7 Sheets--Sheet 1.

D. J. & S. FARMER.

Horseshoe-Nail Machine.

No. 168,244. Patented Sept. 28, 1875.

FIG. 1.

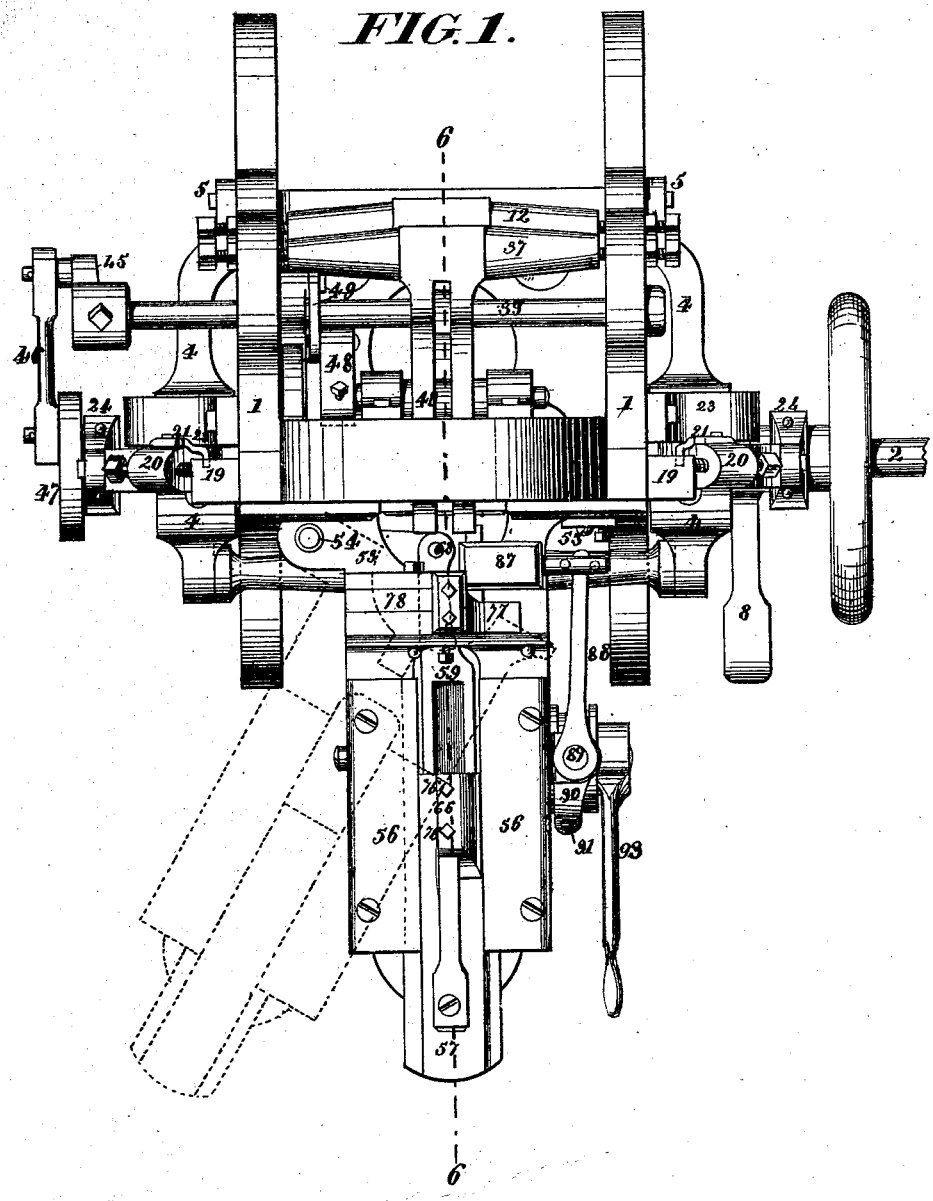

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FIG. 2.

