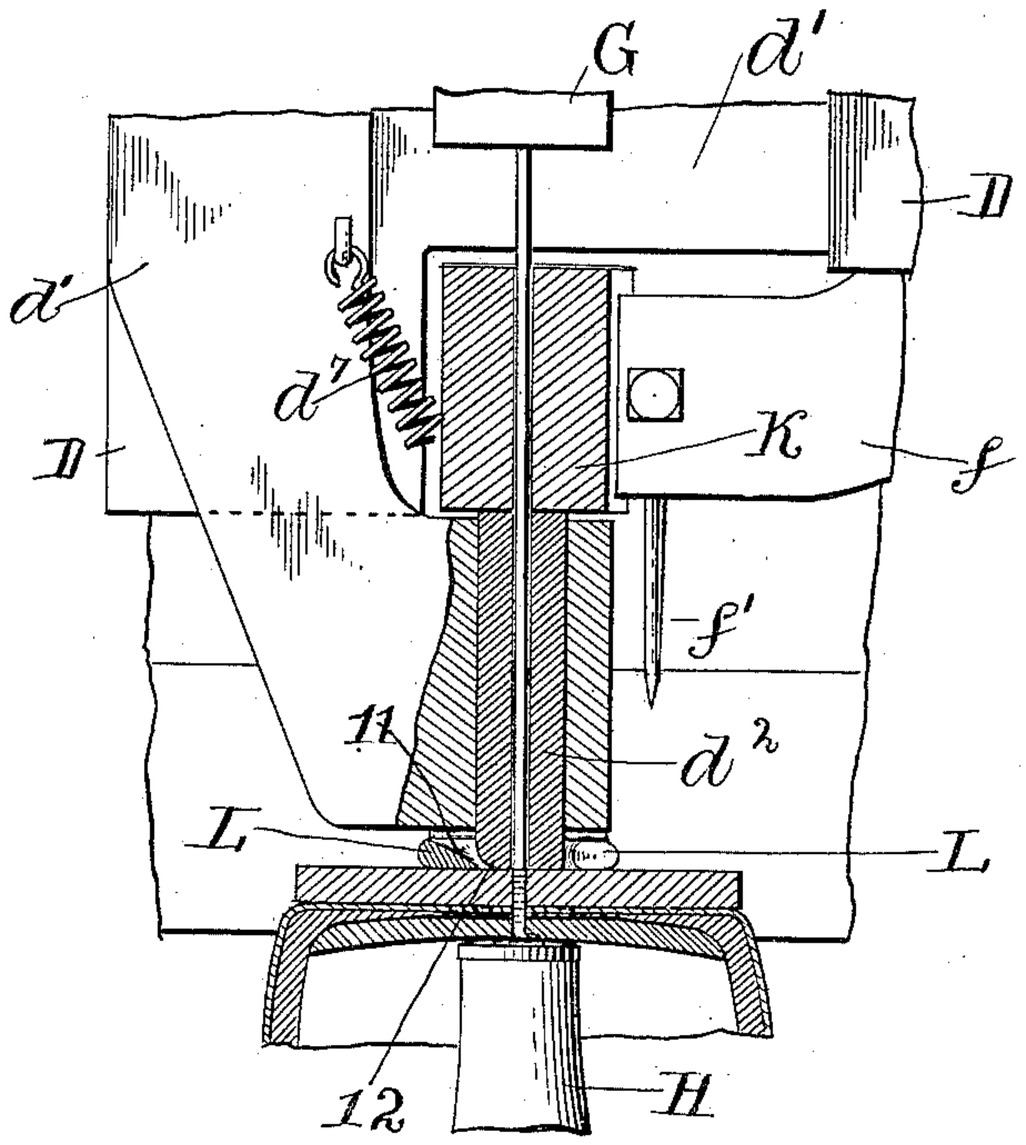

Fig. 7.

