(No Model.) 5 Sheets—Sheet 1.

E. B. PARKHURST.

WIRE NAIL MACHINE.

No. 365,855. Patented July 5, 1887.

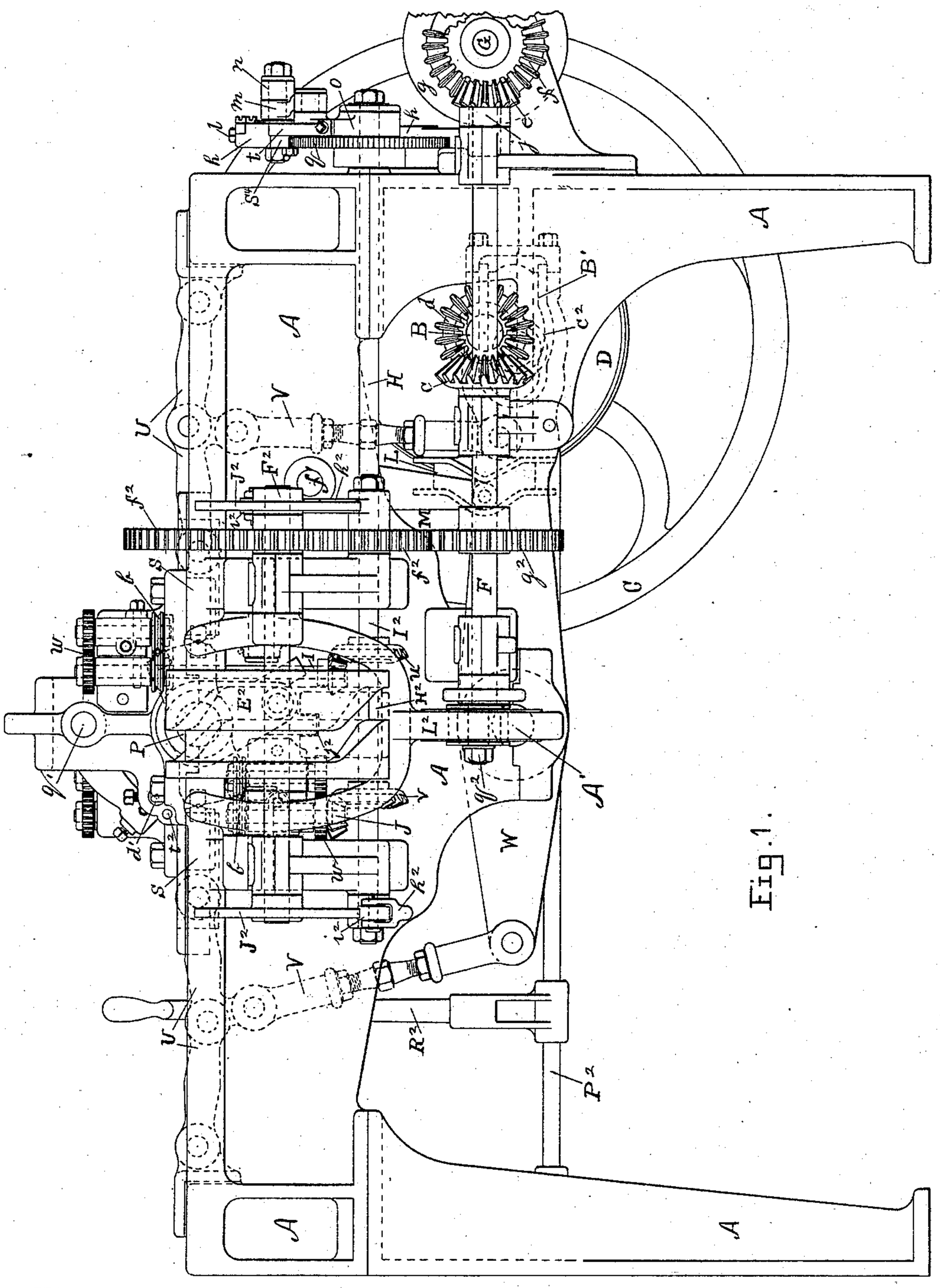

Fig. 1.

Witnesses.
Robert Wallace.
M. A. Thompson

Inventor.
Edward B. Parkhurst
by Wm. A. MacCord,
his Atty.

(No Model.)

5 Sheets—Sheet 2.

E. B. PARKHURST.

WIRE NAIL MACHINE.

No. 365,855. Patented July 5, 1887.

