(No Model.) 3 Sheets—Sheet 1.

G. N. COOPER.

WIRE NAIL MACHINE.

No. 333,730. Patented Jan. 5, 1886.

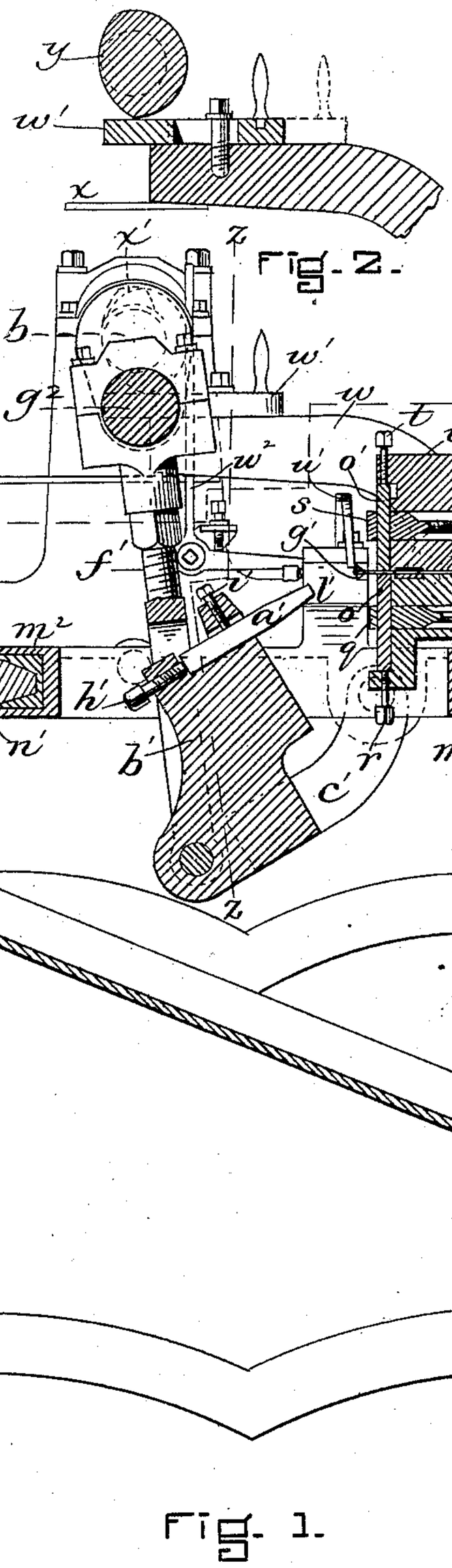

Fig. 1.

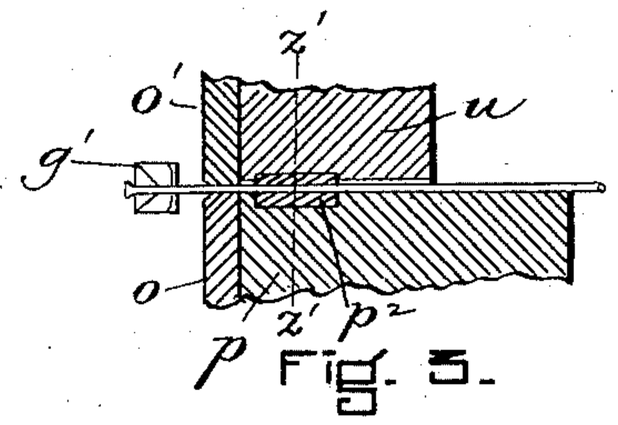

Fig. 2.

Fig. 5.

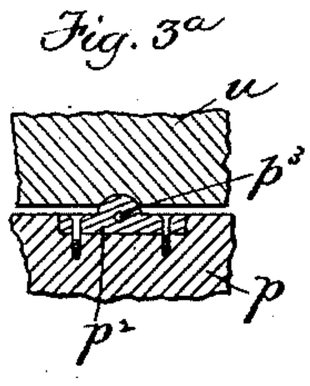

Fig. 3a

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(No Model.)