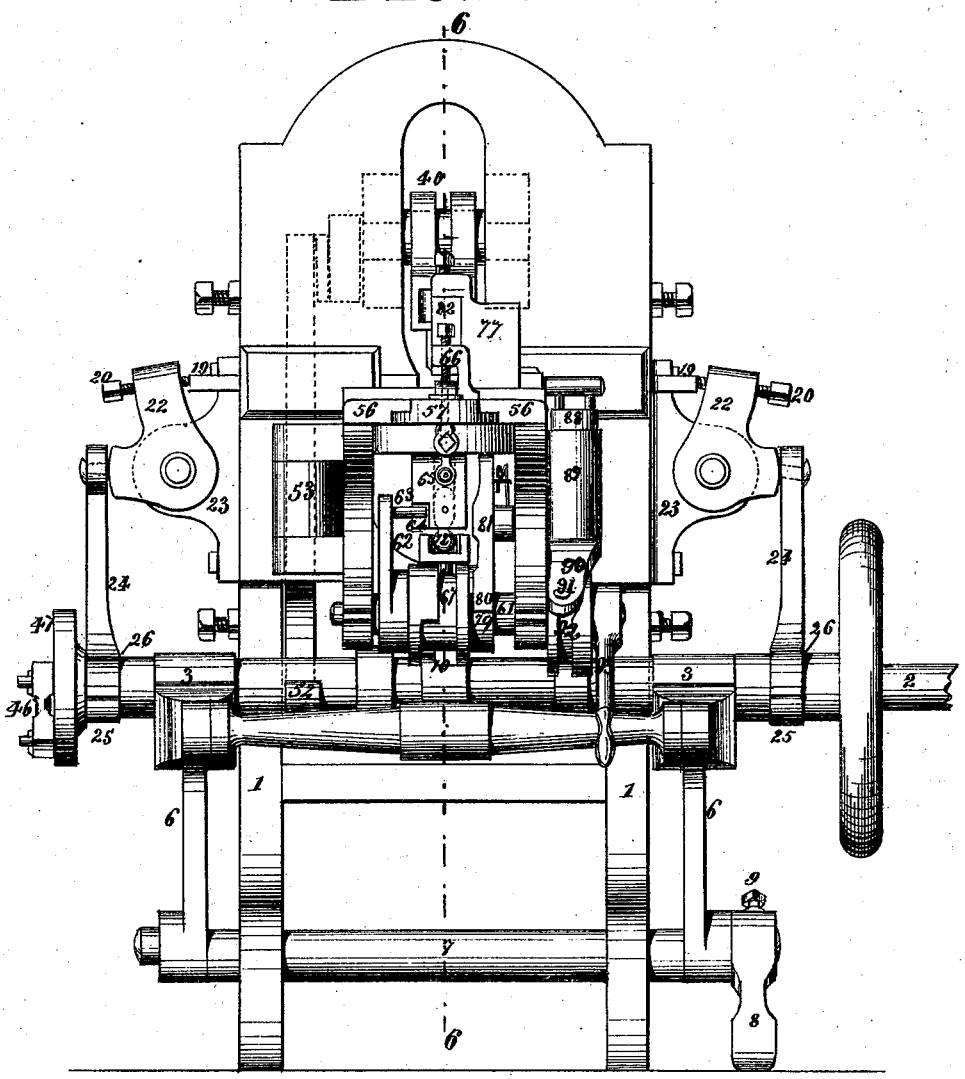

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FIG. 3.

