(No Model.)

3 Sheets—Sheet 1.

N. C. LEWIS.

WIRE NAIL MACHINE.

No. 328,236.

Patented Oct. 13, 1885.

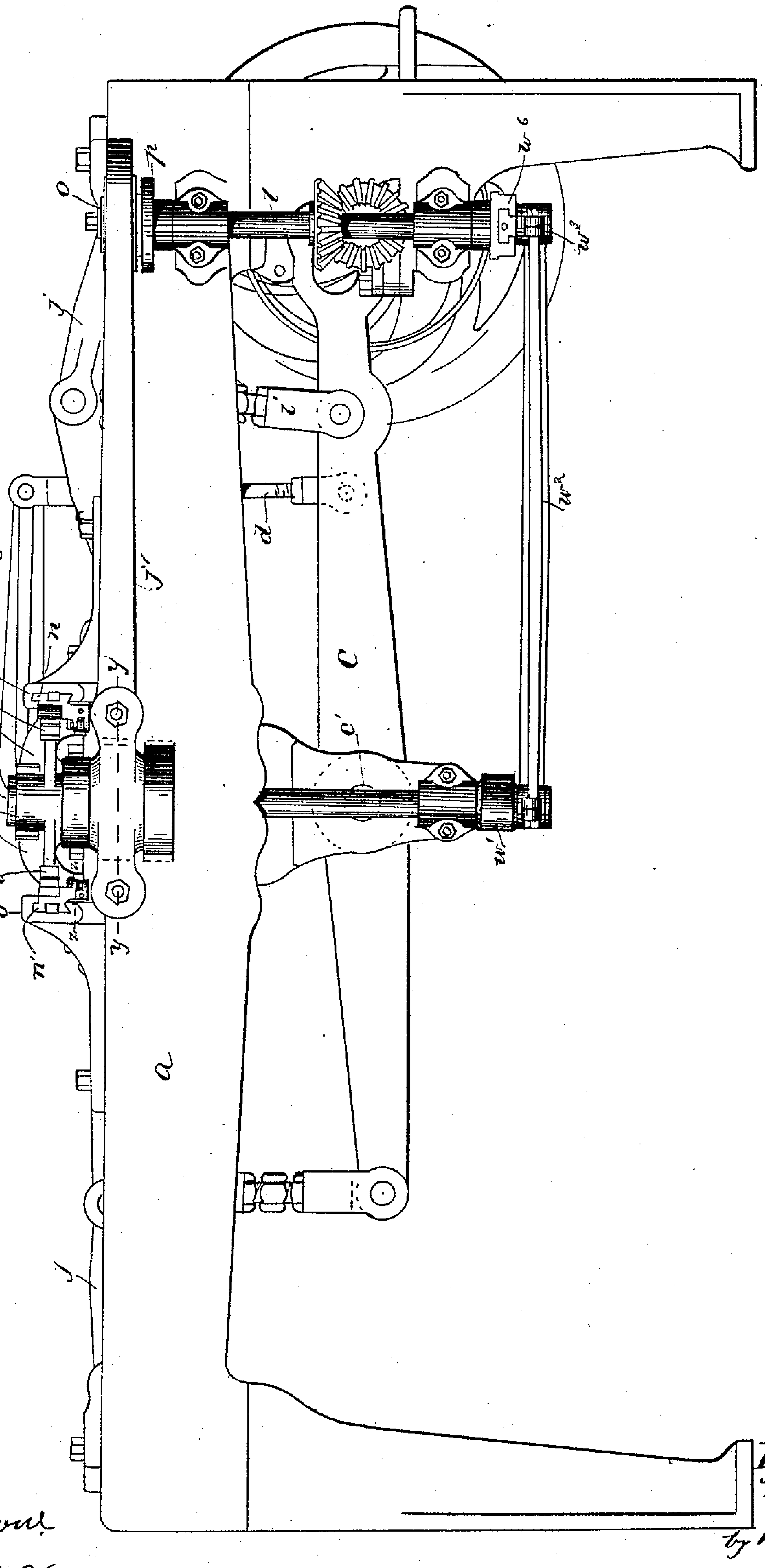

Fig. 1.

