

No. 644,603.

Patented Mar. 6, 1900.

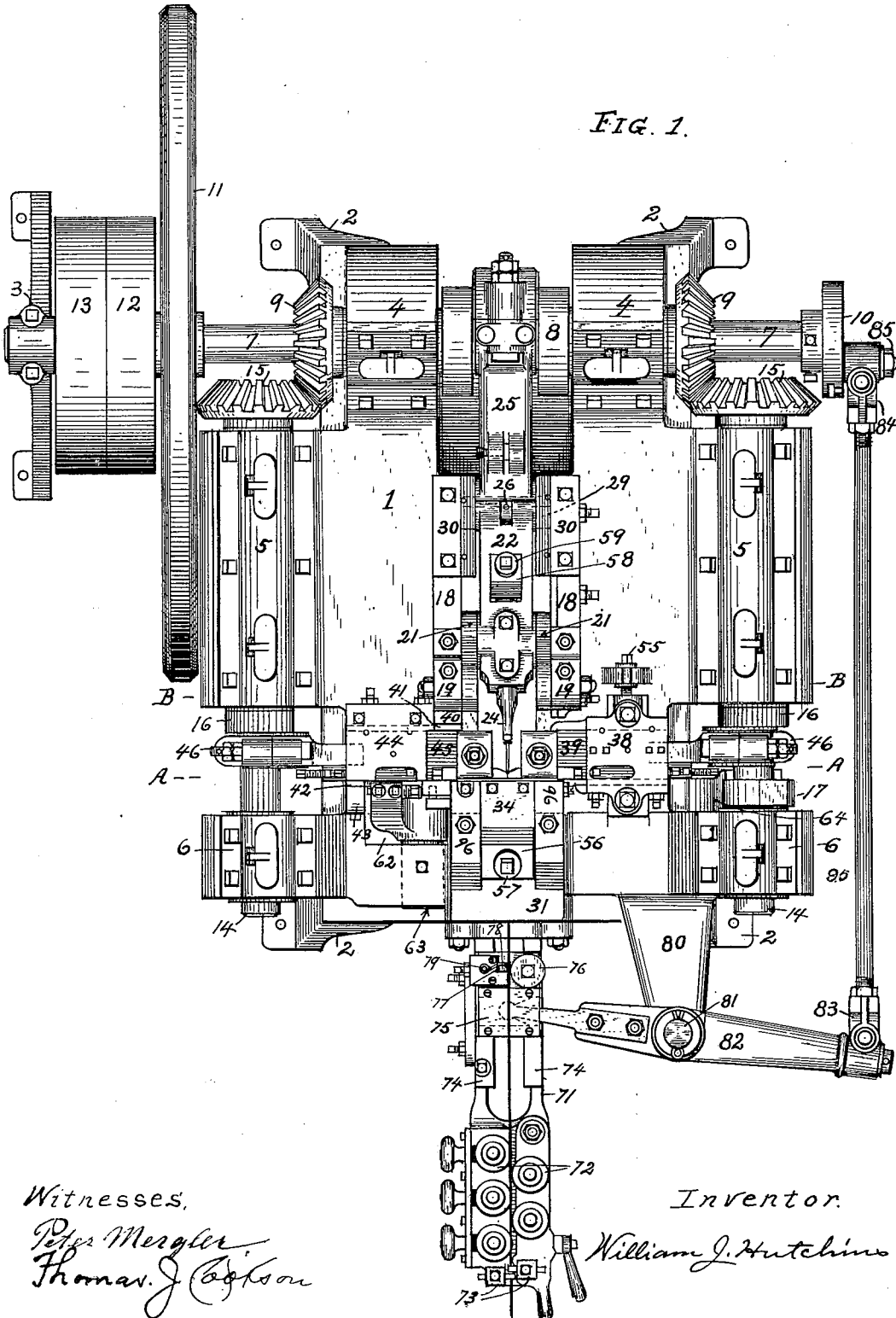
W. J. HUTCHINS.  
WIRE NAIL MACHINE.

(Application filed July 18, 1898.)

7 Sheets—Sheet 1.

(No Model.)

FIG. 1.



Witnesses,

*Peter Mesgler*  
*Thomas J. Carlson*

Inventor,

*William J. Hutchins*

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7 Sheets—Sheet 2.

