(No Model.) 4 Sheets—Sheet 1.

F. BRYANT.

NAIL MAKING MACHINE.

No. 378,656. Patented Feb. 28, 1888.

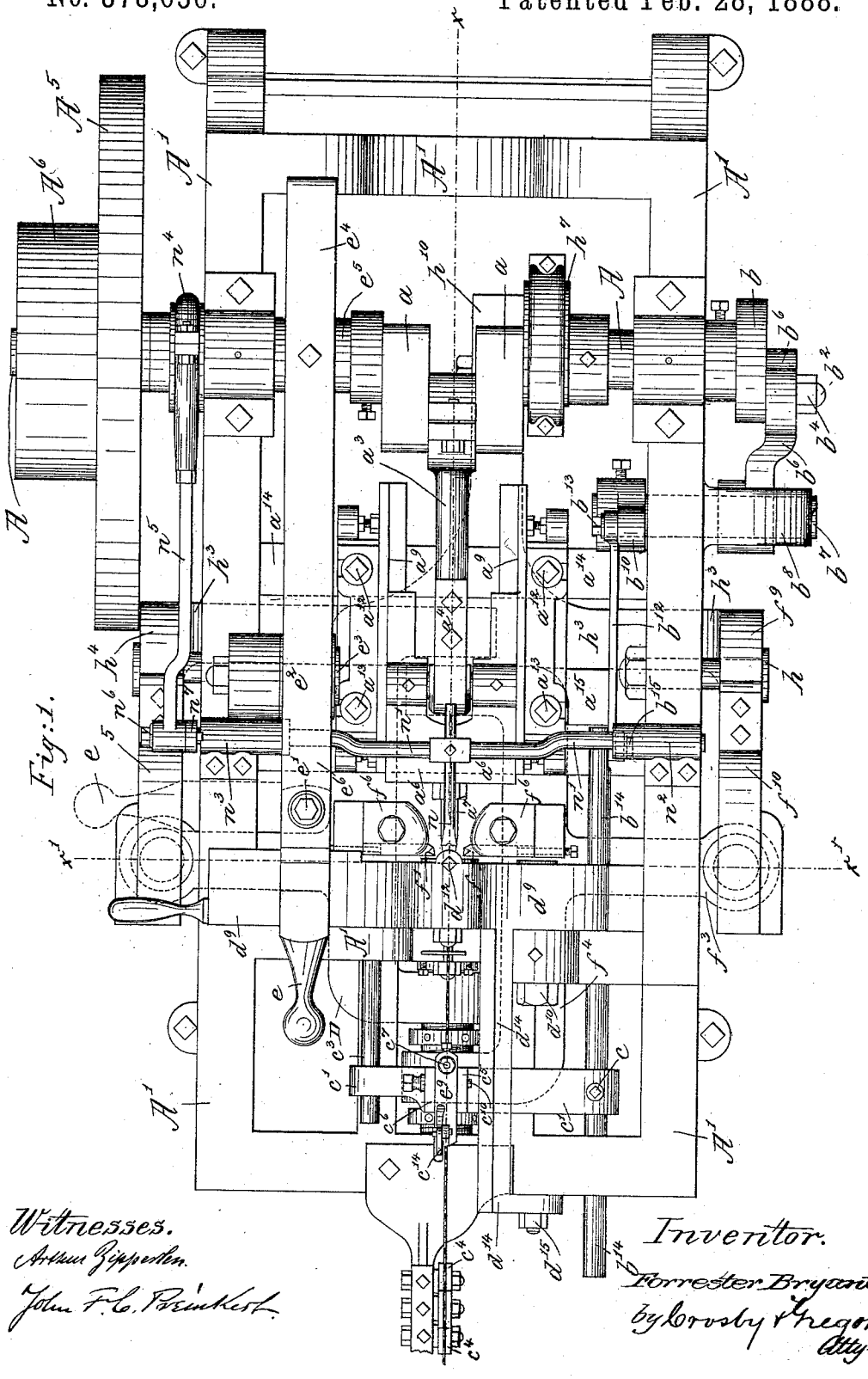

Fig. 1.