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Inventor:

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by Wright Brown Attys.

(No Model.) 3 Sheets—Sheet 2.

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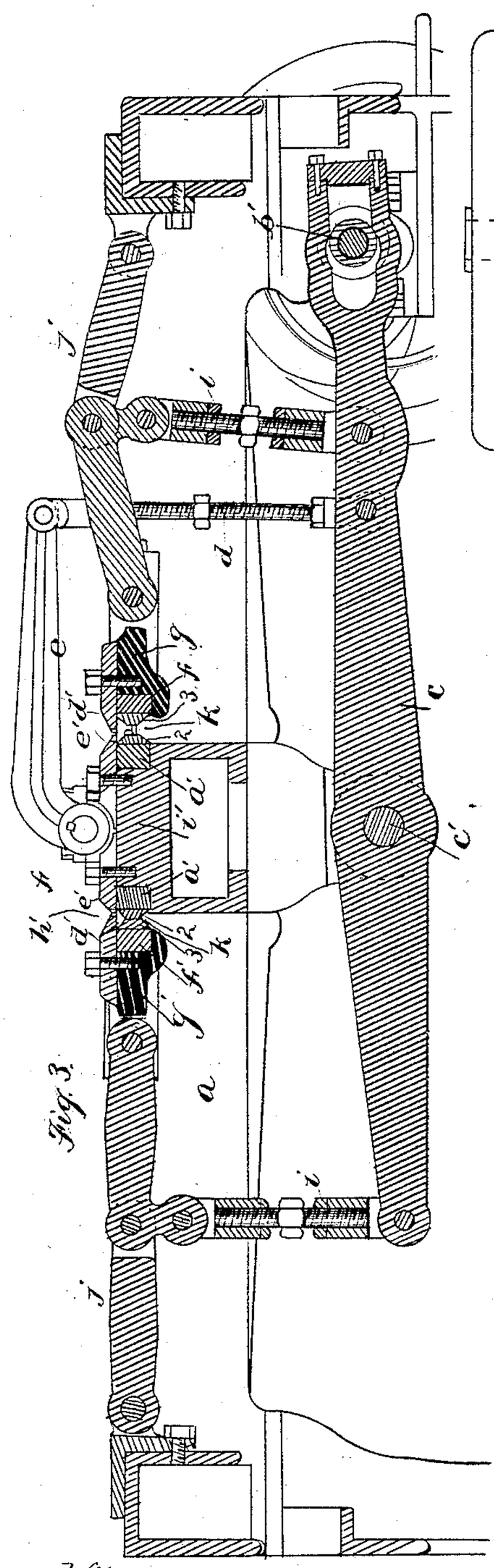

Fig. 3.