3 Sheets—Sheet 2.

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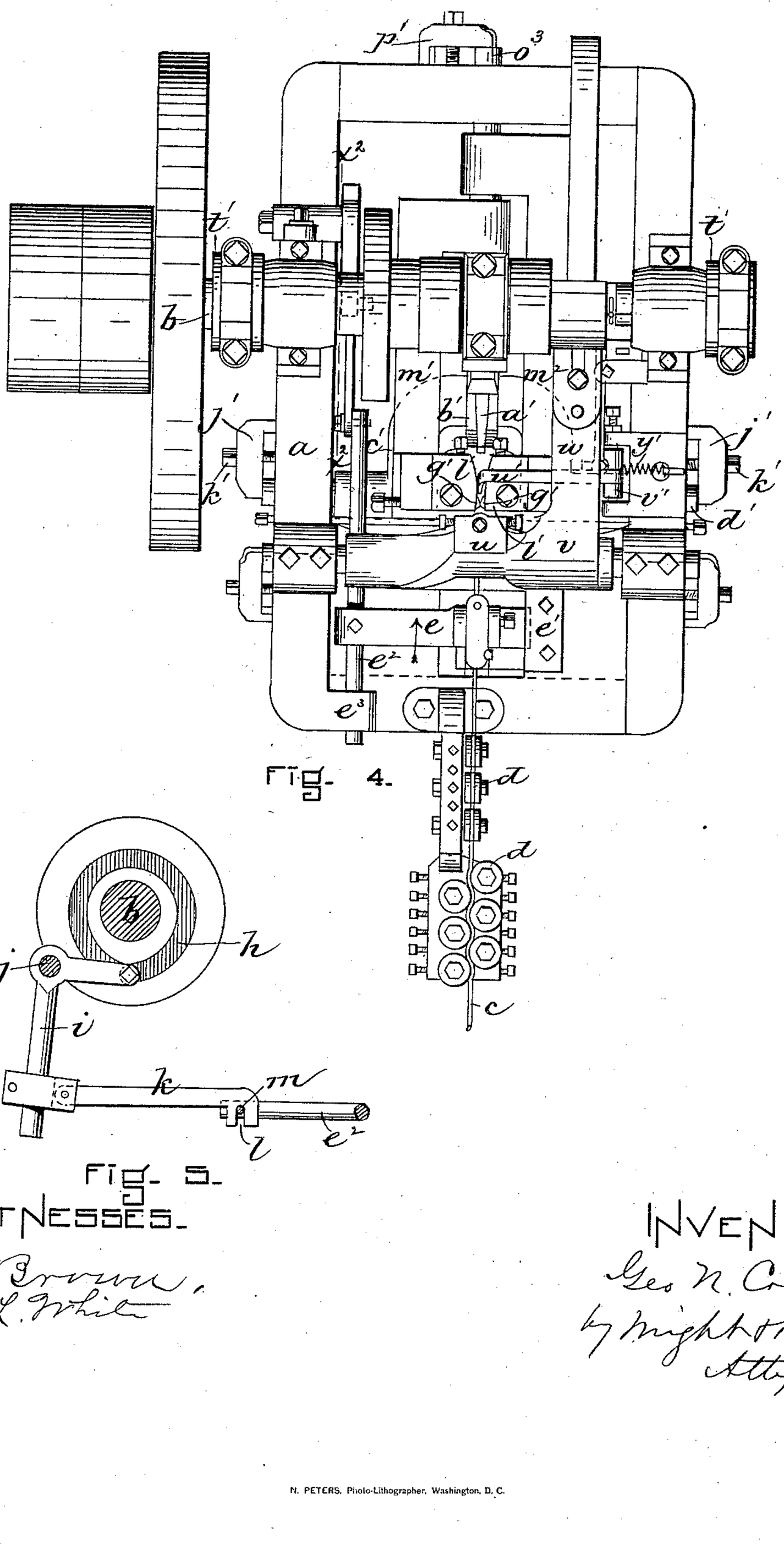

FIG. 4.