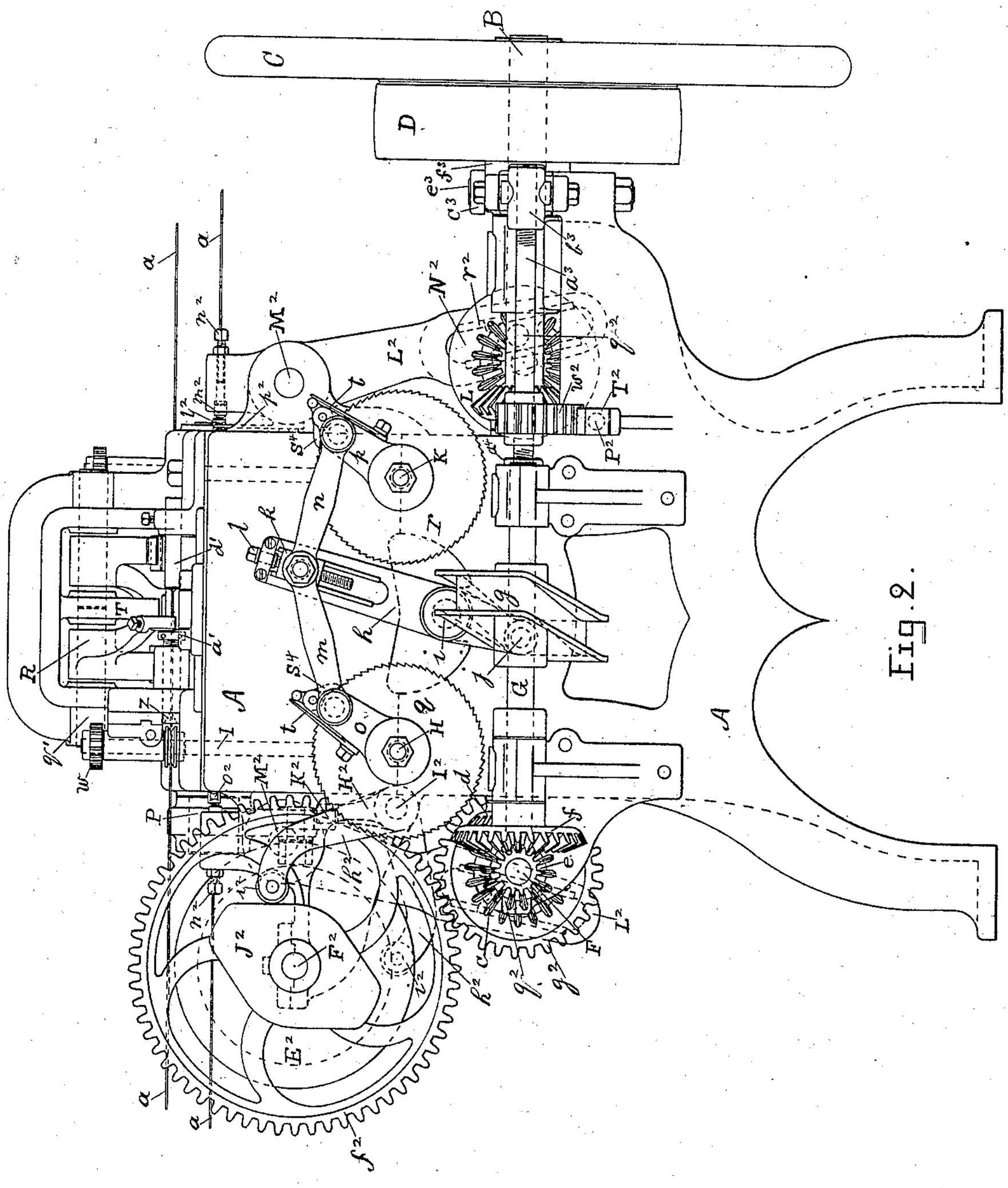

Fig. 2.

Witnesses.
Robert Wallace,
M. A. Thompson.

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Edward B. Parkhurst
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his atty.

(No Model.)

5 Sheets—Sheet 3.

E. B. PARKHURST.

WIRE NAIL MACHINE.

No. 365,855. Patented July 5, 1887.

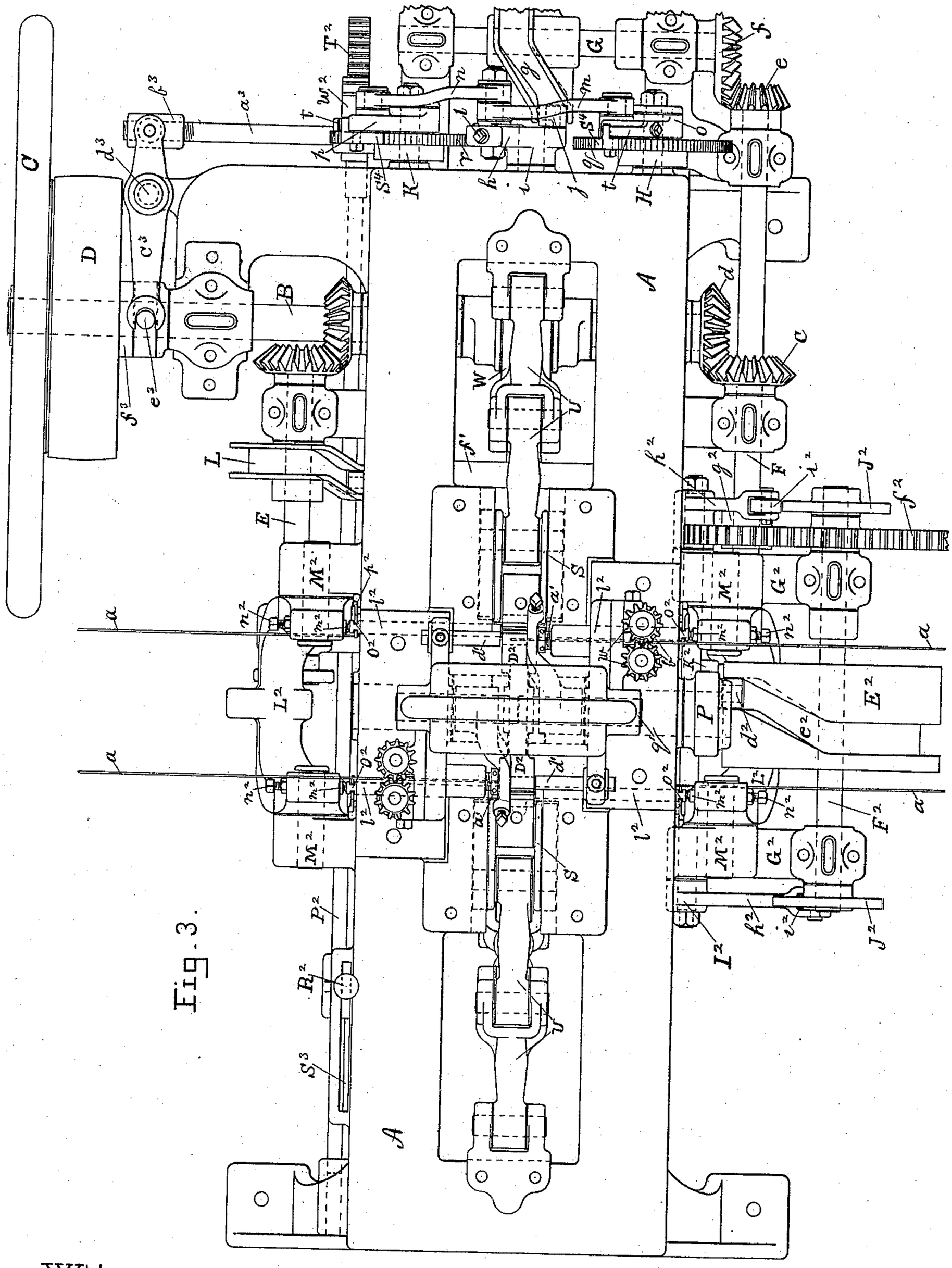

Fig. 3.

Witnesses.
Robert Wallace.
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Edward B. Parkhurst
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his atty

(No Model.)