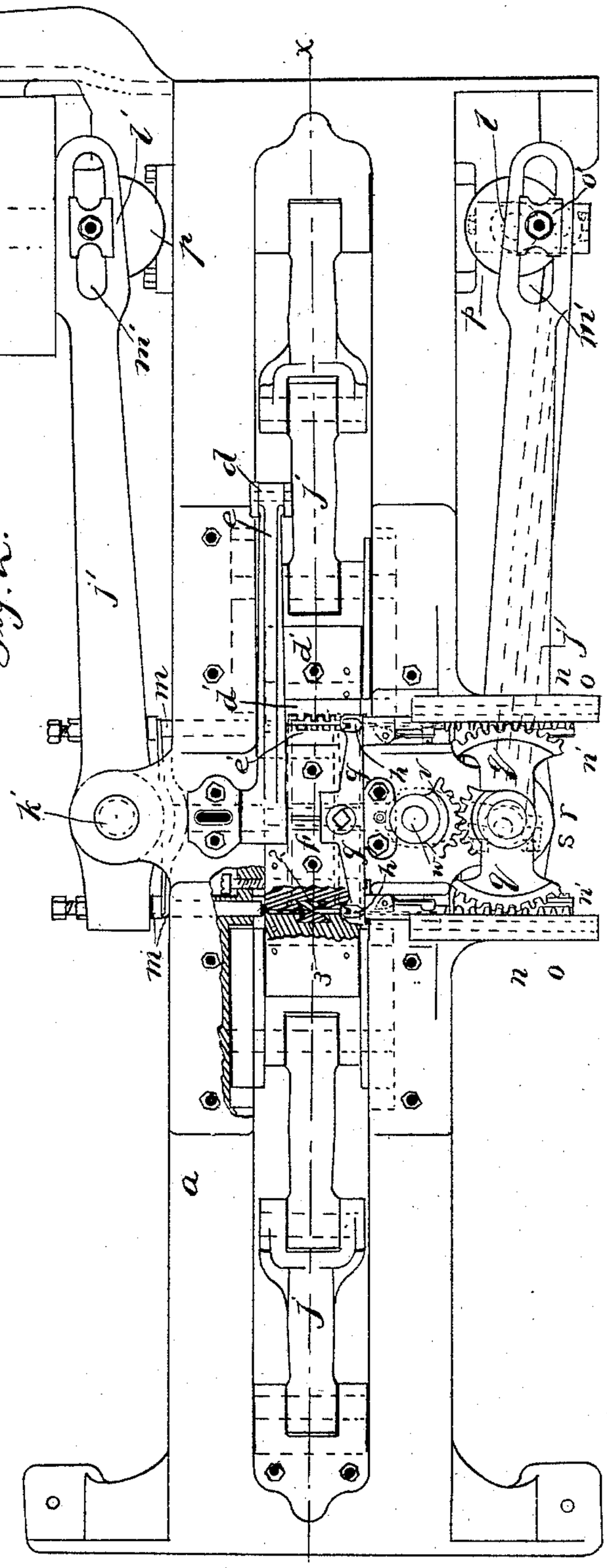

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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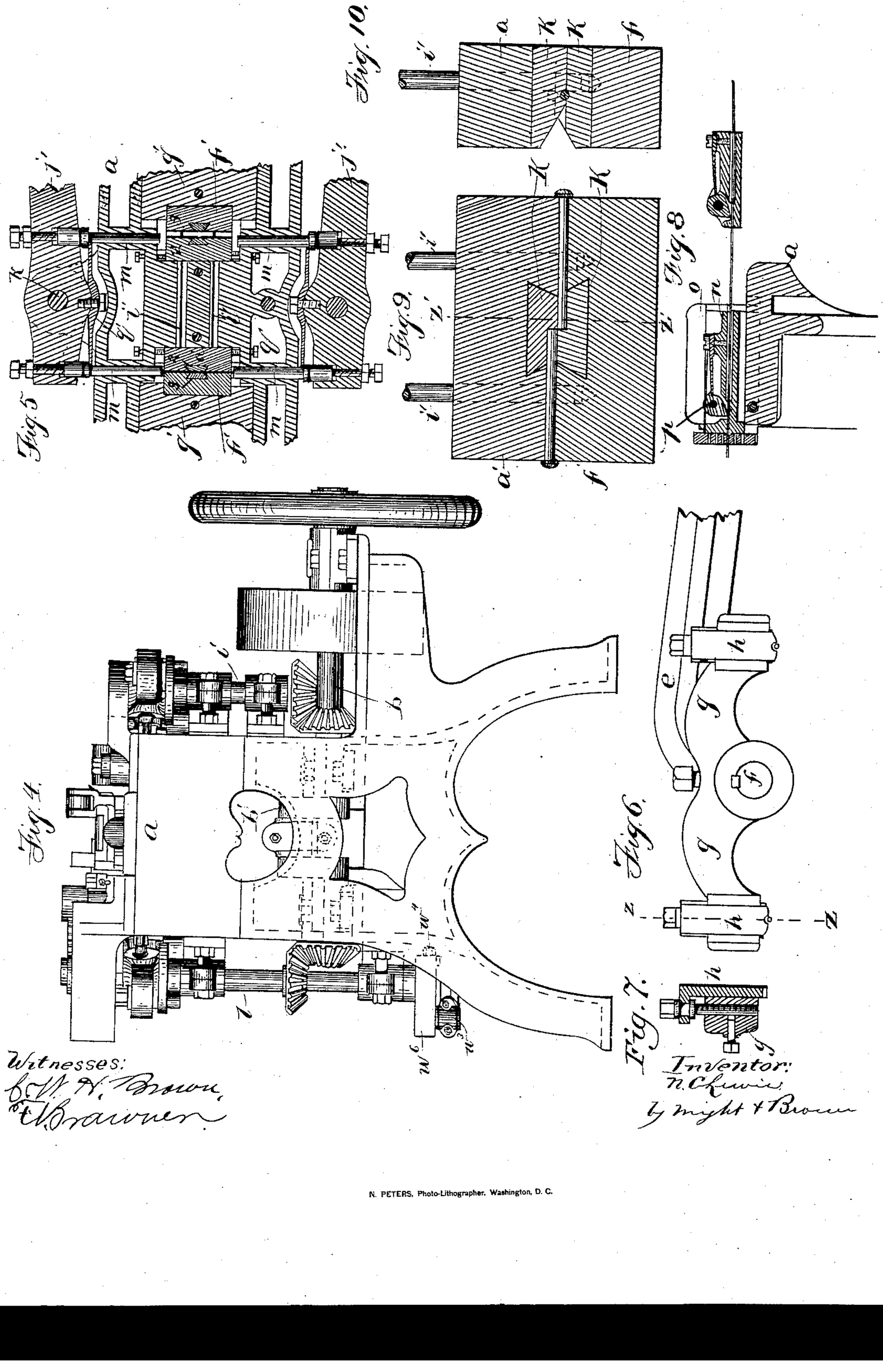

Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

NATHAN C. LEWIS, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO CLINTON LOVELL, OF SAME PLACE.

WIRE-NAIL MACHINE.

SPECIFICATION forming part of Letters Patent No. 328,236, dated October 13, 1885.

Application filed July 19, 1884. Serial No. 138,237. (No model.)

To all whom it may concern:

Be it known that I, NATHAN C. LEWIS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Machines for Making Wire Nails and Rivets, of which the following is a specification.

This invention relates to machines adapted to form nails, rivets, or similar articles from continuous lengths of wire, and having the following elements, viz: wire-feeding mechanism adapted to feed twice the length of wire required for a single nail or other articles to be produced, means for cutting off a section of the length of the feed-movement, dividing-dies located below the plane of the feeding and cutting-off devices, and adapted to divide the section at the middle of its length into two nails, and headers or hammers adapted to simultaneously upset or head both nails.

The invention consists as a whole in the combination of two duplicate nail-forming organizations, each including the elements above named, with operating mechanism, whereby each element of one organization is caused to act alternately with the corresponding element of the other organization.

The invention also consists in certain details, all of which I will now proceed to describe.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation of a machine embodying my invention. Fig. 2 represents a plan view of the same. Fig. 3 represents a longitudinal section on line *x x*, Fig. 2. Fig. 4 represents an end elevation. Fig. 5 represents a section on line *y y*, Fig. 1. Fig. 6 represents an enlarged view of the cutting-off cutters. Fig. 7 represents a section on line *z z*, Fig. 6. Fig. 8 represents an enlarged section on line *z z*, Fig. 1. Fig. 9 represents a horizontal section of the dividing-dies used in forming rivets. Fig. 10 represents a section on line *z′ z′*, Fig. 9.

