(No Model.) 5 Sheets—Sheet 1.

E. B. PARKHURST & C. LOVELL.

WIRE NAIL MACHINE.

No. 345,534. Patented July 13, 1886.

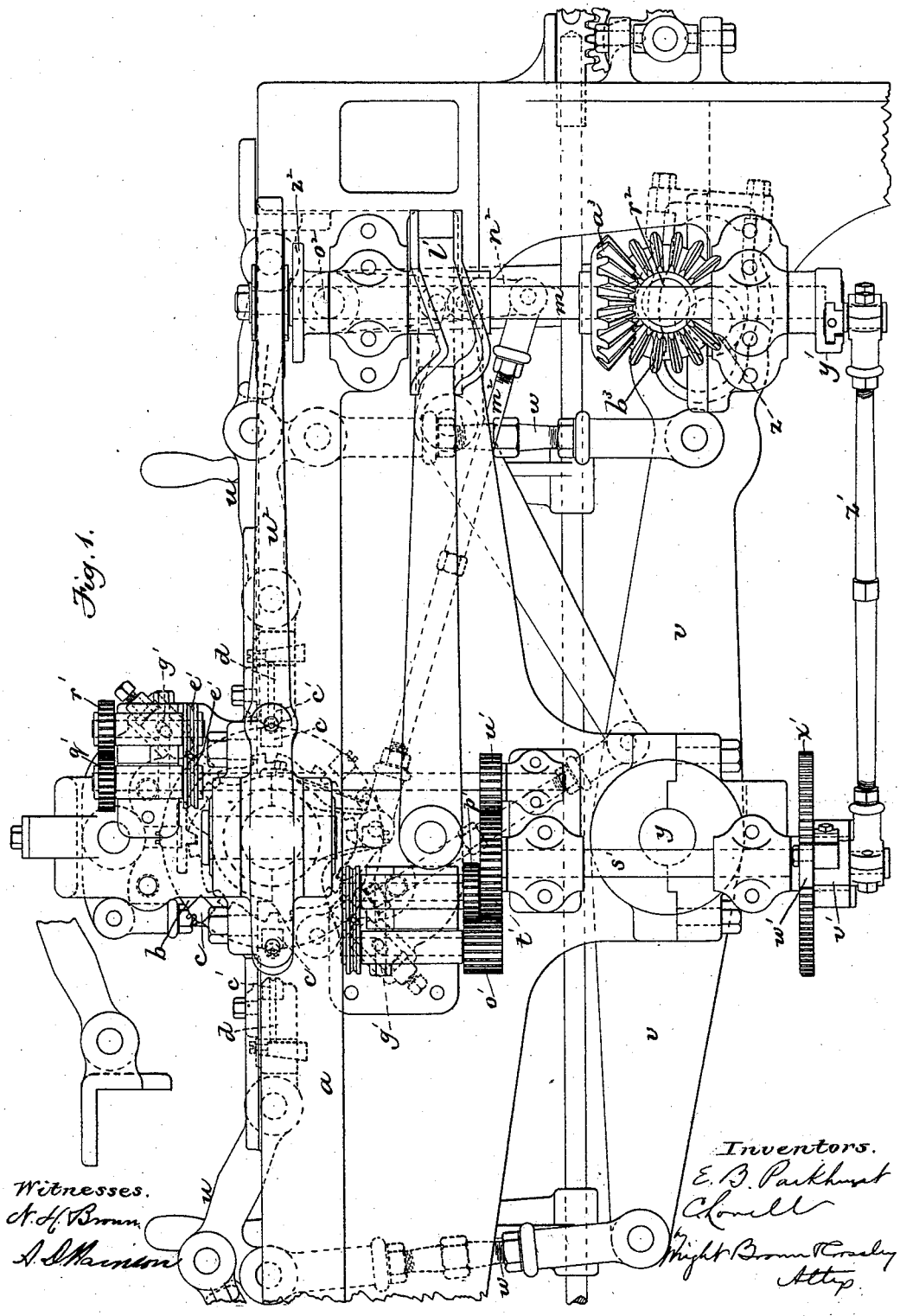


Fig. 1.

Witnesses.
A. H. Brown
A. D. Harrison

Inventors.
E. B. Parkhurst
C. Lovell
by Wright Brown & Quinby
Attys.

(No Model.) 5 Sheets—Sheet 2.

E. B. PARKHURST & C. LOVELL.

WIRE NAIL MACHINE.

No. 345,534. Patented July 13, 1886.

