(No Model.) 4 Sheets—Sheet 1.

A. EPPLER, Jr.

NAILING MACHINE.

No. 283,228. Patented Aug. 14, 1883.

Fig. 1.

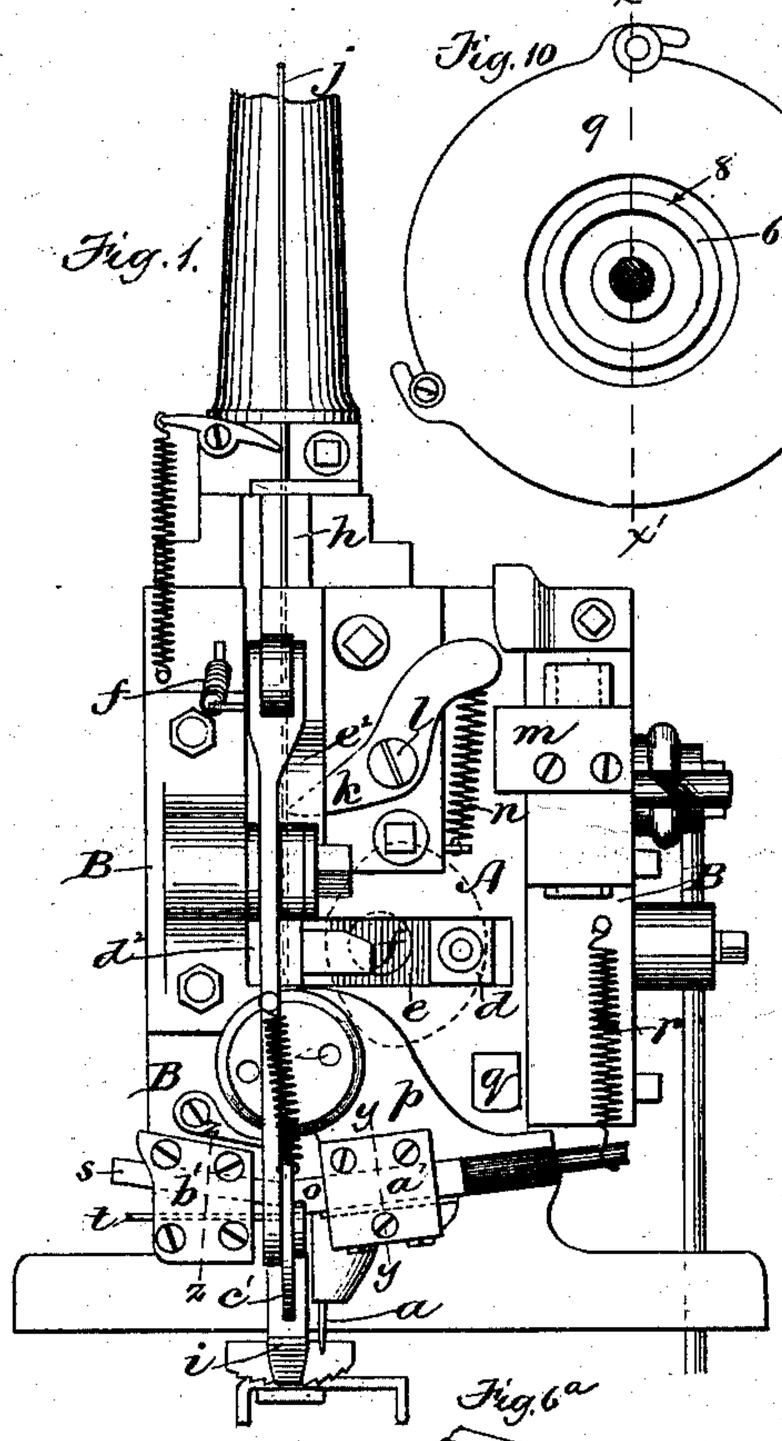


Fig. 10

Fig. 11

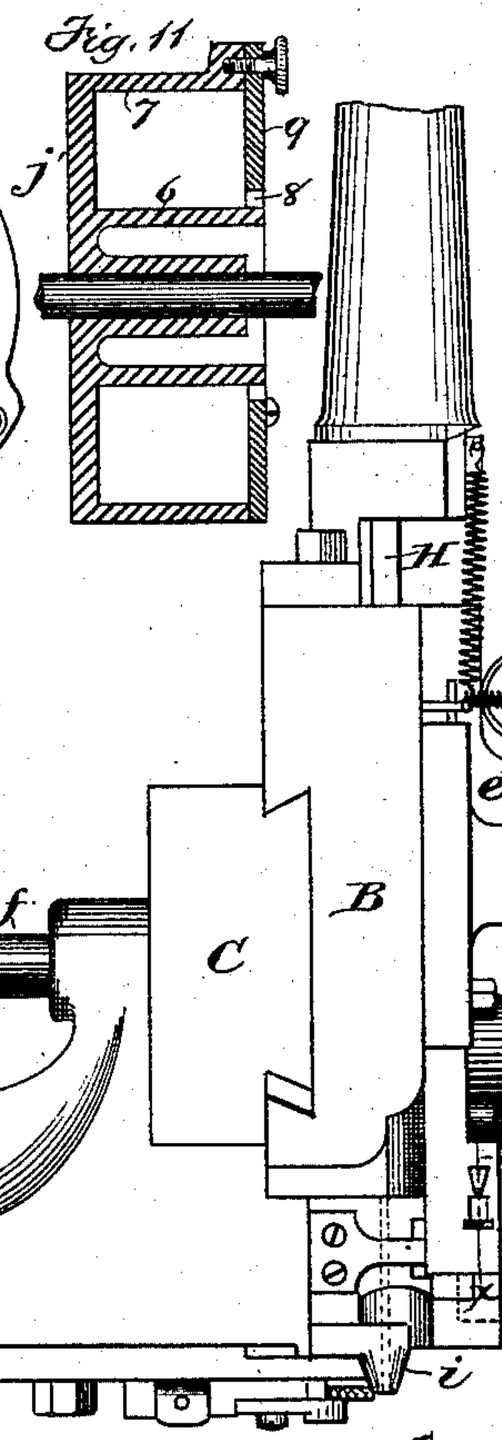


Fig. 2.

Fig. 6a

Fig. 6.

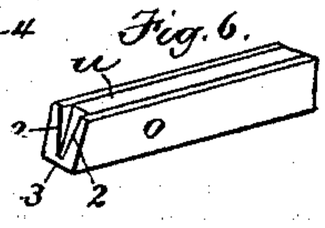


Fig. 3.

Fig. 4.

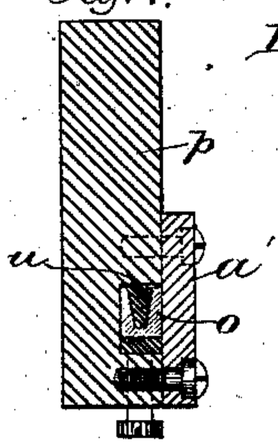


Fig. 5.

