(No Model.)

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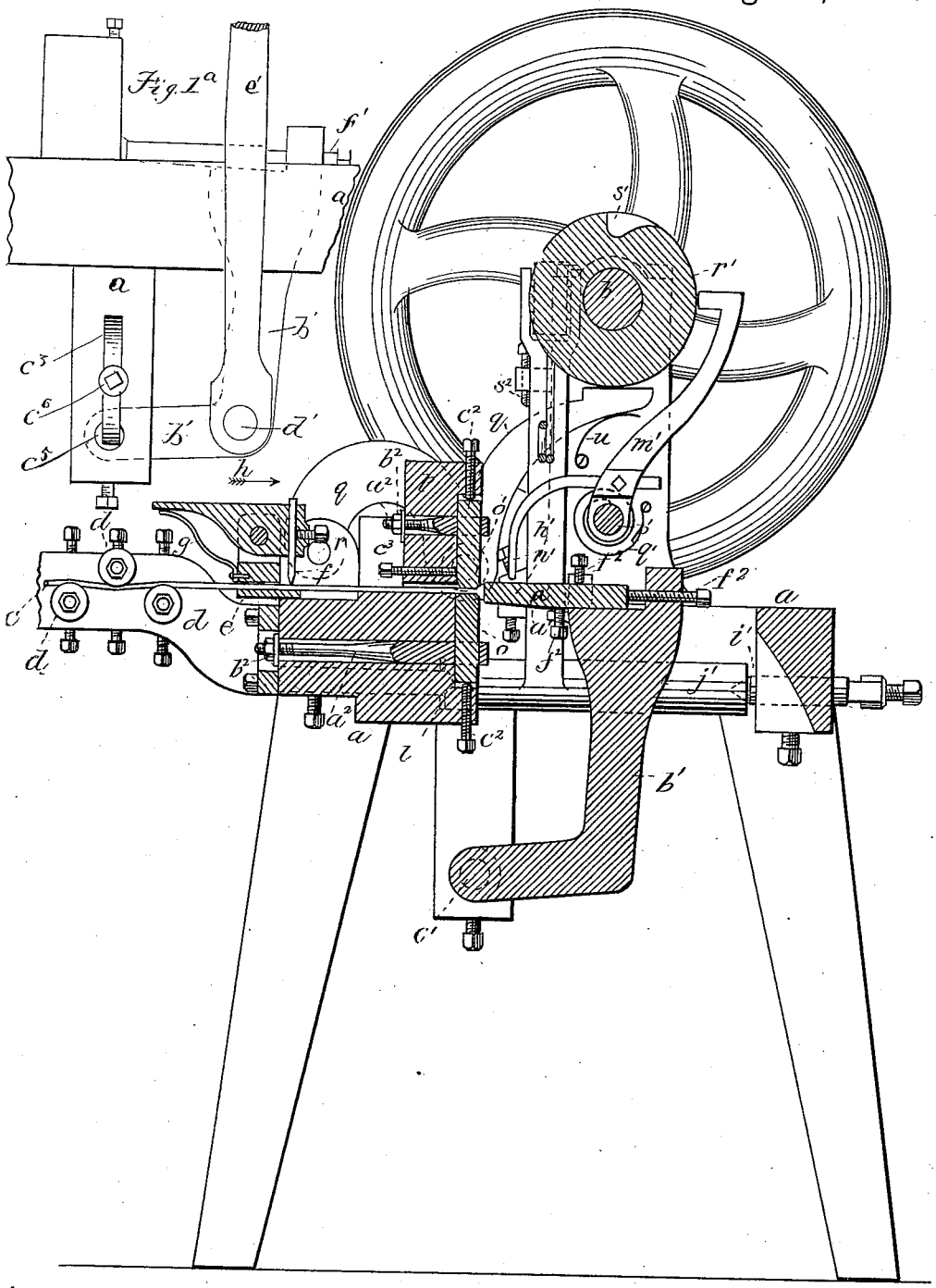
G. N. COOPER.

WIRE NAIL MACHINE.

No. 303,419. Patented Aug. 12, 1884.



WITNESSES

Fig. 1.

