

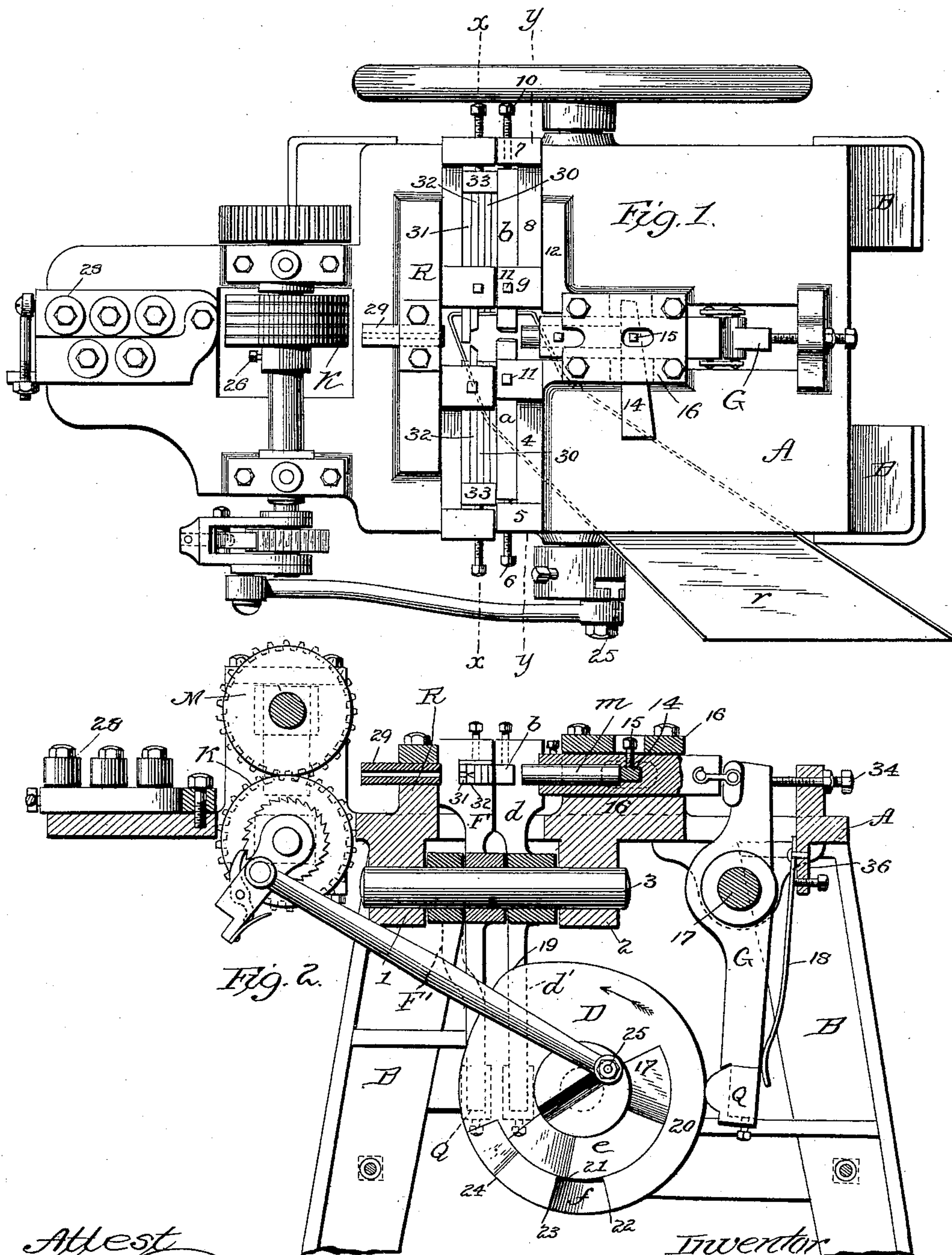
(No Model.)

2 Sheets—Sheet 1.

A. J. SWEENEY.
WIRE NAIL MACHINE.

No. 435,256.

Patented Aug. 26, 1890.