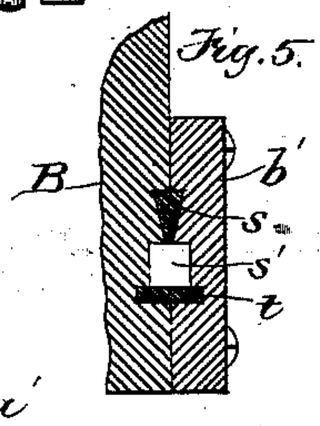
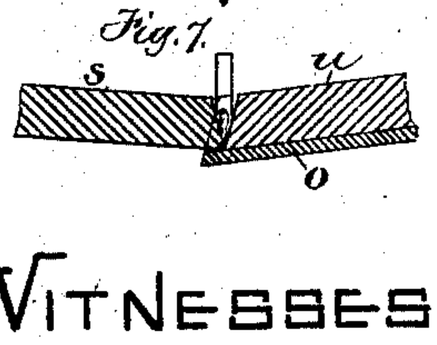


Fig. 7.



WITNESSES-

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A. L. White.

INVENTOR-

A. Eppler Jr.

by Wright Brown

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(No Model.)

4 Sheets—Sheet 2.

A. EPPLER, Jr.

NAILING MACHINE.

No. 283,228. Patented Aug. 14, 1883.