FIG. 5.

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(No Model.) 3 Sheets—Sheet 3.

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WIRE NAIL MACHINE.

No. 333,730. Patented Jan. 5, 1886.

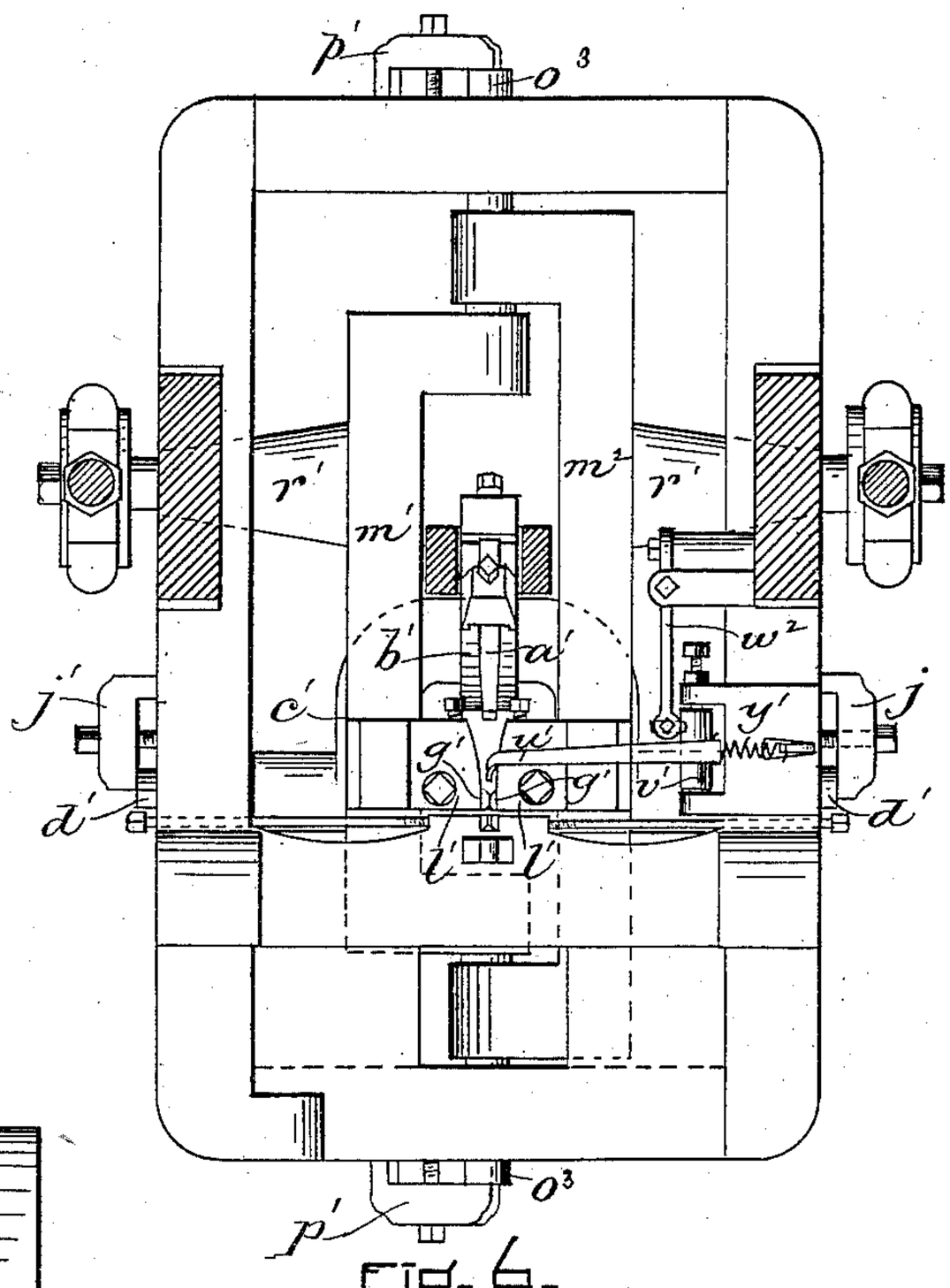

FIG. 6.