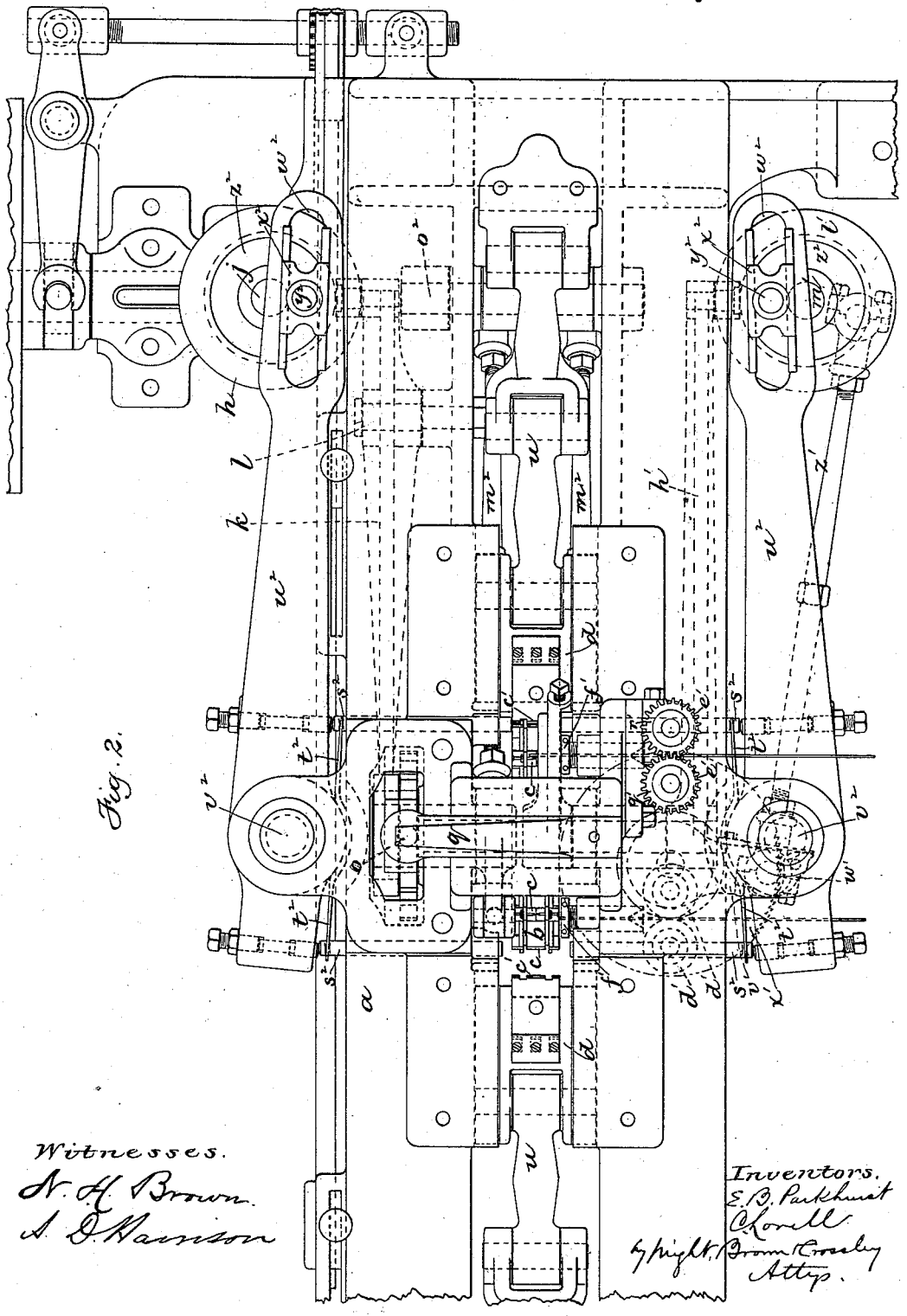


Fig. 2.

Witnesses.
N. H. Brown.
A. D. Harrison

Inventors.
E. B. Parkhurst
C. Lovell
by Wright, Brown & Crosby
Attys.