Witnesses.
Arthur Zipperlen.
John F. C. Reinhart.

Inventor.
Forrester Bryant.
by Crosby & Gregory
Attys.

(No Model.) 4 Sheets—Sheet 2.

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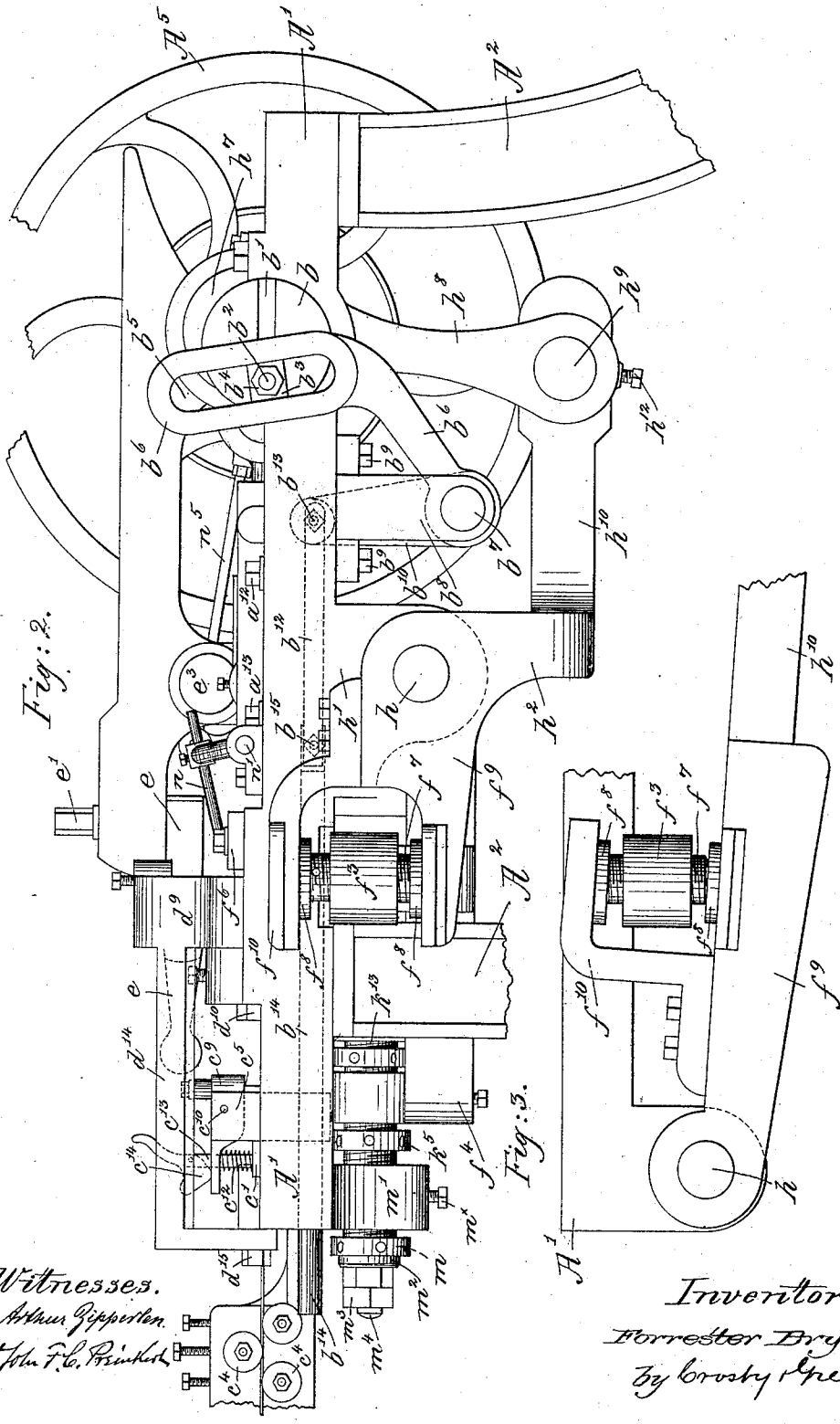

Fig. 2.