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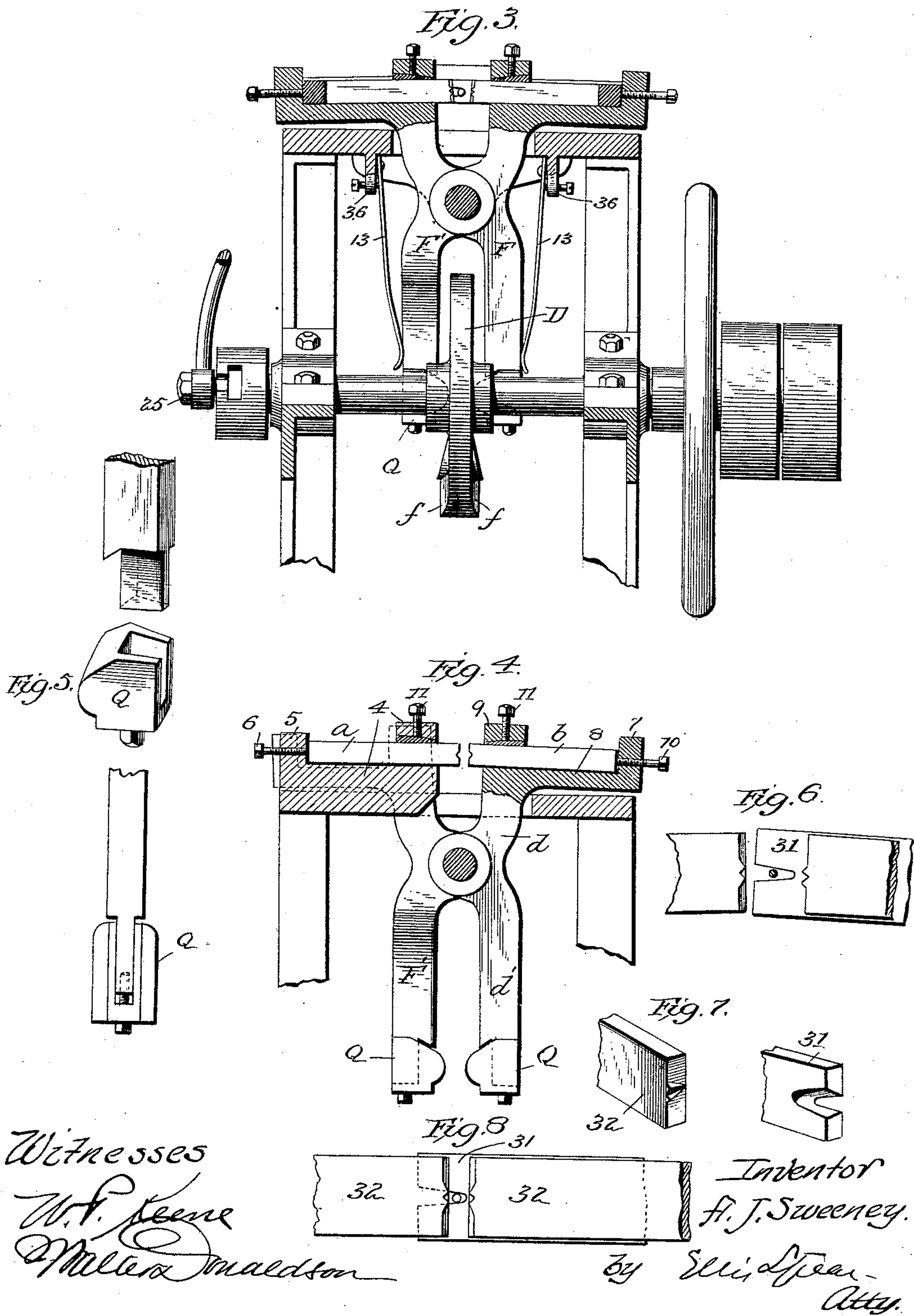
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

ANDREW J. SWEENEY, OF WHEELING, WEST VIRGINIA.

WIRE-NAIL MACHINE.

SPECIFICATION forming part of Letters Patent No. 435,256, dated August 26, 1890.