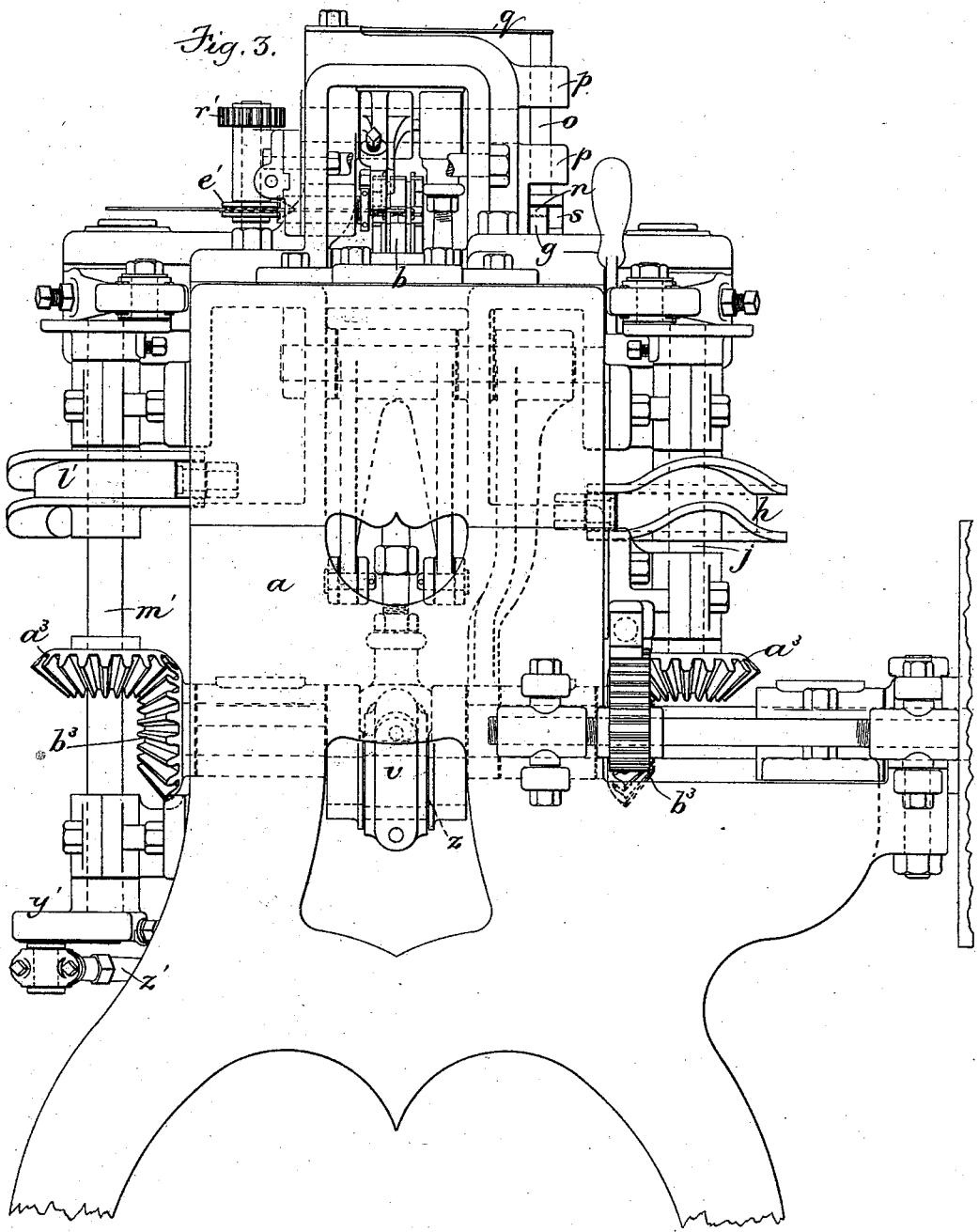
(No Model.) 5 Sheets—Sheet 3.

E. B. PARKHURST & C. LOVELL.

WIRE NAIL MACHINE.

No. 345,534. Patented July 13, 1886.

Fig. 3.



Witnesses.
N. H. Brown.
A. D. Harrison.

Inventors.
E. B. Parkhurst.
C. Lovell
by Wright Brown & Quinby.
Attys.

(No Model.) 5 Sheets—Sheet 4.

E. B. PARKHURST & C. LOVELL.

WIRE NAIL MACHINE.

No. 345,534. Patented July 13, 1886.

Fig. 5.

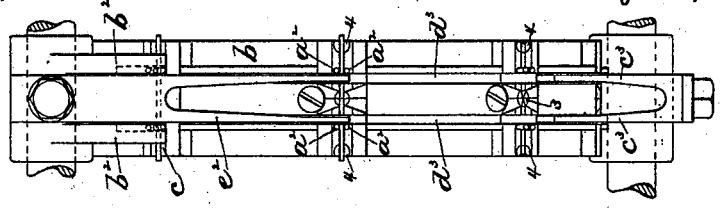


Fig. 4.