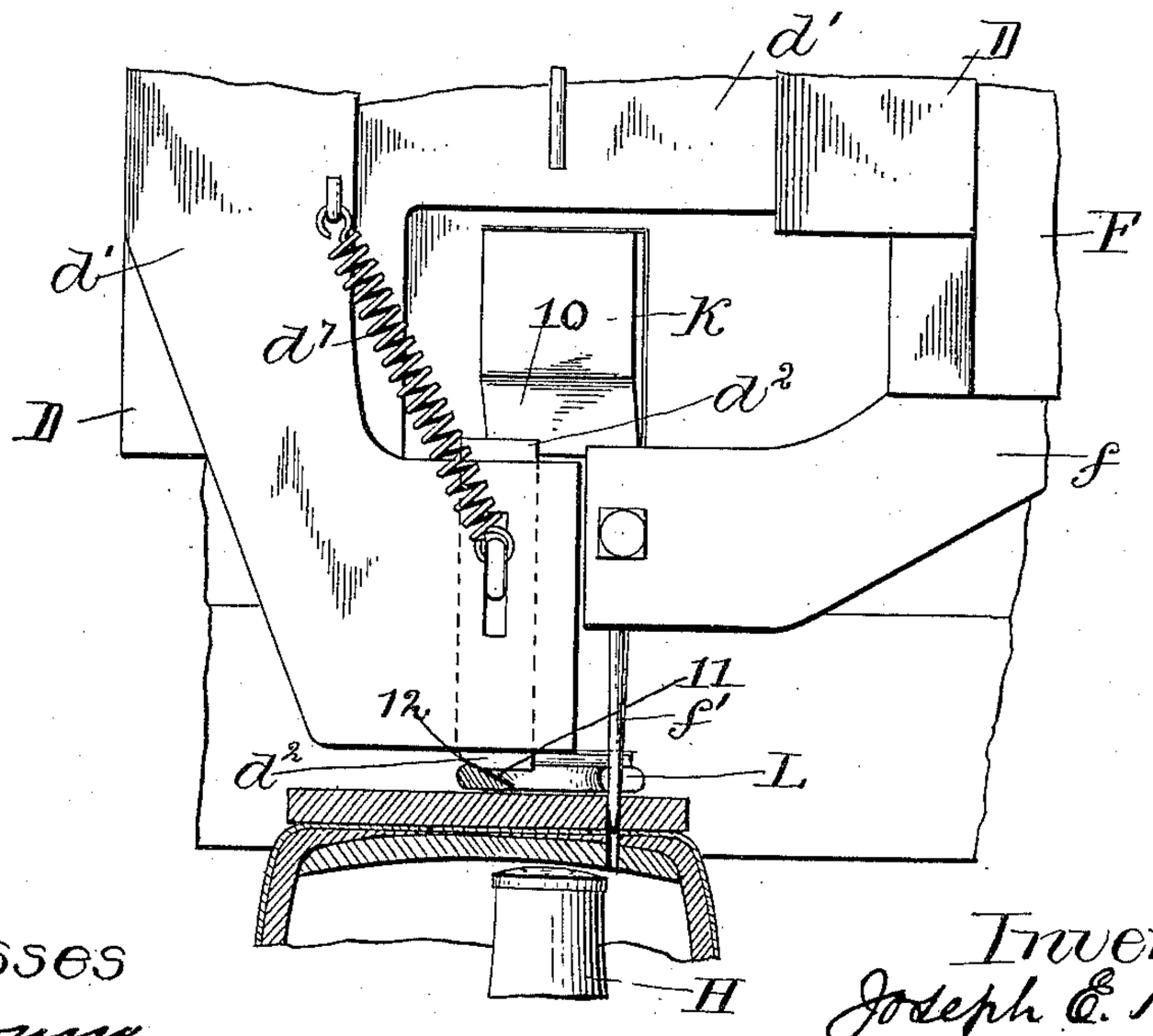

Fig. 8.

Witnesses
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UNITED STATES PATENT OFFICE.

JOSEPH E. KIMBALL, OF ABINGTON, ASSIGNOR, BY MESNE ASSIGNMENTS, TO EPHRAIM L. WIRES, OF MILFORD, MASSACHUSETTS.

NAILING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 415,672, dated November 19, 1889.

Application filed September 26, 1888. Serial No. 286,450. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH E. KIMBALL, of Abington, in the county of Plymouth and State of Massachusetts, have invented a new and useful Nailing-Machine, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a machine embodying my invention, a part being broken away for greater clearness. Fig. 2 is a plan with a part broken away for greater clearness. Fig. 3 is a view, partly in section, on line 3 3 of Fig. 1. Fig. 4 is a front elevation. Fig. 5 is a view, partly in section, on line 5 5 of Fig. 1, looking to the right. Fig. 6 is a sectional view on line 6 6 of Fig. 3, and Figs. 7 and 8 are views more clearly illustrating the cutter and carrier throat and rest explained below.

The main feature of my invention is an improved machine which severs a fastening from a coil of wire, carries it under a driver, and over an awl-hole made in the stock by the awl; and the main novelty of my improved machine is the combination of a sliding carriage which carries the awl with the mechanisms for feeding the wire, cutting off and carrying the fastening, driving the fastening, and supporting the stock into which the fastening is to be driven.

Another feature of my invention relates to the wire-feed mechanism, and consists in using nippers which are moved positively during the first part of their motion to feed the wire, but by a spring during the latter part of their feeding motion. This is a practical improvement on this class of machines, as it enables the speed to be increased without impairing the accuracy of the feed.