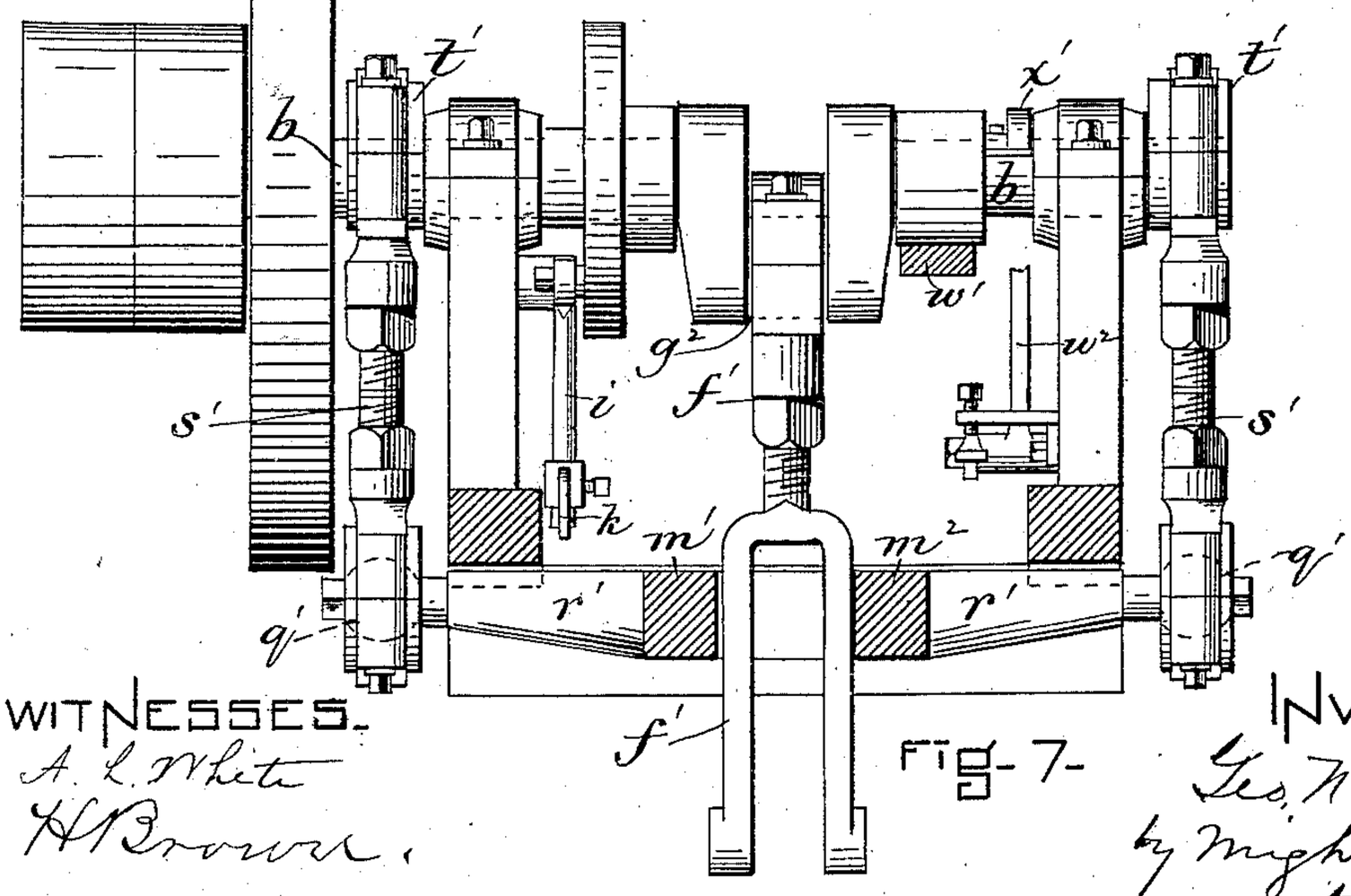

FIG. 7.

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UNITED STATES PATENT OFFICE.

GEORGE N. COOPER, OF HAVERHILL, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE WIRE GOODS COMPANY, OF WORCESTER, MASSACHUSETTS.

WIRE-NAIL MACHINE.

SPECIFICATION forming part of Letters Patent No. 333,730, dated January 5, 1886.

Application filed July 23, 1884. Renewed September 10, 1885. Serial No. 176,704. (No model.)

To all whom it may concern:

Be it known that I, GEORGE N. COOPER, of Haverhill, in the county of Essex and State of Massachusetts, have invented certain Improvements in Wire-Nail Machines, of which the following is a specification.

This invention has for its object to provide a simple and effective machine for forming headed and pointed nails from a continuous wire; 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 longitudinal vertical central section of a machine embodying my improvements. Figs. 2 and 3 represent enlarged sectional views of details. Fig. 3ª represents a section on line z' z', Fig. 3. Fig. 4 represents a top view. Fig. 5 represents a section on line x^2 x^2, Fig. 1. Fig. 6 represents a section on line y^2 y^2, Fig. 1, and a plan view of the machine below said line. Fig. 7 represents a section on line z z, Fig. 1, and an elevation of portions of the machine at the left of said line.

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

The operative parts of the machine, hereinafter described, are supported by a frame, *a*, which is provided with a driving-shaft, *b*, to which power is applied in any suitable manner. The wire *c*, to be formed into nails, is passed between guide-rolls *d d* to a feeding device, which consists of a cross-head or block, *e*, fitted at one end to slide in a guide, *e'*, in the frame *a*, and rigidly secured at its other end to a rod, e^2, which is adapted to slide in a guide, e^3, and a dog, *f*, which is pressed by a spring, *g*, against the wire, and moves the latter when the cross-head *e* is moving in the direction of the arrow in Fig. 4, but slips on the wire when the cross-head is moving in the opposite direction. The