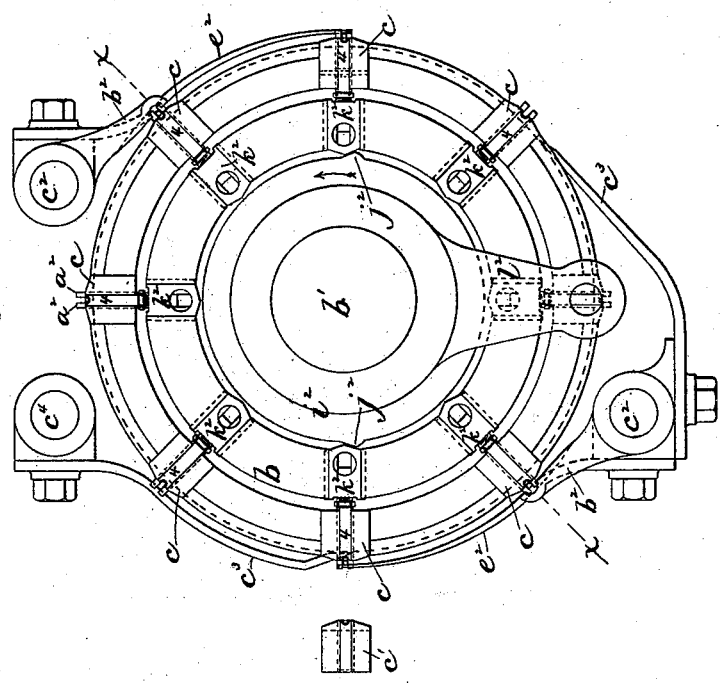
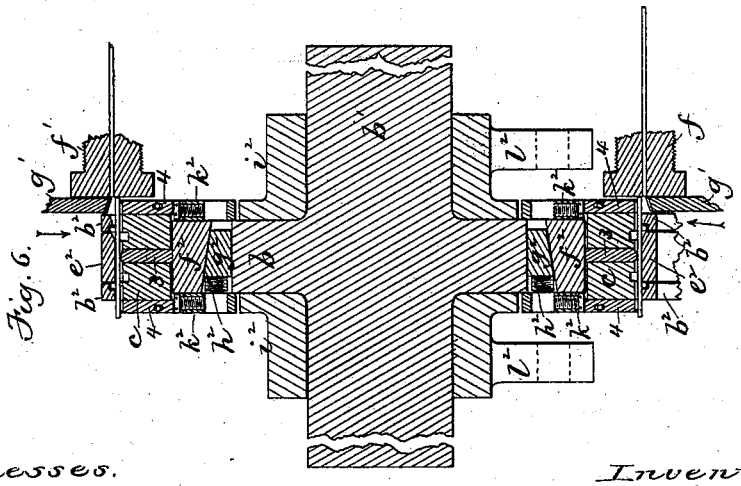


Fig. 6.



Witnesses.
A. H. Brown.
A. D. Harrison.

Inventors.
E. B. Parkhurst
C. Lovell
by Wright Brown & Quinby
Attys.

(No Model.) 5 Sheets—Sheet 5

E. B. PARKHURST & C. LOVELL.

WIRE NAIL MACHINE.

No. 345,534. Patented July 13, 1886.

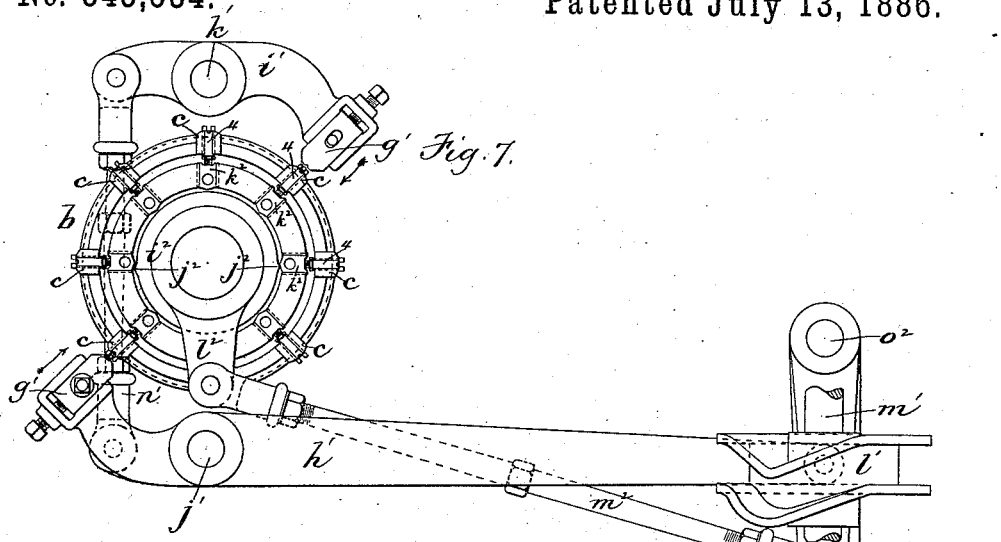


Fig. 7.