A third feature of my invention consists in giving an endwise motion to the throat or tube which supports the fastening when struck by the driver, the object being to cause the lower end of this reciprocating throat to extend through the support, against which the upper surface of the work is pressed by the main work-support, (which for bottoming shoes should be the well-known rotating horn,) and thereby bring the lower end of the throat close to or in contact with the upper surface of the work. While this is of a good deal of practical importance in work where the outer ends of the fastenings are flush with the sole, it is of still greater importance where the fastenings are driven in a channel or groove formed in the sole.

In that form of my machine shown in the drawings the main shaft A carries the cam a for actuating the shoe-supporting horn, cam a' for actuating the shoe-feeding mechanism, and cams a^2 a^3 for actuating the wire-feeding mechanism, and also the cam a^4, which lifts the driver and aids in operating the awl-bar. The main shaft also carries the beveled gear a^5, through which a gear a^6 on shaft B is driven. Shaft B carries the cams b, b', and b^2, which operate the cutters for forming the point and for severing and carrying the fastening. The sliding head D is mounted upon ways d, which are fast to the frame of the machine. This sliding head D receives its motions from the cam a' through the rock-shaft d^3 and its arms d^4 d^5, the arm d^4 being connected by link d^6 to the sliding head D. The awl-bar F is mounted in ways in the sliding head D, and a bracket f from the end of the awl-bar carries the awl f'. The awl-bar receives its up and down motions from the driver-cam a^4 through the arm f^2 and link f^3, the arm having a groove on its inner face in which a stud fast to the driver-cam a^4 projects, as shown in dotted lines in Fig. 4, and its sidewise movements from the sliding head D.

The driver-bar G is raised by the driver-cam a^4, a portion of the driver-cam engaging a stud 3 on bar G, and is thrown down by spring g. The ways of the driver-bar G and the supports for the spring g are attached to the frame of the machine, as will be readily understood by all skilled in the art.

The horn or work-support H is the usual revolving shoe-supporting horn, too well known to require description. This horn is supported by the rod h, which passes through ears h' on the frame of the machine. This rod h is connected to the treadle h^2 in the usual way. The horn H is forced up by spring h^3 and forced down by lever h^4, the lever being operated by rod h^5, rocker-lever h^6, and cam a.

The wire is fed by the reciprocating nippers

J J′, the jaw J′ being closed by the surface-cam a^3 and opened by the spring j', as will be readily understood by reference to Fig. 5, and the wire is fed by the nippers J J′ into proper relation to the cutters j^2, which form the end of the wire into the shape of a wedge by slicing off two segments, one from each side of the wire, the wire being held in the die j^3 by a clamp 4 against a wall 5 of the guide 6, as more fully described in my pending application, Serial No. 168,473, filed June 12, 1885. After the point is thus partially formed by the cutters j^2 the wire is fed by means of the cam a^2, a roll on arm j^{10}, which is fast to slide J, entering the groove in cam a^2, until the partially-formed point is brought into proper relation with the cutters 8, carried by carrier j^4, and the die 9, carried by carrier j^5. The cutter-carrier j^4 and die-carrier j^5 are actuated by levers j^6 j^7 through the cross-head j^8, which is actuated by cam b' through slide j^9, to which cross-head j^8 is fast, the cross-head being reciprocated by cam b'. These cutters and means for actuating them are also described in my pending application above mentioned. This finishes the point, and when the clamp 4 has been moved back by the further rotation of cam b (see Fig. 6) the nippers J J′ are thrown down by the spring J^2 until the projection j^{11} is arrested by the stop h^7, which is a bracket fast to the rod b of horn H, and the position of the bracket h^7 determines the length of the fastening, for the cam a^2 is positive in both directions until after the point is fully formed, so that the spring J^2 has practically nothing to do with the feed of the wire until after the point is fully formed, but is put away, as will be clear from Fig. 5, leaving the nippers J J′ wholly under the control of spring J^2 in making the final feed of the wire. During the final feed of the wire a length sufficient to form the fastening (determined by the position of the bracket or stop h^7) is fed into the cutter and carrier K, which is then thrown forward by the cam b^2, and in its forward motion its beveled under side 10 strikes upon the upper end of the reciprocating throat or nail-tube d^2 and forces it into contact with the sole of the shoe, the shoe being then pressed up by the horn H and the upper surface of the sole or work resting against the rest L.

The combination of the work-support and a rest (hereinafter explained) with the wire-feed by means of the stops h^7 and j^{11}, or their equivalents, is new with me and one feature of my invention, and is a substantial improvement on the other constructions known to me for feeding the wire a distance depending on the position of the work-support or horn.

One of the most important features of my invention is the combination of the work-rest L and driving mechanism with the reciprocating throat or nail-tube d^2 above described, the practical importance of this construction lying in the fact that the throat is pressed down through the hole in the rest against the opposed surface of the work (the tread surface of a sole or the bottom of a channel-groove, for example) when the fastening is driven, so that the fastening is prevented from crippling.