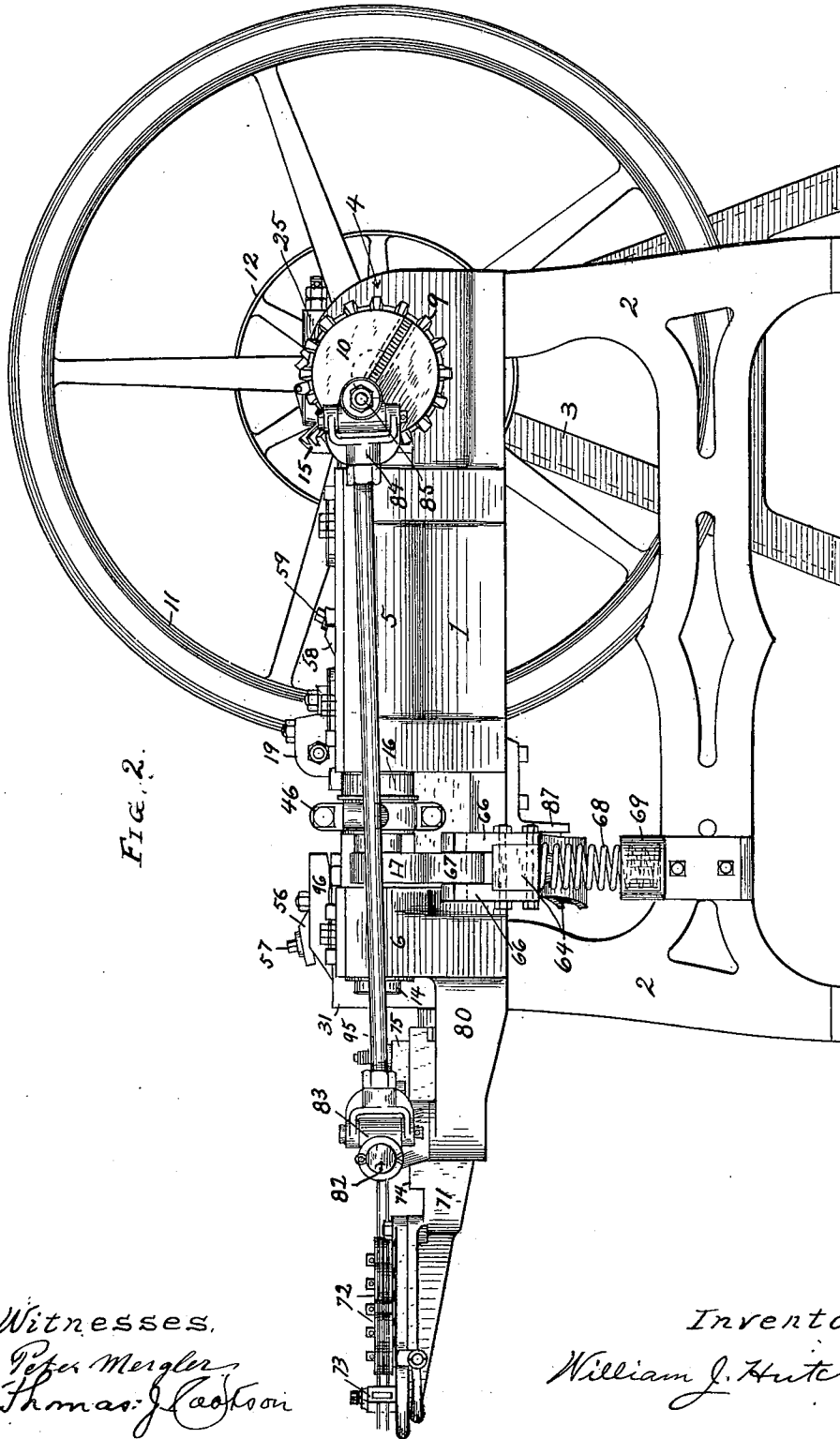


FIG. 2.

Witnesses,  
*Peter Mergler*  
*Thomas Jackson*

Inventor,  
*William J. Hutchins.*

No. 644,603.

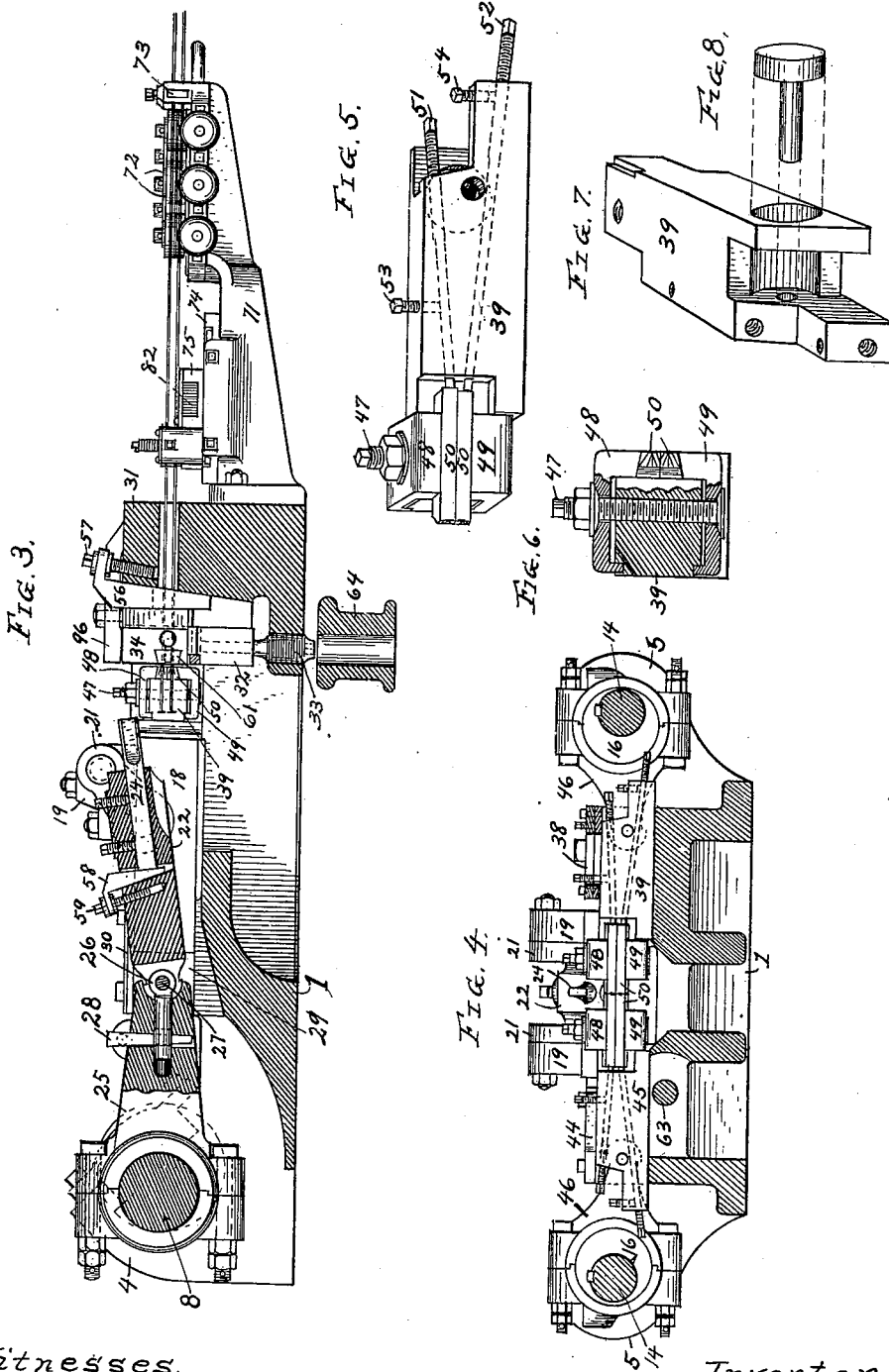
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7 Sheets—Sheet 3



Witnesses.  
Peter Mergler  
Thomas J. Cookson

Inventor.  
William J. Hutchins.