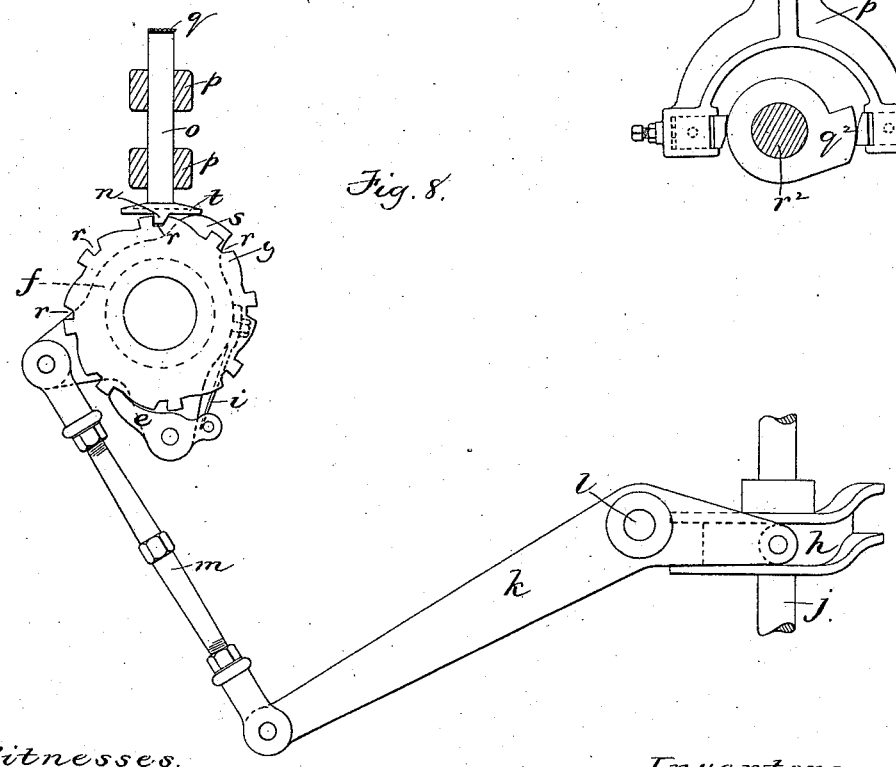


Fig. 8.

Witnesses.
N. H. Brown.
A. D. Harrison.

Inventors.
E. B. Parkhurst.
C. Lovell.
by Wright, Brown & Crosby
Attys.

UNITED STATES PATENT OFFICE.

EDWARD B. PARKHURST, OF WOBURN, AND CLINTON LOVELL, OF BOSTON, MASS., ASSIGNORS TO THE ALBERT NAIL COMPANY, OF NEW YORK, N. Y.

WIRE-NAIL MACHINE.

SPECIFICATION forming part of Letters Patent No. 345,534, dated July 13, 1886.

Application filed March 1, 1886. Serial No. 193,597. (No model.)

To all whom it may concern:

Be it known that we, EDWARD B. PARKHURST, of Woburn, in the county of Middlesex, and CLINTON LOVELL, of Boston, in the county of Suffolk, and State of Massachusetts, have invented certain new and useful Improvements in Wire-Nail Machines, of which the following is a specification.

This invention relates to that class of wire-nail machines in which half-dies co-operate in pairs in severing a length of wire midway of its length into two parts, and forming points on the proximate ends of said parts, and hammers arranged in pairs co-operate with said dies in upsetting or forming heads simultaneously on the outer ends of the nails or nail-blanks held by the said dies, two nails being thus formed by one operation.

The invention relates more particularly to machines of the class named in which a rotary head is employed, having a series of half-dies, as in the machine shown in Letters Patent of the United States granted to N. C. Lewis, October 13, 1885, No. 328,237.

The invention has for its object to provide certain improvements in the construction and operation of machines of the class above named; and it consists in the several improvements hereinafter described and claimed.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation of our improved machine, a portion at one end being broken away. Fig. 2 represents a top view of the same. Fig. 3 represents an end view. Fig. 4 represents a side view of the rotary head. Fig. 5 represents a front view of the head. Fig. 6 represents a section on line *x x*, Fig. 4. Figs. 7 and 8 represent detail views.

a represents the supporting-frame of the machine, having bearings in which is journaled the horizontal axis *b'* of a rotary head, *b*. (Shown in detail in Figs. 4, 5, 6, and 7.) The head *b* has a series of half-dies, *c c c*, which co-operate with similarly-formed reciprocating half-dies *c' c'* in severing lengths of wire into two equal parts and forming points on the adjacent ends of said parts. The head *b* is rotated step by step by mechanism hereinafter described, and is held after each partial rotation, while the half-dies *c' c'* advance and recede from it, said half-dies being attached to slides or cross-heads *d d*. (Shown in Fig. 2 and in dotted lines in Fig. 1.)

The half-dies *c' c'* are located at opposite sides of the head *b*, and are reciprocated simultaneously, so that when one is approaching the head the other is receding from it. The head is held after each partial rotation to present two of its half-dies to the dies *c' c'*, so that when each half-die *c'* advances it co-operates with one of the half-dies *c* in severing a length of wire and pointing the parts thus separated.

The head is rotated step by step by means shown clearly in Fig. 8, and by dotted lines in Fig. 1, viz: a pawl, *e*, a collar, *f*, mounted to oscillate loosely on the axis of the head, and having an ear to which said pawl is pivoted, and a ratchet, *g*, affixed to said axis, the pawl being engaged with the teeth of said ratchet by a spring, *i*. The plate or collar *f* is oscillated to cause the pawl to alternately slip upon and engage with the ratchet by means of a cam, *h*, on a vertical shaft, *j*, journaled in bearings at one side of the frame *a*, a lever, *k*, pivoted at *l* to the frame, and having its shorter arm engaged with said cam, and a rod, *m*, connecting the longer arm of said lever with an ear on the plate or collar *f*. The oscillations thus imparted to the collar *f* are of sufficient length to cause the pawl to alternately rotate the ratchet *g* a distance equal to the length of one tooth thereof, and to slip back a like distance. The head is locked after each step or partial rotation by a tooth or detent, *n*, formed on a rod, *o*, which is adapted to slide in bearings *p p* on the frame *a*, and is pressed normally by a spring, *q*, against the ratchet, so as to enter a notch, *r*, formed in each ratchet-tooth, at the close of the movement imparted by the pawl. Said tooth is lifted during each backward movement of the ratchet by the contact of a cam projection, *s*, on the collar *f* with a shoulder, *t*, on the rod *o*, the ratchet being thus unlocked, so that it can be rotated another step by the pawl *e*.

