

H. A. WILLS.  
 Machine for Finishing Horseshoe Nails.  
 No. 224,062. Patented Feb. 3, 1880.

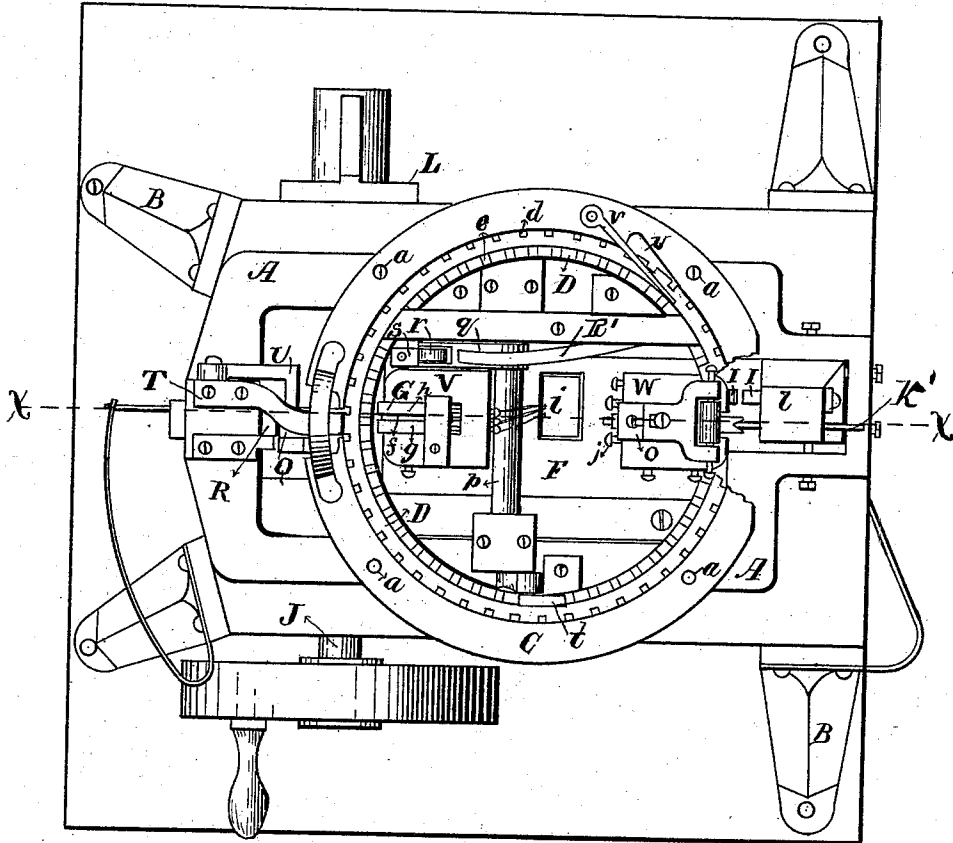


Fig. 1.

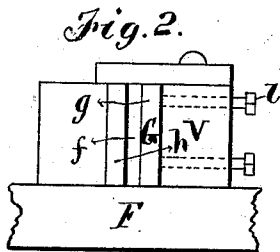


Fig. 2.

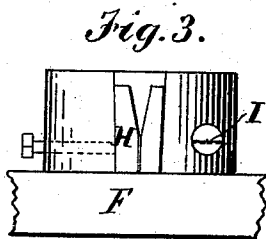


Fig. 3.

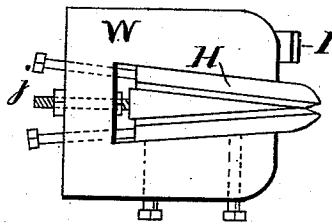


Fig. 4.

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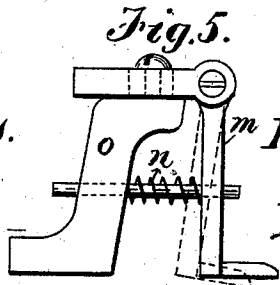


Fig. 5.

