(No Model.)

3 Sheets—Sheet 1.

J. W. THOMPSON.

NAIL MACHINE.

No. 398,009. Patented Feb. 19, 1889.

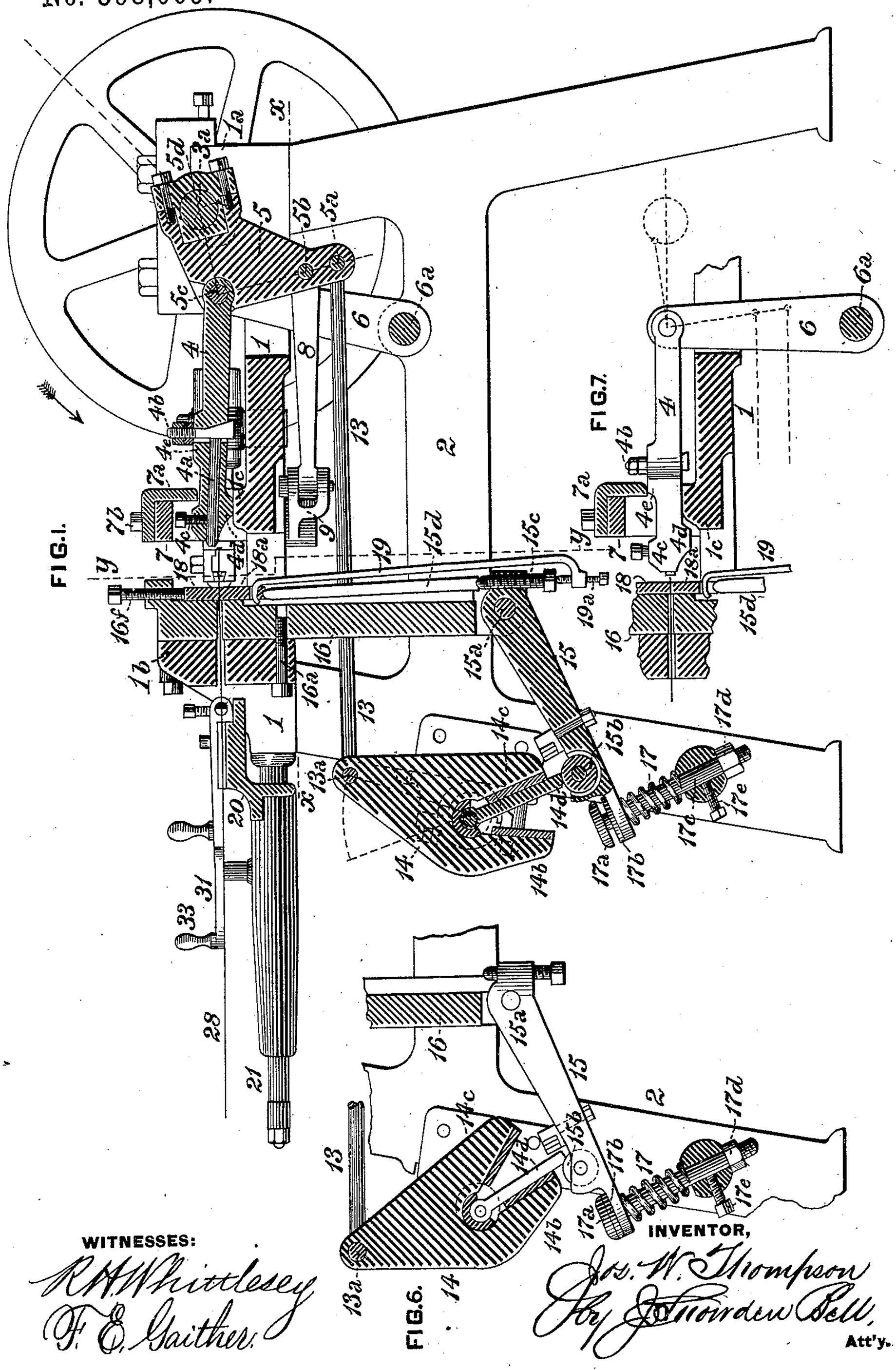

FIG. 1.

FIG. 7.

FIG. 6.

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(No Model.)

3 Sheets—Sheet 2.

J. W. THOMPSON.

NAIL MACHINE.

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FIG. 2.

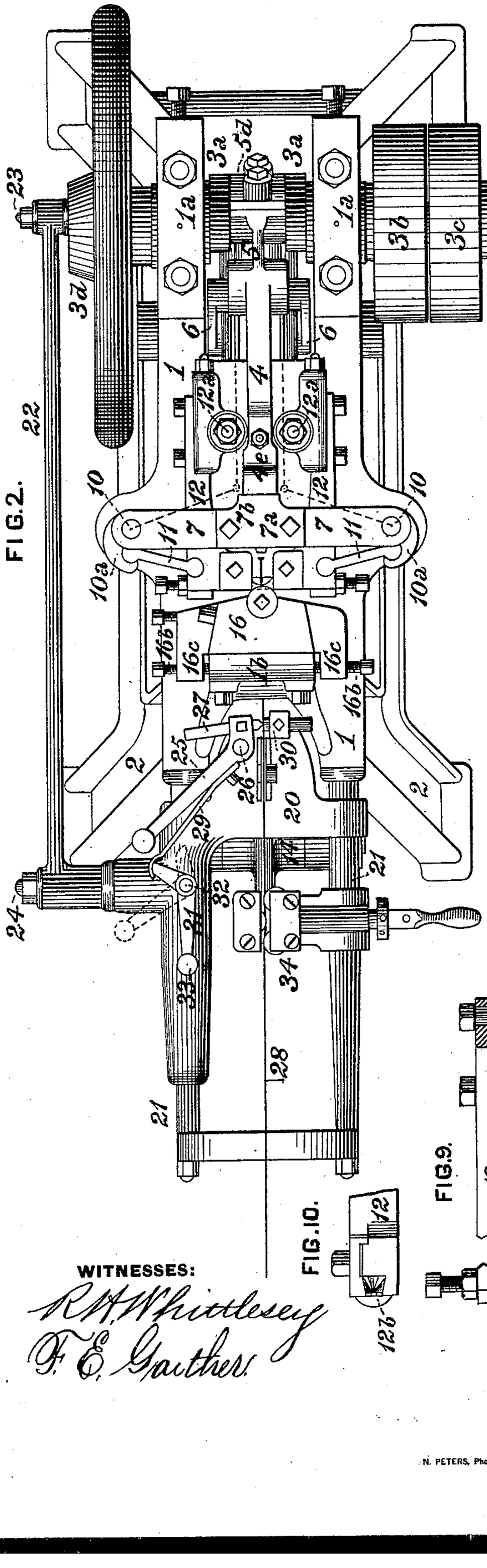

FIG. 3.