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FIG. 12.

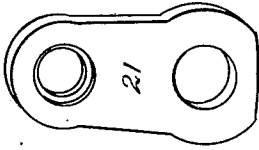


FIG. 11.

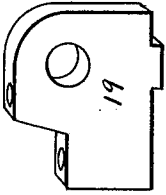


FIG. 9.

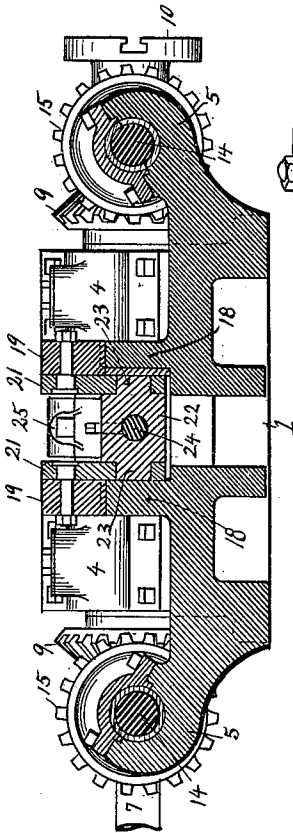
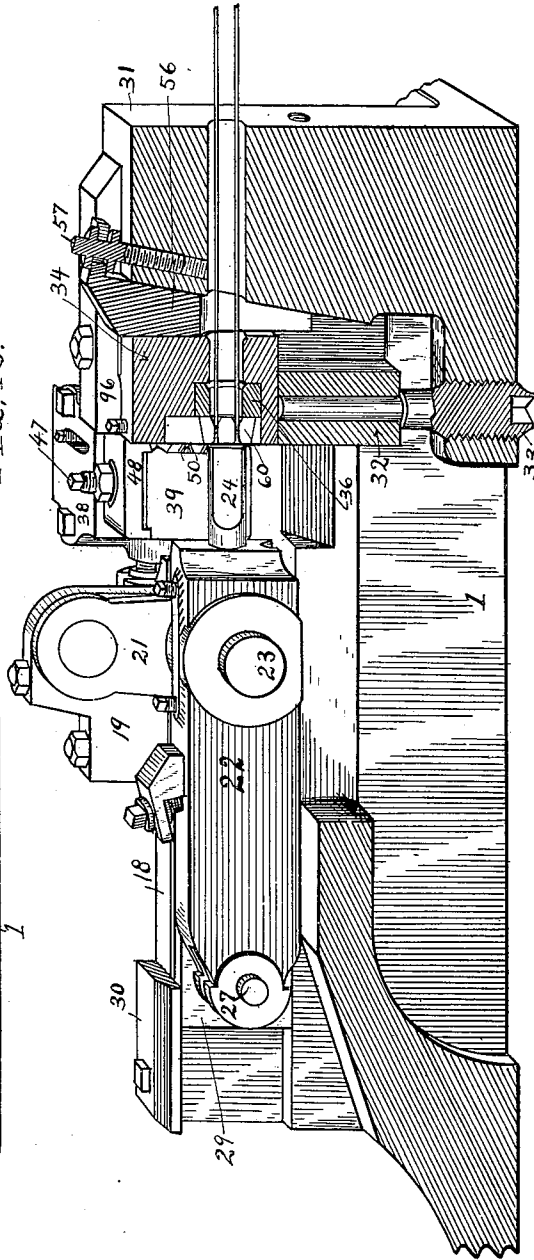


FIG. 10.



Witnesses.

Peter Mergler  
Thomas J. Jackson.

Inventor.

William J. Hutchins.

No. 644,603.

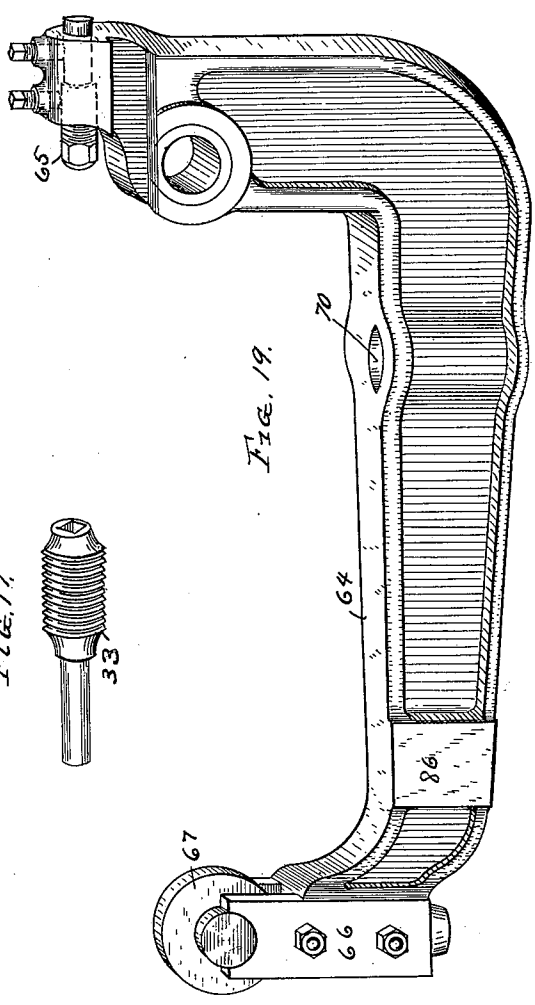
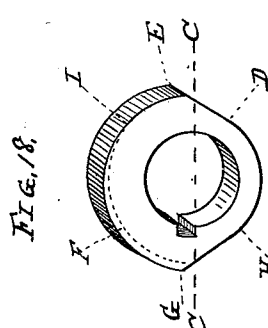
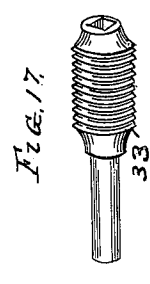
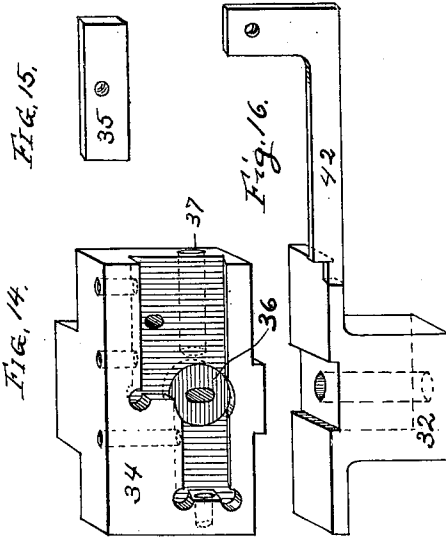
Patented Mar. 6, 1900.