The slides or cross-heads *d d*, carrying the half-dies *c' c'*, are reciprocated by means of toggle-joints *u u*, the members of which are pivoted, respectively, to said slides and to the frame *a*, as shown in Figs. 1 and 2, a lever, *v*,

pivoted at y to the frame a, and oscillated by a crank or eccentric, z, on the main driving-shaft, and rods $w\,w$, connecting the lever v with the toggle-joints $u\,u$, the arrangement being such that the oscillations of the lever throw the members of one joint out of and those of the other joint into alignment simultaneously, as shown in Fig. 1, thus forcing one half-die c' against and drawing the other away from the head b.

The wire to be converted into nails is supplied to the head b at two points by two pairs of feed-rolls, $d'\,d'$ and $c'\,c'$, two lengths of wire being moved simultaneously by said feed-rolls into position to be cut off from the supplying-wires. Said feed-rolls are arranged to deliver the wire near the perimeter of the head b at diametrically-opposite sides thereof, as shown in Fig. 1, and each pair of rolls delivers its wire through a tubular guide, f', (shown in Figs. 2 and 6,) which guides are externally screw-threaded and inserted in threaded sockets in the frame a, so that they are adjustable in and out. The lengths of wire are severed from the main wires by cutters $g'\,g'$, which are in rubbing contact, or nearly so, with the inner ends of the tubular guides $f'\,f'$, through which the wires are fed, and are reciprocated crosswise of said guides by oscillating levers $h'\,i'$, to which they (the cutters) are secured. (See Fig. 7.) Said levers are pivoted, respectively, at j' and k' to the frame a, and are oscillated, so as to cause the cutters to operate simultaneously, the cutters moving simultaneously in opposite directions and cutting the wires while moving toward the axis of the head b, in the direction indicated by the arrow in Figs. 6 and 7.

The lever h' is engaged at one end with a cam, l', on a vertical shaft, m', journaled in bearings on the frame a, and is oscillated by said cam. The lever i' is connected by a rod, n', with the lever h', and is oscillated by said lever h', as will be readily seen by reference to Fig. 7.

The arbors of the feed-rolls $d'\,d'$ are connected by gears $o'\,p'$, and the arbors of the feed-rolls $c'\,c'$ are connected by gears $q'\,r'$.

s' represents a vertical shaft journaled in bearings in the frame a, and having at its upper end a gear-wheel, t', meshing with the gear o', and imparting motion to the feed-rolls $d'\,d'$. The arbor of one of the feed-rolls c' is extended downwardly, and provided at its lower end with a gear, u', meshing with the gear t' on the shaft s', so that the gear t' imparts motion to both pairs of feed-rolls.

The shaft s' is rotated step by step, to operate the feed-rolls intermittingly, by an arm, v', mounted to oscillate loosely on the shaft s', a pawl, w', pivoted to said arm, a ratchet, x', affixed to the shaft s' and engaged by said pawl, a crank, y', on the vertical shaft m', and a rod, z', connecting the wrist-pin of the crank y' with the arm v', so that the said arm is oscillated, and its pawl is caused to alternately engage with and rotate the ratchet x' and the shaft s', and to slip back on said ratchet. Said wrist-pin is adjustable, so that the throw of the rod z' can be varied to vary the length of the feed-movement.

When the wires are being fed forward, the head b is locked by the devices already described, and the wires are fed between pins $a^2\,a^2$, projecting outwardly from the half-dies c, said pins being arranged at opposite sides of the wire-receiving cavities of said dies, so that they will hold the lengths of wire laterally in the proper positions. Arms $b^2\,b^2$, Figs. 4, 5, and 6, are affixed to rods $c^2\,c^2$, attached to the frame a, and project over the perimeter of the head b, so that the wires, when fed forward, will pass between said arms and the two half-dies c, then in position to receive said wires, the arms $b^2\,b^2$ being separated from the perimeter of the head sufficiently to permit the easy insertion of the wires between their outer ends and the said half-dies. Between the arms $b^2\,b^2$ are located spring-guides $c^2\,c^2$, extending substantially parallel with the perimeter of the head from the outer ends of the arms b^2 to or beyond the points on the perimeter of the head where half-dies c stand when in position to co-operate with the reciprocating half-dies c', said spring-arms being arranged to hold the lengths of wire against the half-dies while the head is being rotated to carry the lengths of wire from the positions they occupy when first severed to the positions they occupy when they are being divided, pointed, and headed.