Fig. 13

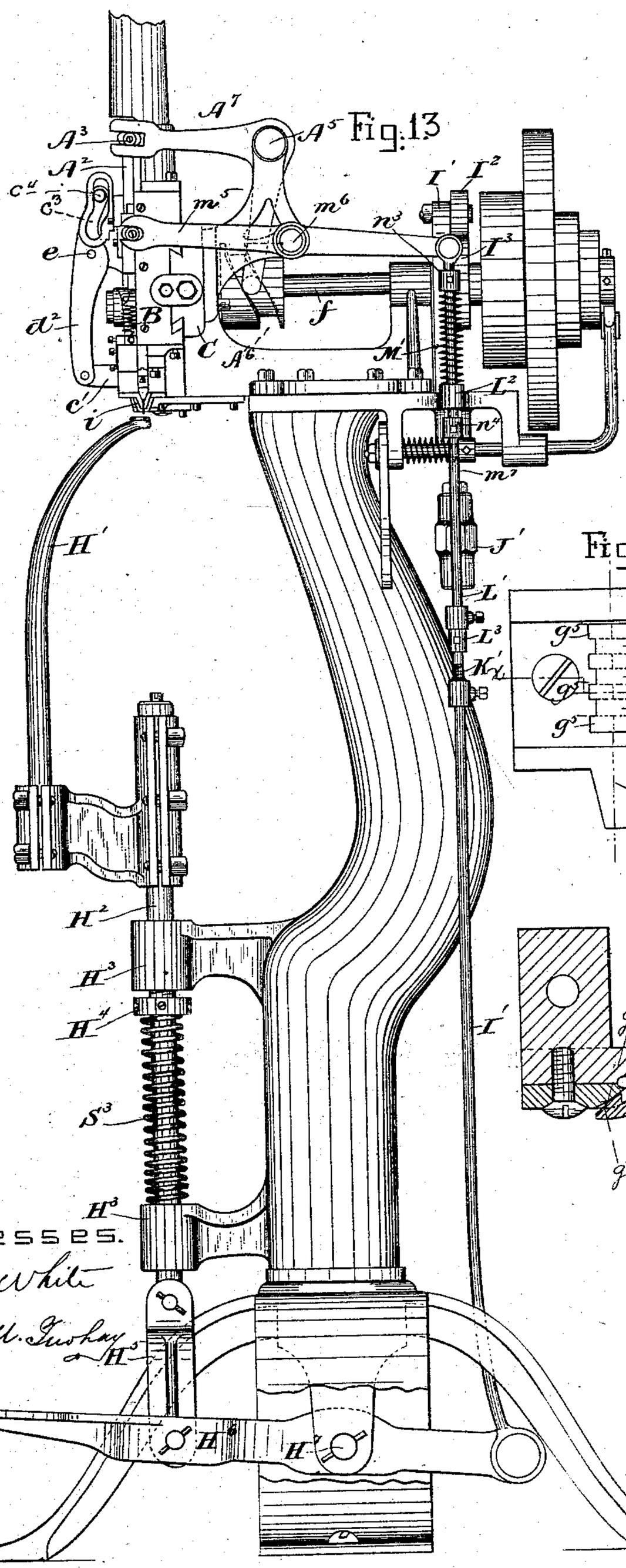


Fig. 8.

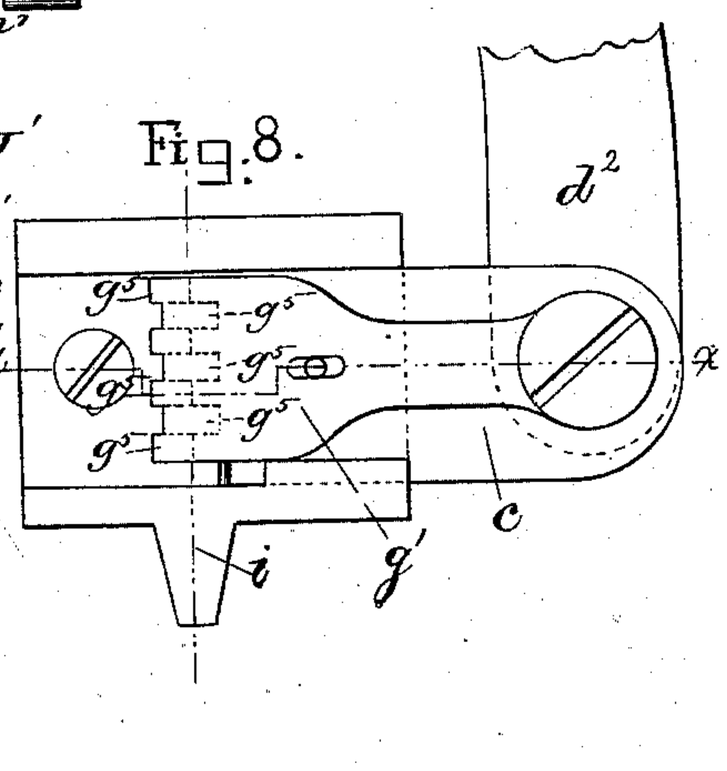
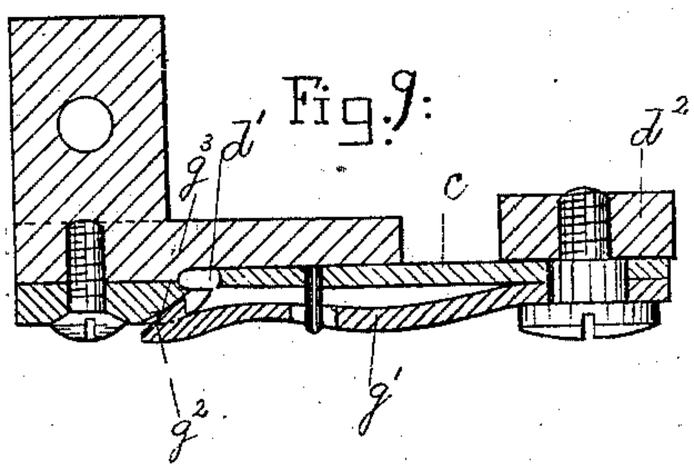


Fig. 9.



Witnesses.

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(No Model.) 4 Sheets—Sheet 3.

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NAILING MACHINE.

No. 283,228. Patented Aug. 14, 1883.

Fig. 12.