W. J. HUTCHINS.  
WIRE NAIL MACHINE.

(Application filed July 18, 1898.)

7 Sheets—Sheet 5.

(No Model.)



Witnesses.  
*Peter Meyer*  
*Thomas J. Jackson.*

Inventor.  
*William J. Hutchins*

No. 644,603.

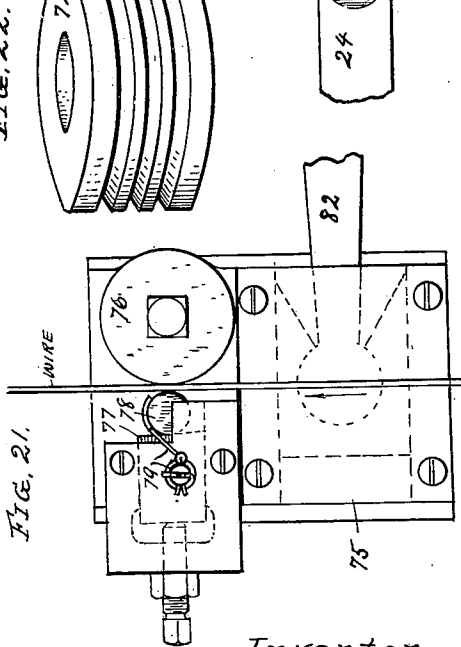
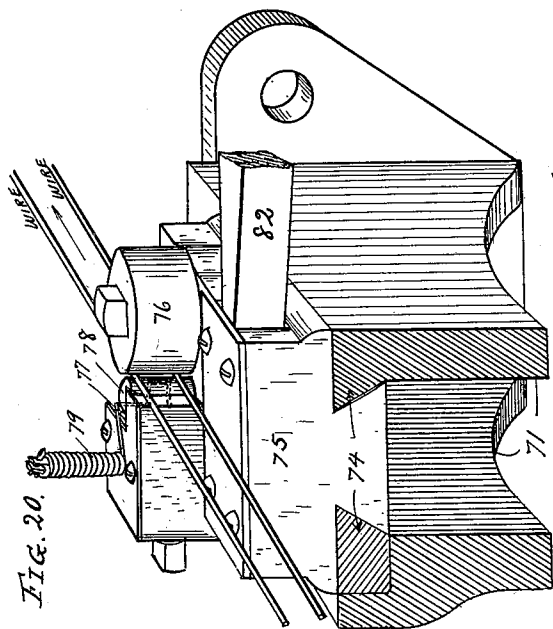
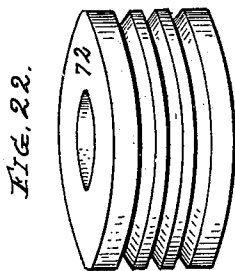
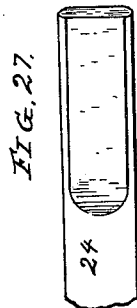
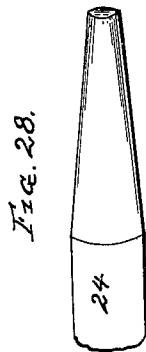
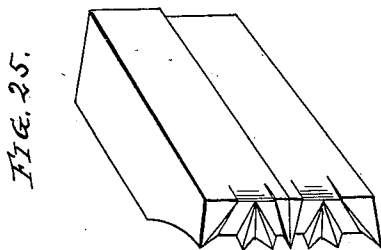
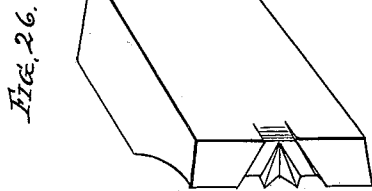
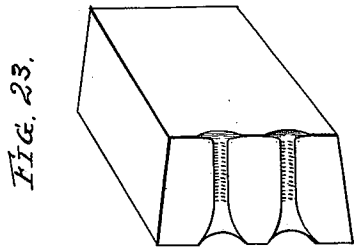
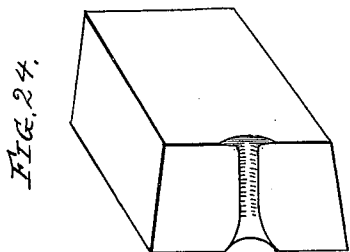
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(No Model.)

7 Sheets—Sheet 6.



Witnesses.

*Peter Mezler*  
*Thomas J. Colton*

Inventor.