5 Sheets—Sheet 4.

E. B. PARKHURST.

WIRE NAIL MACHINE.

No. 365,855. Patented July 5, 1887.

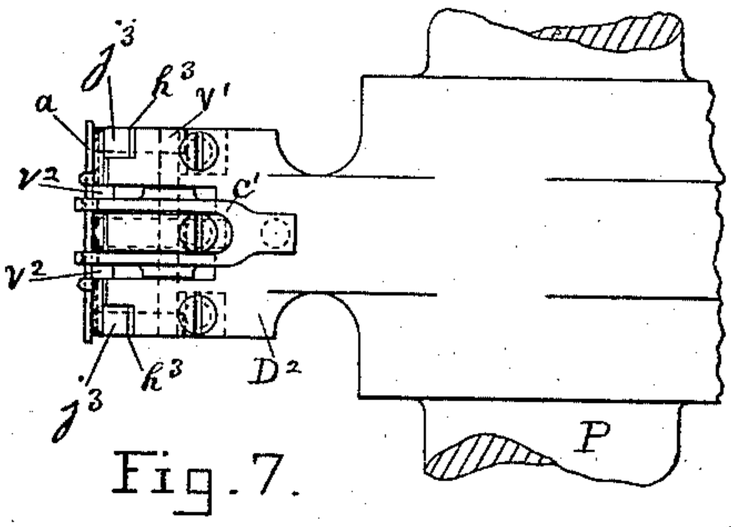

Fig. 7.

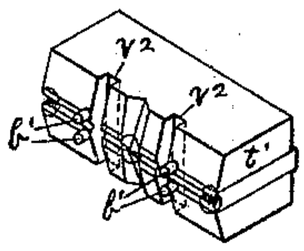

Fig. 8.

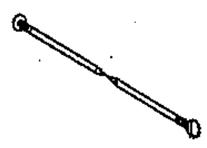

Fig. 9.

Fig. 4.

Witnesses.
Robert Wallace,
M. A. Thompson.

Inventor.
Edward B. Parkhurst
by Wm. D. Macleod.
his atty

(No Model.)

5 Sheets—Sheet 5.

E. B. PARKHURST.

WIRE NAIL MACHINE.

No. 365,855. Patented July 5, 1887.

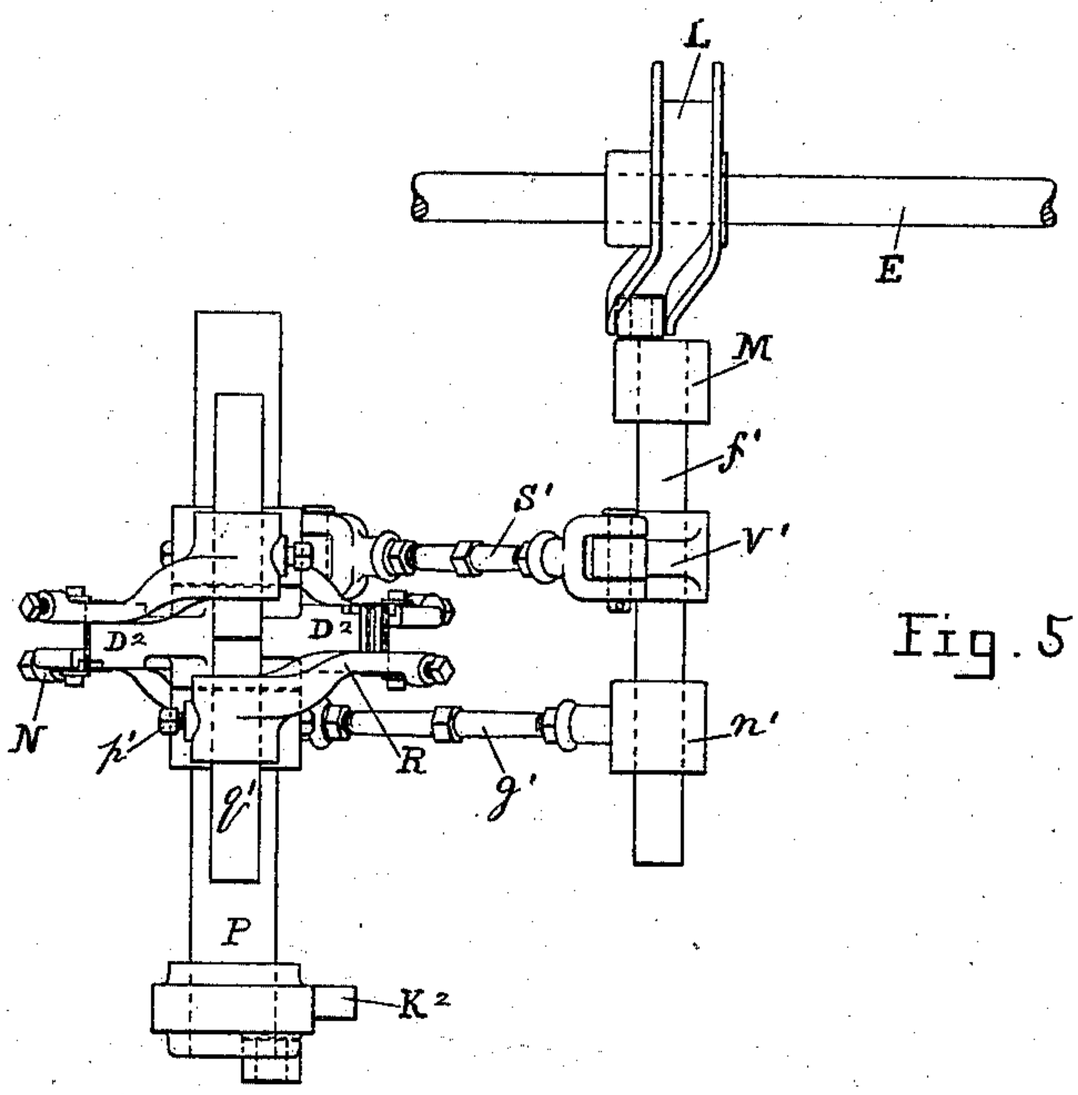

Fig. 5.