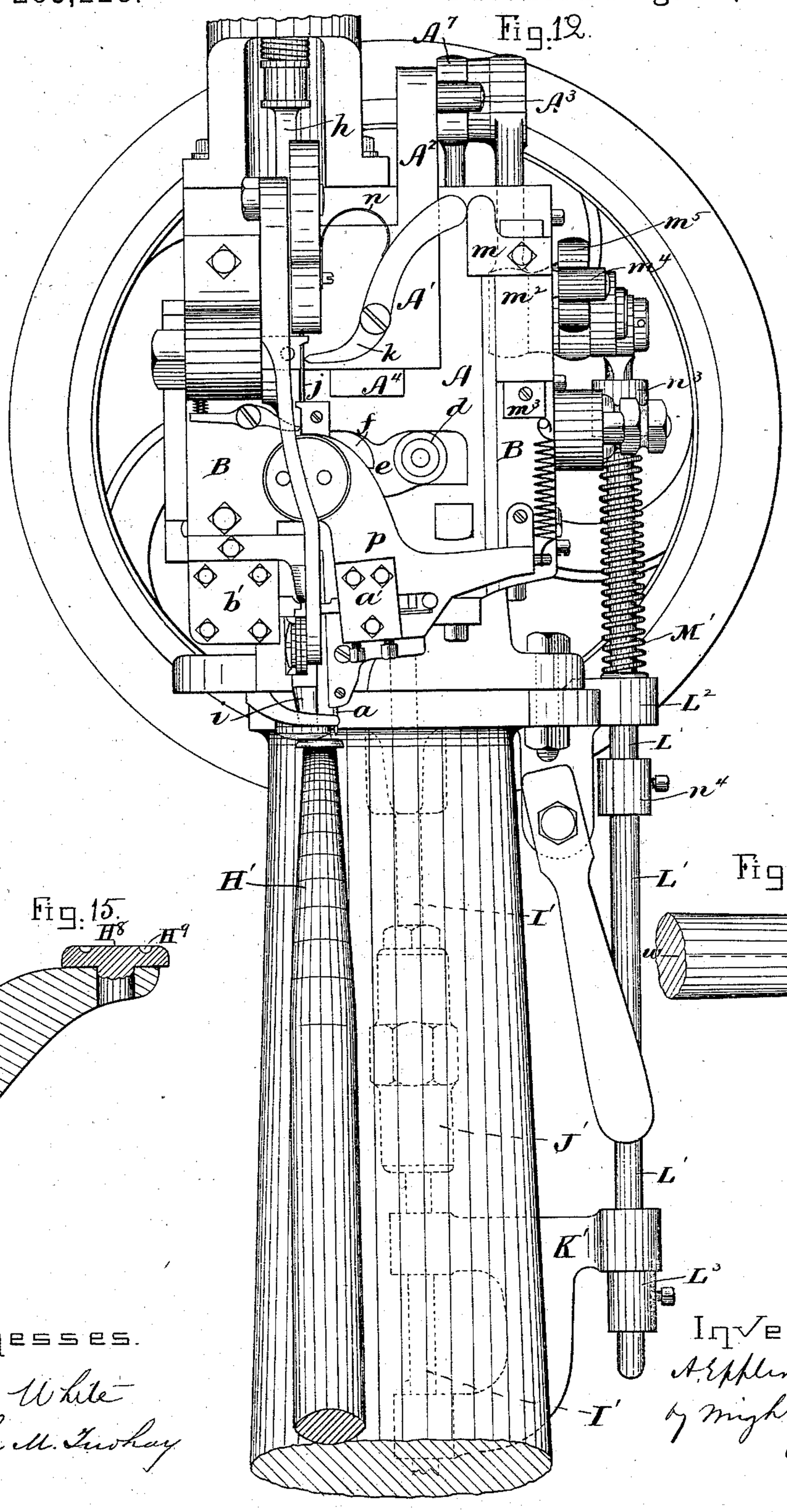

Fig. 15.

Fig. 14.

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(No Model.)

