

(No Model.)

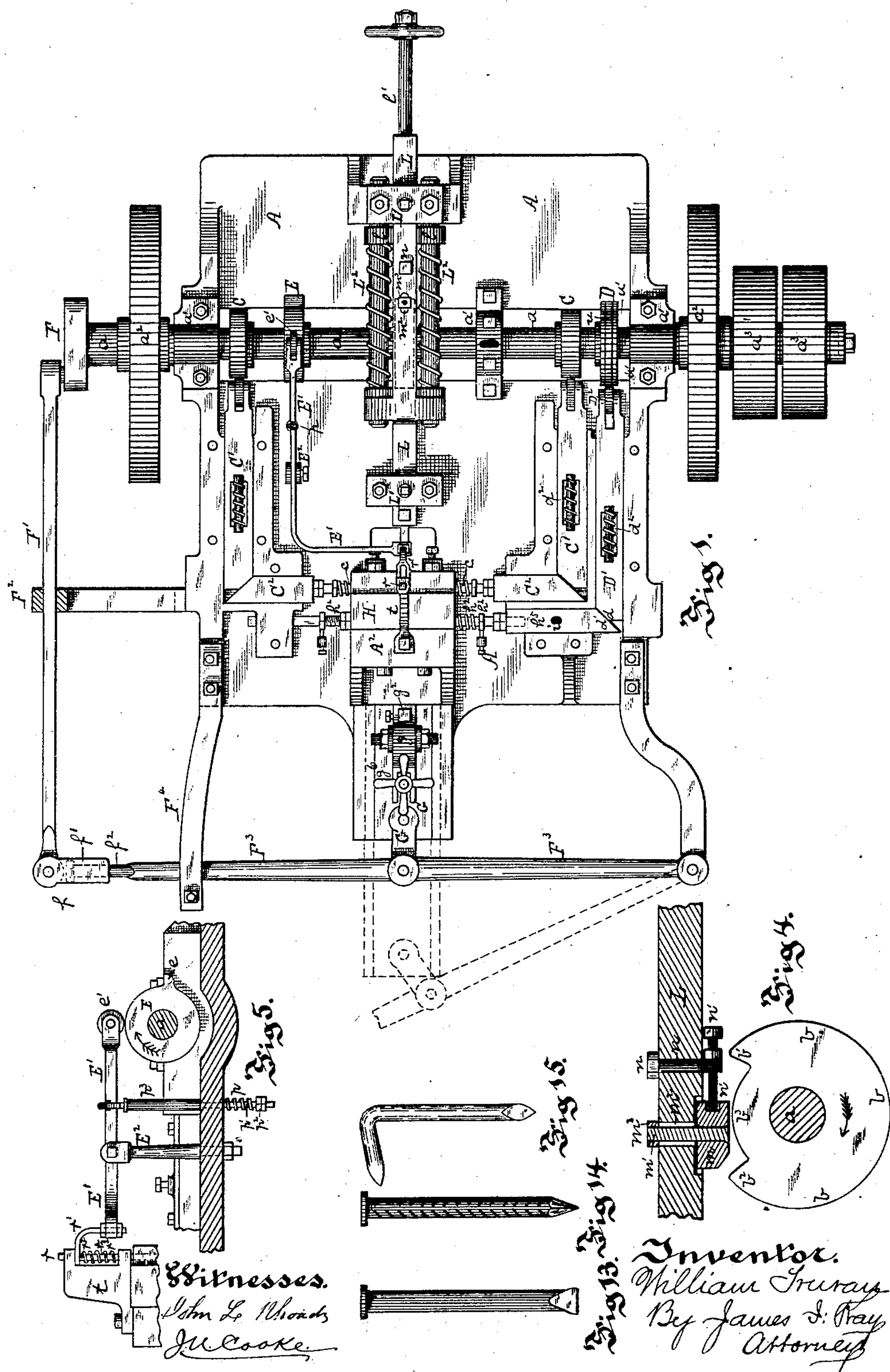
3 Sheets—Sheet 1.

W. TRURAN.

MACHINE FOR MAKING WROUGHT NAILS.

No. 314,894.

Patented Mar. 31, 1885.



(No Model.)