*William J. Hutchins*

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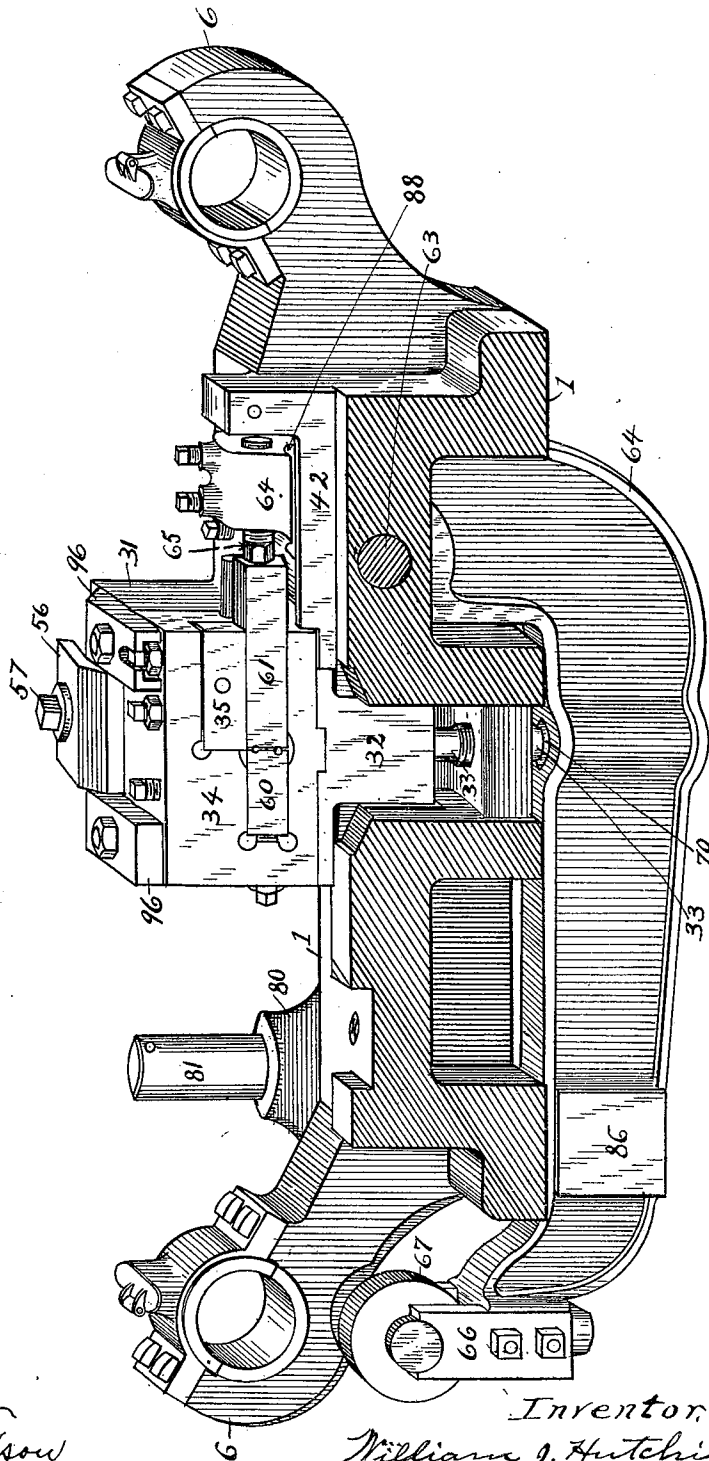
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(No Model.)

7 Sheets—Sheet 7.

FIG. 29.



Witnesses.

*Peter Meszler*  
*Thomas J. Cookson*

Inventor,  
*William J. Hutchins*

# UNITED STATES PATENT OFFICE.

WILLIAM J. HUTCHINS, OF JOLIET, ILLINOIS.

## WIRE-NAIL MACHINE.

SPECIFICATION forming part of Letters Patent No. 644,603, dated March 6, 1900.

Application filed July 18, 1898. Serial No. 686,308. No model.

*To all whom it may concern:*

Be it known that I, WILLIAM J. HUTCHINS, a citizen of the United States, residing at Joliet, in the county of Will and State of Illinois, have invented certain new and useful Improvements in Wire-Nail Machines, of which the following is a specification, reference being had therein to the accompanying drawings and references marked thereon.

10 This invention relates to improvements in that class of nail-making machines wherein the nails are formed of wire, and is designed as an improvement in the wire-nail machine patented by me April 6, 1897, No. 580,318, 15 which improvements are fully set forth and described in the following specification and pointed out in the annexed claims.

The objects of this invention are to produce a machine of greater strength and durability 20 without materially increasing the general outline dimensions; to decrease the stroke of the parts employed in forming the nail-heads, thereby increasing the power of compression and decreasing the vibratory movement of 25 the machine when in action; to render the machine capable of making either one or two nails at a single operation or revolution; to construct and confine the constituent parts of the machine so that there will be no perceptible 30 yield or undue strain experienced during the operation thereof, thereby reducing the liability of breakage to a minimum and rendering it possible to fully maintain adjustments of parts, resulting in a more nearly continuous operation, and hence a greater production 35 of nails; to increase the adjustments of the grip-dies, so as to make it possible to bring the nail-wire in more minute alinement with the heading-tool; to increase by a change of 40 form the leverage of the grip or pinch lever, so as to reduce the wear thereof and the power required to operate it; to provide a pinch-feed instead of the grip-feed heretofore employed, and other objects which are described 45 hereinafter.

In the drawings, Figure 1 is a general plan of the machine; Fig. 2, a side elevation thereof looking at Fig. 1 from the right; Fig. 3, a central vertical longitudinal sectional view of 50 the machine; Fig. 4, a vertical cross-sectional view taken on line A A of Fig. 1 looking toward the rear of the machine; Fig. 5, a side

perspective of one of the point-cutter heads of the machine provided with its cutters, adjusting-screws, and clamps; Fig. 6, a front end 55 view of the same having a portion represented in section; Fig. 7, a rear perspective of said head stripped of said parts; Fig. 8, a perspective view of the pitman-coupling pin of said head; Fig. 9, a vertical cross-sectional 60 view taken on line B B of Fig. 1 looking toward the rear of the machine; Fig. 10, a sectional perspective view of the interior of the machine, showing the manner in which the heading-tool engages the nail-wire to form 65 the nail-heads; Fig. 11, a detailed perspective of one of the header-cross-head-link-supporting posts; Fig. 12, a similar view of one of the links supported by said posts; Fig. 13, a vertical cross-section taken on line 70 A A of Fig. 1 looking toward the front of the machine; Fig. 14, a detailed perspective of the die-block of the machine; Fig. 15, a similar view of the die-gib thereof; Fig. 16, a similar view of the adjustable die-block-supporting table and the side plate of one cross-head 75 guideway of the machine; Fig. 17, a similar view of the die-block-table adjusting-screw; Fig. 18, a similar view of the grip or pinch cam of the machine; Fig. 19, a similar view of 80 the grip or pinch lever of the machine; Fig. 20, a front perspective of the feed-head of the machine and a sectional view of the frame and guideway thereof; Fig. 21, a plan of said head; Fig. 22, a perspective view of one of the 85 straightener-rolls of the machine; Fig. 23, a perspective view of a two-wire-grip die; Fig. 24, a similar view of a single-wire-grip die; Fig. 25, a similar view of a double-point cutter; Fig. 26, a similar view of a single-point 90 cutter; Fig. 27, a perspective view of the end portion of the heading-tool employed in heading two nails simultaneously; Fig. 28, a similar view of the heading-tool employed in heading single nails; and Fig. 29 is a cross-sectional perspective view of the machine on line 95 A A of Fig. 1 looking toward the left, omitting the cutter-heads and their connecting mechanism.

