No. 780,873. PATENTED JAN. 24, 1905.

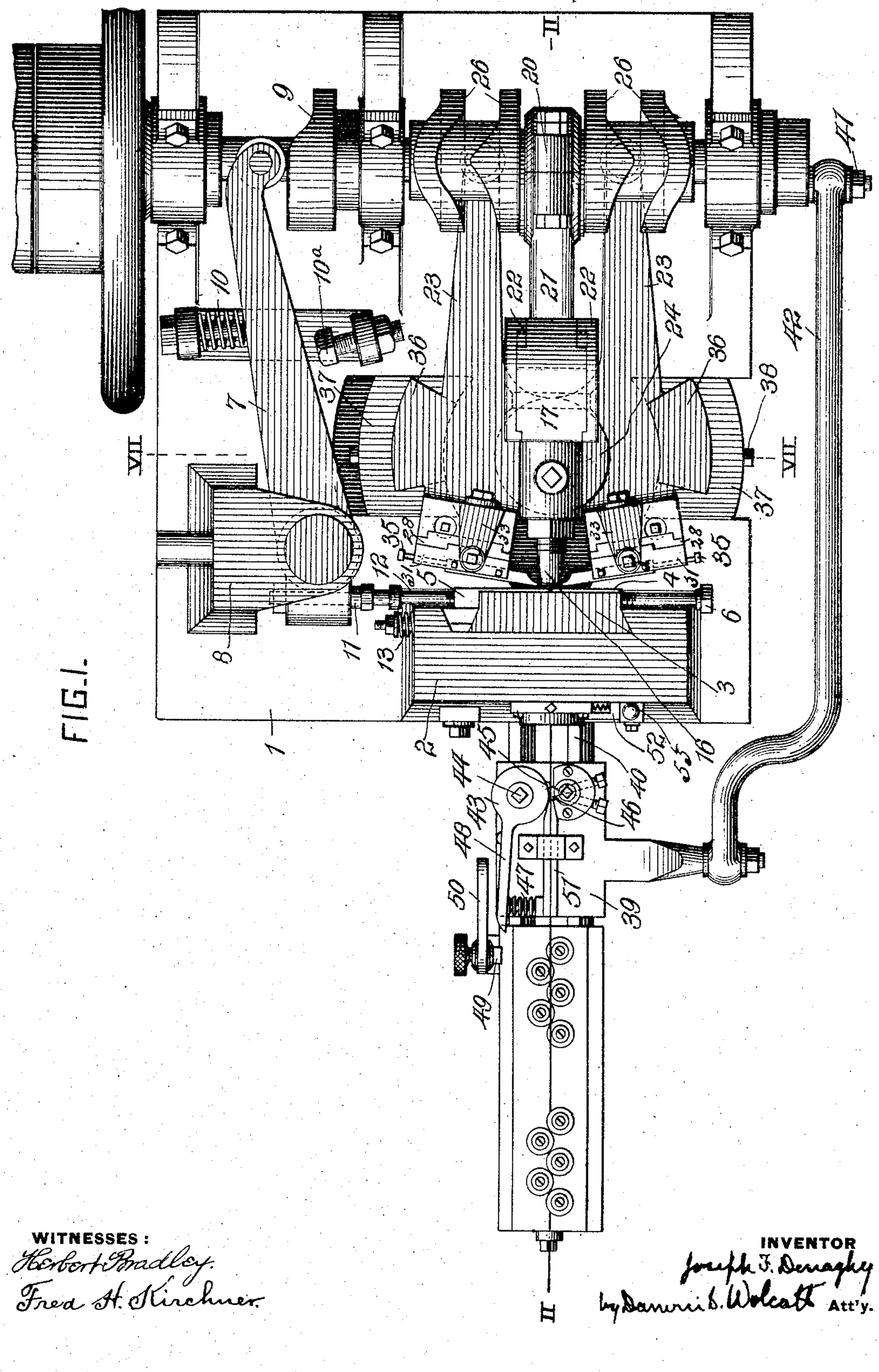
J. F. DONAGHY.

WIRE NAIL MACHINE.

APPLICATION FILED JUNE 6, 1902.

4 SHEETS—SHEET 1.

FIG. 1.



WITNESSES:
Herbert Bradley.
Fred H. Kirchner.

INVENTOR
Joseph J. Donaghy
by Dennis B. Wolcott Att'y.

No. 780,873. PATENTED JAN. 24, 1905.

J. F. DONAGHY.

WIRE NAIL MACHINE.

APPLICATION FILED JUNE 6, 1902.