Application filed April 5, 1890. Serial No. 346,712. (No model.)

To all whom it may concern:

Be it known that I, ANDREW JAMES SWEENEY, of Wheeling, in the county of Ohio and State of West Virginia, have invented a new and useful Improvement in Wire-Nail Machines; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention pertains to that class of nail-machines in which the nails are made of wire fed from a coil and formed successively from the wire as it is fed to the machine.

The general objects of the invention have been to simplify the machine and reduce the first cost of it; second, to render it durable and easy and inexpensive to keep in repair; third, to make it efficient in operation, and, fourth, to increase the speed or the amount of product in a given time.

The points of my invention, stated in general terms, consist, first, in an arrangement of the levers which work the gripping, pointing, and severing dies and the lever which operates the heading-die, so that they are all worked by a single cam, and this includes an arrangement whereby the gripping and pointing dies are operated by the sides of the cam, while the header is operated by the periphery. It also includes an arrangement of the parts by means of which the strains of the dies in opposite directions are made to oppose each other and are thrown wholly on the pivoting-bolt.

The invention consists, second, in such a pivoting of the levers and construction and arrangement of the gripping-dies and of the pointing and severing dies that the completion of their forward movement shall bring their opposing faces into the same plane with the axis of the pin on which the levers are pivoted which operate the dies.

The invention consists, third, in the formation of the upper end of the pointing and gripping levers in connection with the dies and their relative arrangement, whereby they may be shifted in position within the boxes formed in the upper ends of the levers, the adjustment of the dies for longer or shorter nails being effected by such shifting. This part of the invention includes, also, the special construction of the base-plate with parallel bars cast thereon in which the upper

ends of the pointer and gripper levers fit and work. The bars integral with the base-plate also serve to resist the thrust of the header.

The invention consists, fourth, of a cutting-die arranged separate from the pointers. This is so formed as to aid in guiding the wire as it is fed into the machine.

The invention also includes the adjustability of the feed-rolls to bring grooves of different sizes in their periphery into range with the wire to accommodate the machine to different sizes of wire.

The invention also includes, in connection with the other parts, an adjustable stop behind the header-lever for regulating the length of the wire as it is fed.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 shows a plan view of the machine. Fig. 2 shows a central longitudinal section with parts in elevation. Fig. 3 is a transverse section on line $x x$ of Fig. 1, showing a part of the machine taken alongside the pointing-dies, with parts in elevation. Fig. 4 is a similar view on line $y y$ of Fig. 1. Fig. 5 is a detail view showing a removable shoe on the end of the levers which bears upon the side of the cam. Fig. 6 is a detail view of the pointing-dies and cutter. Figs. 7 and 8 also illustrate the construction and arrangement of the pointer-dies and cutter.

Referring to the drawings in the more particular description of the parts, the base-plate will be seen at A. It rests upon suitable supporting-legs B and is cast with projections which support the working parts, as hereinafter described in connection with those parts. Two of these projections (marked, respectively, 1 and 2) are on the under side, and are bored out to receive the pivot 3, on which turn the gripping and pointing levers. Of the grippers one a is fixed and the other b is movable. The fixed die lies within a box formed by the ribs 4 and 5, cast with the base-plate. It is held in this box securely by other dies and spacing-pieces, as hereinafter described. The fixed die a is adjustable by means of a screw 6. The moving die b is held in the box marked 7 8 9, formed on the top of the gripping-lever d . This die is also adjustable by means of a screw 10. The dies are held in place by screws 11. The grip-

ping-lever is made with an offset of the form shown in Figs. 3 and 4, there being a hole through this offset through which passes the pivot 3. The gripping end of the die *a* is set in a plane with the center of the pivot. The machine being set with the bed horizontal, this plane is a vertical plane. The movable die is arranged so that its face comes up squarely against the face of the fixed die, and is when up in the same plane. The die-faces are formed with grooves fitted to receive the wire. This arrangement of the die-faces in the same plane with the axis of the lever seizes and holds the wire exactly in the same horizontal plane in which it is moved in the feed and does not tend to push it up or draw it down, as would be the case if the die-faces were out of the plane of the lever-pivots. The box of the lever which carries the movable die bears against a rib or abutment 12, cast with the base-plate. The lower end of the lever *d* is shown at *d'*. It extends down upon one side of the cam *D* and is in range with an interior cam-face *e* on the side of the cam-wheel *D* next to the lever end *d'*. The particular arrangement or location of this cam-face is described hereinafter.