Referring to the drawings, 1 is the machine-bed, 2 2 the standards upon which the bed is 100 mounted, and 3 an outer standard-bearing for supporting one extending end of the machine drive-shaft.

The bed has made integral therewith a pair of end boxes 4 and 4 and opposite side boxes 5 6 and 5 6, each of which is provided with a cap properly secured into position by means of

5 screws or studs. 7 is the drive-shaft, journaled in boxes 4 4 and 3, is made with a crank-head 8 between boxes 4 4, and has fixed thereon the miter-gears 9 9, a crank-disk 10, a fly-wheel 11, a tight belt-pulley 12, and sleeved thereon a loose belt-pulley 13 in the manner shown in Fig. 1.

14 14 are opposite side shafts, respectively, journaled in boxes 5 6 and 5 6, and have respectively fixed thereon miter-gears 15 (arranged, respectively, in mesh with and driven by gears 9 9) and eccentrics 16, and the shaft at the right side of the machine also has fixed thereon the grip or pinch cam 17, which affixed parts are arranged as shown in Fig. 1.

On the central portion of bed 1 is a longitudinal guideway formed by a pair of opposite upright parts 18 18, and affixed upon the forward end of said parts 18 18 is a pair of opposite posts 19 19, and swung from pins 20 20, respectively, of said posts is a pair of opposite links 21 21.

22 is the header cross-head, made with side-extending trunnions 23, (see Figs. 9 and 10,) which are hung in the depending portion of said links, and thereby support the forward end of said cross-head so it will swing at that end to bring the heading-tool 24 down to be in line with the nail-wire at the full forward movement of said head and raise said tool to be above the line of the nail-wire at the full rearward movement of said head. The rear end of said cross-head is made to socket and couple with a pitman 25, which is strapped to and driven by the crank of shaft 7, which coupling is effected by means of a link 26, held in a fork of the cross-head by a cross-pin 27 and adjustably held in a longitudinal bore of said pitman by means of a cross-key 28, (see Fig. 3,) and said rear end of said cross-head is guided by means of a pair of opposite sliding blocks 29, arranged in ways in the rear portion of said longitudinal guideway, (see Figs. 1, 3, and 10,) and have respectively arranged therein the end portions of said coupling-pin 27 and are respectively confined against lifting by means of the opposite guide-plates 30 30. In line with said longitudinal guideway at the forward end of the machine-bed is an upright anvil portion 31, made with a vertical recess in its side facing said guideway, which recess merges into an opening through the bed, which opening extends across the space between said anvil and guideway and a distance back below said guideway. Arranged adjacent the inner side of said anvil is the die-block-supporting table 32, with its depending portions extending down into said opening, and turned up through a screw-threaded hole in a ledge in the lower portion of the bed is a screw 33, which engages said table, as shown in Figs. 3, 10, and 13, for the

purpose of giving vertical adjustment to said table. 34 is the die-block placed upon said table, with its depending cross portion fitted into a corresponding recess in said table, (see Figs. 13, 14, and 16,) and is made with a rear extending portion fitted into the recess of anvil 31, is recessed in its face to form a seat for the grip-dies and for a gib 35 for operatively confining the operative die, is provided with a hardened battering-block 36, set therein in a position to be in rear of the working end of the grip-dies, is further provided with a barrel 37 in line with and in rear of the die-seat and with threaded holes for the placing of set-screws for holding, confining, and adjusting the grip-dies, and is held seated upon said table by means of clamping-blocks 38, which are secured down by means of studs set in anvil 31.

Across the machine-bed either way from the space between the longitudinal guideway and said die-block is a guideway, that at the right consisting of an adjustable guide-box 38, wherein one cutter-head 39 is placed, and that at the left consisting, at one side, of an upright portion 40 of the bed and an adjustable gib 41 at the opposite side of a plate 42, attached at one end to an upright lug 43 of the bed and resting against table 32 at its opposite end in a corner recess of said table, (see Fig. 16,) thus spanning the space at the side of the grip or pinch lever of the machine, and at the top of a covering-plate 44, wherein the opposite cutter-head 45 is placed. Said cutter-heads are respectively operated to simultaneously move toward and from each other by means of the opposite eccentrics 16 16 through the agency of the respective pitmen 46 46, which pitmen are socketed in the end of said heads and coupled therewith by means of pins, such as shown in Fig. 8, and have attached to their facing end portion by means of screws, such as shown at 47 in Fig. 6, clamps 48 49, which clamp and hold the point-cutters 50 at one side of their head. (See Figs. 1, 4, 5 and 6.)

The screws 47 are placed in vertically-threaded holes of their respective heads, and by turning them the lower clamps 49 will be adjusted vertically to correspondingly adjust the point-cutters, and when thus adjusted the nuts turned on the upper portions of said screws are set down hard upon the upper clamps 48, thus firmly pinching and holding the point-cutters. The rear end of said cutter-heads are stepped or offset, as shown in Figs. 5 and 7, and entered at said respective offsets are screws 51 and 52, which extend longitudinally through the head and engage the rear end of the respective cutters 50, as shown in said Fig. 5, for the purpose of adjusting said cutters, and turned into the head are set-screws 53 54, which engage against said adjusting-screws, respectively, to lock their engagement.