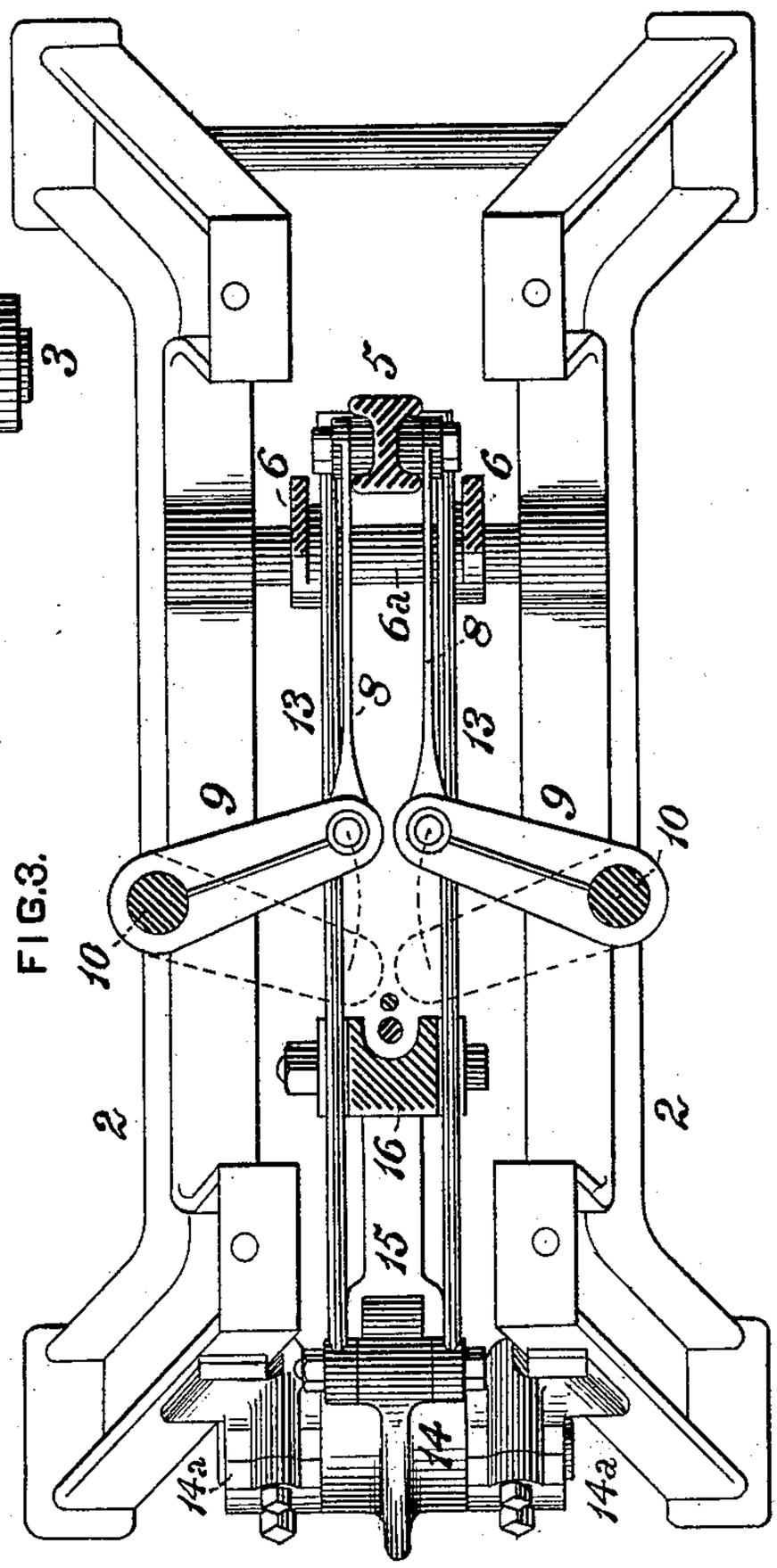

FIG. 8.

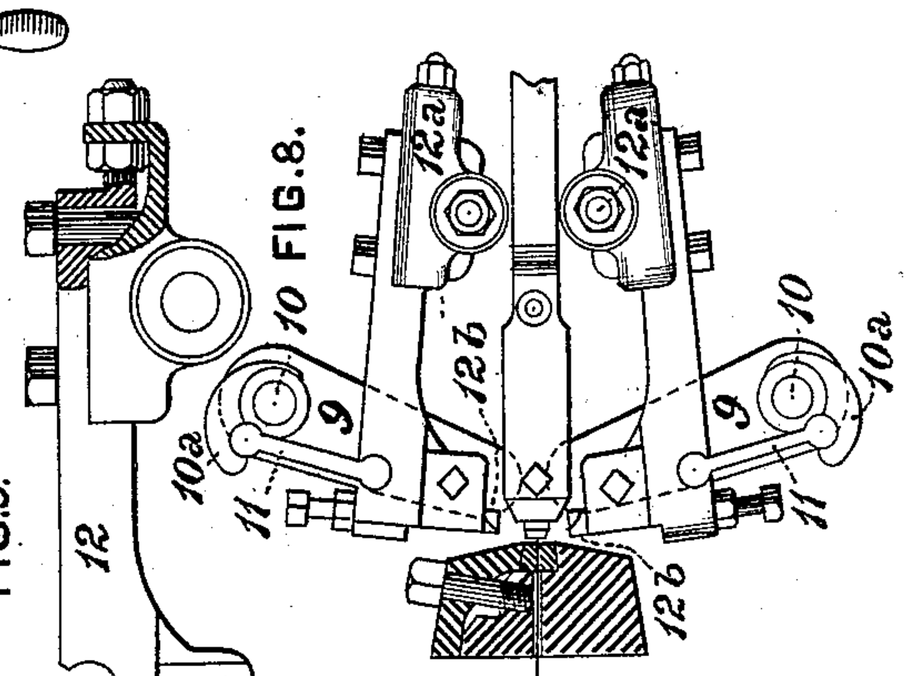

FIG. 9.