4 SHEETS—SHEET 2.

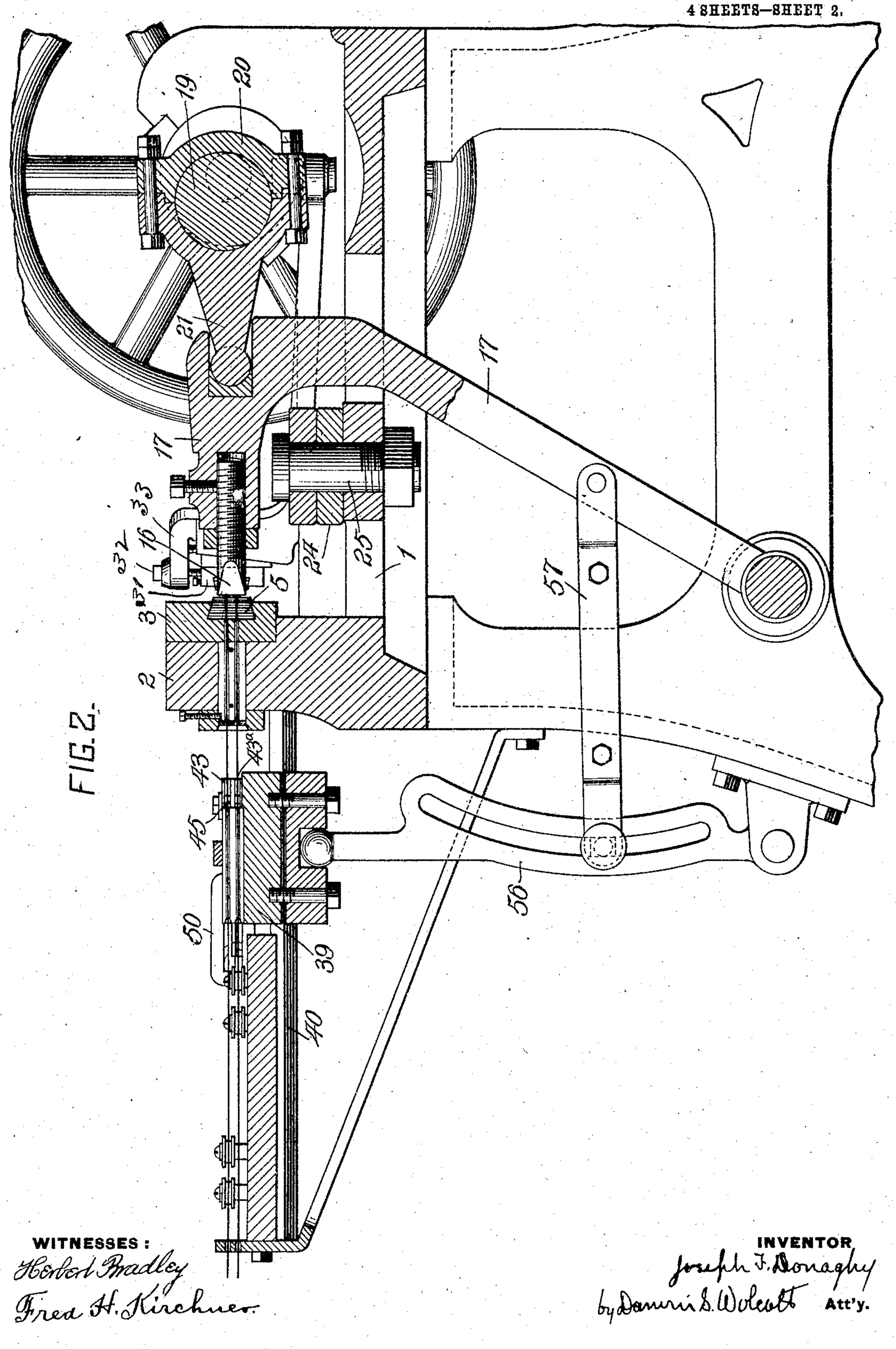


FIG. 2.

WITNESSES:
Herbert Bradley
Fred H. Kirchner.

INVENTOR
Joseph F. Donaghy
by Dennis S. Wolcott Att'y.

No. 780,873. PATENTED JAN. 24, 1905.

J. F. DONAGHY.

WIRE NAIL MACHINE.

APPLICATION FILED JUNE 6, 1902.

4 SHEETS—SHEET 3.

FIG. 3.

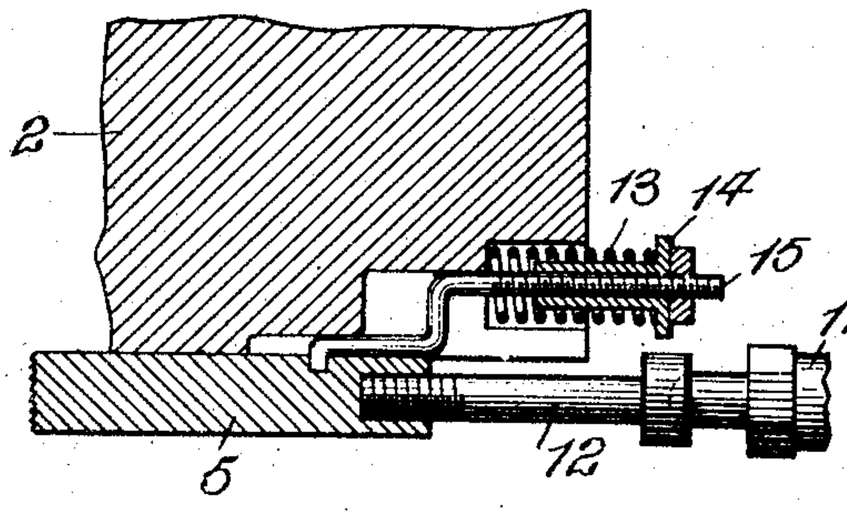


FIG. 4.