In the drawings, *a* represents the supporting-frame of the machine, at one end of which is journaled the transverse driving-shaft *b*. Said shaft is provided with a crank, *b′*, which enters a slot in the end of a lever, *c*. Said lever is pivoted at *c′* to fixed lugs on the frame *a*, and is connected by a rod, *d*, with a lever, *e*, affixed to a rock-shaft, *f*, having two arms, which are provided with cutters *h h*, whereby lengths or sections are cut from two supplying-wires, each section being of the proper length for two nails. The lever *c* is also connected by rods *i i*, at opposite sides of its pivot, with toggle-joints *j j*, which operate the removable parts of dies *k k*, which divide the sections cut off by the cutters *h h* into two parts, and form points on both parts.

The driving-shaft is connected by bevel-gears with two vertical shafts, *l l′*, journaled in bearings on the sides of the frame *a*. The shaft *l* actuates the duplicate feed mechanisms hereinafter described, whereby the two continuous wires are fed forward to be severed by the cutters *h h*. Four headers or hammers, *m m m m*, (two for each wire-cutter *h* and each pair of separating and pointing dies *k*,) are operated by the shafts *l l′*, each shaft operating two headers, as will be described.

The wire-feeding devices consist of two slides, *n n*, adapted to move in guides *o o*, affixed to the frame *a*, each slide being provided with a longitudinal orifice for the wire, and a spring-dog, *p*, adapted to grasp the wire and move it with the slide when the latter is moving forward, and to slip on the wire when the slide is moving backward. Each slide *n* is provided with a rack, *n′*, the two racks being on the proximate sides of the slides. With said racks engage two gear segmentals, *q q*, formed on arms attached to a sleeve or collar, *r*, on a vertical bolt or pivot, *s*, which is supported in ears or bearings *t t* on the frame *a*. The collar *r* has another gear-segment, *u*, which meshes with a similar segment, *v*, on a vertical rock-shaft, *w*, mounted in bearings on the frame *a*. The rock-shaft *w* has a crank, *w′*, at its lower end, which is connected by a connecting-rod, w^2, with a wrist-pin, w^3, secured to a cross-head, w^6, on the lower end of the vertical shaft *l*, the wrist-pin being eccentric to the shaft, so that the rotation of the latter causes the connecting-rod to oscillate the rock-shaft *w*, the latter by its gear-segments *q q* reciprocating the feeding-slides *n n*. It will be seen that said slides will move simultaneously in opposite directions, one feeding its wire for-

ward while the other is being drawn backward. The length of movement imparted to the slides is determined by the position of the wrist-pin w^3, said pin being movable toward and from the center of the shaft l in a groove in the cross-head to vary the throw of the connecting-rod w^2, a screw, w^4, working in a lug on the cross-head at one end of the groove holding the wrist-pin at any position to which it may be adjusted. The cutters $h\,h$ are located in close proximity to the inner ends of the feeding-slides $n\,n$, each cutter h, and a co-operating fixed cutter on the frame a, being arranged to sever the wire after it has been fed forward by the corresponding feeding-slide, the rocking motion of the shaft f, to which the arms supporting said cutters are attached, causing the cutters to operate alternately like the feeding-slides. The section of wire moved forward by each movement of the feeding-slides and severed by each cutter h is of sufficient length for two nails.

The dies $k\,k$, which divide the sections of wire into two parts and point each part, are located below the plane of the feeding-slides, so that each section, after it is severed by a cutter, h, drops to position to be acted on by the corresponding die k. The dies $k\,k$ are composed of the fixed half-dies 2 2, attached to blocks $a'\,a'$, affixed to the frame a by set-screws and clamping-plates $e'\,e'$, (see Fig. 3,) and the movable half-dies 3 3, attached by clamping-plates $d'\,d'$ to blocks $f'\,f'$, which are mounted in slides $g'\,g'$, which move in guides in the frame a, and are pivoted to the inner links or members of the toggle-joints $j\,j$. The half-dies 3 3 are operated alternately by the oscillations of the lever c, the parts of one die approaching each other while the parts of the other die are separating.