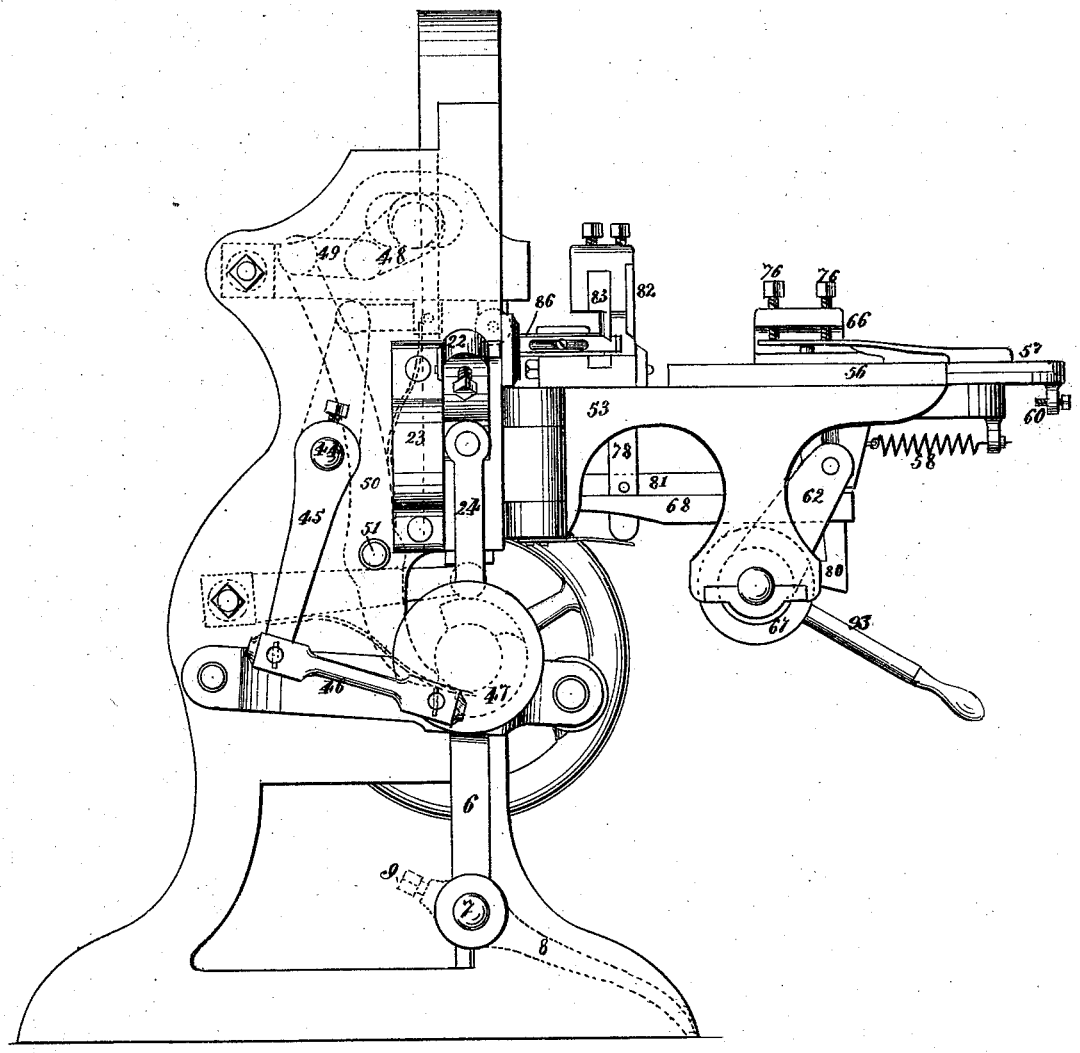

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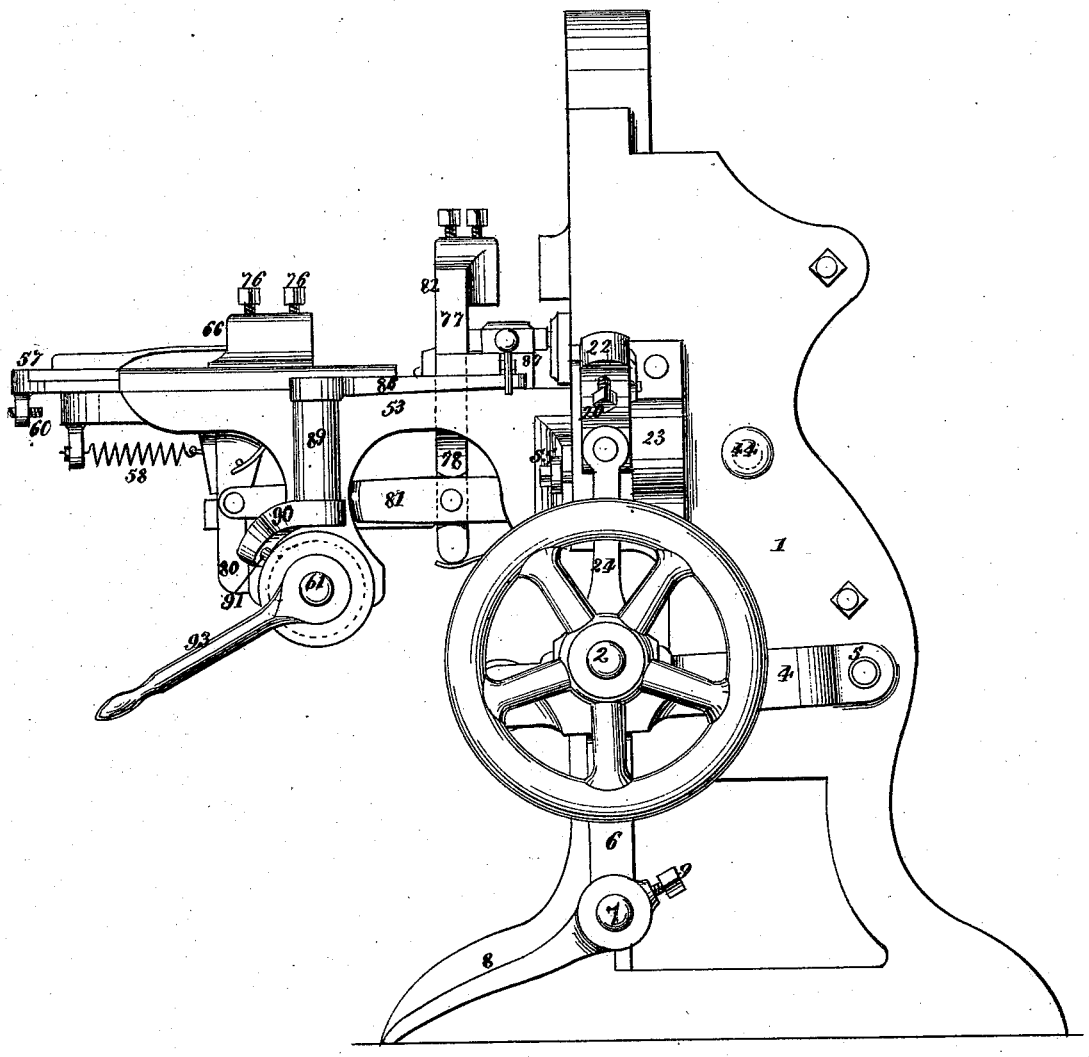
FIG. 4.



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7 Sheets--Sheet 5.

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FIG. 5.