Fig. 3.

Witnesses.
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(No Model.) 4 Sheets—Sheet 3.

F. BRYANT.

NAIL MAKING MACHINE.

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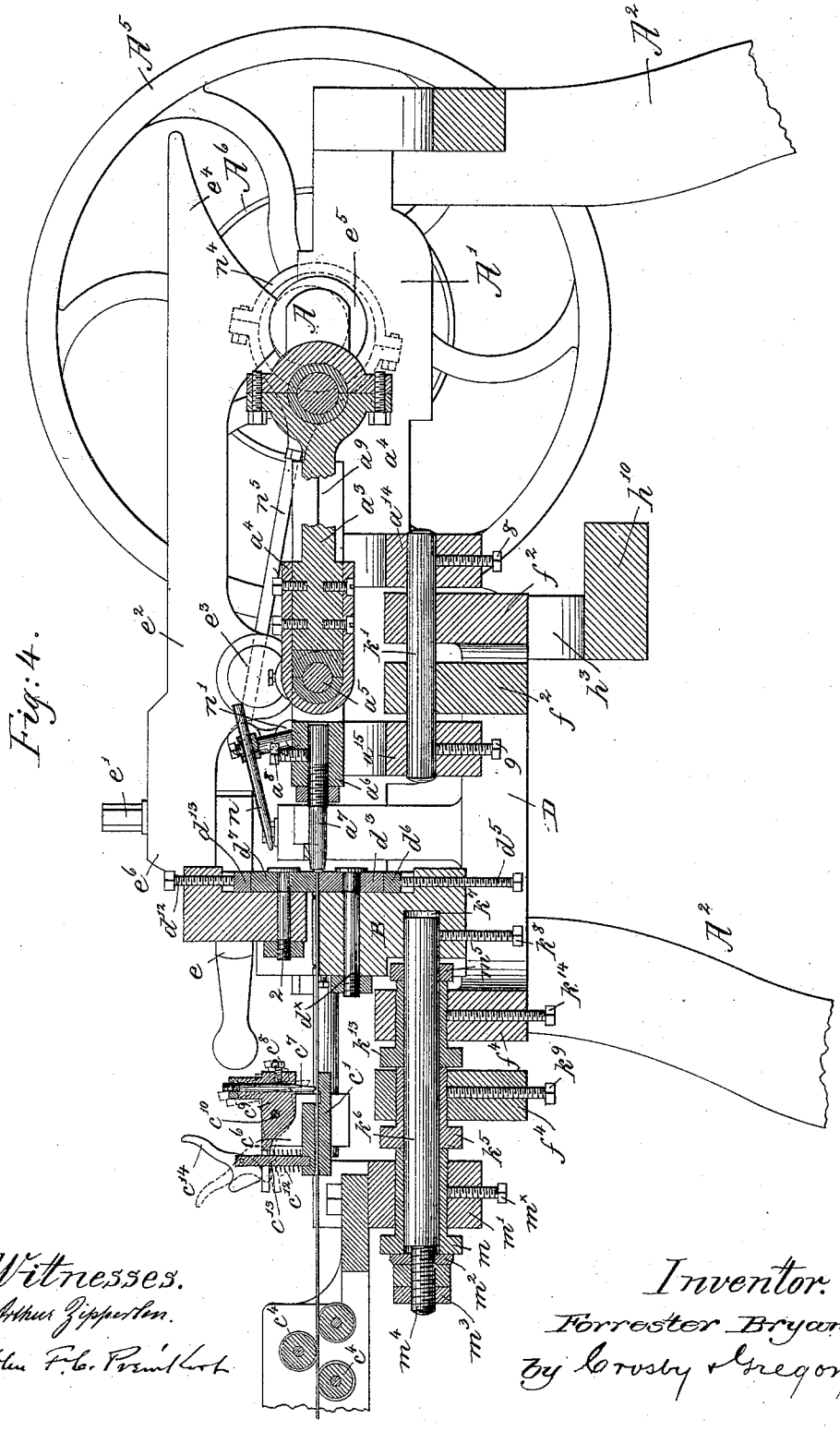

Fig: 4.