cross-head *e* is reciprocated by means of a cam, *h*, on the driving-shaft *b*, a bell-crank lever, *i*, pivoted at *j* to the frame *a* and engaged with the cam *h*, and an arm, *k*, pivoted at one end to the lever and provided at the other end with a slot, *l*, which receives a pin or stud, *m*, on the rod e^2, said slot being open at its lower end, so that the arm *k* can be disconnected from the rod *m* by an upward-swinging movement. The bell-crank lever *i* is oscillated by the rotation of the cam, and through its connection with the rod e^2 reciprocates the latter with the cross-head *e* and its dog *f*.

o o' represent a pair of dies between which the end of the wire is fed, and which bite or grasp the wire while it is being headed, as hereinafter described. The die *o* is secured to a fixed holder, *p*, by means of a horizontal bolt, *q*, having a slot through which the die *o* passes, and a vertical bolt, *r*, bearing against the lower end of said die. The bolt *r* adjusts the position of the die *o* vertically, while the bolt *q* confines the die against its holder in any position to which it may be adjusted by the bolt *r*. The die *o'* is adjustably secured by bolts *s t*, arranged and operating like the bolts *q r*, to a holder, *u*, formed on or rigidly attached to a rocking shaft or head, *v*, journaled at its ends in bearings in the frame *a*, and provided with an arm or lever, *w*, which is pressed upwardly by a spring, *x*, against a cam, *y*, on the driving-shaft *b*. The lever *w* is provided with a terminal, *w'*, adapted to be moved backwardly from under the cam *y*, as shown in dotted lines in Fig. 2, so that when it is necessary to obtain access to the dies *o o'* the lever *w* can be turned upwardly. The rotation of the cam *y* causes the die *o'* to alternately meet and recede from the die *o*. The acting faces of said dies are provided with nail-head-forming cavities, and may have teeth to indent the sides of the wire and form corrugations thereon. The die *o'* is raised while the wire is being fed forward, and is afterward brought down on the wire, the end thereof projecting somewhat beyond the dies.