FIG. 10.

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(No Model.) 3 Sheets—Sheet 3.

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NAIL MACHINE.

No. 398,009. Patented Feb. 19, 1889.

FIG. 5.

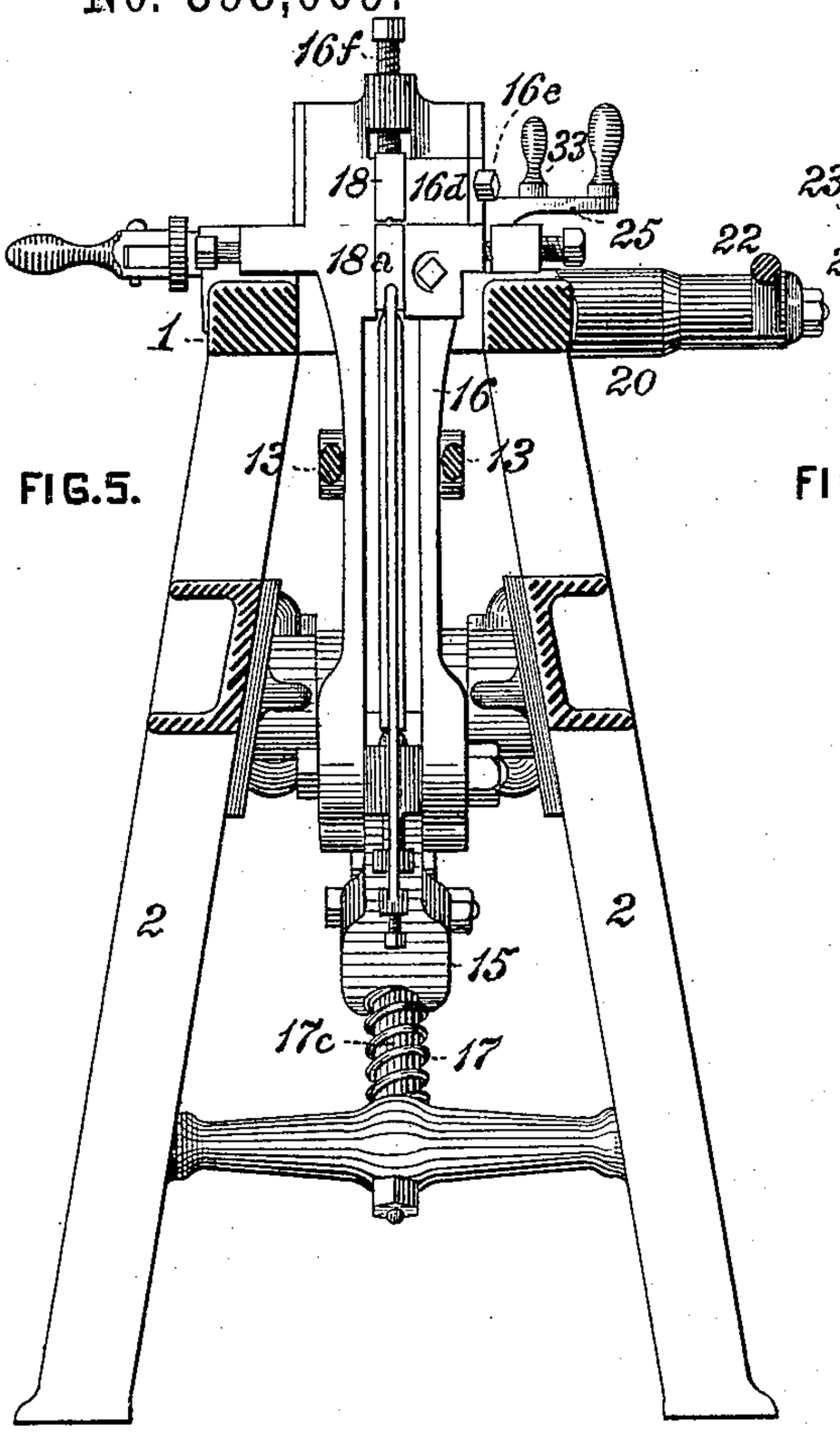


FIG. 4.