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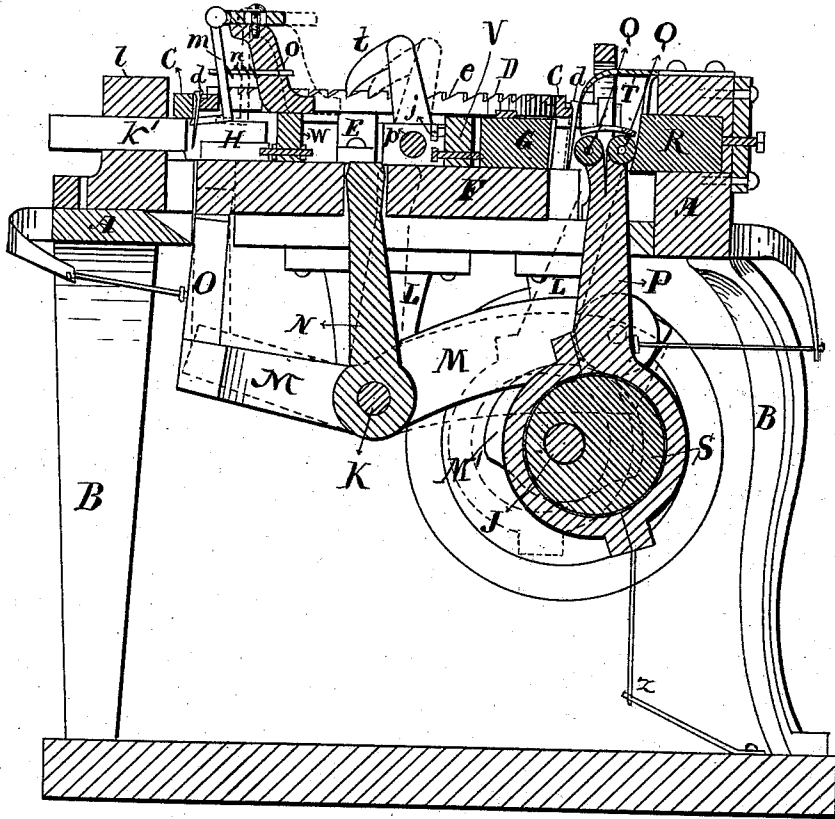


Fig. 6.

Fig. 7.

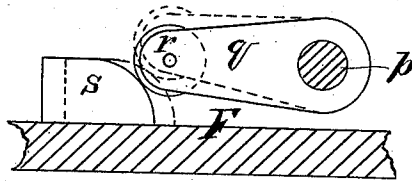
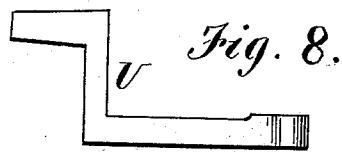
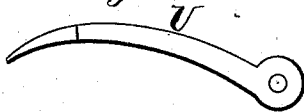


Fig. 9.