a' represents the upsetting die or hammer attached to lever *b'*, which is provided with arms *c' c'*, having trunnions *d' d'*, journaled in bearings in the frame *a*. A forked connecting-rod, *f'*, mounted at its upper end upon a crank or eccentric, g^2, on the driving-shaft, is pivoted at its forked end to the lever *b''*. The rotation of the driving-shaft causes the crank or eccentric g^2 to oscillate the hammer *a'*, causing it to strike and upset the end of the wire when it is held by the dies *o o'*. The hammer is secured to its lever by means of

set-screws h' i', one bearing against its rear end and adjusting it lengthwise, and the other bearing against its side and holding it at any point to which it may be adjusted. Dogs j' j', secured to the frame a by set-screws k' k', bear against the ends of the trunnions d' and permit endwise adjustment of said trunnions and lateral adjustment of the hammer-lever and hammer.

g' g' represent the cutting-off and pointing dies, which are arranged to cut off the wire after the same has been headed, and at a suitable distance from the head, and at the same time form a pyramidal point on the cut-off portion. The dies g' g' are secured to levers l' l', attached to bars m' and m^2, having offset ends. The ends (see Figs. 4 and 6) of the bar m' are pivoted to the ends of the bar m^2 by studs or pivots n' n', rigidly attached to the bar m' by set-screws, and entering sockets in the bar m^2, as shown in Fig. 1. Pivots o^3 o^3, secured by set-screws to the frame a in line with the pivots n', enter sockets in the latter, and thus support both bars m' m^2 and their dies, both bars being thus permitted to oscillate on an axial line common to both. Dogs p' p', secured to the frame a by set-screws, bear against the outer ends of the pivots o^3 o^3, and prevent said pivots from being moved outwardly after they are adjusted, the dogs permitting any desired longitudinal adjustment of said pivots and of the bars and the cutting-dies supported thereby. The bars m' m^2 are provided with lateral arms r' r', which have spherical enlargements q' q', Fig. 7, at their ends, fitting in corresponding sockets in the lower ends of eccentric-rods s' s', which are mounted on eccentrics t' t' on the driving shaft. The rods s' s' are reciprocated vertically by the rotation of the eccentrics, and are thus caused to oscillate the bars m' m^2 and cause the dies g' g' to alternately approach and recede from each other. The cutting of the wire by the dies g' g' completes the nail, which drops into a receptacle below, a clearer, u', being preferably employed to detach the nail from the wire in case it is not entirely removed by them. Said clearer is a finger attached to a rock-shaft, v', which is pivoted to ears on the frame a. A bell-crank lever, w^2, pivoted to the frame a, bears at one end on a lug on the rock-shaft v', and projects upwardly at its upper end within reach of a cam, x', on the driving-shaft. When said cam bears against the lever w^2, it turns the latter on its pivot, causing its other end to partially turn the rock-shaft v' and depress the clearer u', the latter striking the nail and knocking it off. When the cam x' recedes from the lever w^2, a spring, y', returns the clearer to its normal position above the wire.

The order of the different steps of the operation is the same as in other machines of this class—viz: The hammer a' advances and upsets the projecting end of the wire while it is grasped by the dies o o'. The hammer then recedes, the dies o o' open, and the wire is fed forward until the head last formed has passed between the cutting-dies the desired distance. The cutting-dies then close upon the wire and sever and point the same.