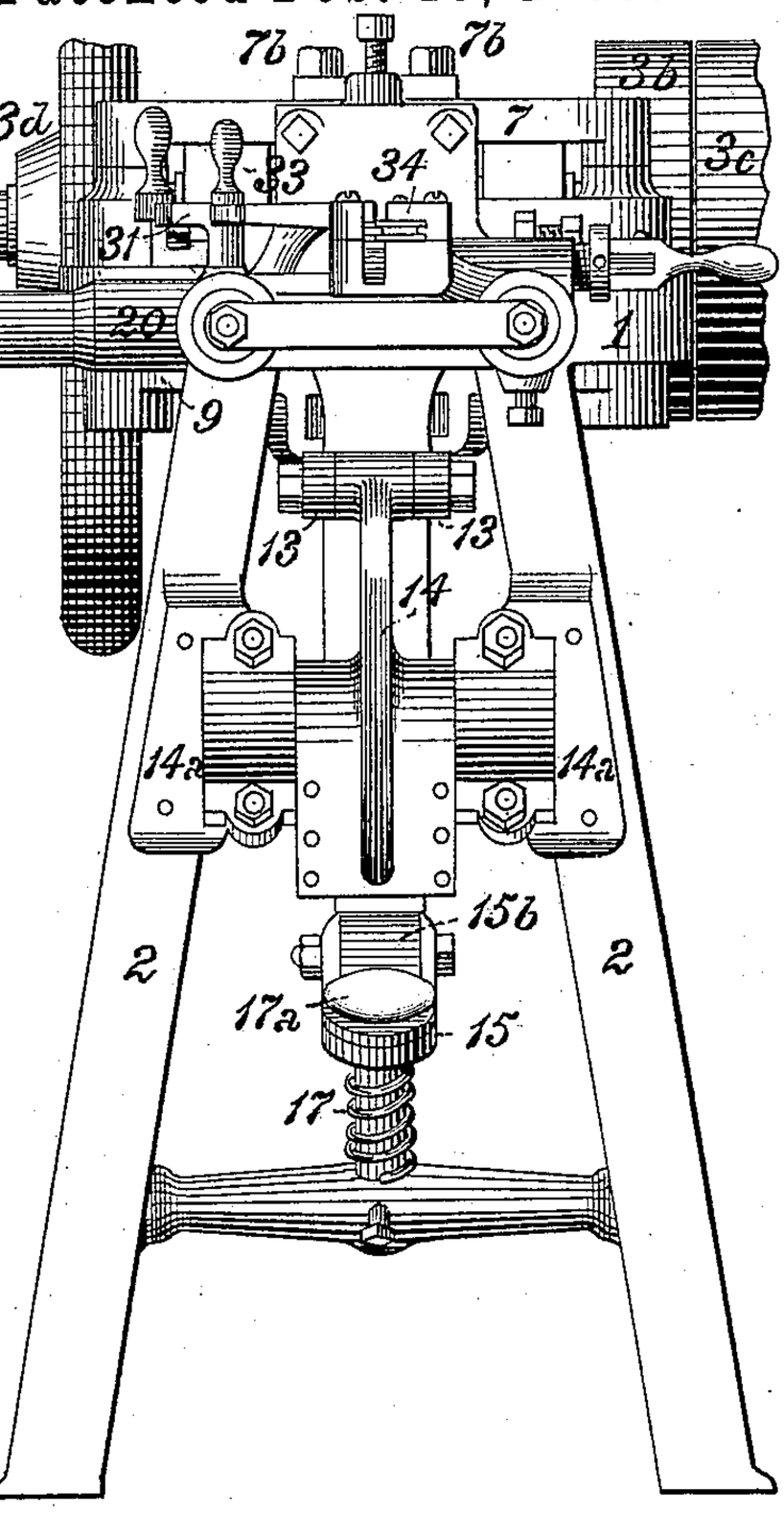
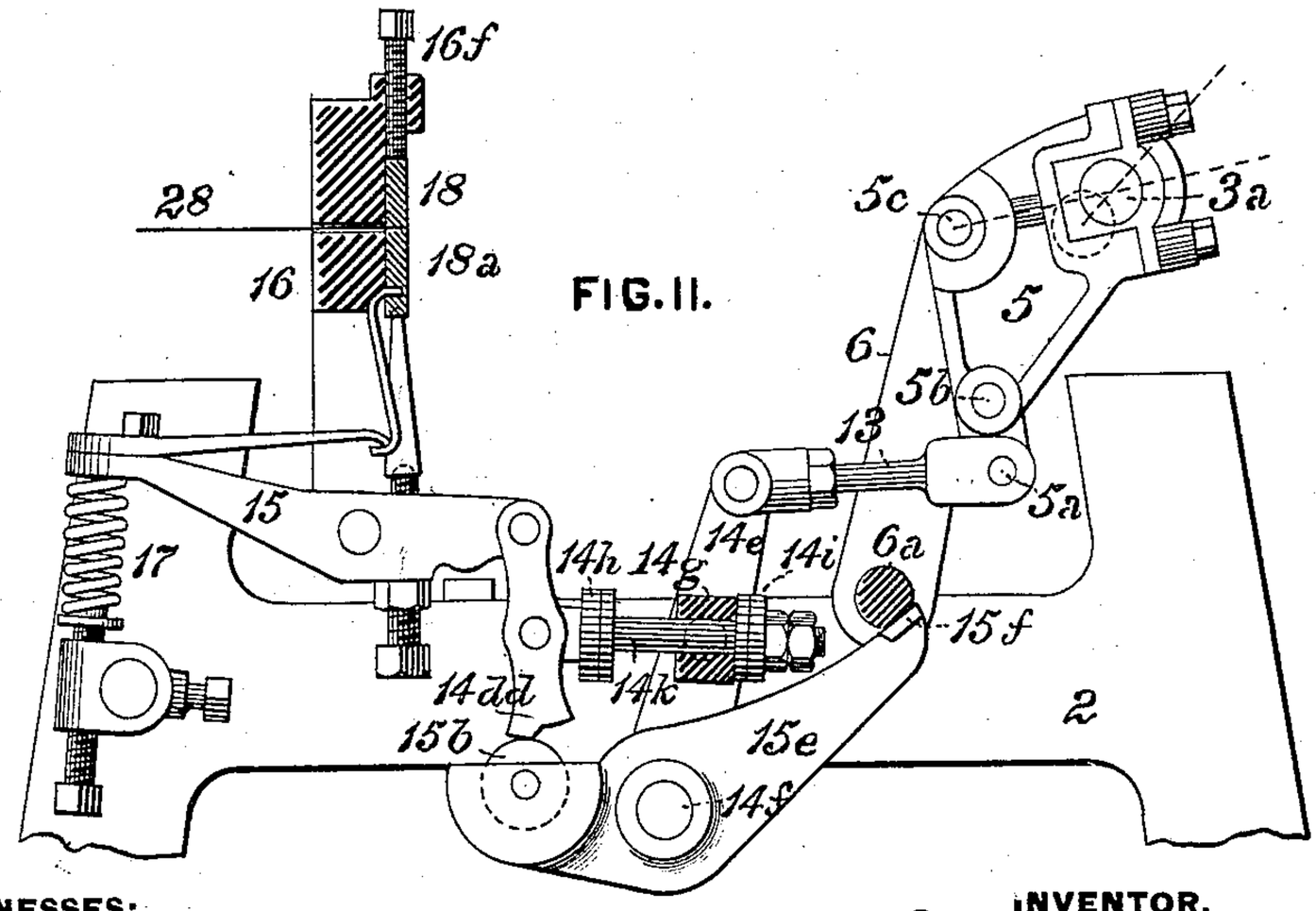


FIG. 11.



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UNITED STATES PATENT OFFICE.