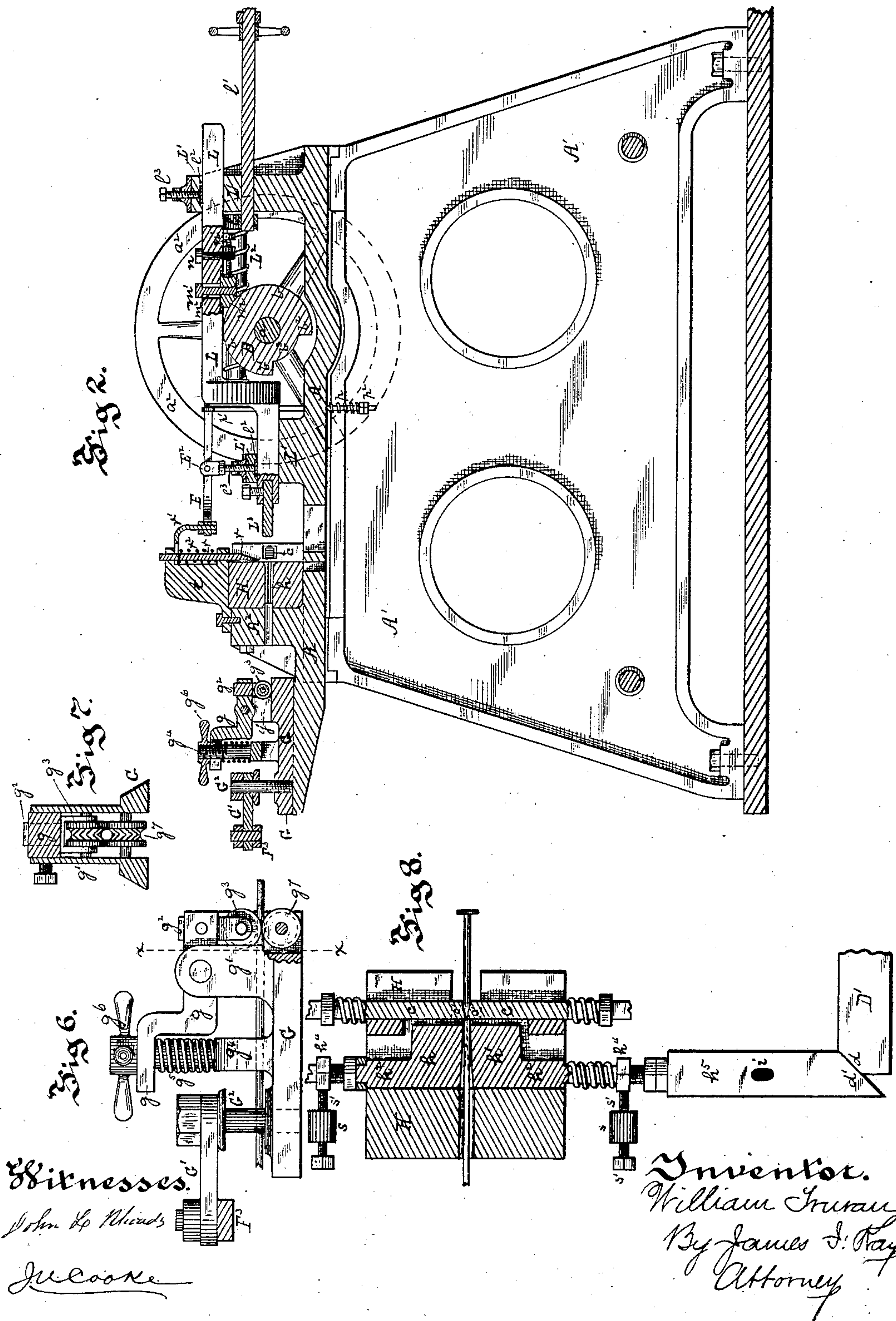
3. Sheets—Sheet 2.