The levers which carry the pointing-dies and cutting-die are shown at *F F'*, Figs. 3 and 4. They are of the same general construction as the gripping-die lever just described and they turn on the same pivot. They are pivoted side by side, as shown in Fig. 2, the lever *F'* being bent to bring it into line with the lever *F* at the upper and lower ends. This construction and arrangement brings the meeting faces of the dies into the same plane with the axle on which the levers turn, as described heretofore in connection with the gripping-dies and for the same purpose. The lower ends of these levers *F F'* straddle the cam-wheel *D* near its periphery and are in line with the cam-face on the side marked *f*. As the parts are arranged the motion of the cam-wheel *D* is in the direction of the arrow thereon, and the cam-face *e* is the first to come into operation. It will be understood that the levers are held against the sides of the cam-wheel by the leaf-springs 13. With the levers, as described, the cam-face *e*, striking the tail of the lever *d*, brings up the gripping-die against the wire and grips it firmly. Next to follow is the action of the header. The heading-die *m* is held in a mandrel, it being adjustable longitudinally therein by means of a wedge 14 in a transverse slot, the wedge being held by a set-screw 15, all as shown in Figs. 1 and 2. The mandrel reciprocates in a boss or projection 16, formed integral with the base-plate. It is connected by links to the upper end of a lever *G*, pivoted on a transverse pin 17 in ears formed on the under side of the base-plate. The lower end of the lever *G* is pressed constantly against the periphery of the cam-wheel *D* by a leaf-spring 18. The high part of the periphery of the cam-wheel is shown at 19.

This is arranged to strike the lever *G* next in order and immediately after the cam-face *e* has moved the lever *d*. This brings the heading-die *m* against the end of the wire while it is firmly gripped and upsets the end forming the head of the nail. Next in order the cam-face *f* strikes the levers *F F'*, and this operates to point the nail and sever it from the wire.

Before particularly describing the operations referred to in more general terms, I next proceed to describe the feeding mechanism, the operation of which immediately follows after severing of the formed nail from the wire, as indicated in Fig. 2, where the cam-faces have passed the ends of the pointer and gripper levers, while the wrist-pin on the opposite side is advanced. The wrist-pin 25 is set in a groove in the face-plate on the end of the cam-shaft adjustably, and is connected by a rod with pawl-and-ratchet mechanism on the end of the shaft of the lower feed-wheel. The ratchet-wheel is made smaller than the feed-wheel in order to give increased speed in feeding the wire. The feed-wheels *K M* have a series of grooves about their peripheries varying in size to suit different sizes of wire. They are adjustable upon their shafts to bring any one of these grooves into alignment with the wire and are held by a set-screw 26, set in a sleeve on each of the wheels. The wheels are connected by gearing in the usual manner, as shown in Figs. 1 and 2. The end of the table next the feed-wheels is provided with straightening-pulleys 28. Three of them are set on pins in a rib cast with the base-plate. The two opposite these are on a pivoted piece adapted to be swung aside to admit the wire and held closed by a link. The wire passes from the coil between these straightening-pulleys, thence between the feed-rolls, and thence through a tube 29, set in a rib *R*, cast upon the base-plate. This rib is located close to the box of the pointer-levers and affords a strong abutment fitted to bear the thrust of the header. This thrust is transmitted to the abutment *R* through the dies and the spacing-pieces 30, interposed between the dies, and through the walls of the boxes on the pointer-levers. The cutting-die 31, in the arrangement shown in Fig. 1, lies next to the wall of its box, and next in order is placed the pair of pointer-dies 32, a piece of the same thickness as the cutter-dies being laid in the opposite box opposite to the cutter-die and of the same thickness. The faces of the pointer-dies are illustrated in Fig. 7. In the center of the plane face of the die is a V-shaped transverse rib having an angular groove tapering nearly to a point. The groove is V-shaped in cross-section, and it leaves straight converging edges, which nearly touch each other at the converging ends, so that when the two dies come together the edges coincide and form a cavity substantially rectangular in cross-section, the larger end being about the size of the wire and the