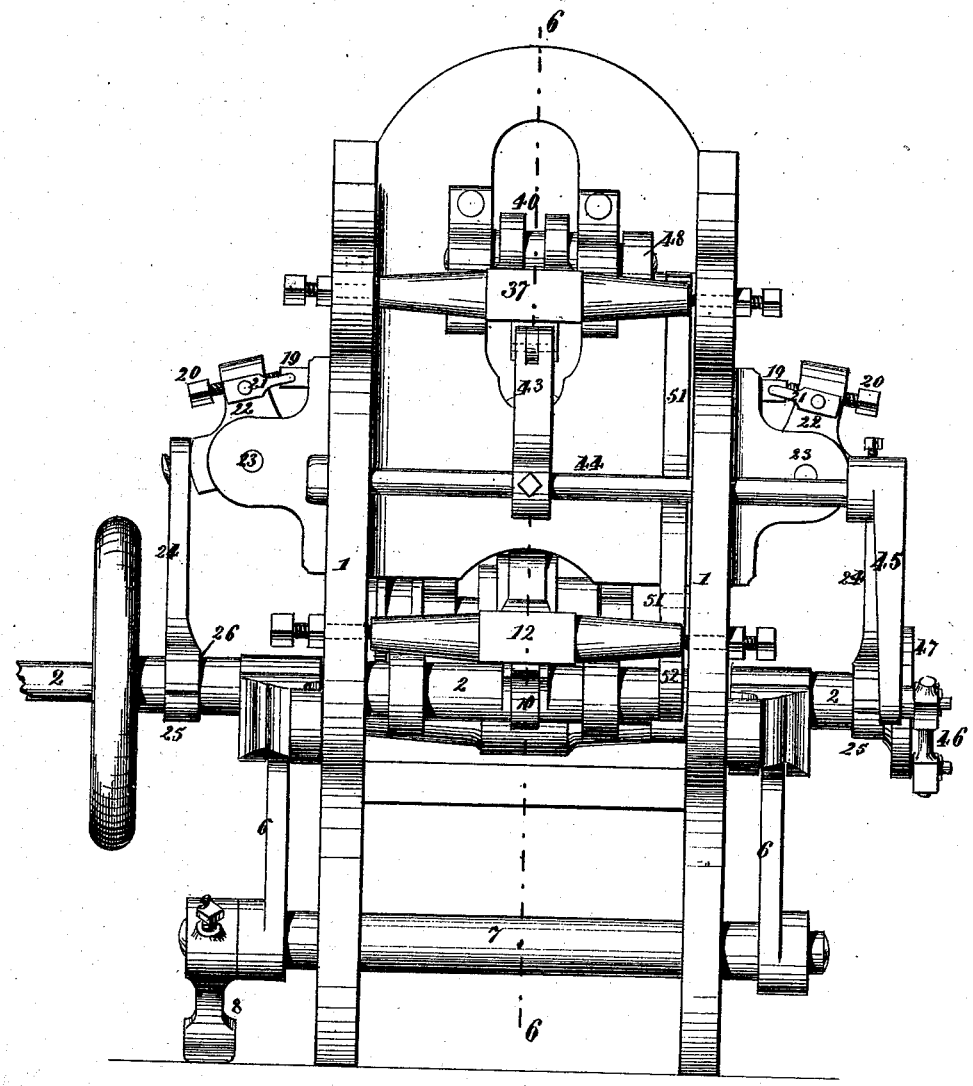

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FIG. 7.

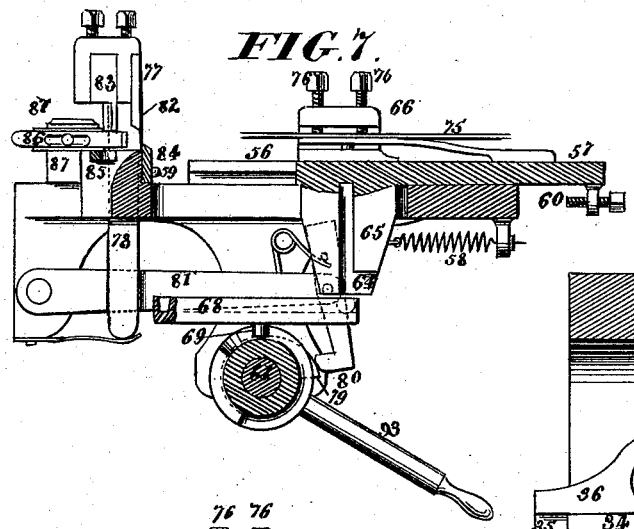

FIG. 6.