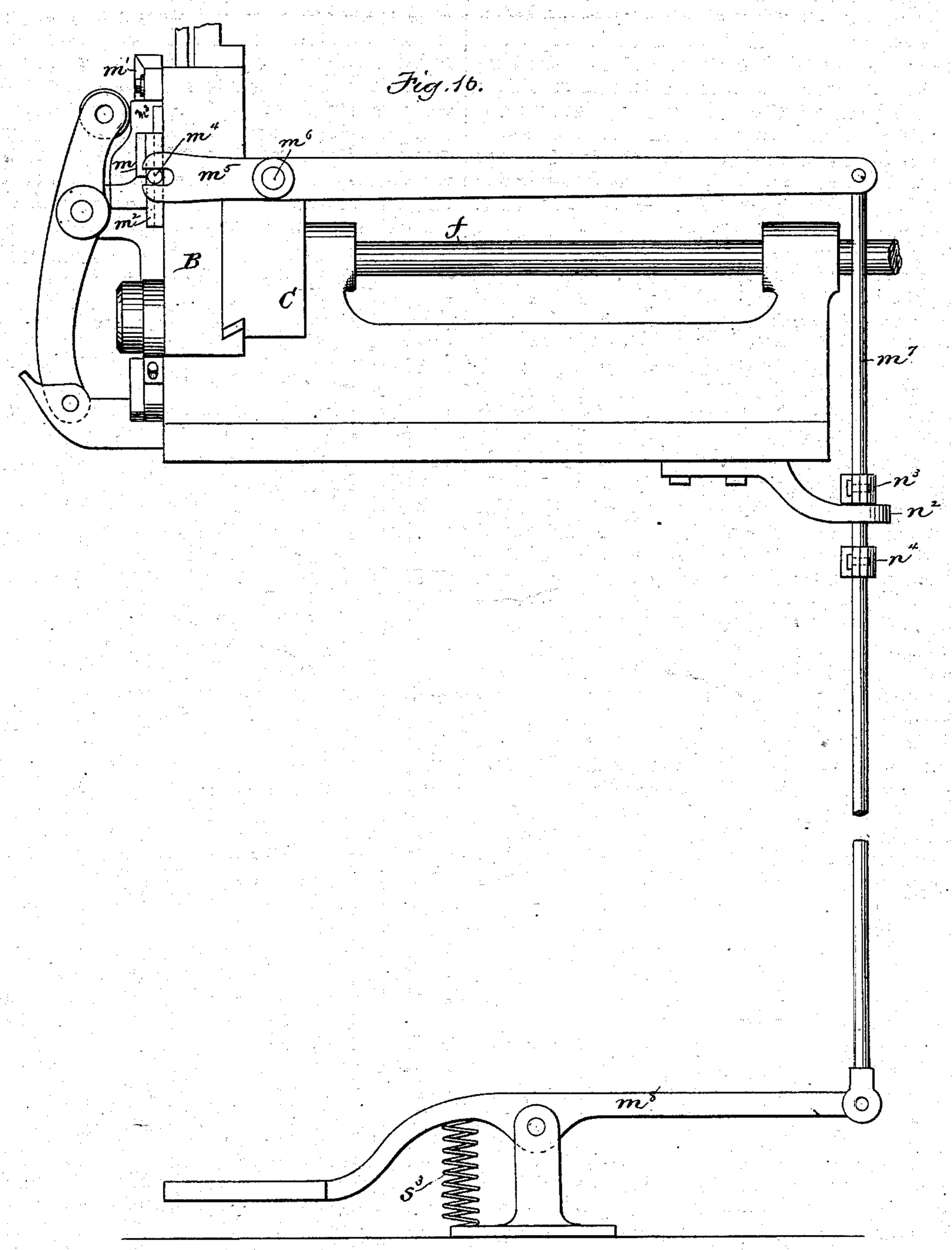
4 Sheets—Sheet 4.

A. EPPLER, Jr.

NAILING MACHINE.

No. 283,228. Patented Aug. 14, 1883.

Fig. 16.



Witnesses:

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Inventor:

A. Eppler Jr.

by Wright Brown

Attys.

UNITED STATES PATENT OFFICE.

ANDREW EPPLER, JR., OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE UNION FASTENING COMPANY, OF JERSEY CITY, N. J.

NAILING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 283,228, dated August 14, 1883.

Application filed May 19, 1883. (No model.)

To all whom it may concern:

Be it known that I, ANDREW EPPLER, JR., of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Nailing-Machines, of which the following is a specification.

This invention relates to that class of sole-nailing machines in which a continuous wire is fed into the machine and cut up into nails or fastenings, which are pointed at one end and driven into the boot or shoe as fast as formed. An example of this class of machines to which my invention relates is found in Letters Patent to Lamphear, dated August 23, 1859.

The present invention has for its object to enable a machine of this class to deal with wire composed of a metallic shell or tube and a core or filling of waxed thread or other fibrous material and convert the same into nails or fastenings, each pointed at one end.

This invention also has for its object to provide improved means for regulating the length of each feed movement of the wire, so as to regulate the length of the nails, and also to prevent the nail from tipping from a vertical position after it is severed and formed and while it is being moved forward to position under the driver.

To these ends my invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a front elevation of a portion of a nailing-machine embodying my improvements. Fig. 2 represents a side elevation of the same. Fig. 3 represents a section on line *x x*, Fig. 2. Fig. 4 represents a section on line *y y*, Fig. 1. Fig. 5 represents a section on line *z z*, Fig. 1. Figs. 6 and 6ª represent perspective views of the cutters. Fig. 7 represents a sectional view, showing the cutters in a different position from that shown in Fig. 3. Fig. 8 represents an enlarged side elevation of the carrier and the part of the machine in which it works. Fig. 9 represents a section on line *x x*, Fig. 8. Fig. 10 represents a front view of the reel. Fig. 11 represents a section on line *x x*, Fig. 10. Fig. 12 represents an enlarged front view of the machine, showing the same provided with a work-supporting horn. Fig. 13 represents a side elevation of the entire machine. Fig. 14 represents a top view of the upper end of the horn. Fig. 15 represents a section on line *w w*, Fig. 14. Fig. 16 represents a modification of the nail-adjusting mechanism.

The same letters of reference indicate the same parts in all the figures.