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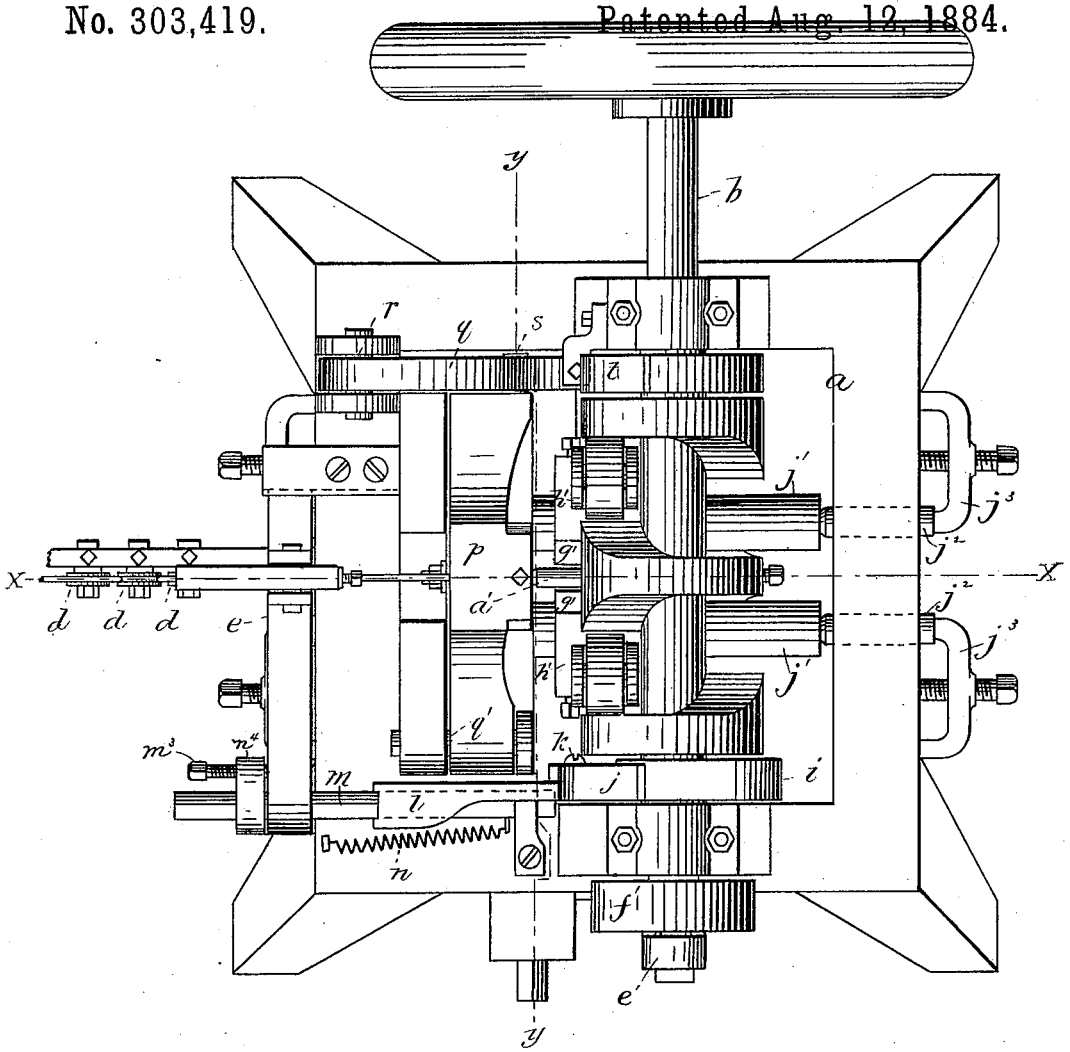

Fig. 2.

WITNESSES

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WIRE NAIL MACHINE.

No. 303,419. Patented Aug. 12, 1884.