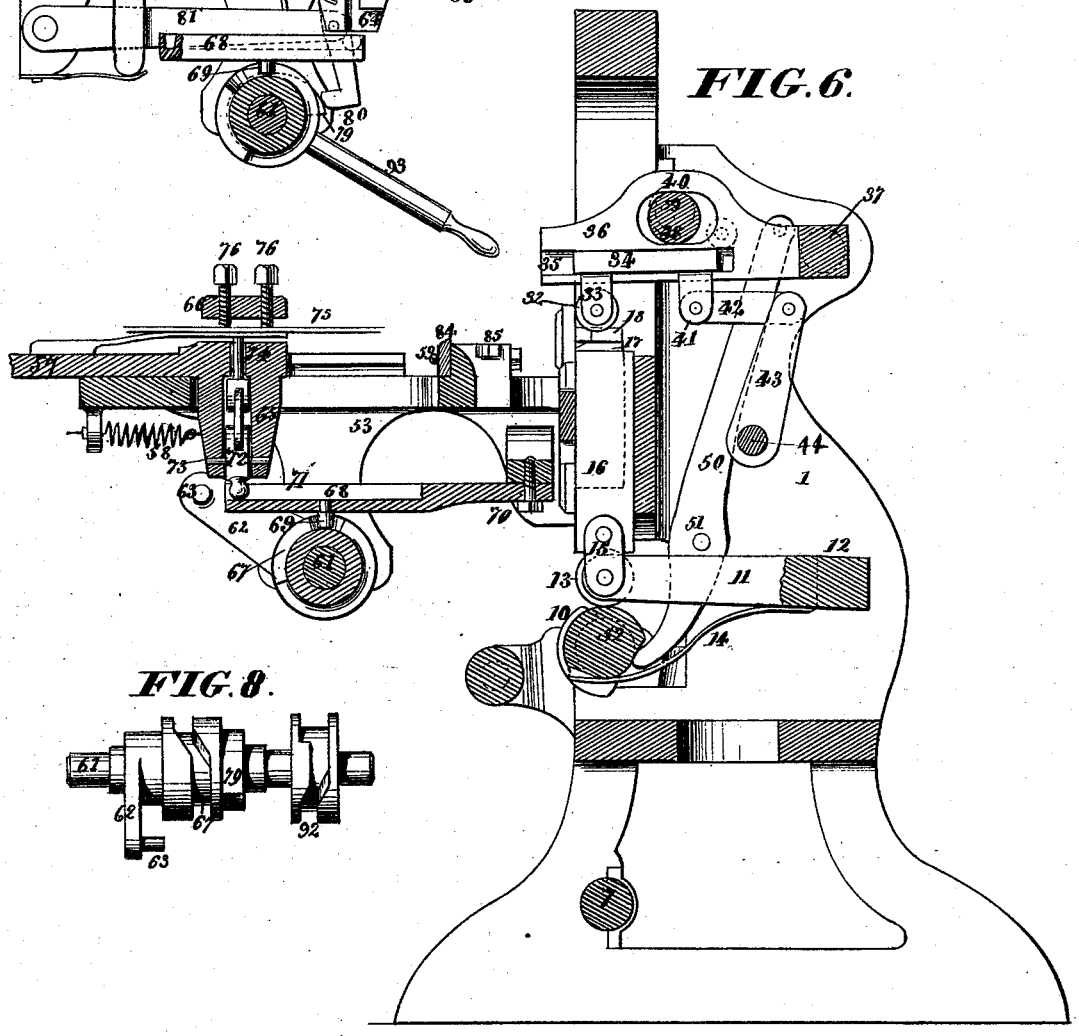

FIG. 8.

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FIG. 10.

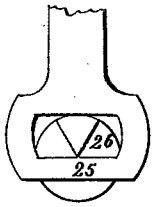
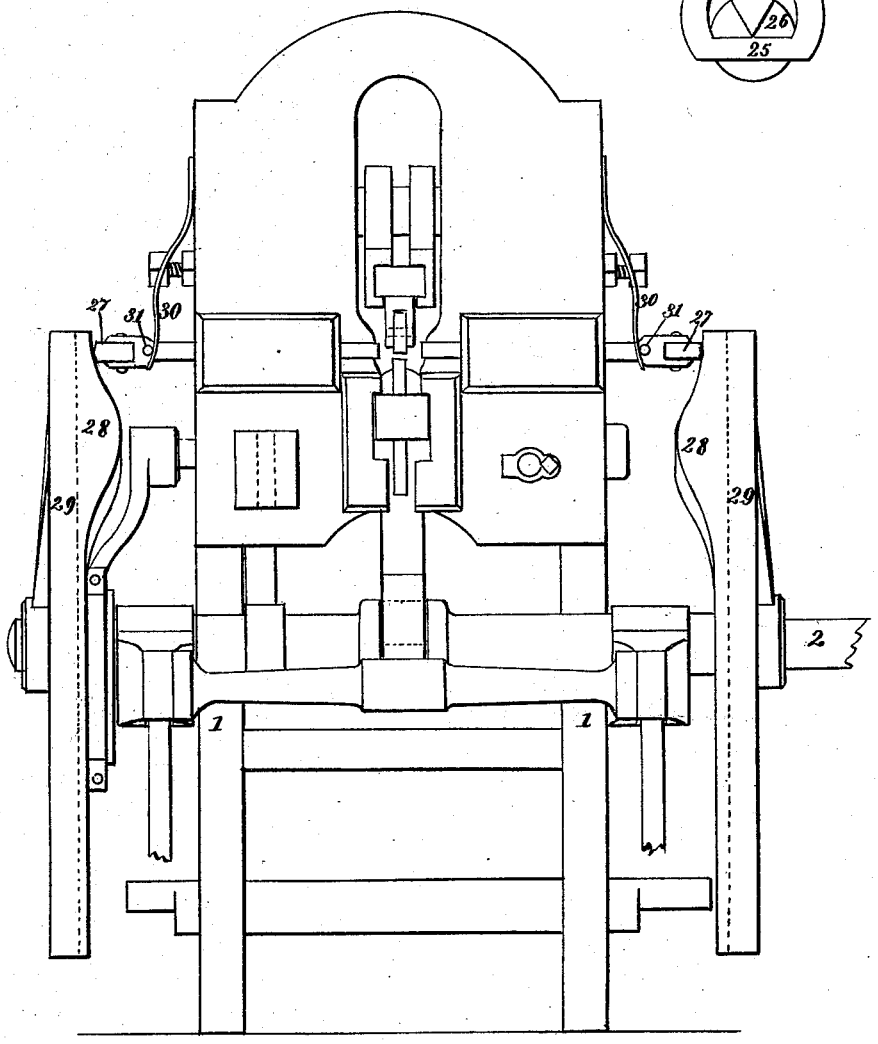