Each half-die c is composed of a block or body suitably affixed to the head, and provided with a wire-receiving cavity extending lengthwise of it; and crosswise of the perimeter of the head a central swaging cutter, 3, formed to co-operate with a like cutter on the reciprocating half-dies, divides a length of wire and makes tapering points on the two parts into which it divides the length, and two gripping dies or jaws, 4 4, at the ends of the block, said jaws being formed to co-operate with jaws of like form on the reciprocating half-dies in grasping the wire-sections while they are being headed.

The cutters 3 are adjustable in the blocks, so that they may be moved outwardly to compensate for wear. The adjusting devices here shown are two wedges, $f^2\,g^2$, which are inserted in cavities in the head b, one of said wedges bearing against the back of the cutter 3, as shown in Fig. 6. The inner one of each pair of wedges may be moved by means of a screw, h^2, to adjust the cutter, as will be readily seen. Any other suitable adjusting device may be employed, however, if preferred.

$s^2\,s^2\,s^2\,s^2$ represent four hammers or headers, which are adapted to slide in guides or sockets in the frame, and are arranged in pairs, those of each pair being forced inwardly simultaneously against the outer ends of the nail-blanks while said blanks are held between the half-dies of the head and the reciprocating half-dies, the projecting ends of the nail-blanks

being thus upset and converted into heads. The two pairs of hammers operate alternately, those of one pair being forced outwardly by springs l^2, while those of the other pair are being forced inwardly. The hammers are operated by two levers, w^2 w^2, Fig. 2, pivoted at v^2 v^2 to ears on the frame and bearing against the hammers, as shown in Fig. 2. The longer arm of said levers have slots w^2 w^2, in which are fitted slides x^2 x^2, which receive adjustable wrist-pins y^2 y^2, eccentrically affixed to disks z^2 on the vertical shafts j and m'. The rotation of said shafts (effected by bevel-gears a^3 thereon meshing with bevel-gears b^3 on the driving-shaft r^2) cause the levers w^2 w^2 to oscillate, and thus operate the pairs of headers alternately, as above described.

The gripping-jaws belonging to the half-dies c are movable radially in guides in the head b, and are made operative to grasp the nails only after they have been separated and pointed by the cutters, so that during the separating and pointing operation the wire is free to elongate, and the nails will not be bent, as they would be likely to be if the wire were grasped by the gripping-jaws while the nails are being separated and pointed. To this end two collars, i^2 i^2, are fitted to rotate on the axis b' of the head b, each collar having two projections, j^2 j^2, Fig. 4. Fitted to slide in radial guides in the sides of the head b are a series of slides or blocks, k^2, the inner ends of which are arranged to come in contact with the projections j^2 j^2 on the collars i^2, while their outer ends bear against the inner ends of the gripping-jaws 4. To the collars i^2 are affixed arms l^2, which are connected by rods m^2 with arms n^2 n^2 on a rock-shaft, o^2, journaled in the frame a. Said rock-shaft is provided with a bifurcated arm, p^2, the bifurcations of which bestride a cam, q^2, on the driving-shaft r^2, the arm p^2 and rock-shaft o^2 being oscillated by the rotation of the cam q^2, and thus caused to oscillate the collars i^2 through the connecting-rod m^2. The projections j^2 being in the position shown in Fig. 4, a movement of the collars in the direction indicated by the arrow in said figure will cause the projection at the right of the collar to push outwardly a slide, k^2, and through the latter the grippers 4 in the operating half-die c at the right-hand side of the head, thus causing the grippers of said half-die to grasp the nails therein. The succeeding movement of the collars i^2 in the opposite direction causes the other projection j^2 to act in like manner on the grippers of the other operating half-die c, and so on, the grippers of each operating half-die being forced outwardly after the nails have been separated and pointed, so that the nails are rigidly held lengthwise only while the headers are operating to form the heads. The operation is as follows: The wires having been simultaneously fed forward until a quantity of each wire sufficient for two nails projects between the head b and the spring-arms e^2 e^2, the cutters g' g' move simultaneously, cutting off two lengths of wire. The head b then makes a partial rotation until it brings the two half-dies c c, having the lengths of wire, into position to co-operate with the reciprocating half-dies c' c', and is locked in such position by the devices above described. One of the half-dies c' then moves toward the head and co-operates with one of the half-dies c in severing the length of wire thereon and pointing the two parts into which the wire is severed, the other half-die c' at the same time moving away from the head. After the severing and pointing operation the grippers 4 of the operating half-die c are forced outwardly, the operating half-die c' remaining in the same position, the nail-blanks being thus firmly grasped. Then, while the blanks are thus grasped, the headers of one pair are moved inwardly and form the heads, thus completing the nails. The half-dies c' c' are then moved simultaneously in the opposite direction, thus separating the half-die c', whose operation has just been described, from the head, and causing the other half-die c' to co-operate with the half-die at the opposite side of the head, the successive operations of severing, pointing, and grasping being performed by the half-die c and c', and their accompanying devices thus made operative, and the heading operation by the other pair of headers. After the four nails have been completed the head is released and rotated another step, thus bringing two fresh lengths of wire into position to be acted on by the dies, and the operation is thus continued, four nails being formed after each partial rotation of the head. The wires are fed and cut off while the head is held during the nail-forming operations, so that when the four nails are completed the head is ready to carry, by another partial rotation, two fresh lengths of wire to the points where they are converted into nails. To prevent the completed nails from clinging to the half-dies of the head, we provide arms c^3 c^3, which are affixed to the rods c^2 c^4 and project into grooves d^3 d^3, Fig. 5, in the periphery of the head, said grooves extending across the half-dies, so that in case any nails cling to the half-dies they will be dislodged therefrom when said dies are passing the ends of the arms c^3.