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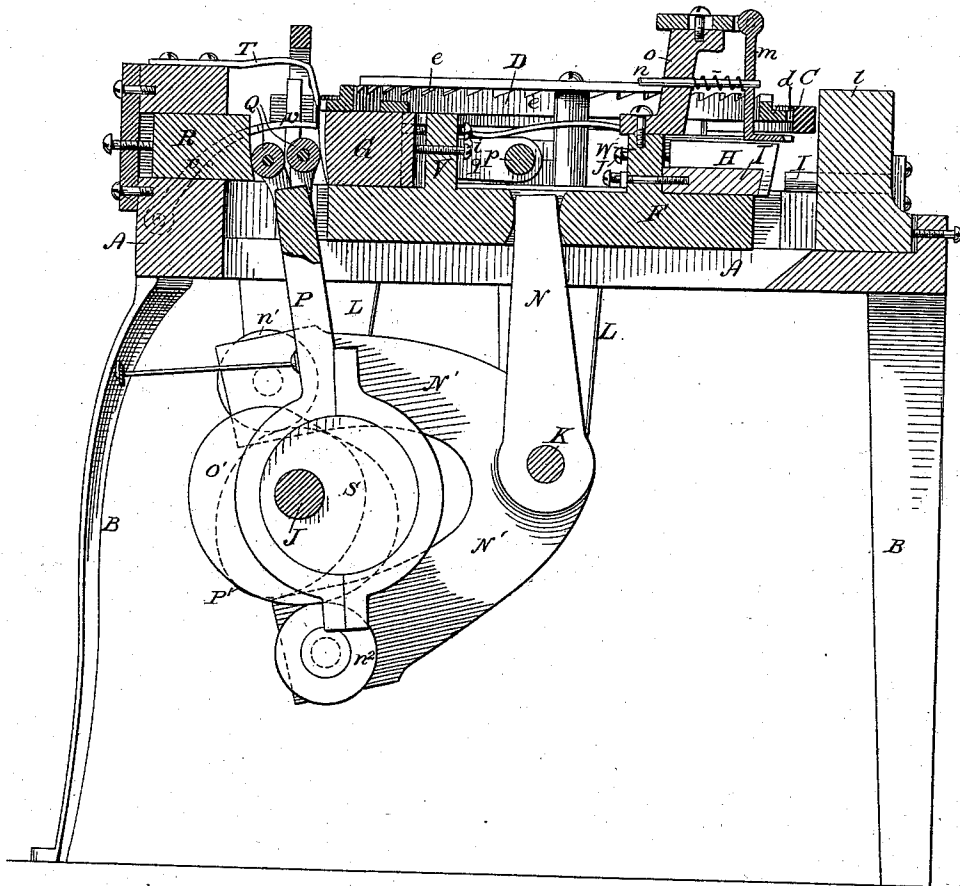
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Fig. 10.



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# UNITED STATES PATENT OFFICE.

HARRY A. WILLS, OF CHICAGO, ILLINOIS.

## MACHINE FOR FINISHING HORSESHOE-NAILS.

SPECIFICATION forming part of Letters Patent No. 224,062, dated February 3, 1880.

Application filed August 28, 1877.

To all whom it may concern:

Be it known that I, HARRY A. WILLS, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Machines for Finishing Horseshoe-Nails, which is fully described in the following specification, reference being had to the accompanying drawings.

My invention relates to that class of horseshoe-nail machines within which the nail is finished while cold, ready for use by the blacksmith.

My invention consists in the combinations of mechanisms, hereinafter fully described, by which the nail is carried to the rollers, the pointing-dies, and beveling-dies, and the various parts made to operate upon the nail to roll it and finish the point, making a complete finished nail ready for use.

It is very essential to have a machine for finishing horse-nails cold that shall be very accurate and certain in all of its movements, so as to prevent destruction of the nails, and positive and uniform in each of its operations, in order that it may give every nail the same shape and a uniform stiffness and finish.

In the drawings, Figure 1 represents a top or plan view of my machine; Fig. 2, a front view of the anvil or die against which the nail is rolled; Fig. 3, a front view of the die for pointing the nail, and also one of the dies for beveling the point; Fig. 4, a top or plan view of the pointing-die; Fig. 5, a side elevation of the pivoted nail-holder for centering the nail over the pointing-die; Fig. 6, a longitudinal section at the line *x x*, Fig. 1; Fig. 7, a side elevation of the pivoted nail-holder which holds the nail in place while being rolled; Fig. 8, a top or plan view of the same, and Fig. 9 a detached view of the cam and arm that reciprocates the shaft from which the mechanism is operated to intermittingly move the nail-carrying ring.