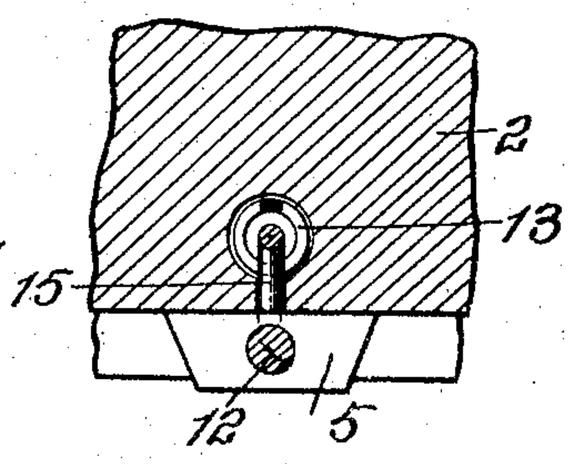


FIG. 5.

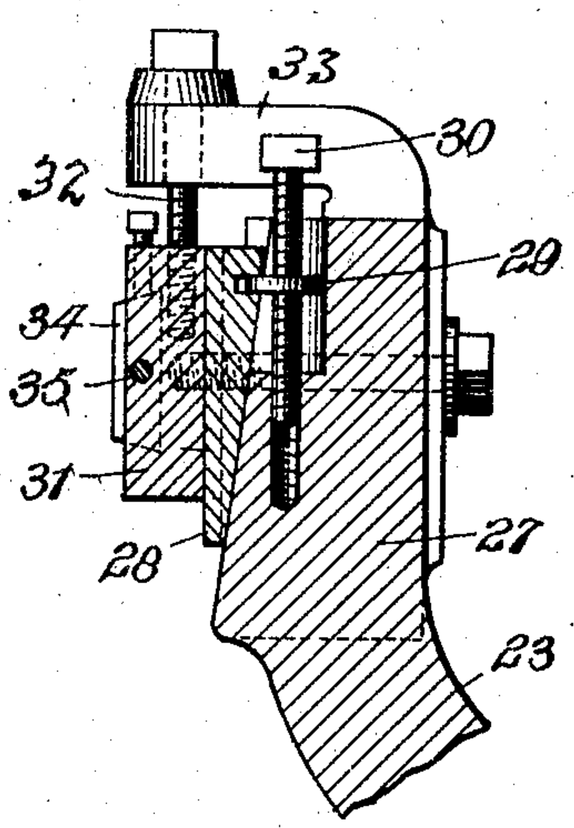


FIG. 6.

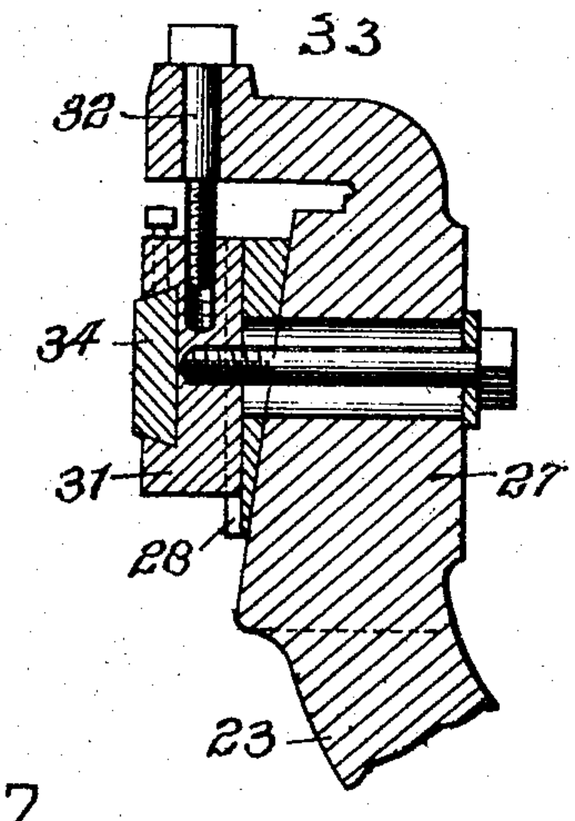
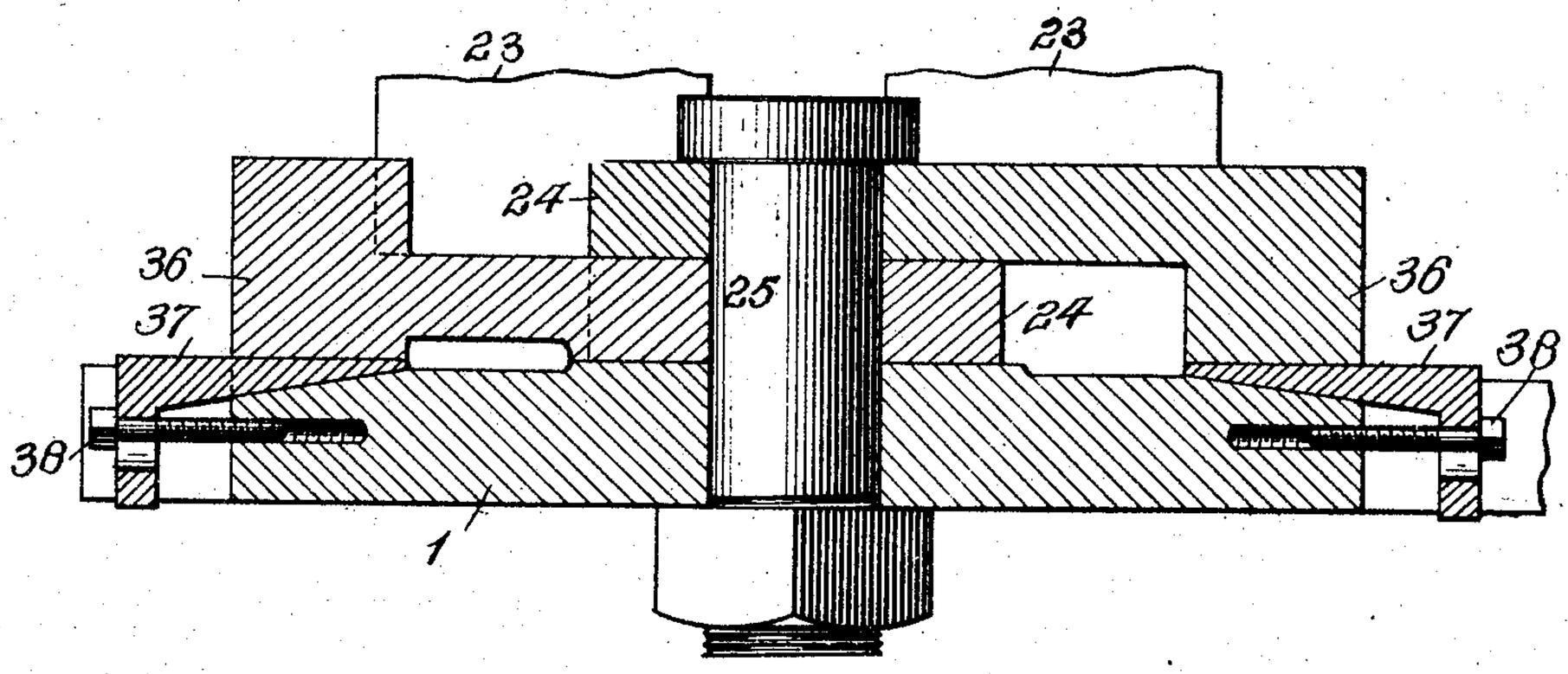