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NAIL MAKING MACHINE.

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Fig: 5.

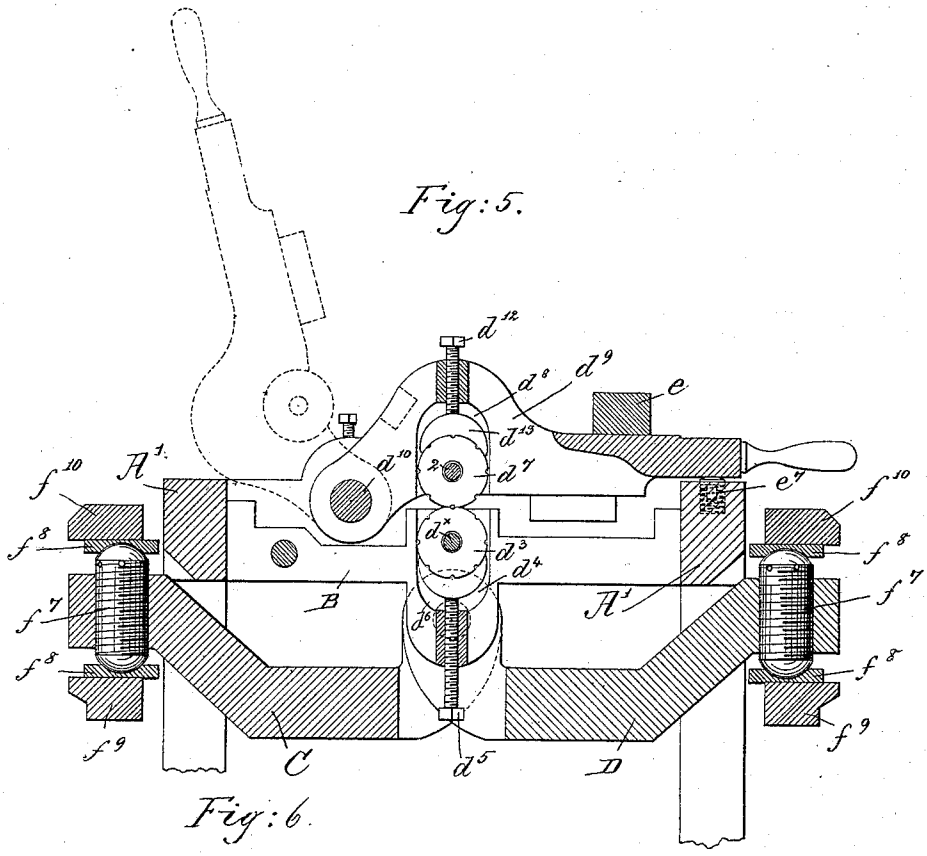


Fig: 6.

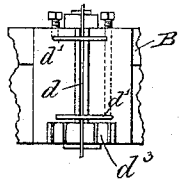
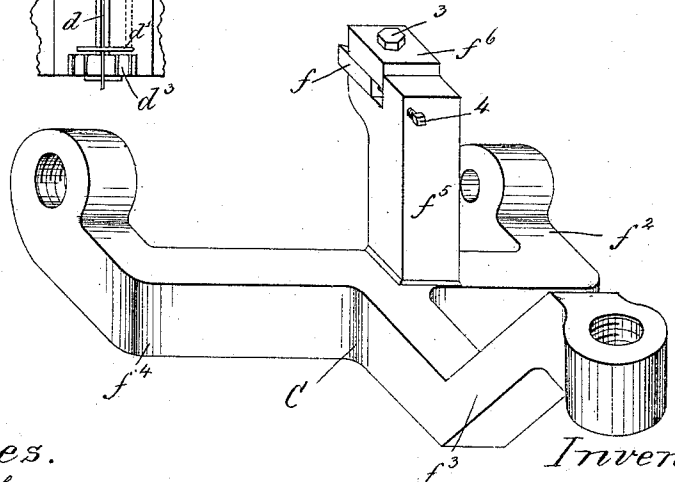


Fig: 7.