In the accompanying drawings, A is the bed-plate or frame of the machine, and B the legs on which this bed-plate or frame is supported. C is a ring, permanently attached to posts or uprights secured to the bed-plate or frame A of the machine by means of screws *a*. D is also a ring, which closely fits within the ring C and rests upon three bearings, one of which is shown at E. This ring D is provided with

notches *d*, in which nails are hung suspended, as shown at the section in Fig. 6. There are also notches *e* in the upper side of this ring D, by which the ring is intermittingly moved upon its bearings E, as hereinafter described.

F is a sliding plate, that rests firmly on the bed-plate or frame A and extends across beneath the rings C and D. The bed-plate F carries the die or anvil G, against which the nail is rolled, and also the pointing-die H and beveling-die I.

J and K are two cross-shafts, hung on bearings in the hangers L, suspended from the frame A of the machine.

Cams O' and P' are mounted upon the shaft J, and the forked arm or lever N', with its friction-rollers *n' n''*, rests upon and is operated by said cams as the shaft J revolves. The lever N' has its pivotal bearing on the shaft K, and it is extended upward therefrom in the arm N, the upper end whereof rests in a seat in the plate F, which is thereby reciprocated as the arm or lever N' is actuated. (See Fig. 10.)

A lever, M, also has its pivotal bearing upon the shaft K, and is actuated at one end by a cam, M', mounted upon the shaft J. At the other extremity of the lever M there is pivoted an arm, O, the upper or free end of which is, at each upward movement, interposed between the slide F and the frame A, so as to take the whole pressure of the rollers while the nail is being rolled, and relieve the bearings and operating parts of the machinery from the wear and tear which they would receive if the pressure necessary to roll the nail cold were sustained by them.

The cam *m* vibrates the lever *m* and withdraws the arm O just before the slide F reciprocates toward the punch K', and a spring, *z*, causes said lever and arm to be returned as the slide F reciprocates toward the rollers, after the completion of the trimming operation, and block the said slide solid while the nail is being rolled.

P is a vertical arm carrying the rollers Q Q. In machines heretofore constructed the rollers have been set in a solid and unyielding block, and caused to pass between opposite abutments, also unyielding, the nail being interposed between one of said abutments and one of the rollers. The nail was thereby re-

duced to a certain thickness irrespective of the original thickness of the blank. The inequality in the thickness and hardness of the blanks renders the expenditure of force required very unequal, and the effect upon the nail also unequal, the fibers in some being simply compressed and in others displaced.

In my machine the arm P is bifurcated at its upper end, and the rollers Q Q are mounted at the forked ends, as shown, and are therefore capable of a slight elastic movement toward and away from each other, and the slight elasticity permits the rollers to traverse the nail without reducing it absolutely to a uniform thickness, but leaving it with nearly uniform hardness, and with much less strain upon the machine than is encountered when the rollers are incapable of yielding.

R is a block, against which one of the rollers Q presses, while the other roller is pressed against the side of the nail, as clearly shown in Fig. 6.

The arm P is operated by the eccentric S on the shaft J.

T is a presser, that rests against the head of the nail as it is brought into the open space in the ring C in front of the rollers. There is also a nail-holder, U, pivoted so that it is raised above the nail when the rollers make their upward stroke, and follows down close to the rollers as the nail is rolled, holding the nail against the bed-die or anvil, and preventing it from bending out of shape as the roller passes over and rolls only one side of it.

The die or anvil G, against which the nail is rolled, is set in a holding-block, V, and is also made in three parts, *f*, *g*, and *h*, with set-screws *i* behind them, by which they are set up to regulate the size and thickness of the nail, and they can also be removed and renewed separately.

H is the pointing-die, which is also made of three pieces set in the holding-block W, with set-screws *j* behind them to adjust them as they are ground away, and also regulate the size of the point of the nail. K' is the punch against which the nail strikes when it is forced into the die H. The shape of the end of the punch conforms to the point of the nail, and the punch is held and is adjusted in the holding-block *l*.

I I are the beveling-dies which bevel the points of the nails. One of them is held in the movable holding-block W and the other in the stationary holder *l*.