The operation is as follows: Starting with the driver down, as in Fig. 4, the end of the wire will be in proper relation with the first pair of cutters j^2 j^2, and the segmental slices will then have been cut off and the point partially formed, the wire being held by the nippers J J′. As the driver-cam a^4 takes hold of the driver-bar G to move it up against the force of spring g, the nippers J J′ are moved down by cam a^2 and parts connecting the cam and nippers to bring the wire to its second position, and the cutter 8, carried by carrier j^4, operates upon it, and during the upward motion of driver-bar G the awl-bar F is moved down and the awl caused to penetrate the sole of the shoe held between the upper surface of horn H and the under surface of rest L. The horn is then depressed by the lever h^4 and its connections, so that the shoe may be fed by the motion of sliding head D, in which the awl-bar F is mounted, as explained above, the rest L having a passage l, through which the awl moves during the feed of the stock. As soon as the driver has risen far enough to clear the throat through the carrier K, carrier K is moved back, releasing the reciprocating throat d^2, (secured to an arm of sliding head D,) which is cleared from the rest L (through which it extends when depressed by the carrier K) by the spring d^7, and the head D is moved on its ways d to bring the awl f' into proper relation with the rest L and driver. The lower part of the throat d^2 is beveled at 12 and the upper surface of the rest L beveled at 11, (see Fig. 8,) so that the motion of head D will itself cause the reciprocating throat d^2 to rise free from rest L, even if its spring d^7 should fail to lift it. This construction is also a feature of my invention. When the carrier K has its throat brought in line with the wire, the nippers are thrown down by their spring J^2, the horn H having in the meantime been released from the control of lever h^4 and been thrown up by its spring until the sole is compressed between the upper surface of the horn H and the under surface of the rest L. As soon as the shoe is thus fed, and while the horn is rising to clamp the shoe between the horn and the rest, the awl-bar F is lifted, withdrawing the awl, and as soon as the awl is withdrawn the head D is moved back to its position shown in Fig. 4, bringing the reciprocating throat d^2 in line with the driver and over the awl-hole. The carrier K is then thrown forward, severing a fastening and depressing the reciprocating throat d^2 until its lower end projects through the rest L and comes into contact with the sole of the shoe. The driver-bar G is then released and the fastening driven. (See Fig. 7.) After the

carrier K has moved forward and severed the nail the jaw J′ of the nippers is opened by its spring j', when the cam a^3 moves out of contact with an arm of this jaw and the nippers are lifted against the force of spring J^2 by the cam a^2. The cam a^3 is so shaped that the nippers close upon the wire as soon as the nippers have passed over the wire the proper distance, when the jaw J′ is closed by the spring j' and the wire is lifted by the upward motion of the nippers until its end is brought in proper relation with the first pair of cutters.

It will be plain that the various features of my invention may be used separately, and also that the cutters described are necessary only when the peculiar point described is required. A nail provided with this point was patented to me in Patent No. 386,435, July 17, 1888.

What I claim is—

1. In combination, the sliding head-awl, awl-bar, driver, driver-bar, shoe-support, and wire-feeding mechanism, with a cutter and carrier, and mechanism, substantially such as is described, for reciprocating the cutter and carrier between its position with its throat in line with the wire and its position with its throat in line with the driver and over the hole in the work made by the awl, all arranged and operating substantially as described.

2. In a wire-feeding mechanism of a nailing-machine, nippers J J′, cam a^2, and spring J^2, combined and operating substantially as described.

3. In a nailing-machine, throat d^2, in combination with mechanism, substantially such as described, for moving the throat endwise toward and from the work-rest L of the nailing-machine, all substantially as and for the purpose specified.

4. In a nailing-machine, in combination, work-support H, rest L, and throat d^2, with devices, substantially such as described, for moving throat d^2 endwise, substantially as described.

5. In a nailing-machine, the combination of the reciprocating cutter and carrier K, with the reciprocating nail-tube d^2, the cutter and carrier being beveled at 10, all substantially as described.

6. In a nailing-machine, the combination of sliding head D, reciprocating throat d^2, and rest L, having a cam-surface 11, substantially as and for the purpose set forth.

7. In a nipper-feeding mechanism of a nailing-machine, the cam a^2, whose groove is shaped as specified, in combination with nippers J J′ and spring J^2, the cam moving the nippers positively during a portion of each revolution of the cam and the spring moving the nippers during the rest of the revolution of the cam, all substantially as described.

8. The combination of a work-support and a work-rest, with wire-feed mechanism, and two members of a stop, one member carried by the work-support and the other by the wire-feed mechanism, whereby the distance between the work-support and the rest determines the length of wire fed, all substantially as described.

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