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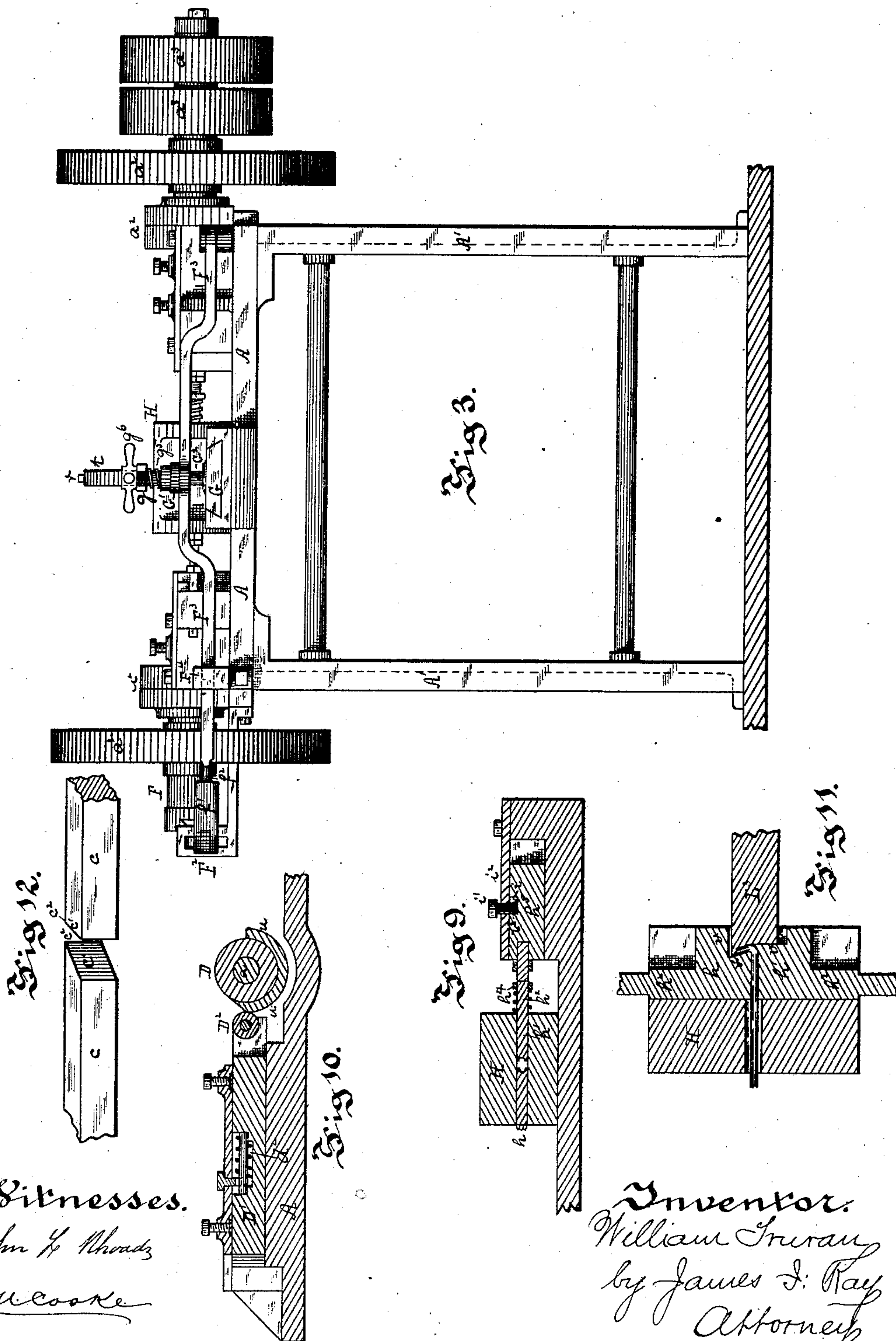
3 Sheets—Sheet 3.

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MACHINE FOR MAKING WROUGHT NAILS.

No. 314,894.

Patented Mar. 31, 1885.



Witnesses.  
John H. Rhoads  
J. Cooke

Inventor.  
William Truran  
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Attorney



# UNITED STATES PATENT OFFICE.

WILLIAM TRURAN, OF ALLEGHENY CITY, PENNSYLVANIA, ASSIGNOR TO  
THE PITTSBURG STEEL NAIL COMPANY, OF SAME PLACE.

## MACHINE FOR MAKING WROUGHT NAILS.

SPECIFICATION forming part of Letters Patent No 314,894, dated March 31, 1885.

Application filed July 8, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM TRURAN, of Allegheny City, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Nail, Spike, and Bolt Machines; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to nail, spike, and bolt machines, having special reference to machines for forming the articles from rods or wire, its object being to improve the construction of the machine shown and described in Letters Patent No. 278,629, granted to William Taylor, May 29, 1883. Its object is to improve the mechanism for operating the header, the feeding mechanism, the gripping apparatus, and apparatus for knocking off or breaking the finished nail from the rod, as well as to improve the machine in other particulars.