*m* is a pivoted nail-centerer, the lower arm of which is forked, so that when the slide F carries the pointing-die to the nail this forked nail-centerer straddles the nail and carries it directly in front of the punch K'. This centerer is so pivoted that it strikes against the ring and is thrown into the position shown by dotted lines in Fig. 5, which makes a downward pull on the nail, so that the nail is drawn by it firmly down into the ring-carrier, and all the nails are pointed alike.

When the pointing-die recedes the spring *n* (shown in Fig. 5) throws the centerer *m* forward on its pivot and raises its forked end slightly, so that before it leaves the nail it loosens it in the carrying-ring after it is pointed. It will be observed that this nail-centerer *m* is pivoted upon a standard, *o*, that is carried by the sliding plate F.

*p* is a rock-shaft that passes over the sliding plate F, and has rigidly attached thereto an arm, *q*, carrying a roller, *r*. *s* is a cam attached to the sliding plate F. As the sliding plate F reciprocates, the cam *s* strikes the roller *r*, and the arm *q* is raised and lowered and the rock-shaft *p* vibrated. A spring, R', vibrates shaft *p* backward when the cam is withdrawn from under roller *r*. This rock-shaft also carries a pawl, *t*, which engages with the notches *e* in the top of the ring in such a manner as to move the nail-carrying ring forward one notch at each full reciprocation of the sliding plate F.

There is a notch, *u*, in the ring C, and a poker, *v*, which passes behind the head of the nails after they are finished and forces them from the nail-carrying ring, discharging them through the notch *u* from the machine.

The operation of the machine is as follows: Nail-blanks, or nails that have been forged into shape, are placed in the notches *d* in the nail-carrying ring, and as the ring is intermittently rotated they are carried forward to the rolling-die G, where one of the rollers Q rolls one side of the nail, every nail being rolled as the rollers pass between the guide or former plate R and the die or anvil G. While the operation of rolling is being performed the piece or arm O is thrown up behind the sliding plate F, so as to hold it perfectly firm and solid, as above described. When this rolling operation is performed the slide-plate F is thrown back and carries the pointing-die to the punch K', where a nail is first drawn down into the ring and centered over the punch K', and then pointed by the pointing-die H, as above described. As the slide-plate starts to withdraw the cutting-die the spring *n* vibrates the nail-centerer, as above described, and causes it to loosen the nail in the ring. It will be observed that as the pointing-die is carried forward to point a nail, as above described, the beveling-dies I I are also brought together, so as to bevel the point of the last nail pointed, the beveling-dies being set just one motion of the nail-carrying ring from the pointing-dies.

In this manner the machine continues to roll, point, and bevel the nails and move the nail-carrying ring intermittently, so as to carry the nails forward to the rolling, pointing, and beveling dies and discharge them, as above described.

I am aware that a horseshoe-nail machine having a pair of horizontal wheels and a belt carried thereon, provided with holders for the nails, which nails were thereby carried between a die on a reciprocating frame and a

roller on a rocking frame, has been heretofore made, and I therefore do not claim such structure.

Having thus fully described the construction and operation of my machine, what I claim as new, and desire to secure by Letters Patent, is—

1. The slide-plate F, carrying a rolling-die or anvil and the blocking-arm O, so arranged as to pass behind the slide F and block it solid while the nail is rolled, as above specified.

2. The pivoted nail-holder U in a nail-finishing machine, constructed and arranged so as to follow the rollers and press against the nail while being rolled, as above described.

3. The shaft J, eccentric S, and vertical arm

P, bifurcated at its top and provided with two rollers, Q Q, combined with the abutment-plate R and die G, as set forth, whereby the nail is rolled with a slightly-yielding pressure.

4. In combination, nail-carrier D, having peripheral notches, in which the nails hang by their heads, the sliding plate F, die G, rolling-die Q Q, and actuating parts J S P N N' and cams O' P', all arranged, as shown, below the plane of said carrier-ring.

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Witnesses:

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