JOSEPH W. THOMPSON, OF SALEM, OHIO, ASSIGNOR OF ONE-HALF TO THE BUCKEYE ENGINE COMPANY, OF SAME PLACE.

NAIL-MACHINE.

SPECIFICATION forming part of Letters Patent No. 398,009, dated February 19, 1889.

Application filed September 8, 1888. Serial No. 284,928. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH W. THOMPSON, of Salem, in the county of Columbiana and State of Ohio, have invented certain new and useful Improvements in Wire-Nail Machines, of which improvements the following is a specification.

My invention relates to wire-nail-making machines of the class in which wire is intermittently fed between gripping-dies for a distance sufficient to form a nail, gripped by said dies, cut off and pointed, headed, released, and again fed forward, these operations being consecutively and continuously performed upon a length of wire in its passage through the machine.

The object of my invention is to dispense with the multiplicity of cams, eccentrics, and cranks heretofore ordinarily employed in effecting the several operations above recited, and to perform the same, excepting the feeding of the wire, by mechanism actuated by a single crank, thereby materially diminishing friction, wear, noise, consumption of lubricants, and space required, as well as adapting the machine to effective operation at comparatively high speed.

To this end my improvements consist in certain novel devices and combinations of mechanism hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a vertical longitudinal central section through a wire-nail machine embodying my invention; Fig. 2, a plan or top view of the same; Fig. 3, a horizontal section at the line *x x* of Fig. 1; Fig. 4, an end view as seen from the left; Fig. 5, a vertical transverse section at the line *y y* of Fig. 1; Fig. 6, a detached view of a portion of the gripping mechanism in the positions occupied when the gripping-jaws are released from the wire; Fig. 7, a view showing the heading-ram in position for forming a head upon a nail; Fig. 8, a plan view of the cutting levers and knives at the outer extremity of their movement; Fig. 9, a similar view, on an enlarged scale, of one of the cutting-levers; Fig. 10, a side view in elevation of a portion of the same; and Fig. 11, a view partly in elevation and partly in longitudinal central section, illustrating a modification of the gripping mechanism.

The operative mechanism is mounted and supported upon a frame composed of a horizontal table or bed, 1, and vertical standards or legs 2. A driving-shaft, 3, carrying fast and loose pulleys 3^b 3^c, for the reception of a belt through which the operating-power is transmitted from a suitable prime mover, is mounted in bearings 1^a on the table 1, said shaft having formed upon it a double crank, 3^a, which actuates the gripping, cutting and pointing, and heading mechanisms, as presently to be described, and carrying upon one of its ends a crank, disk, or arm, 3^d, for operating the mechanism by which the wire is progressively fed or advanced to be formed by cutting and heading into a series of nails.

The feeding mechanism does not differ as to its essential elements from those heretofore known in the art. A feed-carriage, 20, is reciprocated upon horizontal guides 21, secured to the end of the frame 1 farthest from the driving-shaft by a connecting-rod, 22, which is coupled at one end to a crank-pin, 23, on the disk or arm 3^d and at the other to a pin, 24, on the carriage 20. The crank-pin 23 is secured adjustably in a radial groove or slot in the disk 3^d, so that the traverse of the feed-carriage may be increased or diminished as required for different lengths of nails. A double-armed feed-dog, 25, pivoted on a vertical stem, 26, on the carriage 20, carries upon its inner and shorter arm a rod, 27, having a chisel-faced end, which is forced against the wire 28 by a spring, 29, secured to the outer and longer arm of the dog 25 and bearing against an abutment. The wire traverses between the chisel-face of the rod 27 and a bearing, 30, secured adjustably upon the carriage opposite thereto, the pressure of the spring causing the chisel-face of the rod to bear against the wire at an angle to its axial line, and thereby force it forward during and for a distance equal to each traverse of the carriage in the direction of the driving-shaft, the face of the rod 27 sliding freely over the wire without moving the same in the opposite movements of the carriage. In order to admit of the ready stoppage and resumption of the feed whenever desired, the free end of the spring 29 abuts against a lever, 31, pivoted on a pin, 32, upon the carriage and provided

with a handle, 33. By moving the lever 31 into the position shown in dotted lines in Fig. 1 the tension of the spring 29 on the dog 25 is relieved, and, the face of the rod 27 then sliding freely along the wire 28, no feeding movement will be imparted thereto in the traverse of the carriage. The wire is led through a straightener, 34, having three or more rolls fitted to rotate on opposite sides of the wire before passing between the feeding-rod 27 and opposite bearing, 30.

The wire 28 is gripped or firmly held stationary during the cutting and pointing and heading operations by and between gripping-dies 18 and 18^a, which are respectively fixed and movable in a vertical die-block, 16, secured, with the capacity of lateral adjustment, to the table 1, in order that the grooves in the meeting faces of the dies may be kept truly concentric with the desired axial line of the wire 28. The die-block 16 is secured to an upwardly-projecting transverse member, 1^b, of the table 1 by bolts 16^a, passing through slotted holes in the frame member 1^b, to admit of the lateral adjustment thereof, and set-screws 16^b, engaging female threads in side lugs, 16^c, formed on the die-block and having their inner faces at a greater distance apart than the width of the frame member 1^b, bear against the sides of the latter. It will be seen that by proper adjustment of the set-screws 16^b and bolts 16^a the die-block 16 may be adjusted and fixed in proper position to bring the vertical center lines of the dies in line with the axis of the wire.

The upper and fixed die, 18, fits in a dovetail groove in the die-block 16, and is held firmly therein by a lateral clamping-block, 16^d, and bolt 16^e, being adjusted vertically by a set-screw, 16^f, which acts in conjunction with a lower set-screw, 15^c, bearing upon the movable die 18^a, as presently to be described. The die 18^a fits freely and is adapted to move through a limited range of traverse toward and from the fixed die 18 in a groove or guideway in the die-block in line with the die 18. Movement is imparted to the die 18^a from the crank 3^a on the driving-shaft 3 by means of the following mechanism:

A connecting-block, 5, which is in form substantially a right-angled lever, is coupled by a cap, 5^d, to the pin of the crank 3^a on the driving-shaft, the function of the upper arm of the block 5, or that whose mean position is horizontal, being to transmit the substantially unmodified movement of rotation of the crank-pin to the heading-ram 4 in the manner of a connecting-rod in other machines, and the function of the lower arm, or that whose mean position is vertical, to transmit said movement, modified as to time and extent, to the gripping mechanism and to the cutting and pointing mechanism. The heading-ram 4 is coupled to a pin, 5^c, passing through the connecting-block 5 at or near the junction of its upper and lower arms, the center lines of which are indicated in dotted lines in Fig. 1, and the point of junction of said arms is caused to move in a path which may be either horizontal or an arc of comparatively long radius by any guiding mechanism suitable for the purpose—as, for example, a system of slide-guides—or the preferred construction shown—to wit, a pair of radius-bars, 6, coupled at their upper ends to the pin 5^c, and having their lower ends fitted to vibrate about the axis of a pin, 6^a, fitting in bearings in the standard 2 of the frame.