It consists, essentially, in combining with the reciprocating header-bar, having an engaging-lug extending out from one side thereof, a cam mounted on a shaft at right angles to and on a different plane from said reciprocating bar, said cam having a shoulder for pressing back the header-bar, and a continuous concentric face the full diameter of the cam extending from said shoulder to the point where the bar is freed to strike the blow, and said continuous face pressing against the lug, so that the cam acts to both withdraw the bar and hold it back until the next heading-stroke and then release it.

It also consists in mechanism for adjusting and taking up wear on the header-bar and its lug.

It also consists in feeding mechanism having one or more friction-wheels binding upon the wire with sufficient force to hold it and feed it forward until grasped by the grippers, and on the return of the feeding mechanism traveling along the wire and draw on it sufficiently to straighten it.

It also consists in forming the bearing-face of the feeding wheel or wheels corrugated, so that the wheels will not only hold the wire and feed it forward, but as the wheels travel back along the wire it will also be corrugated or roughened thereby.

It also consists in connecting the sliding re-

ciprocating plate of the feeding mechanism with the vibrating bar, imparting the motion thereto by a double-pivot link, thus giving greater freedom to the movement of the plate and allowing of its removal from its guides without disconnecting from the vibrating bar.

It also consists in a sliding connection between the pivoted reciprocating bar and the pitman of the eccentric, thus allowing of a true vertical vibration of the eccentric-pitman within its guides.

It also consists in certain improvements in the construction of the gripping apparatus to overcome and take up the wear of the parts and prevent the binding of the slides upon each other.

It also consists in a vertically-moving knock-off bar and mechanism for operating it, as well as in certain other details of construction hereinafter set forth.

To enable others skilled in the art to make and use my invention, I will describe its construction and operation, referring to the accompanying drawings, in which—

Figure 1 is a plan view of my improved machine, the top plates of the slide-guides being removed. Fig. 2 is a longitudinal central section through the line of feed. Fig. 3 is a front end view. Fig. 4 is an enlarged detail view of the header-bar and cam. Fig. 5 is a like view of the knocker-off cam and lever. Fig. 6 is an enlarged side view, partly broken away, of the reciprocating feeding mechanism. Fig. 7 is a face view on the line *x x*, Fig. 6. Fig. 8 is a horizontal sectional view of the die-box, showing also part of the gripper-slides. Fig. 9 is a cross-section of the die-box and the grippers, showing one of the gripper-slides in longitudinal section. Fig. 10 is a longitudinal section of the gripper cam and slide. Fig. 11 is a view of another form of dies for forming staples. Fig. 12 is a perspective view of the shears; and Figs. 13 to 15 are views of the nails and other articles formed in the machine.

Like letters of reference indicate like parts in each.

The frame of the machine is formed of sufficient strength to withstand the jars and strains of the operation thereof, having the bed-plate A and the supporting-standards A' connected by suitable braces to strengthen it. The power-



shaft  $a$  is journaled in bearings  $a'$ , and provided with the fly-wheels  $a^2$  and band-wheels  $a^3$ , and carrying the header-cam B, shear-cams C, gripper-cam D, knocker-off cam E, and the adjustable crank F at the end thereof for imparting a reciprocating motion to the feeding mechanism. This crank F is constructed substantially as described in said patent, and has the pitman F' passing through the vertical guide F<sup>2</sup>, and connected to the vibrating bar F<sup>3</sup>, pivoted to a bar extending forward from the opposite side of the bed-plate A, the vibrating bar fitting within the horizontal guide F<sup>4</sup>, and being held therein by a bolt at the end. The pitman F' and bar F<sup>3</sup> are connected by a sliding joint,  $f$ , which allows of a true vertical vibration of the pitman in its vertical guide F<sup>2</sup>, and relieves the crank-pin of strain, and at the same time permits of a true horizontal vibration of the bar F<sup>3</sup> when operating the feeding mechanism. This sliding joint is formed of the sleeve  $f'$ , pivoted at the end of the pitman and fitting over the cylindrical stem  $f^2$  of the bar F<sup>3</sup>, and as the pitman moves in its course the stem  $f^2$  of the bar F<sup>3</sup> slides back and forth within the sleeve  $f'$ , the sleeve turning slightly around the cylindrical stem  $f^2$ , according to the throw of the pitman.