Witnesses.
Arthur Zipperlen.
John F. C. Brandt.

Inventor:
Forrester Bryant.
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UNITED STATES PATENT OFFICE.

FORRESTER BRYANT, OF HAVERHILL, MASSACHUSETTS, ASSIGNOR TO THE BRYANT NAIL COMPANY, OF PORTLAND, MAINE.

NAIL-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 378,656, dated February 28, 1888.

Application filed January 18, 1886. Renewed August 15, 1887. Serial No. 247,009. (No model.)

To all whom it may concern:

Be it known that I, FORRESTER BRYANT, of Haverhill, county of Essex, and State of Massachusetts, have invented an Improvement in Nail-Making Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to machines for making nails from a continuous wire, and has for its object to improve the construction of the same.

My invention consists, essentially, of mechanism, as will be described, by which each of the cutter-carriers may be adjusted vertically, of additional means by which each of said carriers may be adjusted longitudinally independent of the other, and of means by which both cutter-carriers may be moved longitudinally together to vary the amount of metal left to form the head of a nail after the action of the cutters, as will be hereinafter fully set forth.

My invention further consists of a pivoted lever to support the upper die or gripper, and a pivoted arm connected to said lever to prevent rocking of the same, thereby obtaining a perfect bind of the upper die upon the wire.

My invention consists, also, in combination with the upper die and the pivoted lever supporting said die, of a pivoted arm adapted to rest on said lever, a second lever, and a cam on the main shaft to act on said second lever to depress the die-carrying lever, causing the die carried thereby to grip and hold the wire while the cutters are operated to cut the nail, and thereafter the punch or "header" is operated to form the head of the next nail, as will be hereinafter fully set forth.

My invention also consists in details of construction, to be hereinafter pointed out in the claims at the end of this specification.

Figure 1 is a plan view of a nail-making machine embodying my invention; Fig. 2, a side elevation of Fig. 1; Fig. 3, a detail of a modification to be referred to; Fig. 4, a longitudinal section on line $x\,x$, Fig. 1; Fig. 5, a section on line $x'\,x'$, Fig. 1, to show the gripping-cutters; and Figs. 6 and 7, details to be referred to.

The main shaft A, having bearings in the top frame, A′, of the machine supported upon standards A^2, is provided with a crank, a, to which is secured the connecting-rod a^3, provided with the usual strap, a^4, said shaft being provided with the usual fly-wheel, A^5, and belt-pulley A^6.

The connecting-rod a^3 has secured to it a head-piece, a^6, to which is secured the punch or header a^7, that forms the head of the nail, said head-piece having extended through it a pin, a^5, to attach it to the said connecting-rod, the punch being secured in the head-piece by screw a^8, said head-piece being adapted to be reciprocated in guides a^9 by the revolution of the crank-shaft, said guides being secured by bolts a^{12} a^{13} to cross-pieces a^{14} a^{15} of the machine. (See Fig. 1.)

The crank-shaft A has mounted upon it outside the frame-work a disk, b, provided with a preferably diametrical dovetailed slot, b', which receives in it the dovetailed head of a bolt or stud, b^2, said bolt or stud having upon it a loose block, b^3, and nut b^4, the said bolt being capable of being held firmly, in any usual manner, in adjusted position, the said loose block entering a slot, b^5, of a lever, b^6, pivoted on a rocker, b^7, supported in an arm, b^8, secured to the top frame, A′, by bolts b^9. To the rocker b^7 is secured one end of an arm, b^{10}, (shown in Fig. 1, and partially in dotted lines, Fig. 2,) said arm being connected at its other end to a pitman, b^{12}, by a pin, b^{13}, (see Figs. 1 and 2,) said pitman being joined at its other end to a guide-rod, b^{14}, by a pin, b^{15}. (Shown in dotted lines, Figs. 1 and 2.)