An intermediate lever, 14, is journaled by lateral trunnions in bearings 14^a, secured to the ends of the frame-standards 2 below the guides of the feed-carriage, and carries a pin, 13^a, adjacent to its upper end, which pin is coupled by a pair of connecting-rods, 13, to a pin, 5^a, in the lower end of the vertical arm of the connecting-block 5, so that the vibrating movements of said arm shall be imparted to the intermediate lever 14. Below the axis of the trunnions of said lever the same is bifurcated, so as to form two outwardly-inclined jaws, 14^b and 14^c, between which a plate or tongue, 14^d, is pivoted at a point slightly eccentric to the axis of the trunnions of the lever. The inner faces of the jaws 14^b and 14^c are inclined one to the other at an angle substantially equal to or slightly less than that through which the lever 14 is vibrated by the connecting-block, so that at the limits of the range of vibration of the lever the jaws will alternately come into contact with the tongue 14^d, and at each contact push it from the position into which it had been brought by the preceding contact for a distance equal to or slightly greater than its own thickness. A double-armed gripping-lever, 15, is pivoted by a pin, 15^a, to the lower end of the die-block 16, its shorter arm being provided with a vertical set-screw, 15^e, the rounded end of which enters a socket in the lower end of a push-bar, 15^d, the upper end of which is in turn rounded and enters a corresponding socket in the lower end of the movable gripping-die 18^a. A pull-rod, 19, is hooked at its upper end into the die 18^a, and a hub in its lower end is engaged by an adjusting-screw, 19^a, which bears against the head of the set-screw 15^e, the pull-rod thus acting to depress the movable die 18^a to release the wire upon the downward movement of the shorter arm of the gripping-lever 15, as in prior constructions.

A friction-roller, 15^b, is journaled in the longer arm of the gripping-lever in such position that the tongue 14^d will be forced over and caused to bear centrally upon it by the jaw 14^c when the intermediate lever 14 is vibrated to the position shown in Fig. 1, and will be forced out of such bearing contact by the jaw 14^b when the lever 14 is vibrated to the position shown in Fig. 6, and as the depression of the longer arm of the lever 15 closes the gripping-dies 18 18^a upon the wire, and its elevation opens or releases said dies, it will be seen that Figs. 1 and 6 illustrate the dies

as gripped upon and released from the wire, respectively. Inasmuch as the movement of the intermediate lever 15 is, by reason of the provision of the connecting-block 5, effected about forty-five degrees behind or following that of the heading-ram, the heading operation will be fully completed before the wire is released by the gripping-dies.

The wire is held gripped during one-half the period of operation of the machine, corresponding with the backward movements of the feeding-carriage, which movements would retract the wire unless held; but only a moderate gripping force is required for this purpose comparatively to that which is necessary during the heading operation, and therefore, in order to relieve the jaw 14^c from any unnecessary stress, the initial grip is made only sufficient to prevent the retraction of the wire by the feeding-dog, so that the tongue 14^d may be forced against the roller 15^b to depress the longer arm of the gripping-lever 15 by a very moderate pressure of the jaw 14^c, an increased grip pressure as required for the heading operation being provided for by the eccentricity of the axis of vibration of the tongue 14^d relatively to that of the trunnions of the intermediate lever 14. This eccentricity is in such direction that as the lever 14 moves from the position shown in Fig. 1 toward that shown in Fig. 6 the pivot of the tongue coincidently moves downward and progressively depresses the longer arm of the gripping-lever 15, thereby correspondingly augmenting the force of the grip upon the wire, which by a proper degree of the pivotal eccentricity before mentioned may be made to provide any desired amount of force at the time that it is required for the heading operation. The force required to release the tongue 14^d from its bearing against the roller 15^b, being due only to the friction of the pivots of the tongue and roller, is quite moderate at its maximum.

In order to overcome the gravity of the gripping-lever 15 and insure the prompt release of the wire from the gripping-dies, a spring, 17, is fitted to bear against the lower side of its longer arm and against an abutment on a cross-bar connecting the frame-standards 2. Undue upward movement of the longer arm is prevented by a bolt, 17^c, fixed to the cross-bar, and having a head, 17^a, acting as a stop for the arm. The lift of the arm may be accurately adjusted as required by means of a nut, 17^d, engaging a thread on the bolt 17^c and bearing against the frame cross-bar, and the bolt is held securely in adjusted position by a set-screw, 17^e. A disk or washer, 17^b, of leather, india-rubber, or other material of elastic character, is interposed between the head 17^a of the bolt 17^c and the adjacent surface of the arm of the gripping-lever to prevent objectionable noise or wear, and the jaws 14^b 14^c may be faced with similar material for the same purpose.