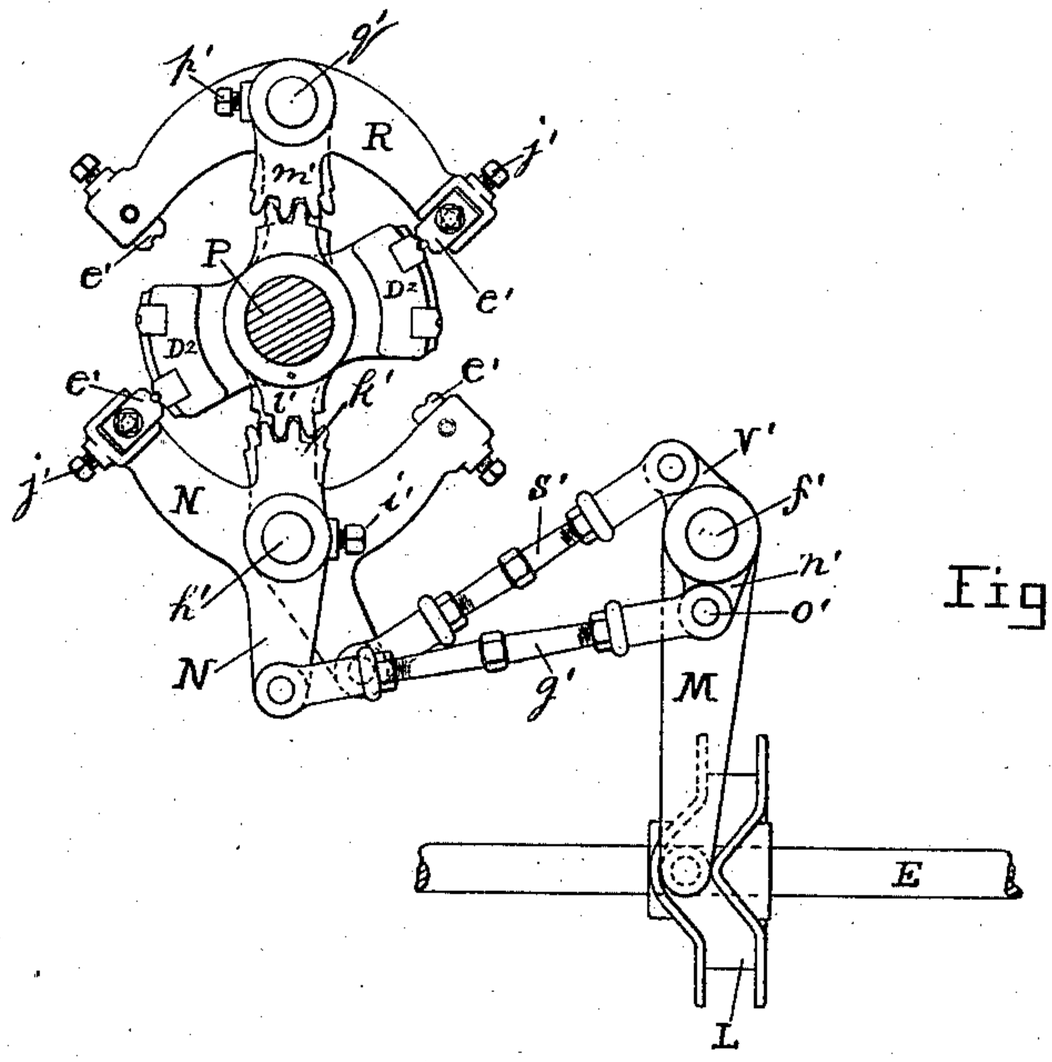

Fig. 6.

Witnesses.
Robert Wallace
H. A. Thompson

Inventor.
Edward B. Parkhurst
by Wm. Wallace & Co
his attys

UNITED STATES PATENT OFFICE.

EDWARD B. PARKHURST, OF WOBURN, MASSACHUSETTS.

WIRE-NAIL MACHINE.

SPECIFICATION forming part of Letters Patent No. 365,855, dated July 5, 1887.

Application filed January 24, 1887. Serial No. 225,279. (No model.)

To all whom it may concern:

Be it known that I, EDWARD B. PARKHURST, of Woburn, county of Middlesex, State of Massachusetts, have invented certain new and useful Improvements in Wire-Nail Machines, of which the following is a specification, reference being had to the drawings accompanying and forming a part thereof, in which—

Figure 1 is a side elevation of my improved machine. Fig. 2 is an end elevation from the right of Fig. 1. Fig. 3 is a plan view. Fig. 4 is a side view of the oscillating die-head, showing the relative position of the nail-dies, as also their operation. Figs. 5 and 6 are side and plan views, respectively, of the cutters detached, which operate to separate a section of wire from the continuous piece, and showing their position relatively to the die-head. Fig. 7 is a detail. Fig. 8 is a perspective view of one of the dies in the die-head detached. Fig. 9 shows two nails as they appear when formed and before they drop from the dies.

The object of my invention is the construction of a machine for the manufacture of nails from coils of wire; and it consists of mechanism constructed and organized, as hereinafter set forth, for feeding the wire from the coil to the cutter, severing from the continuous wire lengths or sections sufficient for the construction of two nails, carrying the sections so cut to the point where they are operated upon by the dies, the die mechanism for compressing the section of wire centrally to form the points of two nails, hammers to operate on the ends of the section and form the heads of the nails, devices for clearing the nails from the machine, and shipper mechanism by which the driving power may be speedily and certainly put on or off, all co-operating in an organized machine, as hereinafter described.

I will describe my invention using like letters of reference to indicate like parts throughout the drawings.

The frame of the machine A is preferably of iron and of a height to bring the working parts into a position convenient for the operator. The wire *a* is fed from four coils by four sets of feed-wheels into four cutters. Two of the coils and two sets of feed-wheels are on each side of the machine, and the feed-wheels on one side act alternately with those on the other—that is, wire from two of the coils on one side of the machine is being fed into the cutters which receive it while the wire on the other side is at rest. Each set of feed-rolls is alike, and consists of two rolls, *b b*, of common construction, having grooved peripheries, as shown, Fig. 1. These feed rolls are operated as follows:

B is the main shaft, which carries the fly-wheel C and the belt-pulley D, and which is journaled in the frame of the machine. The nail-dies which form the points of the nails are actuated by means of toggle mechanism directly from this main shaft.