In the drawings, A represents a head or plate supporting the awl *a*, and adapted to reciprocate vertically in guides on a supporting-head, B, the latter being adapted to reciprocate horizontally on a dovetail guide on a fixed arm or support, C, Fig. 2. The plate A is reciprocated vertically by means of a roller or slide, *d*, pivoted to a disk or eccentric, *e*, on the driving-shaft *f*, and working in a slot in said plate. The head B is reciprocated horizontally by the eccentric *e*, which as it rotates comes in contact with parts of the head B behind the plate A. The vertical and horizontal movements thus imparted to the awl *a* cause the latter to perforate and feed the work. The driver-bar *h* is alternately raised and released by the rotation of a cam on the driving-shaft, and when released is forced downwardly by a spring into the nose *i*, to drive a nail therefrom into a boot or shoe sole held on a suitable jack or horn.

j represents the wire from which the fastenings are made, said wire being composed of a tube of metal and a core or filling of waxed thread, the nails or fastenings formed therefrom embodying the invention described in Letters Patent to Henry S. Cushman, granted May 15, 1877, No. 190,670. Said wire is supported on a reel, hereinafter described, and is presented to the cutting and pointing devices, hereinafter described, by a feed dog or lever, *k*, which, in the construction shown in Fig. 1, is pivoted at *l* to the vertically-reciprocating plate A, and has a pointed end engaging with the wire. The opposite end of the lever *k* projects, so as to strike a projection, *m*, on the head B when the plate A is moved downwardly and a projection, *m'*, on the head B when the plate A is moved upwardly. A spring, *n*, secured at one end to the plate A and at the other end to the outer end of the

dog *k*, holds the pointed end of said dog normally in engagement with the wire, and the contact of the dog with either the projections *m* or *m'* turns the dog on its pivot, so as to disengage its pointed end from the wire. It will be seen, therefore, that the dog is engaged with the wire and adapted to feed the same only when its outer end coincides with the space between the projections *m m'*, the spring *n* being thus enabled to hold the pointed end of the dog against the wire. The feeding takes place during the downward movement of the plate A, after the dog *k* leaves the projection *m* and until it strikes the projection *m'*. When the plate A rises, the dog *k* slips on the wire. In the construction shown in Figs. 12 and 13 the dog *k* is pivoted to a secondary slide or plate, A', which is adapted to slide vertically on a dovetail guide, A^4, on the plate A, and is provided with an upwardly-projecting arm, A^2, having a stud, A^3, which enters a slot in one end of a bell-crank lever, A^7, pivoted at A^5 to a fixed arm or bracket on the head C. The other arm of the lever A^7 is engaged with a cam-groove, A^6, on the shaft *f*. The lever A^7 is oscillated by said cam and reciprocates the slide A', causing the dog *k*, when moving downwardly, to grasp and feed the wire until the end of said dog strikes the projection *m* and is disengaged thereby from the wire. In this form the projection *m'* is not employed. It will be seen that in either of the described constructions the position of the projection *m* governs the length of the nails. I make said projection variable in position to vary the length of the nails by attaching the projection *m'* to a plate, m^2, which is vertically movable on a dovetail guide, m^3, on the head B. The plate m^2 has an arm, m^4, entering a slot in a lever, m^5, which is pivoted at m^6 to the fixed supporting-frame, and is provided with means, hereinafter described, whereby the operator is enabled to lower the projection *m* and increase the length of the nails and raise said projection, and thus decrease the length of the nails.

o represents a cutter formed by cutting a V-shaped groove in a bar of metal which is rectangular in cross-section, thereby forming oppositely-inclined cutting-edges 2 2 at the sides of said groove and a horizontal cutting-edge, 3, at the under side of the bar. The cutter *o* is adjustably secured to an oscillatory arm or lever, *p*, which is pivoted to the head B, and is oscillated by means of a projection, *q*, on the plate A, which depresses said lever when the plate A descends, and a spring, *r*, which raises the lever when the plate A rises. The cutter *o* is thus given an endwise reciprocating movement.

s represents a fixed cutter or plate attached to the head B, said cutter being V-shaped in cross-section and adapted to fit closely the groove in the cutter *o*, the inclined sides of the plate *s* forming cutting-edges 4 4, co-operating with the edges 2 2 of the cutter *o*.