FIG. 9.



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UNITED STATES PATENT OFFICE.

DAVID J. FARMER AND SAMUEL FARMER, OF PENN YAN, N. Y., ASSIGNORS TO FRED S. ARMSTRONG, HATLEY K. ARMSTRONG, DAVID J. FARMER, AND J. P. FARMER, OF SAME PLACE.

IMPROVEMENT IN HORSESHOE-NAIL MACHINES.

Specification forming part of Letters Patent No. **168,244**, dated September 28, 1875; application filed May 11, 1875.

To all whom it may concern:

Be it known that we, DAVID J. FARMER and SAMUEL FARMER, both of Penn Yan, in the county of Yates and State of New York, have invented certain new and useful Improvements in Machines for Making Horseshoe-Nails, of which the following is a specification:

Our machine is constructed with a pair of horizontally-moving dies to compress the blank sidewise, a flat-faced die or anvil, either movable or stationary, and a vertically and horizontally-moving roller acting against the said anvil to draw the nail after the retraction of horizontal dies. The anvil may be below and the drawing-roller above, or vice-versa, as preferred. When arranged on the top the drawing-roller is attached to a carriage sliding in ways on an arm which receives a vertical motion from a rock-shaft to advance or retract the roller, as required.

For operating the drawing-roller when arranged above, a rocking cam-shaft is employed, working within a yoke above the track-arm of the roller, so as to impart a reciprocating vertical movement to the latter. The main driving-shaft is arranged below the side dies or hammers, and about in the same plane therewith. The lower die or anvil, when arranged to move vertically, receives this motion from a cam or crank on the driving-shaft. The same means are employed to reciprocate the drawing-roller vertically when said roller is arranged underneath, in place of the anvil. In the latter case the anvil is placed above, and may be stationary. The feed mechanism is controlled by hand, so that the blank may receive any number of blows by the continuous movement of the machine. Said feeding mechanism is mounted in a supplemental frame attached by a vertical pivot, so that it may be brought into proper juxtaposition with the forming mechanism, or turned away therefrom at will. A feed-table slides in the aforesaid swinging frame, and carries a clamp consisting of a moving jaw operated by a cam, and an adjustable jaw, against which the rod is pressed, the adjustment of said jaw being by suitable set-screws. The sliding feed-table is projected by a cam or crank-shaft and lever, and retracted by a spring. Its forward movement is arrested by adjustable stops. The griping mechanism of the feed-table is locked by a toggle-lever operated by a reciprocating arm. The finished nail is severed from the rod by a sliding knife actuated by a lever connecting with the feeding mechanism, as hereinafter described. An adjustable sliding gage is employed to regulate the feeding, said gage being retracted automatically.

In the accompanying drawings, Figure 1 is a plan view of a machine illustrating the invention. Fig. 2 is a front view of the same. Figs. 3 and 4 are elevations of the respective sides of the machine. Fig. 5 is a rear view. Fig. 6 is a vertical section on the line 6, Figs. 1, 2, and 5. Fig. 7 is a section of the principal parts of the machine looking in the opposite direction. Fig. 8 is an elevation of the feeder with cam-shaft detached. Fig. 9 is an elevation illustrating a modification in the machine. Fig. 10 is a detached view of an improved cam movement.