On either side of the machine are journaled the secondary shafts E F, from which the hammers are actuated by means of their actuating mechanism, which is hereinafter described. The shaft F, which is actuated from the main shaft by means of the beveled gears *c d*, is extended beyond one end of the frame A, (see Fig. 1,) and actuates, by means of the bevel-gears *e f*, the shaft G, which is journaled in projections on the frame A. The shaft G carries the cam *g*. (See Fig. 2.) The cam *g* actuates the lever *h*, pivoted on a stud, *i*, set in the frame, the lower end of the lever being provided with a pin, *j*, which acts in the cam *g*. The upper end of the lever *h* is slotted, as shown, Fig. 2, the sides of the slot being flanged to receive the grooved block *k*, which is secured in place by the screw *l*, set through a cross-piece secured on the upper end of lever *h*, the screw *l* passing through said cross-piece and through the block *k*, and acting not only to secure the block in position, but to change its position in the slot for the purpose of adjusting the throw of the lever.

To the block *k* the arms *m n* are pivoted. Said arms extend in opposite directions and are pivoted at their outer ends to the cranks *o p*. These cranks are set loosely on the shafts H K, which carry the ratchet-wheels *q r*, the teeth of which point in opposite directions.

The cranks *o p* are provided with pawls S^4, (see Figs. 1 and 2,) pivoted to the upper ends of the cranks and held against the ratchet-teeth by leaf-springs *t*, bolted to the cranks, and which act against the free ends of the pawls, as shown, Fig. 2. The movement of the upper end of lever *h* in one direction throws

the pawl on the side toward which it is moving backward over the teeth of the ratchet-wheel, the wheel remaining stationary as the ratchet slips over the teeth. The movement of the lever *h* in the opposite direction causes the pawl to act on the ratchet-teeth and causes a partial revolution of the ratchet-wheel. While this ratchet-wheel is revolving the one on the opposite side of the lever is stationary, the corresponding movements of the parts alternating, thus causing the wires on one side of the machine to be fed alternately with those on the other side.

The shaft H, to which the ratchet-wheel *q* is secured, is provided with two beveled gears, *u v*, which mesh with beveled gears secured to the lower end of the vertical shafts I J, each of which carries a feed-roll and a small gear, *w*, which meshes with a corresponding small gear on the shaft of the companion feed-roll. (See Fig. 1.) The shafts of the feed-rolls are journaled in projections secured to the frame, and the connecting-gears *w* are on one set of the feed-rolls at the upper ends of their shafts and on the other set at the lower ends thereof.

The shaft K at the other side of the machine drives the two sets of feed-rolls on that side in the same manner and by similar means as does the shaft H the feed-rolls above described, both sides of the machine being the same in respect to the feeding mechanism, although the feed mechanism on one side alternates in its action with that on the other side. One set of feed-rolls on each side is higher up on the machine than the other set on the same side, and the highest set on one side is located directly opposite the lowest set on the other side, as will be clear from Figs. 1 and 3. The wire, after passing the feed-rolls, passes into a tube or guideway having a flaring mouth at the end nearest the feed-rolls, as shown at *z*, Fig. 2, to receive the wire, and the latter is guided through the stationary cutter *a'*, thence across the face of the nail-die, between the lugs *b'*, and under the beak of the gripper *c'*, (see Fig. 4,) which is at this time raised slightly, so as not to bear on the wire. As soon as the wire has been fed across the face of the die it is stopped by a stop-pin, *d'*, so that the section of wire lying between the stop-pin and the stationary cutter *a'* is just sufficient to form two nails—that is, is enough longer than the die *t'* to leave sufficient at each end to form the heads of the nails. While in this position the movable cutter *e'* moves across the face of the stationary die *a'* and severs the wire.

The mechanism for operating the movable cutters is as follows: On the secondary shaft E a cam-wheel, L, is secured. (See Figs. 3, 5, and 6.) A lever, M, set on a shaft, *f'*, is actuated by the cam L. A link, *g'*, having a right and left hand adjusting-screw in it, is pivoted at *o'* to an arm, *n'*, fast on the shaft *f'*, and is pivoted at its other end to a lever, N, which carries the movable cutter *e'*. The lever N is mounted on a shaft, *h'*, (see Fig. 6,) journaled in the frame, and to which it is firmly secured by a set-screw, *i'*. The lever N is of the form shown, Fig. 6, the movable cutter *e'* being mounted on an arm of the lever in a recess or slot made to receive it, and being adjustable by means of the adjusting-screw *j'*.

The other or short arm of the lever is toothed at *k'*, forming a segment of a gear, which meshes with a corresponding segment, *l'*, which is mounted loosely by means of a sleeve on the spindle P of the oscillating die-head. The segment *l'* extends above the spindle P, and has thereon another toothed segment, which in turn meshes with a corresponding segment on the arm *m'* of the bent lever R, which carries one set of the upper movable cutters, *e'*. The bent lever R is secured by a set-screw, *p'*, to a short shaft, *q'*, journaled in a projection of the frame.

The mechanism just described operates the cutters on one side of the machine, and a similar mechanism actuated from the same shaft, *f'*, by means of the arm *r'* and the adjustable link *s'*, (see Figs. 5 and 6,) operates the cutters on the other side of the oscillating die-head, which correspond exactly with those above described, but which operate alternately with them—that is, their movements are exactly the reverse at a given time and this reverse movement is obtained from the same shaft, *f'*, by securing the lever arm *r'* in a different relative position on the shaft *f'* from the position of the lever-arm *o'*, as will be clear from an examination of Figs. 5 and 6. After the section of wire has been severed by the cutters, it lies between the guides or lugs *b'* and directly on the face of the die which is mounted in the oscillating die-head. The head then moves so as to bring the die *t'* and the section of wire in line with the laterally-reciprocating die *u'*, mounted in the sliding head S. (See Fig. 4.) At this point the head S moves toward the oscillating die-head, bringing the nail-dies together and forming in the center of the section of wire the points of two nails, the dies *t'* and *u'* being when brought together of a shape to give the desired tapering points to the nails.