smaller reduced to a small hole. When the dies, therefore, come together upon the wire, they point the nail and leave a very small filament of the metal remaining. The cutter 31, being in the same box, moves with the pointer-dies, but is arranged to shut slightly past this small hole in the closed pointers and sever the nail entirely from the wire. The relative arrangement of the cutter and pointers is shown in Figs. 6 and 8. The deep notch in the cutting-die is flared toward the tube 29, so that it aids in directing the end of the wire, after the nail is severed, in the next advance of the wire to the dies.

Behind the cutting-die and pointer-dies and spacing-pieces is a block 33, against which the set-screw bears, so that all are moved and held together when adjusted for the work, and all are held down by set-screws that bear on plates resting directly on the dies and spacing-pieces.

The different operations upon the wire to form the nail and to sever it are necessarily very precise and in rapid succession. The movements of the respective dies are required to be in like precise order and of different continuance. These operations therefore require exact construction and arrangement of the parts of the cam which are shown in Fig. 2, and which I now describe. The cam moves in the direction of the arrow, (supposing the machine to be in the act of feeding the wire,) and this movement begins very gradually as the wrist-pin leaves the dead-point. It is represented in the figure as advancing from that point and near its fullest movement of throw. When it reaches the second dead-point, the forward rise of the cam-face *e*, being just behind the wrist-pin, immediately strikes the gripping-lever. The high part of the cam-face *e* is from 20 to 21, and during the movement of this high part over the tail of the lever *d* the grip holds; but the high part 19 of the periphery is about opposite the center of the high part of *e*, and therefore strikes the heading-lever while the grip holds. At the point 21 the grip begins gradually to relax, and almost instantaneously the high parts of the cam-faces *f* begin to act on the pointer-levers. Only one of these is shown in Fig. 2, the other being exactly opposite. They begin gradually to act at the point 22, and the forward end of the high part begins at 23, following quickly the end of the high part of *e*. The high part of the cam-face *b* extends from 23 to 24, (a small part of the whole face, but long enough for the necessary work of the pointer-dies and cutter-die.) The rear slope of the cam-face *e* terminates before the rear slope of the cam-face *f*, and thus the gripping-dies are wholly retracted before the complete retraction of the pointers. The result of the construction and arrangement is that the wire is first fed until it bears against the end of the header, and its advance depends upon the adjustment of the header by

the set-screw 34. The feed-wheels are arranged to permit any slipping that may be necessary of the wire, and this renders unnecessary the very accurate adjustment of the pawl-and-ratchet mechanism. As soon as the wire is advanced its forward end is seized by the grippers and held while the header upsets the end against the grippers. Next follows the action of the pointers, and as soon as they begin to act upon the wire the grippers begin to relax, and they recede to their rearmost position just before the pointers recede, so that when the pointers let go their hold the nail drops, having been fully severed by the cutting-die. The movements of the parts are all gradual and positive in their operations upon the wire to form the nail. There are no blows delivered by springs, and consequently less noise, and the force is more easily adjusted and controlled.

Apart from the dies the principal wear is upon the cam-wheel and ends of the levers bearing thereon. The cam-wheel is of cast metal, preferably chilled, and may be easily and cheaply replaced. To save the expense of replacing the levers when the ends are worn, and at the same time to render the ends more durable, I have provided shoes *Q*, which may be made of either hardened or soft metal. They are provided with a recess fitted to a tenon on the end of the lever, to which they are held removably by set-screws, as shown in Fig. 5.

The springs are attached to lugs 36, cast on the under side of the base-plate. The upper ends of the springs are riveted thereto, and the springs are adjusted by screws set in the lugs and bearing on the springs below the rivets.