FIG. 7.



WITNESSES:

Herbert Bradley.

Fred H. Kirchner.

INVENTOR

Joseph F. Donaghy

by Dawrin S. Wolcott Att'y.

No. 780,873. PATENTED JAN. 24, 1905.

J. F. DONAGHY.

WIRE NAIL MACHINE.

APPLICATION FILED JUNE 6, 1902.

4 SHEETS—SHEET 4.

FIG. 8.

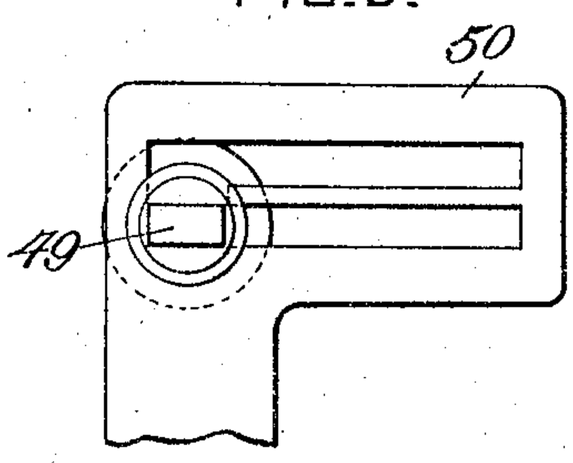


FIG. 9.

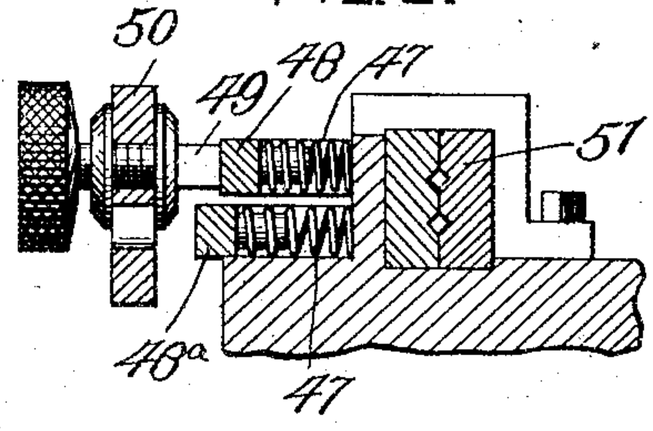


FIG. 10.