The clamping-plates $d'\,e'$ are beveled on their proximate ends and provided with corresponding projections and recesses, so arranged that the projections of the plate d' will enter the recesses in the corresponding plate, e', the two beveled edges forming a bottomless V-shaped trough, h', as shown at the left in Fig. 3, which receives the section of wire severed by a cutter, h. When the plate d' is moved away from the plate e' by the separation of the parts of the die below said plates, an opening is formed between the plates of sufficient size to permit the section of wire to fall onto supporting-rods $i'\,i'$, which are adapted to slide in orifices formed through the dies 2, the blocks a', and the parts of the frame a supporting said blocks, said rods extending across the space between the dies 3 3, and being moved alternately by the dies 3 3, each die 3 as it approaches its fixed companion pushing the rods $i'\,i'$ across the space that is at the same time being formed by the separation of the other die 3 from its fixed companion, thus enabling the rods to arrest the next blank that falls into said space. Said rods support the sections of wire between the half-dies 2 3 at the proper height for the action of said dies.

The headers $m\,m\,m\,m$ are plungers adapted to slide in sockets in the frame a and to strike and upset the opposite ends of the sections of wire and upset them against the ends of the blocks $a'\,f'$, thus forming the heads of the nails. The headers are operated by levers $j'\,j'$ pivoted at $k'\,k'$ to ears on the frame a, and having at their rear ends slots $m'\,m'$, in which are adapted to reciprocate slides $o'\,o'$, eccentrically pivoted to disks $p'\,p'$ on the vertical shafts $l\,l'$. The rotation of the shafts $l\,l'$ causes the levers $j'\,j'$ to oscillate. The headers m bear against the levers j' at opposite sides of the pivotal points of the latter, and are pressed against the levers by springs g', Fig. 5, so that when the headers at one side of the pivots of the levers j' are being pressed inwardly to form the nail-heads the other headers are moving outwardly.

The operation of one series of parts—viz., a feeding-slide and the cutter h, dies k, and headers $m\,m$ co-operating therewith—is as follows: The feeding-slide feeds its wire while the cutter h is raised, and the dies k are brought together to divide the section of wire previously cut by the same cutter. After the wire is fed the cutter h descends and cuts off a section of wire, which drops into the V-shaped trough h'. The half-die 3, with its plate d', then recedes from the fixed half-die 2, the previously-completed nails at the same time dropping into a chute or receptacle below, the supporting-rods i' having been pushed into the fixed half-die by the last approach of the moving half-die, so that they interpose no obstacle to the descent of the nails. Immediately after the nails fall the rods i' are pushed back by the inward movement of the opposite half-die 3, and extend across the space formed by the outward movement of the half-die 3 now under consideration. The trough h' is opened by the outward movement of the half-die 3 and plate d', and the section of wire falls upon the rods i'. The half-die 3 then moves toward the half-die 2, the two severing the wire at the center of its length, and by a combined cutting and swaging action forming pyramidal or conical points on the nail ends thus formed. At the same time the headers move simultaneously against the projecting ends of the sections and form heads on both nails. The half-dies 2 3 then separate, as before, the completed nails fall, and the operation is repeated.

The operation of the machine as a whole will be readily understood from the foregoing description, it being borne in mind that the feeding devices, the severing-cutters, the dividing and pointing dies, and the headers of one series alternate in their operation with the corresponding parts in the other series.

The mechanism is so timed that both series operate during a single rotation of the driving-shaft, four nails being thus formed in the time required in most machines to make one.