At the forward end of the bed-plate in the line of feed is a dovetailed recess, in which the base-plate G of the feeding apparatus slides, this base-plate being connected to the vibrating bar F<sup>3</sup>, and a reciprocating motion being imparted thereto by the bar. The connection between the bar F<sup>3</sup> and plate G is formed by the double-pivot link G', pivoted on the standard G<sup>2</sup> of the base-plate, the rod or wire being fed to the machine through an opening in said standard under the link. By this double-pivot-link connection the base-plate and feeding mechanism can be drawn into and out of the guides without disconnecting it from the bar, and the feeding mechanism can therefore be more rapidly and easily changed or adjusted.

On the base-plate G is the bearing  $g'$ , in which is mounted the bent lever  $g$ , at the forward end of which, in a journal-bar,  $g^2$ , is the feeding-wheel  $g^3$ , the bar  $g^2$  extending up through the lever, and being held therein by a set-screw. The forward end of the lever is forked, and extends on each side of the standard  $g^4$ , over the spring  $g^5$  around said standard, the upper end of the standard being threaded, and a hand-wheel,  $g^6$ , screwed thereon above the forked end of the lever. The feeding-wheel is grooved to receive the rod or wire, which passes through the standard  $g^4$  and rests on the base-plate under the wheel  $g^3$ , or on the lower feeding-wheel,  $g^7$ , mounted therein, and is held by said wheel or wheels and pushed forward thereby on the movement of the base-plate, being fed the proper length for a spike or nail, and then grasped by the grippers, and on the return of the base-plate the feeding-wheel travels over the rod or wire, and on ac-

count of the binding of the wheel on the wire as it is held by the grippers the wheel draws on the wire between it and the grippers and stretches and straightens it.

In practice I find that but one feeding-wheel is necessary; but it is in some cases desirable to roughen or corrugate the body of the nail, as shown in Fig. 14, and in this case two feeding-wheels are employed, and the grooves within which the wire fits are corrugated, as shown in Fig. 7, and on the return of the feeding mechanism these wheels traveling over the wire press the corrugations therein. The pressure of the feeding wheel or wheels is regulated by the hand-wheel  $g^6$  according to the thickness of rod or wire employed.

In the line of feed beyond the feeding mechanism is the block A<sup>2</sup>, integral with the bed-plate A, and supported against and bolted to this block is the die-box H, within which the grippers and shears work. One gripper,  $h$ , is stationary, and is adjusted by suitable means within or at the side of the box. The other gripper,  $h'$ , has a bar,  $h^2$ , extending through the box, and having a spring,  $h^3$ , confined between the side of the box, and a nut,  $h^4$ , screwed on the end of the bar, this spring holding the grippers open, except when pressed together, as hereinafter described. In line with this bar  $h^2$  is the slide  $h^5$ , working in guides and having a beveled face,  $d'$ , at the outer end. At right angles to this slide  $h^5$  is the slide D', having the beveled face  $d$ , and provided at the other end with the idle-roller D<sup>2</sup>, working against the cam D.

In the machine heretofore used it was found that the grippers were liable to spread open at the forward end or wear off at the end, and consequently the rod or wire would be forced back and kinked within the grippers by the heading-blow, and also that the gripper-slides would bind so tightly that the slide D' would not be drawn back by the spring  $d^2$ , and the grippers would not open.

To overcome the spreading or opening of the forward end of the grippers, the standards  $s$  are secured to the bed-plate in front of the nuts  $h^4$  on the gripper-bars  $h^2$ , and adjusting-screws  $s'$ , extended through the standards against said bars  $h^2$ , or nuts on the bars, so that the pressure at the front of the grippers is sustained by said standards through the bars  $h^2$  and nuts  $h^4$ , the nut  $h^4$  on the movable gripper-bar sliding over said adjusting-screw  $s'$ . By this means the grippers can be adjusted so that they bind on the rod or wire over their entire face or only at the forward end, and any uneven wear on the faces of the grippers may be taken up. By this device the strain on the gripper-slides and the cam is relieved to a great extent, and the tendency of the slides to bind is decreased.