The guide-rod b^{14} has secured to it, by screw c, one end of a carriage, c', the other end of which encircles and slides upon a supporting-rod, c^3, secured to the top frame, A′.

The carriage c', near its center and in line with the straightening-rolls c^4, common to this class of machines, supports, between upturned ears c^5 c^6, a lever, c^9, provided with a dog, c^7, to engage the wire after passing the rolls c^4 and feed it forward, the said lever, dog, and carriage c' constituting a feeding mechanism for the wire. The dog c^7, herein shown as chisel-pointed at the end, is connected to the lever by a screw, c^8. The rear end of the lever c^9 is

acted upon by a spiral spring, c^{12}, encircling a stud, c^{13}, on the carriage c', said stud having pivoted to it a lifter, c^{14}, by means of which the feed mechanism may be rendered inoperative by turning said lifter into the dotted-line position shown in Fig. 4, said lifter when in said position compressing the spring c^{12} and raising the dog or chisel c^7 away from the wire, thus stopping the feed of said wire, said feed being due to the movement of the lever b^6, which movement is communicated to the carriage c' and lever c^9 by the connecting mechanism described.

The wire fed forward by the feed mechanism described enters a guideway, d, (see Fig. 6,) formed in and extending across the plate B, attached to the frame A', said plate having secured to it metal pieces d', which are extended across the said guideway—one at each end—to prevent the wire coming out of the said guideway and out of the lower die, d^3, when the upper die, d^7, is raised in a manner, as will be hereinafter fully set forth.

The lower die, d^3, (shown as a notched wheel, and upon which the wire rests,) is herein shown (see Fig. 5) as set in a recess, d^4, of the plate B, and is secured to the said plate by bolt $d^\times$, said die being vertically adjustable by means of the bolt d^5, a cushion, d^6, being interposed between the die and bolt to prevent injury to said die. The bolt $d^\times$, holding the die d^3, as well as the bolt 2, holding the die d^7, is, within the said die, of smaller diameter than the central opening of the said die, so as to admit of its adjustment. The upper die, d^7, by which the wire is gripped, is set in a recess, d^8, of a lever, d^9, pivoted at d^{10} to the plate B, referred to, the die d^7 being made adjustable by a bolt, d^{12}, a cushion, d^{13}, being interposed between said die and bolt, said die being secured to said lever by bolt 2. The lever d^9 has resting upon it at one end an arm, e, herein shown as pivoted on a bolt, e', (see Figs. 1 and 4,) said bolt being extended through a lever, e^2, pivoted on a stud, e^3, of the top frame, A', and having its long arm e^4 bearing upon a cam, e^5, on the main shaft A. The cam e^5, during part of the revolution of the shaft A, raises the long arm e^4 of the lever e^2, turning said lever on its pivot and depressing the short arm e^6 and the pivoted arm e, thereby exerting a pressure on the lever d^9, which pressure causes the upper die to grip the wire and hold the same firmly between it and the lower die, while the punch or header a^7 strikes the end of the wire to upset the wire and form the head of the nail.

The lever d^9 has secured to it near its pivoted end a second arm, d^{14}, pivoted at d^{15} to the top frame, A', (see Figs. 1 and 2,) said pivot being in line with the pivot d^{10}, said arm d^{14} preventing the lever d^9 from rocking, thus obtaining an even or uniform bind or grip of the die d^7 upon the wire. As the cam e^5 recedes from the long arm e^4 of the lever e^2, a spring, e^7, herein shown as a spiral spring embedded in a socket in the top frame, A', as in dotted lines, Fig. 5, forces the lever d^9 upward, thus lifting the die d^7 and permitting the wire to be fed forward by the feed mechanism, said feed mechanism being so regulated as to begin to feed the wire forward as soon as the upper die has been raised, as above described. A flat or other usual-shaped spring may be used instead of the one shown.