t represents a flat cutter attached to the head B, and having its end sharpened to form a cutting-edge, 5, adapted to co-operate with the edge 3 of the cutter *o*. The wire passes between the cutter *o* and the cutters *s t*, and when the cutter *o* moves forward the edges 2 2 and 4 4 co-operate to sever the wire with a V-shaped cut, which bevels the end of the wire on two sides, leaving two V-shaped tongues of metal at opposite sides of the wire. These tongues are pressed inwardly by the joint action of a bevel-ended V-shaped block, *u*, which is fitted into the groove of the cutter *o* and the correspondingly-beveled end of the cutter *s*, as shown in Fig. 7, thus giving the end of the wire four beveled sides. At the same time the cutting-edges 3 and 5 co-operate in severing the wire at a lower point, thus detaching a nail previously pointed at its lower end, as above described, the edges 3 and 5 making a straight cut, which gives the nail a flat head. The chip or waste piece that is formed between the two cuts slides out through an open space, *s'*, between the cutters *s t*. The cutters *o* and *s t* are confined in place, respectively, by a plate, *a'*, which is screwed to the lever *p*, and clamps the cutter *o* against the same, and a plate, *b'*, which is screwed to the head B and clamps the cutters *s t*. Each cutter can be adjusted lengthwise to compensate for wear, &c., by loosening the clamping-plate *a'* or *b'*. The compressor *u* is held in place by the compression against it of the sides of the cutter *o* under the clamping pressure of the plate *a'*. The proximate surfaces of the head B and plate *b'* are recessed or grooved to fit the cutters *s t*, as shown in Fig. 5. Each nail, after it is severed from the wire, drops into a channel, *d'*, in front of a carrier, *c'*. The carrier is a plate adapted to reciprocate in the channel and force each nail to a point over the orifice in the nose *i*, through which the driver passes to drive the nail. The carrier is pivoted to a lever, d^2, which is pivoted at *e'* to a ear or ears formed on the head B, and is oscillated so as to reciprocate the carrier horizontally by a cam, e^2, on the vertically-sliding plate A, bearing against a roller in the upper end of the lever d^2, and a spring, *f*, which holds said roller against the cam, as shown in Fig. 2, or by a cam-groove, c^3, in a plate rigidly attached to the head *b*, said groove receiving a stud, c^4, on the lever d^2, as shown in Figs. 12 and 13.

g' represents a laterally-movable spring, which normally presses into the channel *d'* in front of the part of said channel into which the nail drops from the cutters, and is attached at one end to the carrier. The spring *g'* is slightly hooked at its free end, so that it retains the nail in a vertical position against the end of the carrier while the carrier is pushing the nail forward. When the nail has nearly or quite reached the orifice in the nose *i*, the beveled end g^2 of the spring *g'* strikes a correspondingly-beveled surface, g^3, which forces the spring *g'* outwardly and causes it to release the nail.

The nail is thus kept in a vertical position, so that it will be properly presented to the driver. The beveled end g^2 and surface g^3 are provided with alternating ribs g^5 and intermediate grooves, the ribs of the end g^2 fitting in the grooves of the surface g^3, and vice versa. This construction insures a support for the nails after the spring g' is displaced, the ribs of the surface g^3 projecting, as shown in Fig. 9, so as to hold the nail from falling outwardly after the spring g' is displaced. It will be observed that the wire and its fibrous core or filling are both entirely severed by each cut, giving each nail clean smooth ends.

I am aware that a solid metal wire has been cut or notched in its opposite sides to form the beveled sides of the point of one nail and portions of the head of another nail, a thin neck of metal being left between the two notches, which neck is afterward broken to sever the nail below it from the wire; but I am not aware that a wire has ever been cut at two points simultaneously to form the point of one nail and the head of another, as above described.

The wire is wound upon a reel, j', which is provided with a central spool or drum, 6, and a peripheral flange, 7, said drum and flange being separated by an annular space, in which the coil of wire is placed. Said coil is wound so that it will unwind from the interior of the coil. An annular plate, 9, is detachably secured to the flange 7 and holds the coil in place, said plate being separated from the spool 6 by an annular slot, 8, through which the wire passes to the machine. The drum is supported in any convenient relation to the machine. The cutter o may be supported on a slide reciprocated in a rectilinear direction, instead of being oscillated, as described.

H′ represents a work-supporting horn, which is pivoted on a vertical rod or standard, H^2, so that it can rotate in the usual manner under the nose i. The horn is provided at its upper end with a horizontal bed, H^8, which is provided with a circular groove, H^9, arranged under the awl, so as to furnish a trough or depression under the awl a to receive the point of the awl when the latter entirely penetrates the bottom of a boot or shoe, the awl moving in said trough while feeding the work. The surfaces of the bed H^8 on the either side of the groove H^9 support the surface of the inner sole close to the awl and prevent the latter from raising burrs or protuberances in making its perforations. The groove H^9 is eccentric to the awl, as shown in Figs. 14 and 15, a^2 in Fig. 14 representing the awl in the position which it assumes while penetrating the sole, and a^3 the position of the awl at the end of its feed movement. The arrangement of the groove is such that some portion of it will always sustain the relation to the awl shown in Fig. 14 in any position to which the horn may be turned. The horn H′ is swiveled on the vertical rod H^2, which is adapted to slide vertically in guides H^3 H^3 on the frame of the machine, and is pressed upwardly by a spring, S^3, interposed between the lower guide, H^3, and a collar, H^4, rigidly attached to the rod H^2. The rod H^2 is connected by a link, H^5, with a treadle, H^6, pivoted to the frame of the machine at H^7. From the rear end of the treadle H^6 a rod, I′, extends upwardly through an orifice in the frame of the machine, and is provided at its upper end with a roller, I^2, bearing on a cam, I^3, on the driving-shaft f, the roller I^2 being pressed downwardly against said cam by the action of the spring S^3 through the intermediate parts. The cam therefore acts to give the horn a slight upward-and-downward movement when the machine is in operation. The rod I′ is made in two parts, which are connected by a nut, J′, provided in one end of its aperture with right-hand screw-threads and at the other end with left-hand screw-threads, the same engaging with corresponding threads cut in the respective parts of the rod I′, so that by turning the nut J′ said rod can be lengthened or shortened to diminish or increase the distance between the work-support of the horn H′ and the nose i when the horn is in its normal position, thus adapting the horn to different thicknesses of soles. The operator can, by depressing the treadle H^6, depress the horn below its normal position to enable a boot or shoe to be applied or removed conveniently. The horn supporting and operating devices above described in themselves form no part of my invention, as they are common in other machines of this class.