For the purpose of holding the section of wire in place on the die *t'* between the lugs *b'* while the oscillating head is moving into the position in which the nail is formed, a gripper or clamping device, *c'*, is provided. This device is in the form of a lever, pivoted centrally at *v'* in a recess in the oscillating head. It is of shape shown, Figs. 4 and 7, and is forked, the ends of the fork being bent over the face of the oscillating head and projecting over the section of wire, so as to bear thereon, and thus hold the wire firmly. The rear or free end of the gripper-lever *c'* is forced upward or outward by a spring-impelled bolt, a^2, set in a recess in the head, as shown, Fig. 4. The bolt a^2 acts to keep the forked ends of the lever in contact with the wire. When, however, the head is in position to receive the wire from the feed-rolls, it is desirable that the forked end of the grippers *c'* be away from

the face of the die t' sufficiently to allow the wire to pass readily into position on the die. To this end I have provided the screw-bolt b^2, set in a downward projection, T, of the frame in a position to come in contact with the rear end of the gripper-lever, thus raising its forked end when the head is in position to receive the wire from the feed-rolls.

The laterally-sliding heads S, which carry the dies u', are reciprocated by toggle-arms U, (see Figs. 1 and 3,) of common construction, the heads S sliding in grooved slots in the top of the frame. The toggles U are operated by means of links V, provided with right and left hand adjusting-screws, the lower ends of the links being pivoted at either end of the large lever W, which is fulcrumed at A' between the sides of the frame. The end of the lever W (shown in dotted lines at the right of Fig. 1) is slotted, as there shown at B', to receive a crank or eccentric secured on the main shaft B. During a revolution of the shaft B the eccentric moves around the interior of the slot, thus oscillating the lever W. A portion of the lower side of the slot is downwardly curved or dished, as shown at c^2, Fig. 1, so that as the eccentric on the shaft reaches that point in its revolution the lever W will remain stationary. This stop in the movement of the lever occurs when the sliding die-head S is at the forward end of its throw and has forced its die against the wire and formed the point of the nail, and the purpose is to thus hold the wire securely between the dies for an instant while the hammers or headers are forming the heads of the nails. In order that the sliding heads S should approach the oscillating die-head at the same time, the toggles on one side of the machine throw above the center, (see the right of Fig. 1,) while on the other side of the machine they throw below the center. This reversing of the toggles is necessary, so that the reverse movements of the ends of the lever W will produce the same movement simultaneously in the nail-dies.

The oscillating die D^2 is of the form shown, Figs. 4 and 7, and is provided with a trunnion or spindle, P, which projects on either side of it and by which it is mounted on the frame of the machine. This trunnion or shaft P is provided at one end (see Fig. 3) with an eccentric-pin, d^2, which travels in a cam, e^2, in the periphery of the wheel E^2, which is mounted on the shaft F^2, set in bearings on projections G^2 of the frame. The revolution of the cam-wheel E^2 rocks the trunnion P and causes the die-heads D^2 to oscillate. The shaft F^2 is driven by means of the gears f^2 g^2, the gear g^2 being fast on the secondary shaft F. As it is necessary that the die-head D^2 should move with a great degree of accuracy, in order that the nail-dies should meet with exactness, and thus form a symmetrical nail, and as the cam e^2 might wear slightly after use, I have provided a locking device by which, while the nail-dies are forming the nail, the oscillating head D^2 is locked in position. This device consists of an eccentric block or crank, H^2, (see Fig. 4,) secured on a shaft, I^2, mounted in the frame and provided at either end with the curved arms h^2, (see Figs. 2 and 3,) secured thereto. The arms h^2 are provided at their ends with friction-rolls i^2, which act against the peripheries of the cams J^2, mounted on the shaft F^2. The revolution of the cams J^2 rocks the shaft, one cam acting to move it in one direction and the other in the opposite direction. The crank on the end of the die-head shaft or spindle P is provided with forked projections K^2, (see Fig. 4,) which, as the crank is at either extreme of its throw, are alternately in line with a slightly-tapering slot, j^2, in the end of the crank H^2. When one of the projections K^2 is in line with the slot j^2, the crank H^2 is, by the rocking of its shaft, moved toward the projection which is received in the slot, thus holding the spindle P and die-head stationary and acting as an additional safeguard to the eccentric-pin d^2, which at this time is lying in the straight portion of the cam-path e^2. When the parts are in this position, the nail-dies t', mounted in the oscillating head D^2, are accurately in line with the corresponding dies, u, in the laterally-sliding heads S.

As before stated, the operation of heading the nails is performed while they are firmly secured by the nail-dies. The heading mechanism is constructed as follows: As there are two nails formed at each end of the reciprocating head D^2 at each movement of the dies, it is necessary to employ four hammers for heading the nails, and these hammers are alike in construction and operation. The hammer which comes directly in contact with the wire consists of a bolt, l^2, which plays in a hole in the frame A. (See Fig. 3.) These hammers l^2 are driven against the wire by the forked levers L^2, pivoted on studs M^2, one forked lever being on either side of the machine. In the upper ends of each lever are set the bolts m^2, which are adjustable by means of the screws n^2. (See Fig. 3.) The bolts m^2 are arranged to strike the projecting ends of the hammers l^2, and at each movement of the lever L^2 drive the hammers against the wire. The projecting ends of the hammers are notched, as shown at o^2, to receive the end of a small arm or projecting piece, p^2, (see Fig. 2,) fast to the upper ends of the lever L, and which act to withdraw the hammers, so that they may be ready for the next blow. The lower ends of the levers L^2 are slotted lengthwise, as shown at N^2, Fig. 2, and these slots receive eccentrics or crank-pins q^2, set on the ends of each of the secondary shafts E F. Each revolution of the secondary shafts reciprocates the lever L^2 and heads four nails. The sides of the slots N^2 may be faced with strips or pieces r^2, to prevent wear, as shown, Fig. 2.

To insure the nails when formed leaving the dies, I provide clearing-fingers s^2, (see Fig. 4,) which are pivoted to the frame t^2 and are held against the face of the dies by means of the springs u^2. These fingers act in grooves v^2,

Fig. 7, and lie close beside the gripper-lever c', as shown. When the nail is being formed, two of these fingers lie underneath it, and the subsequent movement of the oscillating head forces the nail up the incline of the finger clear of the gripper c' and out of the die, and it drops clear of the machine and into a receptacle underneath, which may be provided to receive it.