The cutters 50 of the opposite heads 39 45 may be adjusted vertically by means of the

screws 47 and clamps 48 49, so as to properly register on the wire lines. Also cutter-head 39 may be adjusted laterally or in the direction of the wire line to bring the cutters to register laterally by moving the guide-box 38, which is done by means of the shouldered screw 55, which is threaded into said box and retained by being placed in the fork of an upright lug of the bed, as shown in Fig. 1.

In the vertical recess of anvil 31 in the rear end of the die-block is placed a wedge 56, made adjustable by means of a shouldered screw 57, as shown, for the purpose of adjusting the die-block toward or from the path of the point-cutters to regulate the distance between the face of the grip-dies and point-cutters, and thereby regulate the stock or quantity of wire to be left projecting from the grip-dies after the nails have been cut from the nail-wire, hence gaging the quantity of wire from which the nail-heads are formed to govern their size. The header cross-head 22 is also provided with a wedge 58, arranged in a vertical recess in rear of the heading-tool 24, made adjustable by means of a shouldered screw 59, as shown, for the purpose of adjusting said heading-tool to gage its stroke in forming the nail-heads.

The grip-dies (shown at 60 and 61 in Fig. 13) are placed in their seat in die-block 34, as represented in said figure, with the die 60 held in a fixed position and the die 61 operatively confined, so as to be yieldingly held open from die 60 by a means not necessary to be herein described and pinched to grip the nail-wire between it and die 60 by means of the action of the pinch or grip lever, as hereinafter described.

Adjacent the left side of anvil 31 the bed is recessed vertically, as shown at 62 in Figs. 1 and 13. Across said recess is placed a pin 63 and upon said pin is fulcrumed the grip-lever 64, as shown in said figures. The upper end portion of said lever is provided with a pinch-screw 65, adjustably arranged to engage against the end of die 61, and the lower portion of said lever extends down through said bed-recess across under the bed to the opposite or right side of the machine and terminates with an affixed forked bearing 66 under grip-cam 17 of shaft 14, wherein is placed a roll 67, with its trunnions resting in the bearings of said fork and its face contacting said grip-cam, the action of the cam against said roll causing the lever to be actuated at stated regular intervals to pinch said grip-die 61, and as a means of yieldingly holding said roll 67 in constant contact with cam 17 and releasing the pinch on said die when the position of said cam so permits a coil-spring 68 is arranged under said lever at its end below said roll, which spring is stepped and thus supported in a barrel-bracket 69, which is attached to one of the machine-standards, as represented in Fig. 2. The position of lever 64 is such as to be in line vertically with the die-block, and hence

in line with the table-adjusting screw 33, and as a means of giving access to the socket of said screw by means of a suitable wrench a hole 70, as shown in Fig. 19, is made through said lever directly under said screw.

The machine employing a crank-feed is therefore of that class known as a "two-part-movement machine," one-half revolution being consumed in feeding forward the nail-wire, leaving the remaining one-half revolution to point, shed, and head the next succeeding nails. Therefore the grip-cam 17 must be so shaped as to accommodate the several consecutive movements of each revolution of the machine. By reference to Fig. 18 line C C denotes the cross-center of the cam, the part below said line representing the time of the machine when the nail-wire is being fed forward. Therefore said cam is reduced at that portion so as to permit the grip-dies to be open and free during that period of time of the action of the machine, and the part above said line represents the time of the machine when the feed-head is receding and the nails are being gripped, pointed, shed, and headed.

The section of the cam from D to E represents the time the die 61 is being pinched to grip the nail-wire, the section from E to F the time the nails are being pointed and shed from the machine, the section from F to G the time the nail-heads are being formed, and the section from G to H the time the pinch is being released on die 61, so it may open to permit a succeeding feed to be made. That section of the cam from I to F is made inclined, as represented, for the purpose of gradually increasing the force of pinch on die 61, so that the maximum force of pinch will be exerted on said die during the time of heading the nails and only during said periods of time.

Attached to the front end of bed 1 is a frame 71, which supports at its outer end a set of wire-straightening rolls 72 and guides 73, which are made adjustable in the usual manner and openable so the nail-wire may be laid therein and then closed upon the wire. The inner end portion of said frame comprises a guideway 74, one side of which is made adjustable by means of set-screws, as shown. Placed upon and within said guideway is the feed-head 75, adapted to slide upon said way in the direction of the machine wire line. Fixed upon said head at one side of the wire line is a circular block 76. Opposite said block is arranged in a suitable housing an adjustable square block 77, made adjustable by means of a set-screw turned against its outer side and made with its side facing block 76 beveled, as represented. Placed against said beveled block 77 is a vertically-arranged roll 78, yieldingly held into position by means of a spring 79.

The nail-wire is placed between the block 76 and roll 78, and at each forward movement of said head the roll will wedge back

between the wire and beveled end of block 77 sufficient to pinch the wire firmly against block 76, and thus hold it to cause the proper feed to be made. As said head recedes the action of the wire against roll 78 causes said roll to move back the bevel of block 77, and this releases the pinch, so the wire may remain stationary until a succeeding feed is made.

Bed 1 is made with a forward-extending arm 80, which has fixed therein an upright pin 81, whereon is fulcrumed the feed-lever 82, which extends at one end to engage with and operate the feed-head, and has sleeved on its opposite end the hub of a knuckle 83, which connects with a second knuckle 84 through the medium of a connecting-rod 95, as shown, and said latter knuckle is sleeved on a crank-pin 85 of disk 10, which crank, comprising said disk and pin, drives said rod to operate said lever. Pin 85 is made adjustable in a face-slot of disk 10 for the purpose of changing the stroke of said crank to regulate the movement of the feed-head, so that various lengths of feed may be made to produce various lengths of nails.

Grip-lever 64 is provided near its outer end with a vertical plain surface 86, and attached to the under side of bed 1, adjacent said surface, is a depending bracket 87, set so as to be engaged by and form a guide at one side of said lever to prevent side movement thereof at that end. (See Fig. 2.) Also said lever is made with recess 88 in its side immediately above its point of fulcrum for the purpose of providing space for the guideway side plate 42, in order that the head and hub of said lever may be brought more directly in line with the grip-dies.