The machine in its operation and in several features of its construction is similar to that described in my application filed September 3, 1883, Serial No. 105,422, the chief points of novelty in the present invention being, first, the operating mechanism of the feed-dog carrying cross-head, including the pivoted arm k', detachably connected to the rod e^2, as described; secondly, the means for operating the grasping-dies o and o', including the lever w'; thirdly, the wire-guiding eye hereinafter described, the means for supporting and operating the cutting-dies g' g'; and, lastly, the devices for operating the clearer. It will be seen that all of said parts are operated from the driving-shaft, the mechanism being simple and compactly arranged. The crank or eccentric that operates the hammer is arranged at the opposite side of the axial center of the driving-shaft from the eccentrics t' t', which operate the cutting-dies, each counterbalancing the other, so that little or no jar or vibration attends the operation of the machine. The offset bars m' m^2, supporting the cutting-dies, and adapted to oscillate on an axial line common to both, enable said dies to meet each other in severing the wire, with the same result as if each were moved in a rectilinear direction by a slide. The means for oscillating said bars—viz., the arms r', the eccentric-rods connected to said arms by ball-and-socket joints, and the eccentrics t' t' on the driving-shaft—enable the power to be advantageously applied to the cutting-off dies, as will be readily seen.

The parts have the same capability of adjustment as the corresponding parts of the machine shown in my former application.

To the fixed holder p, supporting the die o, is rigidly attached a block, p^2, provided with an orifice or eye, p^3, for the passage of the nail-wire. Said block is located near the dies o o', and it holds the wire passing through it in the proper position to be grasped by the said dies, and prevents it from being displaced in any direction. This feature is one of considerable importance, for without it the wire passing through an open groove in the holder p might be displaced by a variety of causes, so as to fail to coincide with the dies o o'.

I claim—

1. In a wire-nail machine, the feeding mechanism consisting of the cross-head e, having the spring-dog f and rod e^2, the cam h on the driving-shaft, the bell-crank lever i, and the arm k, connecting said lever with the slide e^2, and detachable from the latter, as set forth.

2. The pivoted head supporting the die o', and provided with the lever w, having the adjustable terminal adapted to be moved away from the operating-cam, as set forth.

3. The combination, with the gripping-dies o o', of the header or hammer a', the lever b', supporting the hammer and pivoted to the

supporting-frame, the crank or eccentric g^2 on the driving-shaft, and the connecting-rod f', pivoted to said lever and mounted on said eccentric, as set forth.

4. The combination of the cutting-dies g' g', the offset bars m' m^2, supporting said dies and pivoted to each other and to the frame a, as described, and mechanism for oscillating said bars, and thereby causing the cutting-dies to alternately approach and recede from each other, as set forth.

5. The combination of the cutting-dies g' g', the offset bars m' m^2, supporting said dies and pivoted to each other and to the frame a, as described, the levers r' r' on said bars, the eccentrics t' t' on the driving-shaft, and the eccentric-rods s' s', mounted on said eccentrics and connected with the levers r' r' by ball-and-socket joints, as set forth.

6. The combination of the driving-shaft having the crank or eccentric g^2, the hammer or header a', connected with said crank by devices substantially as described, the cutting-dies g' g', the oscillating bars supporting said dies, and the eccentrics t' t' on the driving-shaft connected with said oscillating bars by means substantially as described, and arranged at the opposite side of the center of the driving-shaft from the crank g^2, as and for the purpose specified.

7. The clearer u', supported by a rock-shaft, combined with the spring y', whereby it is normally held over the wire, and the bell-crank lever w^2, and cam x', whereby the clearer is intermittently depressed, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 18th day of July, 1884.

GEORGE N. COOPER.

Witnesses:

DAVID O. CLARK,

CHARLES H. POOR.