In forming rivets the pointing-dies *k k* are removed, and dies K K, Figs. 9 and 10, adapted to sever the wire and form blunt ends instead of points, are substituted for them. The headers are arranged with their centers at one side of the line of wire, as shown in Fig. 5, so that by partially rotating each header a different portion of it can be presented to the wire. Cavities are formed in the headers adapted to form the convex heads of rivets, said cavities being interchangeable with the flat nail-head-forming portions of the headers.

I claim—

1. In a machine for making wire nails or other like articles, the combination of two duplicate nail-forming organizations, each including a feeding device, a cutter for severing a section of wire, dividing-dies located below the plane of said feeding device and cutter, and duplicate headers or hammers, and operating mechanism, substantially as described, whereby each element of one organization is caused to act alternately with the corresponding element of the other organization, as set forth.

2. The combination, with duplicate cutting off, dividing, and head-forming mechanism, of the feeding-slides having wire-grasping devices, and racks, the segment-gears *g g*, engaged with said racks, and mechanism, substantially as described, for oscillating said segment-gears, and thereby reciprocating the slides simultaneously in opposite directions, as set forth.

3. The combination of the feeding-slides, the gear-segments engaging with racks thereon, the rock-shaft *w*, adapted to oscillate said gear-segments, the connecting-rod connected to a crank on the rock-shaft, and the driving-shaft *l*, having a cross-head and an adjustable wrist-pin to which the connecting-rod is connected, said wrist-pin enabling the throw of the connecting-rod and the length of the feed movement of the feeding-slides to be adjusted, as set forth.

4. The combination, with duplicate feeding, dividing, and head-forming mechanism, of the cutters *h h*, affixed to arms *g g*, the rock-shaft *f*, supporting said arms, and mechanism for oscillating said rock-shaft, whereby the cutters are caused to act alternately, as set forth.

5. The combination, with duplicate feeding, cutting-off, and head-forming mechanism, of the fixed half-dies 2 2, the half-dies 3 3, secured to slides *g' g'*, the toggle-joints *j j*, connected to said slides and to fixed supports, the pivoted oscillating lever *c*, connected, as described, to the toggle-joints at opposite sides of its pivot, whereby the dies 3 3 are moved in unison and caused to act alternately, as set forth.

6. The combination, with duplicate feeding, cutting-off, and dividing mechanism, of the four spring-retracted hammers arranged to bear against the ends of two sections of wire held by the dividing mechanism and the oscillating levers, whereby said hammers are operated two at a time, as set forth.

7. The combination of the feeding devices having feed movements of twice the length of a nail, the cutters adapted to sever the wire after each feed movement, two plates, *d' e'*, one fixed and the other movable, below the plane of each feeding device and cutter, said plates having their proximate ends formed to present a trough to receive the section of wire, two dividing half-dies, 2 3, one fixed and the other movable, located below each said trough, sliding rods *i' i'*, adapted to be moved by the half-dies 3 3 and arranged to arrest the wire sections falling from the troughs, mechanism for moving said movable plates *d'* and dies 3 toward and from the fixed plate *e'* and dies 2, the headers or hammers, and operating mechanism therefor, all arranged and operated substantially as set forth.

8. The headers or hammers arranged with their centers at one side of the line of wire and adapted to be rotated to present different heading-surfaces to the wire, as set forth.

9. In a wire-nail machine, the combination of two blocks or holders having cavities in their proximate faces, the two cavities fitting the wire from which the nails are to be produced, dies or cutters between said cavities, arranged to sever a blank of wire into two parts by a combined cutting and swaging action, and thereby form two points, two hammers arranged in line with the cavities in the blocks or holders, and adapted to move toward and from said dies in the direction of the length of the wire held thereby, and mechanism, substantially as described, to operate said blocks or holders, dies, and hammers, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 5th day of July, 1884.

NATHAN C. LEWIS.

Witnesses:
C. F. BROWN,
A. L. WHITE.