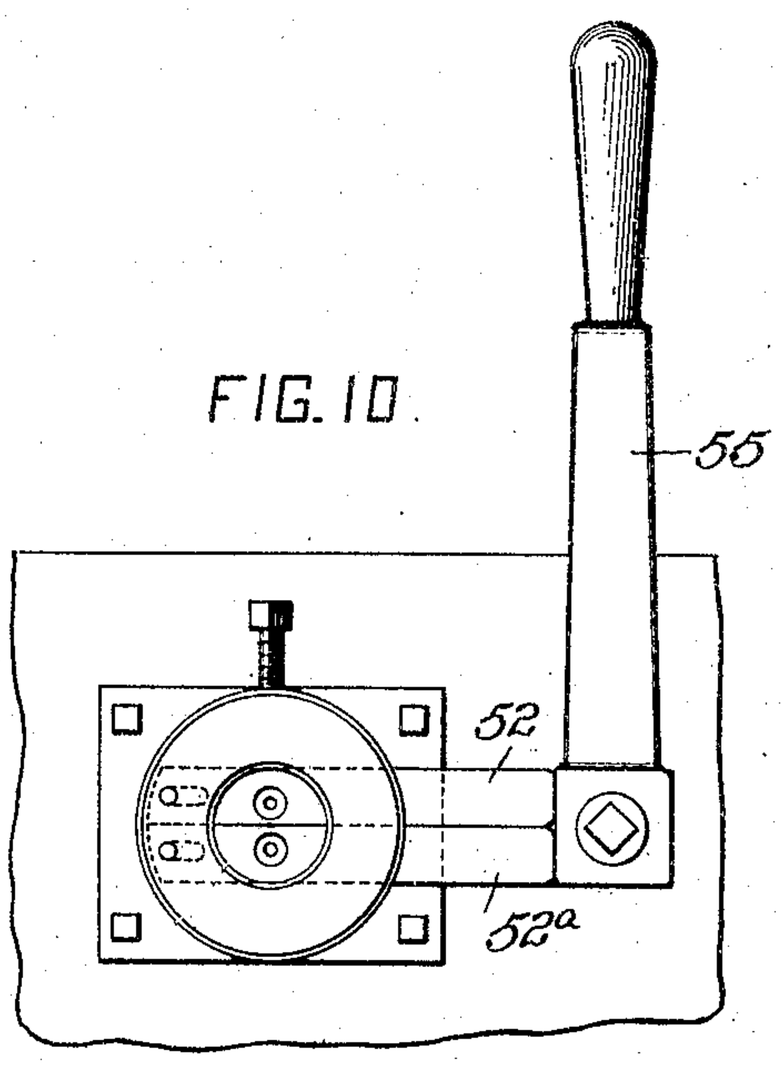


FIG. 11.

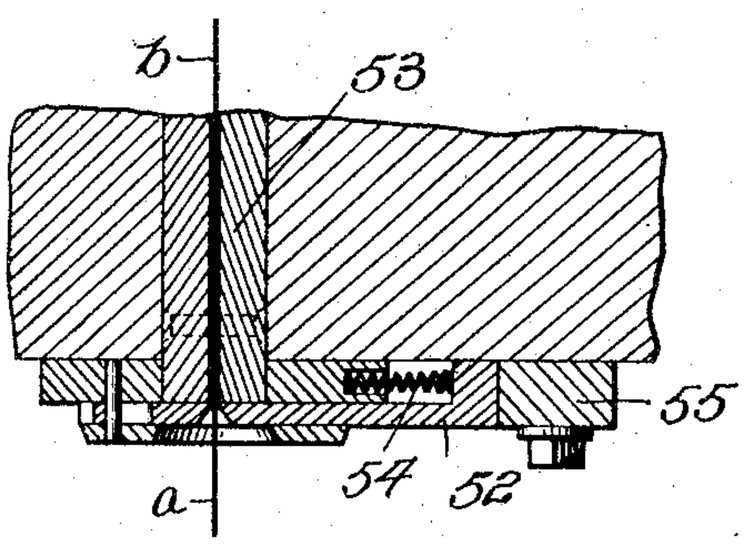
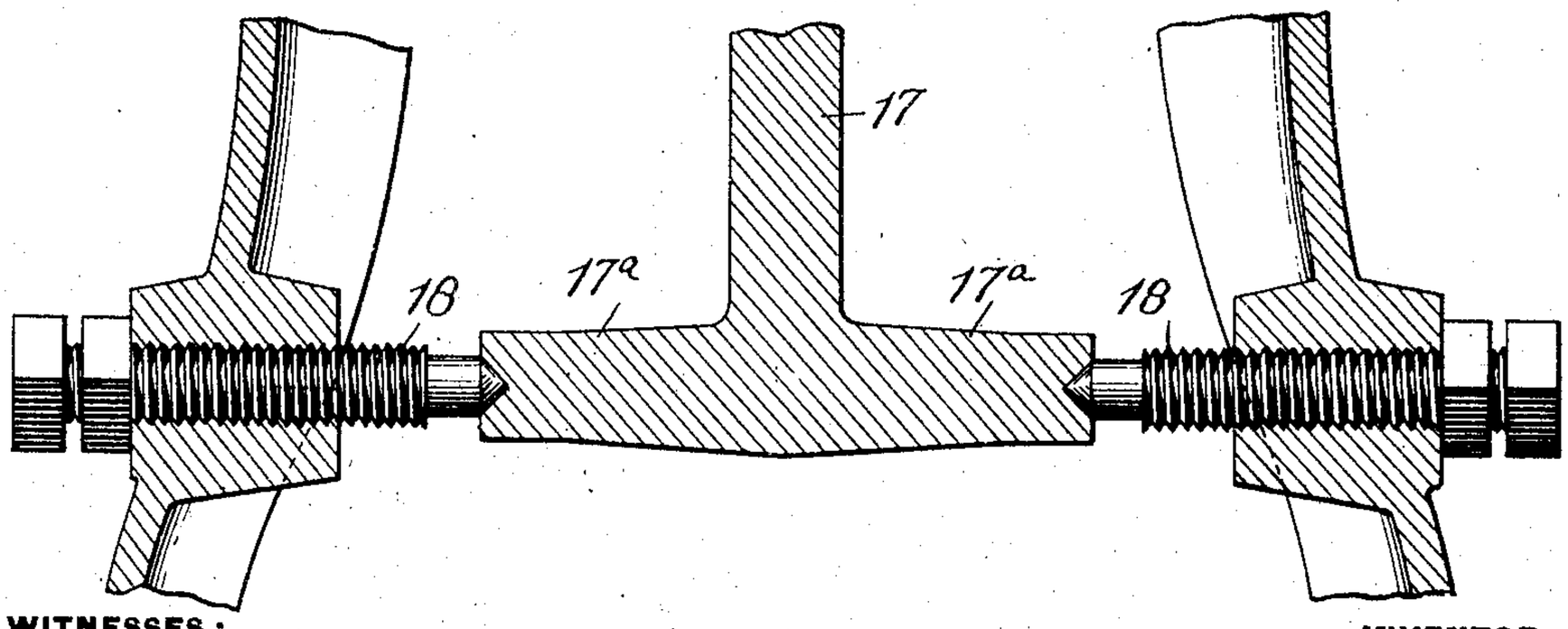