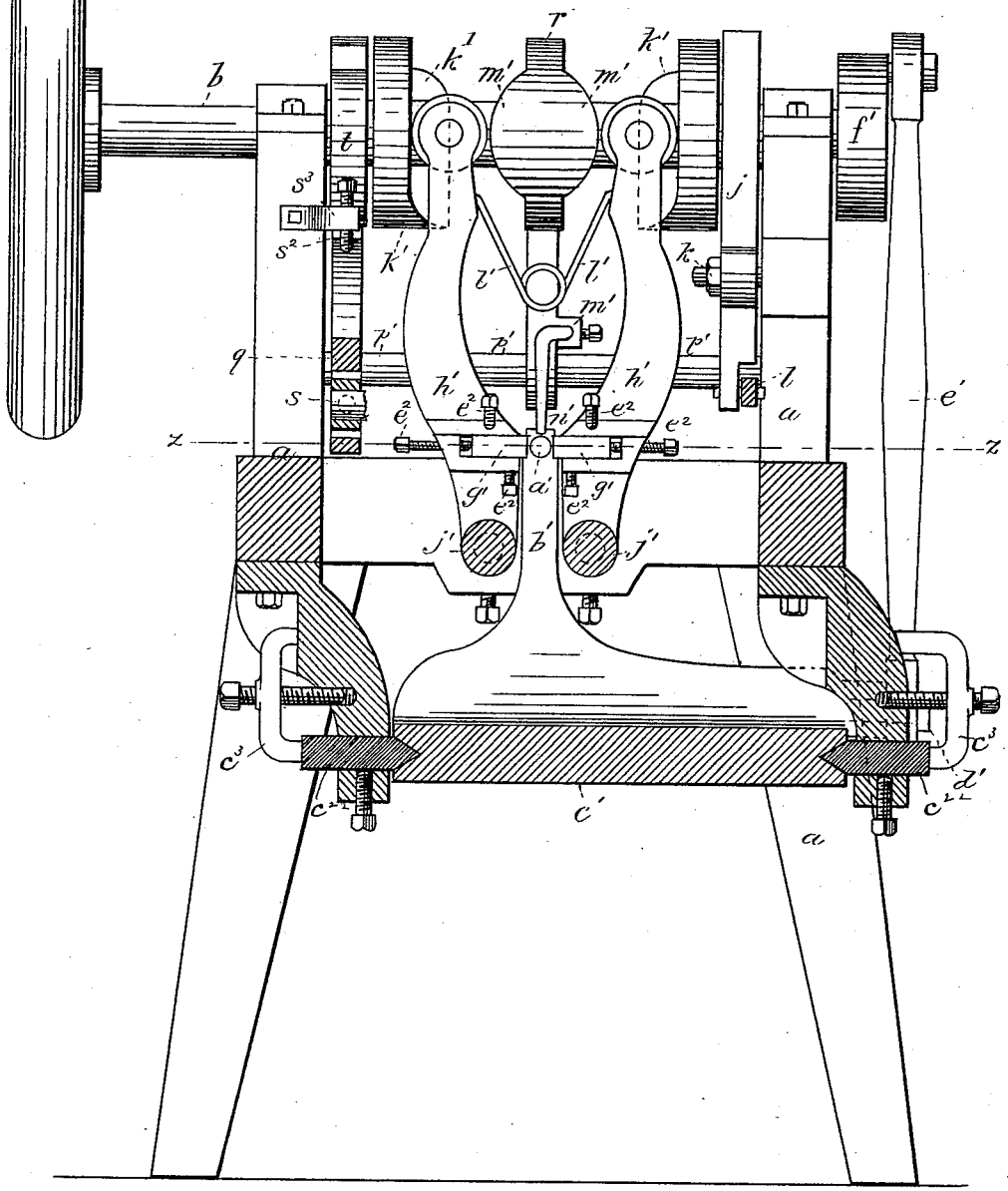

Fig. 3.

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WIRE NAIL MACHINE.

No. 303,419. Patented Aug. 12, 1884.

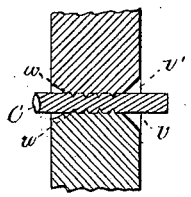

Fig-9-

Fig-4-

Fig-10-

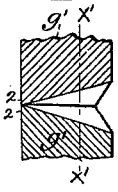

Fig-11

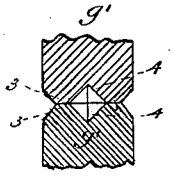

Fig-12-

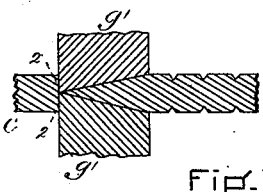

Fig-13-

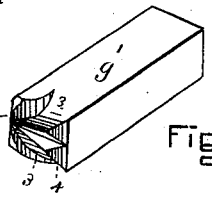

Fig-6-

Fig-8-

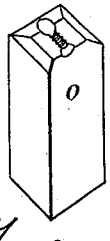

Fig-5-

Fig-7-

WITNESSES

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UNITED STATES PATENT OFFICE.