To the rod I′, below the nut J′, is rigidly attached an arm or bracket, K′, having in its outer end a vertical orifice, through which passes a vertical rod, L′, passing also through a guide, L^2, on the frame of the machine, and pivoted to the rear end of the lever m^5. The rod L′ is adapted to slide in the arm K′ and guide L^2, and is provided with a spring, M′, interposed between the guide L^2 and a collar, n^3, attached to the rod L′. Said spring presses a collar, L^3, attached to the lower end of the rod L, upwardly against the bracket K′, the position of said bracket determining the position of the projection m, above described. It will be seen, therefore, that when the nut J′ is turned to adjust the length of the rod I′ the bracket K′ will be raised or lowered, as the case may be, and the projection m will be adjusted to correspond with the adjustment of the horn. For example, when the rod I′ is lengthened to bring the work-support of the horn nearer the nose i, and thus adapt the horn to a thinner sole than before, the bracket K′, which is depressed or lowered in the operation of lengthening the rod I′, will depress the rod L′ and correspondingly raise the projection m through the lever m^5, thereby providing for a shorter nail corresponding to the thickness of the sole, for which the horn is adapted by said adjustment. The length of the nails and the vertical position of the horn are thus simultane-

ously adjusted. The rod L′ is provided with a fixed collar, n^4, arranged to abut against the guide L^2, and prevent the upward movement of the rod L′ when the horn is depressed by the operator below its normal position for the purpose of applying or removing a boot or shoe.

I do not limit myself to adjusting the projection *m* simultaneously with the horn, for said adjustment may be effected by independent means, as shown in Fig. 16, in which the lever m^5 is connected by a rod, m^7, with a treadle, m^8, whereby the operator is enabled to raise or lower the projection *m*. Said treadle has a spring, s^3, which normally raises the outer end of the treadle. The rod m^7 passes through a perforated arm, n^2, on the supporting-frame, and is provided above and below said arm with adjustable stops or collars n^3 n^4, which limit the vertical movements of the rod m^7 and projection *m*. The stop n^3 is held by the spring s^3 against the arm n^2, and determines the position of the projection *m* for short nails, while the stop n^4, which is raised to the arm n^2 by the depression of the treadle, determines the depression of the projection when longer nails are required. By adjusting said stops the length of the shorter and longer nails may be varied. It will be seen that the change in the length of nails can be effected without stopping the operation of the machine.

I claim—

1. In a nailing-machine of the class described, two series or pairs of cutters adapted at one operation to cut out a short section or length from a continuous wire, and thereby form the V-shaped point of one nail and the flat head of another by the removal of the cut-out section, substantially as set forth.

2. In a nailing-machine of the class described, the combination of the grooved reciprocating cutter *o*, having the cutting-edges 2 2 and 3, the compressor *u*, located in the groove of the cutter *o*, the V-shaped cutter *s*, having the cutting-edges 4 4 and adapted to act as a compressor, and the cutter *t*, all arranged and operated substantially as described.

3. In a nailing-machine of the class described, the combination of the lever or support *p*, having the cutter *o*, means, substantially as described, for reciprocating said lever and cutter, and the fixed cutters *s* and *t*, all arranged and operated substantially as described.

4. The combination of a vertically-reciprocating slide, a spring feed dog or lever, *k*, pivoted thereto, and the head B, having the adjustable projection mounted thereon, substantially as described, whereby the length of the feed movement is regulated, as set forth.

5. The carrier *c′*, having the spring-plate *g′*, whereby the nails are kept in a vertical position while being moved forward to the driver, as set forth.

6. The combination of the carrier *c′*, the spring *g′*, adapted to hold the nail, and the fixed projection g^3, adapted to displace the spring and release the nail, as set forth.

7. The reciprocating slide A, having the spring feed-dog, combined with the adjustable projection and means, substantially as described, for adjusting said projection.

8. In a sole-nailing machine having a work-supporting horn, the combination, with said horn and its supporting, operating, and adjusting devices, substantially as described, of the reciprocating slide A, having the spring feed-dog, the movable projection *m*, and intermediate means, substantially as described, whereby the projection *m* is adjusted simultaneously with the horn, as set forth.

9. The combination, with the reciprocating slide having the spring feed-dog, of the adjustable projection *m*, the lever m^6, the rod L′, having the stops or collars L^3 n^4 and spring M′, the adjustable rod I′, having the bracket K′, the treadle H^6, and the spring-supported horn connected to said treadle, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 10th day of May, 1883.

ANDREW EPPLER, JR.

Witnesses:

C. F. BROWN,

A. L. WHITE.