In the modification of the gripping mechanism which is shown in Fig. 11 the same essential elements and operative principle are embodied, with the employment of different structural details. In this instance the function of the intermediate lever 14, before described, is performed by a pair of vibrating links, 14^e, journaled on a pin, 14^f, in the standards 2, and coupled at their upper ends by a connecting-rod, 13, to the pin 5^a of the lower arm of the connecting-block 5. A block, 14^g, is pivoted by lateral trunnions in the links 14^e, and is fitted to slide freely between collars 14^h 14^i on a pin, 14^k, coupled to a rocking lever, 14^{dd}, which performs a function similar to that of the tongue 14^d, before described. The lever 14^{dd} is coupled at its upper end to the gripping-lever 15, which is connected by a push-rod and pull-rod with the movable die 18^a, as in the former instance, and provided with a similar spring, 17, for a like purpose. The lower end of the lever 14^{dd} is adapted, in the vibrations of the lever imparted by the pressure of the block 14^g at the ends of its traverse against the collars 14^h and 14^i, respectively, to bear centrally upon and be released from bearing contact with a friction-roller, 15^b, journaled in one arm of a double-armed lever, 15^e, which is fitted to vibrate upon a fixed bearing—in this instance, the pin 14^f of the links 14^e. The opposite end of the lever 15^e is provided with a bearing-face, 15^f, which abuts against a corresponding flattened face formed upon the pivot-pin 6^a of the radius-bars 6, the object of which is to provide for increased gripping pressure during the heading operation, such as is attained by the pivotal eccentricity of the tongue of the intermediate lever in the instance first described. In this case in the vibration of the pin 6^a its bearing against the arm of the lever 15^e is changed from a flat to the angle of a flat and a curved surface, the latter acting in the manner of a cam or eccentric to slightly depress the adjacent arm of the lever 15^e, and by the corresponding elevation of the opposite arm, which carries the friction-roller 15^b, to press the latter with greater force against the end of the lever 14^{dd}, and thereby to force the movable die 18^a more closely toward the fixed die 18, and consequently increase the gripping force upon the wire during the heading operation, which is performed while the radius-bars stand in such positions as to bring portions of the curved surface of the pin 6^a in contact with the arm of the lever 15^e.

The cutting and pointing of the wire is effected by the following mechanism: A pin, 5^b, is pivoted in the lower or vertical arm of the connecting-block 5, which arm, in the rotation of the driving-shaft in direction normal for operation, as indicated by the arrow in Fig. 1, imparts later movements to its connections than does the upper or horizontal arm of the connecting-block. The pin 5^b is coupled by a pair of connecting-rods, 8, to the arms 9 of a pair of vertical rock-shafts, 10, journaled on opposite sides of the table 1. Short arms

10ª on the upper ends of the rock-shafts 10 are coupled by links 11 to a pair of cutting-levers, 12, which are pivoted by studs 12ª to the table 1 at points between the driving-shaft and the rock-shafts 10. The links 11 are in the form of deep plates set vertically and provided with cylindrical ends which engage corresponding recesses in the arms 10ª and cutting-levers 12. By this construction pivot-bolts are dispensed with, and the links 11 can be detached from and replaced in the machine without the manipulation of nuts or other fastening devices. The vibration of the arms 9 between the positions shown in full lines in Fig. 3 and those shown in dotted lines in said figure and in full lines in Fig. 8 will cause the cutting-levers to vibrate between the positions shown in Fig. 2 and in Fig. 8, respectively, Fig. 2 showing the levers closed, as when cutting off and pointing the nail, and Fig. 8 showing them expanded, so as to be entirely clear of the line of traverse of the wire and heading-ram. The free ends of the cutting-levers are provided with knives or cutters 12ᵇ, of the ordinary construction. The movement of the cutting-levers is so timed that the knives shall not come in contact with the wire until its feed motion has stopped and it has been clamped by the gripping-dies, and as its feed motion must not begin until after the head has been formed and the wire has been released from the pressure of the gripping-dies that motion must be slightly later than that of the heading-ram, and will be so at both limits of the feeding and heading movements; hence the feed motion will not be stopped until after the ram has begun its forward movement, and as the closure of the knives upon the wire must occur still later about forty-five degrees of movement of the crank past its dead-center on the backward movement of the ram must take place before the nail is severed.

The heading of the nail, which is last described as being the final step in the initial consecutive series of operations of the machine upon a length of wire supplied thereto, although the first to which each section of said wire from which a finished nail is formed is subjected, (the first section cut off being headless,) is performed by the following mechanism: A heading-ram, 4, is coupled to a pin, 5ᶜ, adjacent to the outer end of the upper or horizontal arm of the connecting-block 5, the ram being adapted to bear, in exerting pressure upon the wire, both on the pin and on the connecting-block. A heading-punch, 4ª, of the usual construction, is fitted in the opposite end of the heading-ram, and is adjusted longitudinally therein by a wedge-bolt, 4ᵇ, and secured by a set-screw, 4ᶜ, or by other suitable means. A sole or downward projection, 4ᵈ, is formed upon the lower side of the ram 4 a short distance behind the face of the punch 4ª, the depth of said sole being about equal to the diameter of the head of the largest nail designed to be made, and a similar projection, 4ᵉ, is formed upon the top of the ram at a greater distance in rear of the face of the punch. So far as the connection of the ram 4 to its actuating connecting-block 5 is concerned, its outer or forward end is free to vibrate vertically or be elevated to a vertical position for inspection or adjustment, if desired, the connecting-block being suitably recessed behind the ram for this purpose; but when in operation it is held down to its proper position by means of a guide-piece, 7ª, fixed by bolts 7ᵇ, which further serve to secure both the guide-piece and a cross-bar, 7, by which it is supported, to the table 1, for which purpose the bolts 7ᵇ may be tapped into lugs or cheeks which form side guides for the ram. The projecting sole 4ᵈ of the ram traverses over a bearing, 1ᵉ, secured to or forming part of the table 1, during all the traverse of the ram, except a small portion thereof, during which the head of the nail is formed. By this construction the ram is held up above the projecting nail, as shown in Fig. 1; but near the forward end of the stroke of the ram its sole 4ᵈ passes over and off of its supporting-bearing 1ᵉ, which allows the ram to drop into line with the stub to be headed, as shown in Fig. 7, upon which stub the punch by its pressure forms a head, such movement being further made positive by the passage of the upper projection or shoulder, 4ᵉ, under the guide-piece 7ª simultaneously with or immediately succeeding the passage of the sole 4ᵈ off its bearing. The parts concerned in such movements are so formed with reference to the forward movement of the ram that the latter will descend to the proper position for its work just before coming in contact with the stud to be headed.

The construction above described admits of the formation of longer nails than heretofore with a given travel of the ram, since the latter is elevated at all times while the wire is being fed forward and the nail cut off sufficiently to allow any desired length of nail to pass under the ram. The detachment of the nail, in case it should not be wholly severed by the cutting-knives, is also insured, as the punch in its forward movement will pass above the adhering nail and push it downward off the stub as the ram descends into operative position, thus dispensing with the knocker or kicker ordinarily required for the purpose.