GEORGE N. COOPER, OF HAVERHILL, MASSACHUSETTS, ASSIGNOR TO HIMSELF AND CLARK & DOW, OF SAME PLACE.

WIRE-NAIL MACHINE.

SPECIFICATION forming part of Letters Patent No. 303,419, dated August 12, 1884.

Application filed September 3, 1883. (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 Machines for Making Wire Nails, 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 improved machine hereinafter described and claimed, and in the several details and combinations of parts.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a vertical section on line *x x*, Fig. 2. Fig. 1ª represents a partial side elevation. Fig. 2 represents a plan view. Fig. 3 represents a vertical section on line *y y*, Fig. 2. Fig. 4 represents a horizontal section on line *z z*, Fig. 3. Fig. 5 represents a perspective view of one of the forming and corrugating dies. Fig. 6 represents a similar view of one of the cutting-off and pointing dies. Figs. 7 and 8 represent perspective views of nails made by the improved machine. Figs. 9 and 10 are views of the dies that hold the nail, showing said nail before and after it is headed. Fig. 11 represents a section of the pointing and cutting dies. Fig. 12 represents a section on line *x' x'*, Fig. 11. Fig. 13 represents the same section shown in Fig. 11, with the wire in position.

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 imparted in any suitable manner.

The wire, *c*, to be formed into nails is passed between guide-rolls *d d d* to a feeding device, which consists of a block, *e*, adapted to slide on a supporting-surface on the frame *a*, and a dog, *f*, Fig. 1, which is pressed by a spring, *g*, against the wire, and moves the latter when the block *e* is moving in the direction of the arrow *h* in Fig. 1, but slips on the wire when the block is moving in the opposite direction. The block *e* is reciprocated by means of a cam, *i*, on the shaft *b*, a lever, *j*, pivoted at *k* to the frame *a*, and connected by a rod, *l*, with a guide-rod, *m*, to which the block *e* is rigidly attached, and a spring, *n*, supported by the frame *a* and exerting pressure on the guide-rod, so as to cause the latter to press the lever *j* against the cam *i*. The cam *i*, in rotating, turns the lever *j* on its pivot in one direction, and causes it to move the block *e* in the direction indicated by the arrow in Fig. 1. When the projecting portion of the cam *i* recedes, the spring *n* forces the block *e* in the opposite direction.

o o' represent a pair of dies, between which the end of the wire is fed. The die *o* is affixed rigidly to the frame *a*, and the die *o'* is attached to a rocking head, *p*, which is pivoted at *q'* to the frame *a*, and is oscillated to alternately raise and lower the die *o'* by a lever, *q*, pivoted at *r* to the frame *a*, and having an orifice receiving a stud, *s*, on the block *p*, a cam, *t*, on the shaft acting on the free end of said lever, and a spring, *u*, which presses said lever against the cam *t*. The cam *t* and spring *u* cooperate in oscillating the lever *q* vertically, and the latter, by its pivotal connection with block *p*, oscillates said block vertically on its pivot and causes the die *o'* to alternately meet and recede from the die *o*. The acting faces of the dies *o o'* are provided with nail-head-forming cavities *v v'* and with teeth *w*, which indent the sides of the wire and form barbs or corrugations thereon. The die *o'* is raised while the wire is being fed forward, and is afterward brought down upon the wire, the end thereof projecting somewhat beyond the dies, as shown in Fig. 9.

a' represents an upsetting die or hammer attached to an arm, *b'*, which is bent forward at its lower portion and pivotally connected with the frame *a*, as hereinafter described, and is connected by a pitman, *e'*, and a pin or stud, *d*, with a crank-disk, *f'*, on the shaft *b*, the rotation of said shaft causing the arm *b'* to oscillate and its hammer *a'* to alternately approach and recede from the dies *o o'*. When the hammer approaches said dies, it strikes the projecting end of the wire and upsets the same into the head-forming cavities, as shown in Fig. 10, thereby forming a head on the wire, the form of said head being determined by the form of the cavities *v v'*.