A sufficient length of wire having been fed forward to form a nail of desired length, which length can be varied by varying the position of the bolt or stud b^2 in the slot b' of the disk b, the upper die, d^7, grips the wire, and two cutting-dies, $f\,f'$, (see Fig. 1,) are then operated to cut the wire to form a substantially conical point for the nail. The cutting-dies f f' are secured to like cutter-carriers, C D, one on each side of the machine, and both being alike I will specifically describe but one of them.

The carrier C is shown separately in Fig. 7, and both carriers are shown enlarged and in section in Fig. 5. Each cutter-carrier consists of a yoke-piece having arms f^2 f^3 f^4 and an upright, f^5, to support the die, the die shown in Fig. 7 being marked f, said die being secured in its adjusted position by means of the cap f^6 and screw 3, screwed into said upright, the horizontal position of the die in the upright being controlled by the adjusting-screw 4. A threaded spindle, f^7, is extended through a threaded opening in the arm f^3 of the die-carrier, said spindle having its ends ball-shaped to enter sockets in metal slippers f^8, one at each end of said spindle, said metal slippers being adapted to slide on or between a lever, f^9, and a bent arm, f^{10}, secured to said lever, the horizontal position of the dies carried by the said die-carriers being secured by adjusting the said threaded spindles. Each lever f^9 is pivoted upon a stud, h, secured to the frame A', and arms h^2, one on each of said levers, are connected by a cross-piece, h^3. (Shown in dotted lines, Fig. 1.)

The screw-threaded spindles enable the dies $f\,f'$ to be kept adjusted relatively to each other and in a horizontal position, or at an angle of one hundred and eighty degrees, to insure perfect working of the said dies.

The cutting-dies referred to are made to approach and recede from each other by means of an eccentric, h^7, on the shaft A, having an eccentric-rod, h^8, of usual construction, connected by the pin h^9 to an arm, h^{10}, extended from the cross-piece h^3, before referred to, the said eccentric-rod being herein shown as secured to the pin h^9 by set-screw h^{12}. (See Fig. 2.)

The arm f^2 of the cutter-carrier C rocks upon a rod, k', supported in cross-pieces a^{14} a^{15} of the top frame, A', said rod being secured thereto by screws 8 9. (See Fig. 4.) The arm f^4 of said carrier is provided with a threaded opening to receive a sleeve, k^5, said sleeve being threaded on its outside to engage said threaded opening, and smooth on its inside to receive a rod, k^6, one end of said rod resting in a recess, k^7, in the plate B and main-

tained in position by the screw k^8, the sleeve k^5 being maintained in position by the screw k^9.

The arm f^2 of the cutter-carrier D on the opposite side of the machine is supported by and rocks upon the same rod k', while the arm f^4 of said cutter-carrier has a threaded opening to engage the threaded surface of the sleeve k^{13}, said sleeve also having the spindle k^6 extended through it and being maintained in position by the screw k^{14}. The spindle k^6 is also extended through a sleeve, m, threaded on its outside and supported by the cross-piece m' of the top frame, A', said sleeve being secured by the screw $m^\times$, the said sleeves being kept together by a washer, m^2, and a nut, m^3, screwed on the threaded end m^4 of the spindle, and the collar m^5 securely fastened to the opposite end of said spindle.

The cutter-carrier C can be adjusted longitudinally by rotating the sleeve k^5, and the cutter D by rotating the sleeve k^{13}, while both carriers can be moved longitudinally together to allow more or less metal to be left to form the head of the nail by rotating the sleeve m.

In case the nail after being cut by the cutting-dies still clings to either the wire or the said cutting-dies, a clearer or finger, n, fastened to a rock-shaft, n', (see Fig. 1,) having bearings in hubs n^2 n^3, secured on opposite sides of the top frame, A', is moved down to strike the said nail and project the same into a chute leading to a suitable receptacle (not shown) by means of an eccentric, n^4, on the shaft A, said eccentric being connected by a rod, n^5, to a crank-pin, n^6, of a crank, n^7, on the rock-shaft n'.