To prevent the slides  $h^5$  from binding too hard on the slide D', and to regulate its back movement, the slot  $i$  is formed in the slide,



and a screw-bolt,  $i'$ , extends through the top plate,  $i^2$ , of the guide thereof, the bolt having an eccentric-lug,  $i^3$ , at the base thereof extending into said slot, the back movement being regulated by turning the screw and changing the position of the lug in the slot as the end wall of the slot strikes against the lug on the bolt. These devices may be employed with the shear-slides, if so desired. The friction between the faces of the gripper-cam D and the idle-roller D<sup>2</sup> in the slide D' is so great as to rapidly wear a groove into the face of the gripper-cam, so that it is necessary to frequently replace the cam. This wear is of course only on that portion of the face of the cam employed to press together the grippers, and to overcome the necessity of employing a new cam when so worn I have formed in that portion of the cam a groove for the reception of the removable shoe  $u$ , held in place by countersunk bolts, or by set-screws  $u'$ , as shown in Figs. 1 and 10, the entire wear on the face of the cam being taken by this shoe  $u$ , and when it is worn out it only being necessary to replace this shoe. The shears  $c c$  are operated from the shear-cams C through the slides C' C<sup>2</sup>, in substantially the manner described in said patent, and they extend into the die-box H, across the course of the rod or wire, and shear off the wire a sufficient distance from the face of the grippers to leave metal for the head of the article made extending beyond the grippers. Where a pointed nail or spike is desired, the shears have V-shaped recesses in their faces and clearances on each side thereof, and the rod or wire is sheared off and pointed by them.

To form a chisel-point on the articles, I employ the dies illustrated, having the plain faces  $c'$  beveled, corresponding to the taper or bevel of the chisel-point desired, and a shearing-edge,  $c^2$ , to cut the rod or wire, the shears acting to cut off the nail or other article, and compress or swage its end between the plain beveled faces  $c'$ , thus flattening out the end thereof and spreading it between the faces  $c'$  without removing any stock. The header bar or ram L is mounted in bearings L', and is actuated by a powerful spring or springs, L<sup>2</sup>, confined around rods between the body of the ram and a yoke,  $l$ , secured to an adjusting-screw,  $l'$ , passing through the rear bearing, L', the impetus imparted to the header being regulated by this adjusting-screw according to the size or shape of the head, these parts being substantially as shown in said patent. The header-cam B is of peculiar shape, being concentric with the shaft  $a$  for about three-fourths of its circumference, as at  $b$ , and having the depression  $b^3$ , and the shoulders  $b'$   $b^2$  at each end of the depression, the concentric portion pressing against the stop-lug  $m$  of the header-bar, and so holding back the bar until the shoulder  $b'$  of the cam passes the lug, when the bar is freed and shot forward by the springs to upset the portion of the rod or wire ex-

tending beyond the grippers, and so form the head, the lug  $m$  entering the depression  $b^3$ , and the shoulder  $b^2$  of the cam then engaging with and slowly pressing back the header until the concentric portion  $b$  is brought opposite the lug, the header-bar being thus retracted, held, and released by this cam, and all its operations being controlled thereby.

As the faces of the cam B and lug  $m$  are subject to wear, I have provided mechanism for adjusting the lug, the lug being secured to the bar by a bolt,  $m'$ , extending through the slot  $m^2$ , and secured by a nut,  $m^3$ , on the upper surface, the slot allowing of the adjustment of the lug, and, back of the lug, rigidly secured in the header-bar, is the threaded loop  $n$ , through which the adjusting-screw  $n'$  works against the rear face of the lug  $m$ ; and to adjust the lug the nut  $m^3$  is loosened and the lug pressed forward by the adjusting-screw  $n'$ , and the nut  $m^3$  then screwed tight, the lug  $m$  being thus held firmly to place by the nut and bolt and the adjusting mechanism. As the reciprocating or sliding motion of the header-bar L in its bearing L' is very rapid, it is of course subject to wear, and to take up the wear in the bearings L' the wearing-plates  $l^2$  rest on the bar within the bearings, and are connected to the adjusting-screws  $l^3$ , extending through the cap of the bearing, and thus act to prevent lost motion of the header-bar. This may also be employed with the slides of the gripping and shearing apparatus, as shown in Fig. 10. The header L<sup>3</sup> is secured at the end of the bar L, and its upsetting end may be of any desired form, according to the head to be formed on the nail.