In the construction of eccentrics 16 the one at the right of the machine is made of broader face than the strap of the pitman placed thereon, (see Figs. 1 and 2,) so that said strap may have a limited sliding movement on said eccentric to accommodate different positions of cutter-head 39 when adjusted by moving box 38, as stated.

In operation the feed mechanism is operated to intermittently feed forward sections of nail-wire of length suitable from which to form the size of nails being made. At each forward movement of the feed the grip-cam is turned to such position as to permit the grip-lever to release its pinch on the grip-die 61, thus permitting the dies to be open during such feed movement at the same time the header cross-head is receding, causing its tool 24 to swing rearward and upward, so as to be above the path of the headed ends of the infed nail-wire. At the conclusion of such feed the grip-cam has turned so as to act upon the grip-lever to cause it to pinch die 61, and thus grip the infed wire to hold it during the period of time the feed-head is receding, during which time the point-cutters advance upon the nail-wire adjacent the face of the grip-dies and point the nails, severing them from the nail-wire, and leaving a short section of

the wire projecting from the grip-dies from which to form the nail-heads, which at the receding of the point-cutters is immediately engaged by the heading-tool and the heads formed.

During the forward or advancing movement of the header-tool it is by the swinging movement of its head brought down to line with the nail-wire and during its descent engages and sheds the nails from the nail-wire, permitting them to fall through the opening in the machine-bed into a suitable receptacle placed under the machine.

In constructing the machine the wire passage-way through the die-block and bed-anvil is made elongated vertically, so as to accommodate the feeding of two wires, one a little distance above the other; also, to accommodate two wires the grip-dies are made double-seated, as shown in Fig. 23, the point-cutters are made double, as shown in Fig. 25, and the straightener rolls are made with an extra groove either way from their central groove, as shown in Fig. 22; also, when the machine is in service, making two nails at a single revolution, the elongated faced heading-tool, such as shown in Fig. 27, is employed, which covers both wire ends, as represented in Fig. 10. When making one nail at each single revolution of the machine, the header-tool, as represented in Fig. 28, the grip-dies, as represented in Fig. 24, and the point-cutters, as represented in Fig. 26, are employed in place of the ones described for double service.

The action of the machine and the feed is the same in single or double service—viz., making one or two nails at a single revolution—and the machine may be changed to either service by changing the header-tool, the point-cutters, and the grip-dies and employing the central groove of the straightener-rolls for single-nail making and the two adjacent grooves for double-nail making.

Having thus described my invention, what I claim as new and useful, and desire to secure by Letters Patent, is as follows:

1. In a wire-nail machine, the combination with the bed provided with the upright and vertically-recessed anvil portion, the table recessed across its top, and arranged adjacent the recessed side of said anvil; the die-block seated upon said table and provided with a depending portion adapted to fit into said table-recess, and with an extending portion adapted to fit into the recess of said anvil, and means for vertically and longitudinally adjusting said die-block, for the purpose specified.

2. In a wire-nail machine, the combination with the bed provided with the upright vertically-recessed anvil portion; the top recessed table arranged adjacent the recess of said anvil portion; the die-block seated upon and shaped to register with the top of said table, and provided with the portion extending into said anvil-recess; the vertically-adjustable wedge arranged to give longitudinal

adjustment, and the screw arranged to give vertical adjustment, to said die-block, substantially as set forth.

3. In a wire-nail machine, the combination with the bed, provided with the upright vertically-recessed anvil portion; the top recessed table arranged adjacent said anvil; the die-block provided with depending and lateral projections adapted to respectively fit in said table and anvil recesses; the adjustable wedge arranged to give longitudinal adjustment, and the screw arranged to give vertical adjustment, to said table and die-block; and the clamps arranged holding said die-block seated, substantially as set forth.

4. In the herein-described wire-nail machine, the combination with the bed and the die-block; the die-block-supporting table provided with the depending portion arranged fitted into the vertical opening of the bed, and the screw turned through an underreaching ledge of the bed and into a vertical hole of said table, and adapted to be turned to give vertical adjustment to said table, substantially as and for the purpose specified.

5. In the herein-described wire-nail machine, the combination with the machine-standards, and the grip-lever and its actuating-cam, the barrel attached to the machine-standard and the coil-spring arranged seated at one end in said barrel, and impinging the grip-lever at its opposite end, substantially as and for the purpose specified.

6. In the wire-nail machine described, in combination with the longitudinal guideway thereof, the opposite posts arranged at one end portion of said guideway; the opposite links respectively swung from pins of said posts; the header cross-head provided with opposite trunnions swung in said links; the opposite sliding blocks arranged in the opposite end portion of said guideway and arranged supporting and guiding the rear end

of said cross-head, by means of a cross-pin, and the crank-and-pitman mechanism for operating said head, substantially as and for the purpose specified.

7. In a wire-nail machine, the header cross-head supported by swinging links at its forward end and longitudinally-traveling blocks, or heads, at its rear end and operated by means of a crank-and-pitman mechanism arranged in the wire line of the machine, whereby the nail-heading tool carried thereby is brought into direct line with the nail-wire line when at the limit of its forward movement, and raised above said line at its receding movement, substantially as set forth.

8. A wire-nail machine, provided with means for feeding forward, at stated intervals, two strands of nail-wires simultaneously, one strand vertically above the other; horizontally-operating, gripping mechanism arranged to jointly grip said wires at the junction where the nails are formed, transversely-operating point-cutters arranged in opposite and independently-adjustable pairs adapted to engage and simultaneously point two nails; a longitudinally-operating header arranged in vertical line with the nail-wires and adapted, during its advancing movement, to descend from a position vertically above the nail-wires, engage and shed the nails from the nail-wires, and thereafter engage the nail-wire ends and simultaneously form the nail-heads; and during its receding movement to ascend to its former position above the path of the forwardly-infeeding headed ends of the nail-wires and with crank mechanism arranged in direct line with the nail-wire for giving movement to said header, substantially as set forth.

WILLIAM J. HUTCHINS.

In presence of—

PETER MERGLER,  
THOMAS J. COOKSON.