The leading feature of novelty in the present invention is believed to consist in the construction of a machine wherein the three essential elements required in nail-making—to wit, grippers, cutters, and header—shall all be actuated and in orderly succession from and by means of a single crank-pin through the intermediation of a device specially provided for the purpose—to wit, a right-angled-lever connecting-block. In the devices interposed between the connecting-block and the several mechanisms above enumerated there are also included some minor features of invention; but many and possibly all of these may be omitted and the leading feature of in-

vention retained. In this respect the work would be largely one of selection—that is to say, instead of employing the particular devices which I have shown and described for communicating motion from the connecting-block to each of the three mechanisms enumerated, the skilled mechanic may select out of well-known appliances others which, as mere connections from one device to another, would perform substantially the same work in substantially the same way; hence in using, as I do, the phrase "suitable known mechanical connections" in the claims hereunto annexed, I do so as including the connections shown and described and what may be considered their mechanical equivalents in law, and specifically including such mechanisms or devices as, being known in the art, the skilled mechanic may select as suitable for the purpose and as mechanical substitutes for those shown and described.

I claim as my invention and desire to secure by Letters Patent—

1. In a wire-nail machine, a right-angled-lever connecting-block having a bearing for a heading-ram connecting-rod at the junction of its arms, and having bearings for a crank-pin and for a gripping-lever connecting-rod, respectively, at the opposite ends of its arms, substantially as set forth.

2. In a wire-nail machine, the combination of a driving-shaft, a gripping-die, a pair of cutting-levers, each carrying a cutting and pointing knife, a heading-ram, a right-angled-lever connecting-block having one of its arms coupled to a crank-pin on the driving-shaft and to the heading-ram, and suitable known mechanical connections coupling the gripping-die and cutting-levers to the other arm of the connecting-block, substantially as set forth.

3. In a wire-nail machine, the combination of a driving-shaft, a gripping-die, a heading-ram, a right-angled-lever connecting-block having one of its arms coupled to a crank-pin on the driving-shaft and to the heading-ram, suitable known mechanical connections coupling the gripping-die to the other arm of the connecting-block, and a pair of cutting-levers, each carrying a cutting and pointing knife and actuated by suitable known mechanical connections to which movement is imparted by the driving-shaft, substantially as set forth.

4. In a wire-nail machine, the combination of a driving-shaft, a pair of cutting-levers, each carrying a cutting and pointing knife, a right-angled-lever connecting-block having one of its arms coupled to a crank-pin on the driving-shaft and to the heading-ram, suitable known mechanical connections coupling the cutting-levers to the other arm of the connecting-block, and a gripping-die actuated by suitable known mechanical connections to which movement is imparted by the driving-shaft, substantially as set forth.

5. In a wire-nail machine, the combination of a driving-shaft, a right-angled-lever connecting-block having its upper arm coupled at one end to a crank-pin on the driving-shaft, a heading-ram coupled to the opposite end of said upper arm, a guide adapted to control the direction of traverse of said upper arm, and a suitable known mechanical connection coupled to the lower arm of the connecting-block and transmitting power therefrom to a pressure-exerting member of the machine, substantially as set forth.

6. In a wire-nail machine, the combination of a driving-shaft, a right-angled-lever connecting-block having its upper arm coupled at one end to a crank-pin on the driving-shaft, a heading-ram coupled to the opposite end of said upper arm, a fixed gripping-die, a movable gripping-die, a gripping-lever coupled to the movable die, an intermediate lever coupled to and vibrated by the lower arm of the connecting-block, and a vibrating lever coupled to and actuated by the intermediate lever and adapted to intermittently transmit pressure therefrom to the gripping-lever, substantially as set forth.

7. In a wire-nail machine, the combination of a driving-shaft, a right-angled-lever connecting-block having its upper arm coupled at one end to a crank-pin on the driving-shaft, a heading-ram coupled to the opposite end of said upper arm, a fixed gripping-die, a movable gripping-die, a gripping-lever coupled to the movable die, an intermediate lever coupled to and vibrated by the lower arm of the connecting-block, a vibrating lever coupled to the intermediate lever and adapted to intermittently transmit pressure therefrom to the gripping-lever, and a spring acting upon the gripping-lever in opposite direction to the pressure imparted thereto by the vibrating lever, substantially as set forth.

8. In a wire-nail machine, the combination of a driving-shaft, a right-angled-lever connecting-block having its upper arm coupled at one end to a crank-pin on the driving-shaft, a heading-ram coupled to the opposite end of said upper arm, a fixed gripping-die, a movable gripping-die, a gripping-lever coupled to the movable die, an intermediate lever coupled to and vibrated by the lower arm of the connecting-block, a vibrating lever coupled to the intermediate lever and adapted to intermittently transmit pressure therefrom to the gripping-lever, and a cam or eccentric device for increasing the degree of pressure applied to the gripping-lever during a portion of each period of application of pressure thereto, substantially as set forth.

9. In a wire-nail machine, the combination of a driving-shaft, a right-angled-lever connecting-block having its upper arm coupled at one end to a crank-pin on the driving-shaft, a heading-ram coupled to the opposite end of said upper arm, a fixed gripping-die, a movable gripping-die, a double-armed gripping-lever having one of its arms coupled to the movable die, an intermediate lever coupled to and vibrated by the lower arm of the con-

necting-block and provided with a pair of oppositely-inclined lower jaws or bearing-faces, and a vibrating lever or tongue pivoted to the intermediate lever between its jaws in position to be alternately pressed against and moved off a bearing on the arm of the gripping-lever opposite that which is coupled to the movable die in and by the movements of the jaws of the intermediate lever, substantially as set forth.

the movement of said lever, and a spring bearing against said arm in opposite direction to the vibrating lever or tongue, substantially as set forth.

12. In a wire-nail machine, the combination of a driving-shaft, a heading-ram coupled to a crank-pin thereon and provided with a lower sole or projection, a heading-punch fixed in the ram, and a fixed lower bearing over which the sole of the ram is adapted to traverse dur-