The mechanism for knocking off the spike or nail after the shearing operation is substantially as shown in said patent, having the cam E, provided with the lug  $e$ , lever E', pivoted on the standard E<sup>2</sup>, and idler-roller  $e'$  resting on the cam. The spring  $p$  for retracting the lever fits around a rod,  $p'$ , secured to the lever between the standard and idle-roller, and extending through the bed-plate, the spring being confined between the under surface of the bed-plate and the nut  $p^2$ . As the motion of the lever E' is necessarily quick, it increases the noise of the machine, and to overcome this a rubber sleeve,  $p^3$ , is placed around the rod above the bed-plate, the sleeve acting as a cushion to the lever and deadening the sound. The lever E' is bent, as shown in Fig. 1, to bring it to the line of feed of the machine, and supports at its end the forked arm  $r'$ , which extends on either side of the vertically-moving knocker-off bar  $r$ , this bar being mounted in the bracket  $t$ , bolted on top of the die-box H, so that the course of movement of the bar  $r$  is across the line of feed at the point where the article is sheared, the bar  $r$  serving to sever or break off any fin-connection between the article and the rod or wire. A spring,  $r^2$ , is confined between the lower bear-



ing of the bracket and a pin passing through the bar  $r$ , and the forked arm  $r'$  extends above this pin. The lug  $e$  on the cam raises the lever  $E'$ , and the forked arm  $r'$  presses down the 5 knocker-off bar to strike the blow, the bar being retracted by the spring  $r^2$  and the lever by the spring  $p$ , and cushioned by the sleeve  $p^3$ .

The operation of the machine is as follows: The cam  $F$  is adjusted so that the feeding mechanism feeds forward the proper length of wire, 10 and the hand-wheel  $g^6$  is turned to raise the feeding-wheel  $g^3$ . The rod or wire is then fed forward through openings in the standard  $G^2$  and  $g^4$  under the wheel  $g^3$  until its forward end extends beyond the grippers  $h h'$ . The wheel 15  $g^3$  is then freed by the hand-wheel  $g^6$ , so that the spring  $g^5$  presses it against the wire, and the machine is set in motion. The grippers  $h h'$  then close on and hold the wire, and the 20 shears  $c c$  cut off the end of the rod, and the scrap end is knocked off by the vertically-moving bar  $r$ , leaving the proper amount for the head extending beyond the grippers. The header bar or ram  $L$  is then released by the 25 cam  $B$ , and the header is shot forward by the springs and upsets the portion extending beyond the grippers, forming the head of the nail, and is immediately withdrawn and held by the cam, as above described. During these 30 operations the vibrating rod  $F^3$  has drawn back the feeding mechanism, causing the feeding-wheel to roll over and stretch the wire between it and the grippers, and so straighten it, and to travel back over the wire the proper 35 distance for the length of the nail. The grippers then open, and on the forward movement of the vibrating bar the wheel  $g^3$ , holding on the rod or wire, feeds it forward the proper distance, and the grippers again close on it. 40 The shears then shear off the finished nail, and the knocking-off bar strikes it a blow, as before described, to insure its being severed from the wire. The operation is then continued as above described. In case a corrugated 45 nail is desired, the feeding-wheels having the corrugated biting-faces are employed.

The several parts of the machine have a positive operation and but few parts are employed, and the machine being simplified as 50 far as possible, it is not liable to get out of order. The parts are adjustable, so that any wear can be taken up, and for these reasons the machine is much more durable than the machine described in said patent.

55 Different forms of dies may of course be employed with the machine, according to the article to be formed, the dies shown in Fig. 11 being employed for the formation of the staples shown in Fig. 15, the forward ends,  $v$ , 60 of the grippers  $h h'$  being recessed, so that a greater length of wire is left between the grippers and shears, and one gripper having the backwardly-extending face or anvil  $v'$ , and the end of the header  $L^3$  corresponds in shape to 65 the recessed grippers and forces the portion extending beyond them down into the anvil  $v'$ , thus forming the bent portions of the staple.

No special claim is made herein for this staple or the dies, as separate applications were filed for these improvements on July 9, 1884, 70 Serial No. 137,187, and July 26, 1884, Serial No. 138,838.