In the operation of my improved machine the wire, after being straightened by the rolls c^4 and fed forward by the feed mechanism, is gripped between the gripping-dies d^3 d^7 and firmly held while the head is formed by the punch or header a^7. As soon as the head is formed, as in Fig. 4, the upper die or gripper is raised by the spring e^7, thus permitting the wire to be fed forward. When the desired length of wire has been fed forward, the upper die or gripper, d^7, again binds on the wire, thus holding it firmly while the cutting-dies are operated, as above described, to cut and point the nail, and thereafter the clearer or finger strikes said nail and projects it into the chute leading to the receiver.

It will be noticed that the slotted lever b^6 is so bent that the slot therein is placed angularly with relation to a line intersecting the pivotal center of the said lever and the center of the shaft A, carrying the disk b, which has on it the crank-pin to move the said lever, the inclination of the slot b^5 in the said lever being such as to insure a rapid movement of the feeding mechanism when feeding the wire, and a slower movement when returning to re-engage the wire.

It is evident that instead of operating both cutter-carriers by one eccentric each cutter-carrier may be operated by an independent eccentric, in which case the cross-piece k^3 would not be needed; but I prefer the construction shown.

Instead of pivoting the levers f^9 near the center of the machine, said levers may be pivoted at the front of the machine, as shown in Fig. 3.

I claim—

1. In a nail-making machine, the cutter-carriers and cutters carried thereby, and means, substantially as described, to operate said carriers, combined with the round-ended threaded spindles to adjust said cutter-carriers to place the cutters in correct position each with relation to the other, as and for the purpose set forth.

2. In a nail-making machine, the cutter-carriers, cutters carried thereby, and means to operate said carriers, combined with the sleeves k^5 and k^{13}, to adjust each of said cutter-carriers longitudinally independently of the other, substantially as specified.

3. In a nail-making machine, the cutter-carriers and cutters carried thereby, and means to operate said carriers, combined with the sleeve m, to adjust both of said carriers longitudinally together, as and for the purpose set forth.

4. In a nail-making machine, the feeding mechanism and the lever b^6, having a slot located at an angle to a line intersecting the pivoted part of the said lever, and the shaft carrying the crank-pin to vibrate said lever, combined with intermediate connecting mechanism, substantially as described, to join the said lever operatively with the said feeding mechanism, whereby the forward stroke of the feeding mechanism is made at a faster speed than its return-stroke, as and for the purpose set forth.

5. The upper die, d^7, and the pivoted lever d^9, to support said die, combined with the pivoted arm d^{14}, to prevent rocking of the upper die, substantially as described.

6. The upper die, d^7, the pivoted lever d^9, and pivoted arm d^{14}, connected to said lever, combined with the lower die, d^3, the plate B, and with the guideway d, and pieces d', extended across said guideway to keep the wire in said guideway, and to prevent said wire being disengaged from the lower die when the upper die is raised, substantially as described.

7. The lower die, d^3, the upper die, d^7, and pivoted lever d^9, combined with the pivoted arm e, the lever c^2, and cam e^5, acting on said lever to turn it on its pivot to cause the upper die to grip the wire during one part of the revolution of the main shaft, and with means, substantially as described, to raise said upper die during another part of said revolution, as and for the purpose set forth.

8. The two pivoted cutter-carriers, their spindles f^7, slippers f^8, levers f^9, and arm f^{10}, combined with means, substantially as described, to vibrate the said levers, for the purpose set forth.

9. In a nail-making machine, the pivoted cutter-carriers, cutters carried thereby, the round-ended threaded spindle therein, the slippers, the lever f^9 and arms f^{10}, and the sleeves to effect the longitudinal adjustment of the said carriers, combined with means, substantially as described, for vibrating the said levers, as and for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FORRESTER BRYANT.

Witnesses:
G. W. GREGORY,
J. H. CHURCHILL.