FIG. 12.



WITNESSES:
Herbert Bradley.
Fred Kirchner.

INVENTOR
Joseph F. Donaghy
by Dannin & Wolcott Att'y.

No. 780,873. Patented January 24, 1905.

UNITED STATES PATENT OFFICE.

JOSEPH F. DONAGHY, OF CORAOPOLIS, PENNSYLVANIA, ASSIGNOR OF ONE-THIRD TO EDWARD H. FOREMAN, OF SHOUSETOWN, PENNSYLVANIA.

WIRE-NAIL MACHINE.

SPECIFICATION forming part of Letters Patent No. 780,873, dated January 24, 1905.

Application filed June 6, 1902. Serial No. 110,443.

To all whom it may concern:

Be it known that I, JOSEPH F. DONAGHY, a citizen of the United States, residing at Coraopolis, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Wire-Nail Machines, of which improvements the following is a specification.

The invention described herein relates to certain improvements in machines for the manufacture of wire nails. As heretofore constructed machines for this purpose were formed with quite a number of parts or elements sliding in guideways on the bed of the machine. This construction is objectionable, for the reason that little particles of steel formed in the shearing of the completed nail from the wire lodge upon the guide-surfaces, thereby clogging the machine and cutting and ruining the guideways themselves. This greatly increases the cost of maintenance of the machines and also involving a large loss of time.

The object of the present invention is to provide a machine whose parts shall have a rocking movement on pivotal supports or pins so covered and protected as to render the lodging of pieces of steel or other foreign matter on the wearing places practically impossible.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a top plan view of my improved nail-machine. Fig. 2 is a longitudinal section on the plane indicated by the line II II, Fig. 1. Figs. 3 and 4 are sectional detail views of portions of the gripping mechanism and their connections. Figs. 5 and 6 are sectional detail views illustrative of the cutters and their adjusting devices. Fig. 7 is a transverse section on a plane indicated by the line VII VII, Fig. 1. Figs. 8 and 9 are detail views of portions of the wire-feed mechanism. Figs. 10 and 11 are detail views of the auxiliary shear mechanism, and Fig. 12 is a sectional view showing the manner of mounting the cross-head carrying the upsetting or heading punch.

On the bed-plate 1 is secured or formed a block 2, having suitable dovetailed ways for the reception of an anvil-block 3. In the inner face of this anvil-block are formed suitable guideways for the reception of the gripping-jaws 4 and 5, the jaw 4 being adjustable by means of screw 6, while the jaw 5 is adapted to be reciprocated positively in one direction and to be withdrawn by a spring in the other direction. The means for imparting the positive inward movement to the jaw 5 consists of a lever 7, pivotally mounted in suitable bearings 8 and having one end held against a cam 9 by a spring 10. The opposite end of the lever 7 is provided with an adjustable bearing-pin 11, adapted to bear against a pin 12, adjustably connected to or secured in the sliding-jaw 5, as clearly shown in Figs. 1, 3, and 4. When the lever 7 is shifted by the spring 10, the jaw 5 and the pin 12 are caused to follow up the pin 11 by means of a spring 13, surrounding a sleeve 14, mounted on the rod 15, said spring bearing at one end against a shoulder on the rod 15 or its sleeve and its opposite end against the bottom of a socket formed in the block 2. As clearly shown in Fig. 3, the rod 15 is connected to the sliding jaw 5, so that on the shifting of the lever 7 by its spring 10 the sliding jaw 5 may be withdrawn from the jaw 4. The cam 9 is so constructed that if the end of the lever had a continuous bearing on the cam a greater movement would be imparted to the sliding jaw 5 than is necessary or desirable. Hence provision is made for limiting of the movement effected by the spring 10 by means of an adjustable stop, as the screw 10^a. This abutment reduces the spring-actuated movement to an amount only sufficient to permit the desired withdrawal of the sliding jaw 5. In case of the wearing away of the bearing-surfaces of either the cam or the lever, so that a sufficient movement is not imparted to the sliding jaw 5, the abutment 10^a is shifted to permit the desired movement. By this construction the machine can be maintained easily in operative condition without redressing or renewing of the parts.