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

1. In combination with a reciprocating header bar or ram having an engaging-lug thereon, 75 a cam mounted on a shaft at right angles to and on a different plane from the ram and engaging with said lug, said cam having releasing and withdrawing shoulders and a depression 80 between them, and a continuous concentric face the full diameter of the cam extending from said withdrawing-shoulder to said releasing-shoulder, substantially as and for the purposes set forth. 85

2. In combination with the spring-actuated header bar or ram mounted in bearings and having the lug  $m$  on the under face thereof, the cam  $B$ , mounted on a shaft below and at 90 right angles to said header-bar, and having the concentric face  $b$ , shoulders  $b' b^2$ , and depression  $b^3$ , substantially as and for the purposes set forth.

3. In combination with the reciprocating header-bar  $L$ , carrying the threaded loop  $n$ , 95 the lug  $m$ , adjustably secured to the header-bar, and adjusting-screw  $n'$ , passing through loop and fitting against said lug  $m$ , substantially as and for the purposes set forth.

4. In combination with the reciprocating 100 slide, bearings or guides therefor having the adjusting-screws  $l$  extending through the top plates of the bearings and carrying wearing-plates  $l^2$ , substantially as and for the purposes set forth. 105

5. In nail and like machines, the combination, with the grippers, of reciprocating feeding mechanism carrying one or more feeding-wheels binding upon the rod or wire, so as to 110 feed it forward, and on the return of the feeding mechanism stretch and straighten it, substantially as set forth.

6. In nail or like machines, the combination, with the grippers, of reciprocating feeding mechanism carrying one or more feeding-wheels having corrugated working faces and 115 binding upon the wire, so as to hold and feed forward the rod or wire, and on the return of the feeding mechanism travel over and corrugate it, substantially as set forth. 120

7. The combination of the reciprocating base-plate  $G$ , having the standard  $g^4$ , lever  $g$ , carrying the feeding-wheel  $g^3$ , and extending 125 over or around said standard, spring  $g^5$ , and hand-wheel  $g^6$ , substantially as and for the purposes set forth.

8. The combination of the reciprocating base-plate  $G$ , mounted in guides in the bed-plate, pivoted vibrating bar  $F^3$ , and double-pivot link  $G'$ , pivoted to the base-plate and 130 vibrating bar, substantially as and for the purposes set forth.

9. The combination of the pivoted vibrating bar  $F^3$ , the horizontal guide  $F^4$ , crank  $F$ ,



pitman  $F'$ , fitting within the vertical guide  $F^2$ , and the sliding joint  $f$ , substantially as and for the purposes set forth.

10. In combination with the horizontally-vibrating bar  $F^3$ , having the cylindrical stem  $f^2$ , the vertically-vibrating pitman  $F'$ , and the sleeve  $f'$ , pivoted at the end of the pitman and fitting over said stem, substantially as and for the purposes set forth.

11. In combination with the die-box, the gripper having the bar  $h^2$ , extending out at the side of the box, the standard  $s$ , and adjusting-screw  $s'$ , substantially as and for the purposes set forth.

12. In combination with the reciprocating slide working in a guide in the bed-plate and having the slot  $i$ , the bolt  $i'$ , extending through the top plate of the guide, and having the eccentric-lug fitting in said slot, substantially as and for the purposes set forth.

13. In nail-machine apparatus, the combination of the slide  $D'$ , having the idle-roller  $D^2$  and the cam  $D$ , said cam having a groove in a portion of the working face thereof in the course of the idle-roller, and the removable shoe  $u$ , fitting within said groove, substantially as and for the purposes set forth.

14. The combination of the cam  $E$ , lever  $E'$  operated thereby, and retracting-spring, the vertically-moving bar  $r$ , mounted in the bracket  $t$ , and the spring  $r^2$ , substantially as and for the purposes set forth.

15. The combination of the vertically-moving bar  $r$ , mounted in the bracket  $t$ , spring  $r^2$ , confined within said bracket under a pin in said bar, and power-lever  $E'$ , having the forked arm  $r'$ , extending on either side of said bar above said pin, substantially as and for the purposes set forth.

16. The combination of the cam  $E$ , lever  $E'$ , operated by said cam, and having its opposite end connected to suitable mechanism operated thereby, the rod  $p'$ , secured to the lever and extending through the bed-plate, and the spring  $p$  and rubber sleeve  $p^3$  around said rod, substantially as and for the purposes set forth.

In testimony whereof I, the said WILLIAM TRURAN, have hereunto set my hand.

WILLIAM TRURAN.

Witnesses:

J. W. LITTLE,  
WM. M. VOGLESON.