A chute *r* is located underneath the dies and extends laterally to receive the nails as they drop and discharge them outside of the machine.

To make longer or shorter nails it is only necessary to shift the spacing-pieces from one side of the pointer-dies to the other.

The motion of the reciprocating parts of the machine, both of the dies and the header, is very short, and the machine may therefore be run at a high rate of speed.

To run the machine in an opposite direction it is only necessary to reverse the cam-wheel upon the shaft and turn the shaft in the same direction indicated by the arrow on the cam-wheel.

I claim as my invention—

1. In a wire-nail machine, in combination, a gripper, a header, pointing-dies, the levers *F F'*, carrying said dies, and a single cam-wheel for operating both levers, located between their ends and having cam-faces upon opposite sides for said levers, substantially as described.

2. In a wire-nail machine, the pointing-dies, the levers *F F'* carrying the same, a gripper with the lever therefor, and a single cam-wheel for operating the die-levers *F F'* and the grip-lever, said cam having cam-faces on

its sides and being located between the ends of the die-levers, substantially as described.

3. In combination, the pointing-levers F F', the single cam D, located between their ends for moving them in opposite directions, a gripper-lever d', also operated by the cam D, and the single pivot-pin 3 for all the levers, substantially as described.

4. In combination, in a nail-forming machine, a pair of levers F F', carrying pointer-dies, a cam-wheel arranged between said levers, a gripper-lever d', arranged to bear on one side of the said cam-wheel, and a header-lever G, arranged to bear on the periphery of said cam-wheel, all substantially as described.

5. In combination, in a nail-forming machine, levers F F', carrying the pointer or gripper dies pivoted upon an offset on said levers, and a cam for operating said levers, the faces of the pointer or gripper dies being arranged to meet in a plane extending through the axis of the lever-pivots 3, substantially as described.

6. The pointer-levers formed with boxes on their upper ends to hold the dies and pivoted upon the same pivot, in combination with a cam-wheel arranged between the other ends, substantially as described.

7. In combination, the vertical levers F F', extending through the table and having boxes at their upper ends, the dies in said boxes, the grippers and header, and the abutment R on the table, the said boxes having their sides bearing against the abutment and movable thereagainst, substantially as described.

8. In combination, the gripper and header, with operating means, the die-levers F F', having boxes at their upper ends, the dies held thereby to be adjusted longitudinally, and the spacing-blocks arranged alongside the die and moving therewith, substantially as described.

9. In combination, the table having an opening, a pair of gripping-levers F F', extending vertically through the same and having die-holding boxes at their upper ends, a gripper-lever also extending through said opening and having a box at its upper end, with a grip b held thereby, the abutment R, and rib

12 on the table at the margin of the opening for the die-boxes and movable gripper-box, respectively, the rib 4, also on the table and constituting a stationary gripper-box, the projection 16, also on the table, and the header moving in said projection, substantially as described.

10. In combination, the table having the abutment R formed therewith, having a guiding-opening for the wire, the pointing-dies, the boxes and levers therefor, said boxes bearing against the abutment, the header, and the grippers with their boxes, one movable and the other fixed, said boxes being arranged against the pointing-die boxes and intermediate of the same and the header, whereby the thrust of the header is sustained by the abutment through the pointing-die boxes, substantially as described.

11. In combination, the table having an opening, the gripper-lever extending vertically through the same and having a box at its upper end, with a grip b held adjustably thereby, a rib 4 on the table, constituting a stationary box, and the grip a, adjustably held thereby, substantially as described.

12. In combination, the pointer-dies 32, with means for operating them toward and from each other, and a cutting-die 31, arranged to move with one of the pointer-dies and sever the wire in conjunction with the other pointer, substantially as described.

13. In a nail-machine comprising grippers, a header, and pointing-dies, a table having an opening therein, the abutment, the ribs 4 and 12, and the projection 16 on about the margin of said opening to afford bearing for the various parts, substantially as described.

14. A pair of feed-wheels having a series of grooves and set adjustably on their shafts, substantially as described.

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

A. J. SWEENEY.

Witnesses:

HENRY E. COOPER,
MARGARET V. COOPER.