1 1 represent parts of the stationary frame. 2 is the main driving-shaft, which, in the operation of the machine, is continuously rotated by any suitable motor, and has its bearings in boxes 3, which are carried by arms 4 4, fulcrumed at 5 to the main frame, and raised or lowered by means of struts 6 connecting with eccentrics on a shaft, 7, to which is attached a treadle or foot-lever, 8, by means of a set-screw, 9, the depression of which by rotating the shaft 7 throws up the driving-shaft 2 and its connections.

We will first describe the machine under its present illustration with a vertically-reciprocating base-die or anvil and a drawing-roller arranged above, and will subsequently explain the modification by which the relative positions of these parts are reversed without departing from the essential peculiarities of the invention.

The shaft 2 carries a cam, 10, to impart a vertical reciprocation to an arm, 11, which is fulcrumed by a shaft, 12, to the main frame, and furnished at its ends with a friction-roller,

13, resting on said cam 10. The roller 13 is held in contact with the cam 10 by a spring, 14. The free end of the arm 11 is connected, by links 15, with the vertically-sliding stock 16, with the base-die or anvil 17, so as to impart a reciprocating vertical movement thereto. 18 18 are horizontally-sliding side dies carried by stocks 19, which receive the necessary reciprocating movement by set-screws 20 and links 21 connecting them with bell-cranks 22, which are fulcrumed at 23 and attached to connecting-rods 24, which carry at their lower ends yokes 25 embracing suitable cams or eccentrics 26 on the main shaft 2.

In order that the movement of the side dies may be quick, causing them to strike the heated rod, instead of simply compressing it, the cams 26 may be constructed, as shown in Fig. 10, or in any other suitable manner, to produce the desired effect.

As a substitute for the described cams or eccentrics, connecting-rods, and bell-cranks, for imparting the necessary reciprocating movement to the side dies, a mechanical equivalent may be employed, substantially as shown in Fig. 9, where the die-stocks are furnished with friction-rollers 27, and are pressed directly inward by the contact of cam-surfaces 28 on the wheels 29, mounted on the main driving-shaft 2, and are retracted by springs 30 bearing against pins or studs 31. 32 represents a roller running in suitable boxes 33, attached to a carriage, 34, which slides within ways 35 in arms 36, projecting horizontally from a rock-shaft, 37, constituting the fulcrum of said arms. The arms 36 receive a vertical reciprocating motion on their axes 37 by cams or eccentrics 38 on a shaft, 39, embraced by yokes 40 connected to said arms 36. The carriage 34 receives a reciprocating sliding movement through the medium of an arm, 41, connecting-rod 42, arm 43, rock-shaft 44, and arm 45, which is connected, by a rod, 46, with the wrist of a crank-wheel, 47, on the main driving-shaft 2. The shaft 39 receives a rocking movement through the medium of an arm, 48, connecting-rod 49, and lever 50, the latter being fulcrumed at 51 and operated by a cam, 52, on the main driving-shaft 2.

In operation, the heated nail-rod, being fed forward by the mechanism hereinafter described, or by any suitable means, is hammered and compressed sidewise to any necessary extent by horizontally-moving dies 18. The said dies are then retracted, and the drawing-roller 32, being brought down on the partially-formed nail, is forcibly drawn over the same by its horizontal movement, so as to flatten the nail and form its point in proper shape. If preferred, the anvil 17 may be placed on top, and the drawing-roller 32 underneath. The anvil in this case may be stationary, the guiding and reciprocating arm 36 taking the place of the arm 11, without requiring any other change, excepting in the relative proportions and dimensions of the parts to adapt them to work together as required. The feeding mechanism is mounted in a bracket, 53, hinged to the main frame by a pivot, 54, permitting the bracket to be swung around to expose the swaging-dies when required. The bracket is secured in its operative position by a screw, 55. The bracket 53 is constructed with ways, 56, for guiding a sliding-table, 57, which is carried forward by mechanism presently to be described, and retracted by a spring, 58. Its forward and backward movements are limited by stop-screws 59 and 60. The sliding table is operated by a rock-shaft, 61, beneath the table, on which is a lever, 62, carrying at its extremity a horizontal pin, 63, which engages with an open slot or groove, 64, in a lug, 65, projecting downward from the base of the table. The mechanism is thus arranged so as to allow the lever to become detached at the backward extremity of its stroke, in order to allow the slide to dwell without motion while the rock-shaft moves sufficiently to operate connecting mechanism, hereinafter described. On the sliding table is mounted a griping-jaw, 66, which is employed to gripe the iron rod and hold it while the nail is being made. The griping-jaw is operated from below the sliding table by means of a rock-shaft, 61. The said rock-shaft is constructed with a cam-groove, 67, operating a horizontal lever-arm, 68, by means of a pin, 69, projecting from said lever into the groove 67. The lever 68 is fulcrumed at 70, and is constructed on its upper surface with a groove, 71, for the reception of the lower end of a toggle-lever, 72, which is fulcrumed at 73 within a downwardly-projecting lug, 65, of the sliding table, and carries at its upper extremity a plunger, 74, which bears upward against the griping-jaw 66. The iron rod is shown in position at 75. 76 76 are set-screws constituting adjustable abutments or bearings, against which the rod is clamped by the jaw 66 and plunger 74. The cutter stock and arm 77 and bed 78 are supported by the bracket 53, which carries the sliding feed-table. The cutter stock and arm 77 are operated by means of a tappet projection, 79, on the rock-shaft 61, through the medium of a coupling latch or pawl, 80, lever 81, and the stock and arm 77 carrying the knife 82. 83 represents a second knife for forming the point of the nail after it is severed from the rod. 84 85 are the stationary knives, against which the knives 82 83 cut, respectively. 86 represents a gage attached adjustably to a stock, 87, which is moved laterally to the machine at the proper moment to stop the end of the rod, and thus gage its projection, after which it is clamped to the feed-table by the mechanism already described. The gage-stock 87 is operated by an arm, 88, attached to a vertical shaft, 89, which is reciprocated on its axis by an arm, 90, carrying a pin, 91, which projects into a cam-groove, 92, on the rock-shaft 61. 93 represents a hand-lever, by which the rock-shaft 61 is turned.