g' g' represent 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 h' h', attached to rock-shafts j' j', pivoted at i' i' to the frame a, and oscillated simultaneously in opposite directions, so as to cause the dies g' g' to alternately approach and recede from each other by means of two cams, k' k', on the shaft b and springs l', (or, if preferred, cams m' m',) which press the levers h' against said cams k', as shown in Fig. 3. The operating-faces of the dies g' g' are provided with transverse cutting-edges 2, which co-operate in severing the wire c, as shown in Fig. 13, and with oblique cutting-edges 3 3, which join at the transverse edges 2 and diverge from each other as they recede from said transverse edges, the oblique edges of each die forming an elongated **V**. The space or cavity 4 between the oblique edges 3 3 of each die is **V**-shaped in cross-section, as shown in Fig. 12. It will be seen that when the dies g' g' close upon the wire the transverse edges 2 2 will sever it transversely, leaving the end of the main portion of the wire substantially flat, while the oblique edges 3 3 3 3 will at the same time co-operate with the edges 2 2 in cutting wedge-shaped pieces or chips from the opposite sides of the wire, thereby pointing the severed portion, the point being given a pyramidal form by the joint action of the oblique edges 3 3 3 3 and the cavities 4 4 between said edges, which cavities swage or mold the wire on two sides. The nail is now completed, and drops into a suitable receptacle below the dies g' g', a clearer being preferably employed to dislodge the nail from the dies in case it has a tendency to stick to one of them after they have been operated. Said clearer is a finger attached to a lever, m', on a rock-shaft, p', which is pivoted to the frame of the machine, and is pressed by a spring, q', against the periphery of a disk, r', on the shaft b. Said disk has a short cam-recess or depression, s', in its periphery, which permits the lever m' to be moved briefly and abruptly by its spring in one direction to cause the finger n' to strike the nail after the dies g' g' have separated, and then as quickly moves the lever m' in the opposite direction, thus raising the finger n' above the dies g' g' and holding it so raised, as shown in Fig. 1. The order of the described steps is as follows, viz: The end of the wire being in the position shown in Fig. 9, with its end projecting through the dies o o', the hammer a' advances and upsets said end, passing between the separated dies g' g' in so doing. The hammer then recedes from between the dies g' g', the dies o o' open and release the wire, and the wire is fed forward until the head, formed as above described, has passed between the dies g' g' and is sufficiently removed from the transverse edges 2 2 to enable a nail of the desired length to be formed. The dies g' g' then close upon the wire and sever and point the same, as described, the edges 2 2 severing the wire transversely at a suitable distance from the dies o o' to leave enough wire projecting from said dies for the formation of the next head. The dies o o' close upon and hold the wire after it is fed forward, and remain closed while the feed-block e is moving back to take a new hold. The dies o o' are secured, respectively, to the frame a and block p by threaded bolts a^2 a^2, having sockets, through which said dies pass. Said bolts pass through orifices in the frame a and block p, and have nuts b^2 b^2, whereby they are enabled to clamp or loosen the dies o o'. Said dies are therefore capable of lengthwise adjustment. Sets-screws c^2 c^2 assist the bolts a^2 in holding the dies o o' in any position to which they may be adjusted. The die o' is capable of being adjusted vertically by means of the bolt a^2 and set-screw c^2, and also horizontally in the direction of the length of the wire c by means of the bolt a^2 and a set-screw, c^3, bearing against its rear side, and at right angles to the direction of the wire by set-screws (not shown in the drawings) bearing against opposite sides of the die o'. The dies g' g' are adjustable lengthwise in cavities or ways formed in the levers h' h', and are held in said cavities by set-screws c^2. The rock-shafts j' j' are supported by pivots j^2 j^2, which are movable lengthwise in their bearings in the frame a, and are held by adjustable dogs j^3 j^3, each bearing at one end against a pivot, j^2, secured to the frame a by a screw, j^5, as clearly shown in Fig. 2. The rock-shafts j' are thus enabled to be adjusted lengthwise, so as to vary the distance between the dies o o' and the point where the dies g' g' sever the wire. Any desired amount of metal can therefore be left projecting from the dies o o', and the size of the head subsequently formed by the hammer a' can be regulated at will. The hammer is also adjustable lengthwise and vertically, and is held in the lever h' by set-screws f^2 in any position to which it may be adjusted. The rock-shaft c', which operates the hammer a', is supported by pivots c^{22} c^{22}, held by adjustable dogs c^3, the rock-shaft c' being thus made adjustable like the rock-shaft j'. Provision is thus made for the sidewise adjustment of the hammer a'. The length of the feed movement of the wire, and therefore the length of the nails, may be adjusted by any suitable means—as, for example, by varying the extent of movement of the feed-block e, or, as I prefer, by the employment of an adjustable screw, m^3, working in an arm or offset, m^4, affixed rigidly to the rod m, which screw bears against the side of the frame a when the block e is forced forward by the spring n, and limits the forward movement imparted to the block by said spring, thus enabling the operator to regulate the length of said movement at any time without stopping the machine.