For the purpose of stopping and starting my machine, I have invented an improved shipper device, (shown in Figs. 1 and 3,) which consists of a slide-rod, P^2, arranged to slide in bearings on the frame. This rod is provided with an operating-handle, R^2, secured thereto at its lower end, and at its upper end passing through a slot, S^3, on the side of the top of the frame. One end of the rod (shown at the right of Fig. 3) is provided with a toothed rack, T^2, which operates a toothed segment, w^2, fast to the rod a^3. The inner end of rod a^3 is screw-threaded and works in a threaded socket, a^4, fast to the frame. (See Fig. 2.) The other end of rod a^3 is reversely screw-threaded and carries the threaded sleeve, b^3, to which is pivoted one end of the lever c^3. This lever is fulcrumed at d^3 on a projection of the frame and the other end is forked, as shown, Fig. 3, to receive the pin e^3, set on the collar f^3 on the main shaft. The movement of the collar f^3 on its shaft toward the fly-wheel C forces the belt-pulley D against the fly-wheel and causes the friction device, of usual construction, to operate and cause the fly-wheel and pulley to revolve together, thus driving the shaft and operating the machine. The rod a^3 being provided at one end with a right-hand screw and at the other with a left-hand screw, the movement of slide-rod P^2 is doubled in the movement of the lever c^3, and a slight effort of the operator is all that is required to stop or start the machine. The line h^3 on the oscillating die-head (see Figs. 4 and 7) indicates a groove or recess, j^3, Fig. 7, which is formed at each side of each face of the head to enable the head to receive a shorter set of nail-dies should it be desirable to use the machine in the manufacture of nails of smaller size. If the head was not thus grooved, the width of its face would interfere with the heading of nails made in dies of less length. The dies t' (shown in Fig. 4) are mounted in slots or recesses in the faces of the oscillating die-head. For the purpose of adjusting these dies forward or backward, the blocks a^5 are placed in the slots underneath the dies. The rear face of the block a^5 is inclined and rests against the correspondingly-inclined bottom of the die slot or recess. The block a^5 is not as wide as the slot, and the movement of the block from one side of the slot to the other pushes the die t' outward, or allows it to recede. The blocks a^5 are moved in one direction by spring impelled bolts set in recesses in the die-head, (see the left of Fig. 4,) and in the other direction by the screw-bolts d^5. This arrangement enables the dies to be conveniently and easily adjusted. It will be noticed that the upper part of the frame A, which projects above the trunnion or spindle P, is bolted to the body of the frame and acts as a cap for the trunnion or spindle in its bearings. This construction renders it a comparatively simple matter to remove the die-head, as by taking out two bolts on either side of the machine this upper portion of the frame may be lifted off and the die-head lifted out and removed, and its replacement may be effected with equal facility.

The operation of my machine is as follows: Wire from four reels mounted in any convenient manner, two on either side of the machine, and arranged to allow the wire to pay off as required, is fed into the cutters by means of the grooved feed-rolls. At one extreme of the oscillation of the die-head the feed-rolls on one side of the machine operate, and at the other extreme those on the other side of the machine operate. The wire is fed forward until its end extends across the dies, when the cutter-arms move the movable cutters and sever the section of wire lying across the nail-die. The head then begins its movement, when the grippers seize the section of wire on the die and hold it securely during the movement of the head, which brings the die into position to form the nail. While the nail is being formed by the pressure of the dies, the other dies on the head are receiving the wire from the feed-rolls on the other side of the machine. Thus at every complete oscillation of the head eight nails are formed. Simultaneously with the action of the nail-dies in forming the points of the nails the hammers are forming the heads. As soon as the dies and hammers have withdrawn, the head begins its return movement and the clearers s^2 free the formed nails from the dies and allow them to drop under the machine.

I am aware that machines have been constructed with a die-head arranged to rotate intermittently. Such a construction is shown in Letters Patent to Parkhurst and Lovell, No. 345,534, dated July 13, 1886. Such a machine has proved objectionable in operation, because when the machine is operated at anything but a very slow speed the stopping of the die-head causes a pounding action, which very speedily wears the parts and throws the dies out of position, thus wholly spoiling the nails or rendering them practically valueless by forming the points off of the center of the wire. In such a machine, also, only one size of nail can be formed at a time, and a large number of expensive dies must be provided for each size of nail. Certain movements of the Parkhurst and Lovell machine have also proved objectionable in practice, particularly the movement of the laterally-reciprocating heads which carry half of the nail-dies, and which approach the rotary die-head from opposite sides. These laterally-moving heads do not approach the ro-

tary head simultaneously, but alternately, so that the pressure exerted to point the nails is sustained by the bearings of the rotary head.

In my improved machine the intermittent movement of the head is accomplished without a pounding action and without more than ordinary wear and tear of the machine.

I have shown and described a locking device which may be used, if desired, to insure the perfect registering of the nail-dies; but in practice such a device has not been deemed necessary, since the dies are only liable to get out of position by the wear of the mechanism, and this wear when it occurs can be readily taken up at the point where it takes place.

By the use of the reciprocating die-head the dies at one end of the head may be used on one kind of nail and those on the other end of the head on a different kind of nail, thus necessitating but two dies for one kind of nail. The laterally-reciprocating heads which carry the nail-dies u' are adapted to approach the head simultaneously, as hereinbefore described, and thus their movements balance each other and the shaft of the die-head is relieved from strain.

What I claim is—

1. In a wire-nail machine, the combination of an oscillating die-head having nail-dies, as t', at each end thereof, mechanism for oscillating said head with periods of rest between the movements, suitable wire feeding and cutting mechanism, and nail-dies, as u', operating at right angles, or substantially so, to the axis of the die-head, whereby when the die-head is at rest one set of dies at each end thereof may receive the wire while another set is in operative position to form the nail, substantially as set forth.

2. A wire-nail machine provided with an oscillating head, as D^2, actuating mechanism for imparting to said head a reciprocating movement, and sliding heads, as S, mounted on both sides of said oscillating head and in operation simultaneously approaching and receding from the same, for the purposes and substantially as set forth.

3. In a wire-nail machine, an oscillating head, as D^2, provided with nail-dies, as t', at each end thereof, actuating mechanism for imparting to said head a reciprocating movement, sliding heads, as S, mounted in line with each other on opposite sides of said oscillating head and provided with nail-dies, as u', and actuating mechanism for operating the sliding heads S, whereby said dies u' are caused to approach the oscillating head simultaneously twice during one oscillation thereof, substantially as shown and described.