The heading-die 16 is adjustably mounted,

as clearly shown in Fig. 2, in the horizontal arm of a bent lever or angular cross-head 17. The opposite end of said lever is provided with laterally-extending arms having pivotal bearing upon the frame of the machine. As shown in Fig. 12, such pivotal bearing is preferably formed by means of screws 18 passing through the sides of the frame and having their inner ends cone-shaped and fitting within similarly-shaped bearings or sockets in the ends of an arm 17ª on the lever or cross-head. The arrangement of the pivotal supports at a considerable distance on each side of the plane of movement of the lever forms such a firm bearing for the lever that guides to prevent the lateral movement of the latter are unnecessary. It will be observed by reference to Fig. 2 that the pivotal point of the lever or cross-head 17 is in or approximately in the plane of the outer faces of the combined gripping and heading dies 4 and 5, so that during the heading operation the heading-die 16 will have practically no vertical movement, although the cross-head carrying the same is shifted in the arc of a circle. This lever or cross-head is operated by an eccentric 19, the eccentric being surrounded by a strap 20, provided with an arm or abutment 21, engaging a recess in the rear of the cross-head or lever, at or near the angle or apex thereof, so as to force the lever forward to form the heads. It will be observed by reference to Fig. 2 that at all times the weight of the lever or cross-head is eccentric to its pivotal point on the side of its operating-eccentric 19, so that the weight of the lever will cause it to follow its operating-abutment 21. It is preferred, however, to connect the abutment with the lever by means of side plates 22, secured on opposite sides of the lever or cross-head and engaging trunnions formed on the abutment 21.

Levers 23 are provided with overlapping wings 24, through which passes a pivotal pin 25, said pin also extending down through the bed-plate 1, as clearly shown in Figs. 2 and 7. At their outer ends these levers are provided with pins preferably carrying friction-rollers and extending into cam-grooves formed in disks 26. The heads 27 on these levers are provided with guideways for the reception of adjusting-wedges 28, which are adapted to be shifted vertically by means of collars 29, mounted on screws 30, fitting in threaded openings in the heads, said collars engaging notches in the wedges, as clearly shown in Fig. 5. These adjusting-wedges are provided with guideways for the reception of the shear-carrying blocks 31, adapted to be adjusted vertically on the wedges by means of screws 32 passing through arms 33 on the heads and engaging the shear-blocks. The cutter-blades 34 are mounted in suitable guideways in the shear-carrying blocks and are adapted to be shifted or adjusted by means of screws 35. While not necessary, it is preferred to reinforce the levers by enlargements 36 in line with their pivotal points, as shown in Figs. 1 and 7, and in order to prevent any sagging of the levers supporting wedge-blocks 37 are interposed between the levers and the bed-plate, as shown in Fig. 7, and are adapted to be adjusted to compensate for wear by means of screws 38 passing through lugs on the wedge-blocks and into the bed-plate of the machine.

It will be observed that the center of movement of the levers 23—*i. e.*, the pivot-pin 25—is a plane passing through the wire operated on, so that the edges of the cutting-blades will move practically in the same plane when cutting the wire, or, in other words, these edges will meet squarely and without any push or pull on the wire.

The location of the center of movement of the levers 23 is permitted by the employment of a bent lever mounted as described for carrying the heading-die, the horizontal die of the heading-lever being free to oscillate or move in the arc of a circle above the pivot-point 25.

The feed mechanism for the wire consists of a sliding block 39, mounted upon suitable ways 40 in front of the machine and adapted to be shifted back and forth by means of a crank 41, connected to the slide 39 by means of a pitman 42, as shown in Fig. 1. One, two, or more disks 43 43ª, dependent upon the number of wires to be fed, are mounted one above the other upon a pin 44, each of said disks carrying a ball or roller 45, adapted when the disks are in one position—*i. e.*, during the forward movement of the slide—to press the wires against abutment 46, carried by the slide. The disks are held so as to cause the rollers in the disks 43 43ª to grip the wires by means of springs 47, bearing against arms 48 48ª on the disks. By this construction the wires are clamped between the balls or rollers and the abutment during the forward or feed movement of the slide; but when the slide begins its return movement the pull of the wires will tend to move the balls or rollers away from the abutment, permitting the free device or mechanism to slide over the wires. As it is sometimes desirable to stop the gripping action of the feed mechanism on one of the wires without stopping the operation of the other parts of the machine, I provide a wedge-block 49, arranged in a frame 50, carried by the guides or ways 40, supporting the feed mechanism. As shown in Fig. 8, this frame is provided with two slots or guideways, one in line with the arm 48 on one of the disks and the other in line with the corresponding arm 48ª on the other disk, so that when this block is shifted forward along to the front end of one of the slots it will press the arm in line with said slot in against the spring, and so shifting the

ball or roller that it can have no bearing on the wire during the movement of the feed mechanism in either direction.