It will be seen that the cutting and pointing dies g' g' are arranged between the pivoted and the swinging ends of the upright levers

h' h', so that they operate on the wire and utilize the power applied to them to the best advantage. The comparatively short movements imparted to the dies g' g' in consequence of their proximity to the pivoted ends of the levers h' enable said dies to operate with considerable power, and to cut the wire squarely across, the wire having no tendency to stick to the cutters. The movement imparted to the hammer a' by the crank f' and pitman e' is positive, so that the wire is headed uniformly and to better advantage than when the hammer is controlled by a spring, as heretofore.

It will be observed that all the parts of the machine are operated by the one driving-shaft b. The feed-operating cam i is arranged to actuate the feeding device during about one-third of a rotation of the shaft b, while the other cams, which form the nail, operate during the remaining part of the rotation.

I am aware that it is not broadly new to operate the heading devices of a wire-nail machine by positive mechanism, such being described in English Patent No. 11,620 of 1847.

I claim—

1. In an organized machine for making nails from a continuous wire, the combination of the fixed gripping-die o, jointly with the combination of the reciprocating die o', the threaded bolt, having a socket through which said die o' passes, and the set-screws c^2 c^3, all the parts being relatively arranged substantially as described, and for the purpose stated.

2. In an organized machine for making nails from a continuous wire, the combination of the wire-feeding devices, substantially as described, fixed gripping-die o, the reciprocating die o', the reciprocating pointing-dies g' g', the upsetting-hammer a', and means, substantially as described, for adjusting said dies o' g' g' and hammer a' in any required direction with relation to the die o, as set forth.

3. In an organized machine for making nails from a continuous wire, the combination of a driving-shaft, b, the gripping and heading devices, the upright levers h' h', supported by rock-shafts j' j', and provided with cutting and pointing dies g' g', the longitudinally-movable supports or pivots for said rock-shafts, and adjustable dogs or holders j^3, arranged, as described, to form end bearings for the pivots, whereby said supports and their levers h' and dies g' may be adjusted to vary the distance from the gripping-dies at which the wire is cut by the cutting-dies, as set forth.

4. The combination, with the gripping, cutting off, and feeding devices, of the upsetting or heading hammer, the rock-shaft c', supporting said hammer, the driving-shaft having the crank or eccentric f', and the pitman e', whereby said crank or eccentric is connected to an arm on the rock-shaft and the hammer is positively operated, as set forth.

5. The combination, with the rock-shaft c', supporting the upsetting-hammer, of the longitudinally-movable pivots c^{22}, supporting said rock-shaft, and the adjustable dogs c^3, arranged, as described, to bear against the ends of said pivots, whereby said rock-shaft may be adjusted longitudinally to vary the lateral position of the hammer, as set forth.

6. The upsetting-hammer a', combined with the arm or lever b', having the top, bottom, and end adjusting-screws, f^2, and positive operating mechanism whereby the hammer may be adjusted vertically and longitudinally, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 30th day of August, 1883.

GEORGE N. COOPER.

Witnesses:
DAVID O. CLARK,
EDMUND B. FULLER.