When the machine is in motion the heated iron rod is placed in the griper against the

gage, when the slide is moved forward to its farther extremity, which carries the iron in proper position in the machine, when the dies are closed on the iron and the nail formed, and the dies opened and the nail allowed to be drawn back, which is done by pressing the hand-lever down, which draws back the feeding-slide to its outward extremity, when, by a still further movement of the lever and rock shaft, the nail is cut off and the surplus iron is, if desirable, cut from the point and the nail finished.

Among the advantages may be mentioned: First, by the use of the sliding roller, in combination with the lower die or hammer, the surface of the die is made flat, or nearly so, in place of the concave die, which is absolutely necessary in machines where the roller is mounted in a revolving disk, as in the Dodge Patent, No. 25,309, of 1859, and others. Second, by the use of the movable dies the iron is held in one position until the nail is made, and may then be readily shifted by hand, and does not require machinery to move it from the face of the dies or hammers at every impulse of the hammers. Third, the opening and closing the dies while in motion, which enables the iron to be placed in position before the dies act on it, and also in presenting the iron to the machine without striking the face of the dies, which doubles up the iron and wastes much material and time. The appliance for opening the dies to release the nail, when finished, saves many nails from being spoiled. Fourth, by the hand-feeding appliances, the operator can allow the machine to give a greater or less number of blows to reduce the nail to its desired size, in order to make the nails uniform before drawing the nail from the machine.

The following is claimed as new in this invention, namely:

1. The combination of a roller, 32, a flat or nearly flat opposing die or anvil, 17, and a pair of side dies or hammers, 18, retracted during the effective movements of the roller, substantially as herein described.

2. The combination of carriage 34, sliding in bearing-ways 35, and yoke-arm 36 40, for guiding and reciprocating the roller 32, in the manner set forth.

3. The sliding carriage 34, carrying-roller 32, side dies 18 18, and bottom die or anvil 17, and cranks or their equivalent, in combination with the shaft 2, having cams 10 52, for operating the shaping mechanism, in the manner set forth.

4. The main driving-shaft 2, mounted in arms 4 4, fulcrumed to the main frame, in combination with struts 6, eccentric shaft 7, and treadle 8, for opening and closing the dies, as set forth.

5. The main driving-shaft, arranged below the side dies or hammers, and about on a line with the said dies, substantially as shown and described, in combination with the roller 32, dies 18 18 17, set-screws 20, bell-cranks 22, and connecting-rods 24.

6. The combination in a horseshoe-nail machine, of continuously actuated moving dies or hammers, and a roller, a driving-shaft adapted to rise and fall, to open and close the dies, and a feed mechanism, actuated by hand, substantially as herein shown and described, to provide for subjecting the nail to any required number of blows, and for withdrawing the same at any time, as set forth.

7. The supplemental frame, supporting the feed, gage, and cutting mechanism, and attached to the main frame by a vertical pivot, so as to swing laterally to expose the die-ways, as set forth.

8. The sliding feed-table, projected by a rock-shaft and leyer, and retracted by a spring, in combination with the adjustable stops 60 59, substantially as described, for the purpose specified.

9. The grooved arm 68, and toggle 72, combined and operating, substantially as described, for locking and unlocking the griping mechanism, in the manner set forth.

10. The combination of the tripping-cam 79, pawl 80, lever 81, and lifting-spring, for operating the cutting arm or slide, in the manner set forth.

11. The sliding gage 86, adjustable longitudinally, and projected and retracted laterally by the cam 92, or its mechanical equivalent, in combination with rock-shaft 61, and hand-lever 93, in the manner specified, for the purpose set forth.

12. The combination of the hand-lever 93, rock-shaft 61, crank-lever 62, grooved cams 92, and tripping-cam 79, with their appurtenances, substantially as shown and described, for operating the feeding-slide, griping-jaw, sliding gage, and cutting arm or slide, in unison, by hand, in the manner set forth.

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