4. In a wire-nail machine having an oscillating head, as D^2, actuating mechanism for imparting to said head a reciprocating movement, and feeding mechanism which acts alternately on opposite sides of the machine to fill the dies with wire, the combination, with said devices, of stationary and movable cutters, as a' e', the stationary cutters being in line with the dies in the head when said dies are in position to receive the wire, and the movable cutters being mounted on arms, as N R, which operate to move the cutters e' across the cutters a' and to simultaneously sever the wire which is fed into the dies from one side of the machine, substantially as set forth.

5. The combination, with the oscillating head and its spindle or shaft, of the cutter-arms N R, provided with toothed segments, the toothed segment l', journaled on the spindle or shaft of the die-head, shaft f' and its operating lever and cam, and the arm n' and connecting-link g', substantially as shown and described.

6. The combination, with the nail-die t', mounted in the moving die-head, of the gripper-lever c', pivoted to said head and having one end projecting over the face of the die in position to bear on the section of wire thereon and the other projecting rearwardly and actuated in one direction by contact with a fixed point, as the bolt b^2, and in the other by the spring-impelled bolt a^2, whereby during the movement of the head the nail-wire is held securely in position on the die, substantially as set forth.

7. In a wire-nail machine having an oscillating die-head provided with nail-dies, as t', and actuating mechanism for reciprocating said head, the combination therewith of the spring-actuated clearers s^2, two of said clearers being pivoted to the stationary frame at each end of the oscillating die-head and their free ends being received in slots v^2 in the face of the die-head, and dies whereby a wire blank passes under the clearer in being carried from the point where the die receives the wire blank to the point where the nail is formed and is engaged by the clearer and removed from the die during its return movement, substantially as shown and described.

8. In a wire-nail machine, the combination, with suitable feed mechanism, of the oscillating die-head D^2 and its actuating mechanism, the dies t', provided with projections b', between which the wire is received, and the gripping-levers c', pivoted to the head D^2 and actuated in one direction by a spring and in the other by contact with a stationary point on the frame, substantially as shown and described.

9. In a wire-nail machine, the combination, with suitable feed mechanism, of the oscillating die-head D^2 and its actuating mechanism, the dies t', provided with projections b', between which the wire is received, the gripping-levers c', pivoted to the head D^2 and actuated in one direction by a spring and in the other by contact with a stationary point on the frame, and the clearers s^2, substantially as shown and described.

10. In a wire-nail machine, the combination of an oscillating die-head provided with dies, as t', and suitable feed mechanism, with the

gripping devices c', mounted on and moving with the said die-head, substantially as described.

11. The combination, with the die-head D^2, of the die t', mounted in a slot or recess in said head, said recess having an inclined bottom, an inclined or beveled block, a^5, of less width than the recess and on which the die t' rests, and means for shifting the block a^5 in the recess, whereby the die may be adjusted, substantially as shown and described.

12. In a wire-nail machine having an oscillating die-head carrying at both ends duplicate members, as t', of the nail-forming mechanism, which receive the wire at one point and transfer it to another, where it is formed into nails by the coaction of the other member, as u', of said nail-forming mechanism, a locking-crank, H^2, mounted on a rocker-shaft and provided at its outer end with a slot, which receives an arm fast on the shaft of said oscillating head, whereby the head is locked and maintained in a fixed position while the nails are being formed, substantially as shown and described.

13. In a wire-nail machine having an oscillating die-head, the combination, with said head and its shaft or spindle, of a fixed arm, as K^2, on said shaft, a locking eccentric or crank, as H^2, having a slot which engages with said arm, a rocker shaft on which said crank is mounted, the arms h^2, fast to said rocker-shaft, and their operating-cams, whereby the said shaft and its crank are positively actuated to lock the oscillating head, for the purposes and substantially as set forth.

14. In a wire-nail machine, the combination, with the die-head and its supporting-shaft, said head having dies on opposite sides of said shaft, of the sliding heads, as S, located on opposite sides of said die-head and provided with co-operating dies, and actuating mechanism, substantially as described, for moving said sliding heads simultaneously toward the die-head between them, whereby the shaft of the die-head is relieved from strain, substantially as set forth.

15. In a wire-nail machine, the hammers l^2, actuated simultaneously to head the nails, the levers L^2, and arms p^2, secured to said levers, whereby the hammers are retracted after being driven, substantially as shown and described.

16. In a wire-nail machine having alternate feed mechanism, the shafts H K, which actuate the feed-rolls, each provided with a ratchet-wheel operated intermittently and alternately by a ratchet-and-pawl mechanism connected with a cam-actuated lever, as h, by pivoted links, as m n, said lever being fulcrumed between said shafts H K, whereby the movement of the lever in one direction actuates one shaft and its reverse movement actuates the other shaft, for the purposes and substantially as set forth.

17. The cam-actuated lever h, the block k, and its adjusting-screw, the connecting-arms m n, and the duplicate pawl-and-ratchet mechanism, whereby by the adjustment of the block k the throw of the pawl-cranks may be varied, substantially as shown and described.

18. The combination, with the lever h and its actuating-cam, of the adjusting-block k and its adjusting-screw, the arms m n, having their proximate ends pivoted to said block and their opposite ends to the pawl-cranks o p on either side of said lever h, the shafts H K and their pawl-and-ratchet mechanism, and the feed-rolls and their actuating-shafts geared to said shafts H K, substantially as shown and described.

19. In a wire-nail machine having an oscillating die-head and suitable mechanism for imparting thereto a reciprocating movement, the shaft or spindle of said die-head mounted in bearings on top of the main frame, combined with a detachable upper frame which carries all the mechanism above said die-head, whereby the removal of said die-head may be effected without removing any other operative part of the machine from its framework, substantially as set forth.

20. The combination, with the main shaft having fast and loose wheels, as C D, and a sliding collar, as f^3, of a shipper-lever, c^3, pivoted to a threaded sleeve, b^3, an actuating-rod, a^3, provided at one end with a right-hand screw and at the other with a left-hand screw, and a rack and pinion, said rack being attached to a slide-rod, as P^2, provided with an operating-handle, as R^2, whereby by a slight movement of the handle R^2 the machine may be stopped or started, substantially as set forth.

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