Our invention is not limited to the details of mechanism herein shown, as the same may be variously changed and modified without departing from the spirit of our invention, and other suitable mechanism for feeding the wire, and any other suitable devices for adjusting the cutting-dies and grippers, may be employed. The means for grasping the nails only when they are being headed, so that they are free to elongate while they are being pointed are not limited to a machine having the two complete sets of nail-forming devices, but may be used in any machine in which two nails are formed at one operation.

We claim—

1. In a wire-nail machine, the combination of a pair of dies which sever a length of wire

into two parts and point said parts, two headers which simultaneously form heads on the outer ends of said parts after the severing and pointing operation, and grippers adapted to grasp the nails or parts of the wire, and mechanism whereby said grippers are forced against the wire between the dies while the headers are operating and released while the dies are operating, so that the wire is free to elongate during the severing and pointing operation, as set forth.

2. In a wire-nail machine, the combination of a rotary head having a series of half-dies, means, substantially as described, for alternately rotating and locking said head and holding two of its half-dies at a time in operative position, two reciprocating half-dies located at opposite sides of the head and adapted to co-operate with the two operatively-held half-dies of the head in severing lengths of wire into two parts and pointing said parts, and mechanism for reciprocating said half-dies, and thereby presenting them to and withdrawing them from the two operative half-dies of the head after each locking of the head, as set forth.

3. In a wire-nail machine, the combination of a rotary head having a series of half-dies, means, substantially as described, for alternately rotating and locking said head and holding its half-dies in pairs in operative position, two sliding half-dies and mechanism to reciprocate them, arranged to co-operate with the operatively-held half-dies of the head, mechanism for feeding two wires simultaneously to two of the half-dies of the head which are not in operative position, cutting mechanism, whereby two lengths are cut from said wires after they are fed forward, and devices whereby said lengths of wire are held upon the half-dies of the head while they are being moved to the point where they are operated upon by the reciprocating half-dies, as set forth.

4. In a wire-nail machine, the combination of a rotary head having a series of half-dies, means, substantially as described, for feeding two wires simultaneously to said head, cutters for severing said wires, devices for holding the lengths of wire upon the half-dies, means, substantially as described, for alternately rotating and locking said head, two sliding half-dies arranged as described, at opposite sides of the head, mechanism to reciprocate said sliding dies, and two pairs of hammers or headers, and operating mechanism therefor, as indicated, the arrangement being such that the hammers form four nail-heads at each stoppage of the rotary head, as set forth.

5. In a wire-nail machine, the combination of a rotary head having a series of half-dies, means, substantially as described, for alternately rotating and locking said head, movable normally-loose grippers accompanying said half-dies, two sliding half-dies located at opposite sides of the head, mechanism for reciprocating said half-dies simultaneously, whereby they are caused to co-operate alternately with the half-dies of the head, the headers, and their operating mechanism, and means, substantially as specified, for forcing the grippers against the wire while the headers are operating, and releasing the grippers when the dies are operating, as set forth.

6. The combination of the rotary head, the ratchet affixed to its axis, the spring-rod having a tooth or detent which engages with and locks the ratchet, the collar mounted loosely on the axis of the head, and provided with a pawl engaging the ratchet, and a cam formed to disengage the detent from the ratchet, and means for oscillating said collar, as set forth.

7. The combination of the rotary head having the half-dies and the wire-holding pins, the wire-feeding and cutting-off devices, the fixed arms between which and the perimeter of the head the wires are fed by the feeding devices, and the spring-arms extending over portions of the perimeter of the head, as set forth.

8. The combination of the rotary head having a series of half-dies, and provided with grooves in its perimeter extending across said dies, the reciprocating half-dies co-operating, as described, with the half-dies of the head, and the arms or fingers projecting into said grooves to dislodge nails from the half-dies of the head, as set forth.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, this 15th day of February, 1886.

EDWARD B. PARKHURST.
CLINTON LOVELL.

Witnesses:
C. F. BROWN,
N. H. BROWN.