The wire or wires to be formed into nails are fed through straightening-rollers in front of the feed mechanism, through guide-tubes 51 on the slide, and through guiding-passages on the block 2 and head 3, said tubes or passages being a little larger than the wire operated on, so as to allow free movement of the latter. On the block 2 on the side adjacent to the feed mechanism I provide two auxiliary shear-blades 52 52ª, operative in conjunction with the ends of the tubes 53, through which the wires are fed, to shear the wire, as hereinafter stated. These auxiliary shear-blades are preferably made in the form of steel strips having openings therethrough for the passage of the wire and normally held by springs 54, with the holes in line with the wire-feed passages and with their ends bearing against the flat face of the head 55 of a lever pivoted to the block 2. As will be seen by reference to Fig. 10, the shifting of the lever to the left will operate the upper auxiliary shear-blade and to the right the lower auxiliary shear-blade, so that one or the other of the wires may be cut off.

By arranging the feed mechanism so that the inward limit of its movement will end closely adjacent to the auxiliary shear-blades it will be possible to continue the feed of the length of wire until only so much of it remains as is approximately equal to the distance between the heading-face of the gripping-jaw and the point to which the feed mechanism moves when feeding. By shearing off this waste piece and allowing it to drop out of the line of feed a new wire can be fed in, and its end will abut against the end of the previous length resting within the block 2 and push that forward, so as to form another nail, or out of the block entirely.

By sharing off the end *a*, projecting beyond the front faces of the auxiliary shear-blades 52 52ª, as shown in Fig. 11, the rear end portion *b* will be within the guide tubes or passages 53 in the block 2. As these passages are approximately the same size as the wire being fed, it is evident that the portion *b* will be pushed forward out of the passages by the next length of wire fed into the machine, the front end of such length abutting against the rear end of the portion *b*, said ends being held in alinement with each other by the walls of the guide-passage. It will be observed that the holes in the auxiliary shear-blades 52 52ª guide the front end of the succeeding lengths of wire against the ends of portions *b*. By this construction the waste pieces will never be longer than the distance above mentioned and will generally be less by the length of the nail being formed, as a nail can be cut from the portion *b* when fed forward by a succeeding length of wire.

By the employment of means such as described for preventing the action of the grippers of the feed mechanism without stopping the reciprocation of the latter and by rendering it possible as described to automatically remove the waste portions as described much delay in operating the machine and labor is avoided.

It is preferred that the cams 9 and 26, the eccentric 19, and the crank-arm 41 should be secured to or formed on the same shaft, as shown. It will be observed that all the parts operating on the wire to form the nail are carried or actuated by levers and that the only slides employed are those for one of the gripping-jaws and for the feed mechanism.

As the means shown in Fig. 1 for reciprocating the feed-block 39 tends to twist the feed-block and its guides, it is preferred to employ the construction shown in Fig. 2 for such purpose. As shown, a lever 56 is pivotally mounted in the frame of the machine in a plane passing through the guides 40, and the upper end of such lever is loosely connected to the feed-block 39, as by the projection of its upper end into a socket or recess in the feed-block, so that there will not be any tendency to lateral shifting or twisting of the block during its back-and-forth movements. This lever is connected to the heading-lever 17 by a pitman 57, having one end adjustable on one of said levers, as the lever 56, whereby the stroke of the lever 56 may be changed as desired. As it will be readily understood that the lever acts in the plane passing through the guides 40, there will not be any tendency to twist the latter.

I claim herein as my invention—

1. A wire-nail machine having in combination gripping-dies, wire-feed mechanism, a guide-passage for directing the wire to said dies, means for shearing said wire within the limits of the guide-passages, substantially as set forth.

2. A wire-nail machine having in combination gripping-dies, a reciprocating carriage, a stationary and a movable member mounted on the carriage, a spring-actuated arm on the movable member, and an adjustable holding block or wedge mounted on a stationary portion of the machine, substantially as set forth.

3. A wire-nail machine having in combination gripping-dies, a reciprocating carriage, two or more automatic grippers mounted on the carriage, means for preventing the operation of the gripping-dies during the movement of the carriage, guide-passages interposed between the feed mechanism and the gripping-dies, and means for shearing the wires within the limits of the passages, substantially as set forth.

4. A wire-nail machine having in combina-

tion gripping-dies, a header, shearing mechanism operative in the rear of the gripping-dies, a wire-feed mechanism, two or more guide-passages for directing the wire from the feed mechanism to the gripping-dies, two or more strips or bars provided with openings therethrough normally in line with the guide-passages and means for shifting said strips or bars thereby shearing the wire by the conjoint action of the walls of the guide-passages and those of the openings in the strips or bars, substantially as set forth.

5. A wire-nail machine having in combination a header, means for operating the header, a reciprocating wire-feed-mechanism lever having one end loosely connected to the feed mechanism and a connection from the lever to the header, the lever and its connections with the header and feed mechanism being in a vertical plane passing through the header, substantially as set forth.

6. In a wire-nail machine the combination of a bent lever, a heading-die carried by said lever, means for operating the lever, a wire-feed mechanism, a lever having a loose connection with the feed mechanism and an adjustable connection from the feed-lever to the header-lever, the lever and its connections with the header and feed mechanism being in a vertical plane passing through the header, substantially as set forth.

7. A wire-nail machine having in combination levers, shear-blades mounted on said levers, and means for effecting an adjustment of the shear-blades on the levers longitudinally and in directions transverse of the operating movement of the blades, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JOSEPH F. DONAGHY.

Witnesses:

DARWIN S. WOLCOTT,

F. E. GAITHER.