J. MILLS.

MACHINE FOR FORGING HORSESHOE-NAILS.

No. 182,843. Patented Oct. 3, 1876.

Fig. 1.

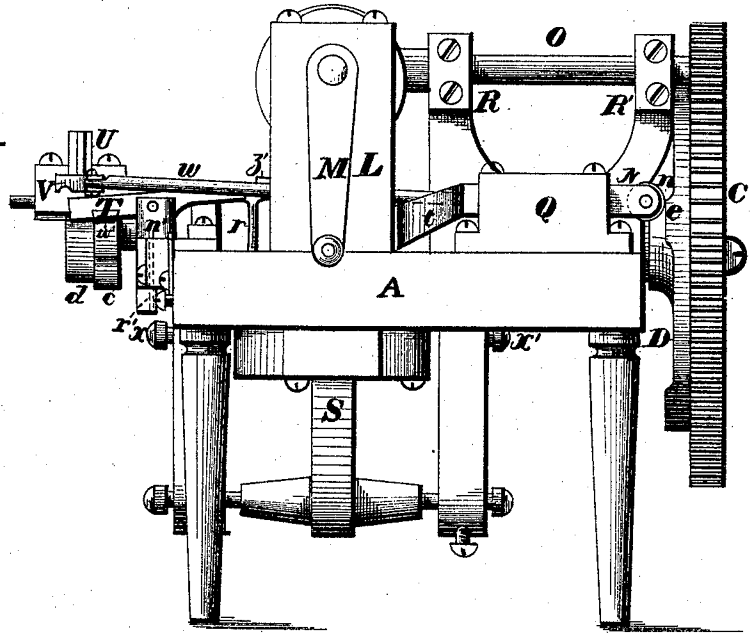
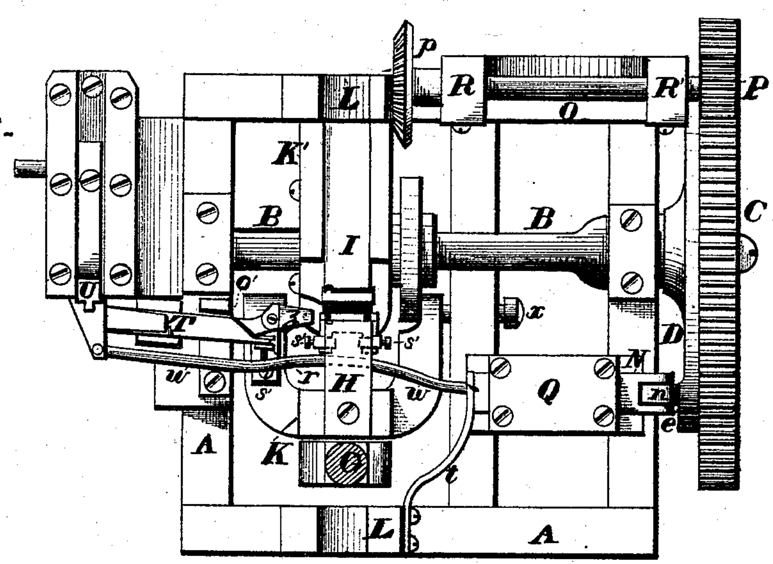


Fig. 2.



WITNESSES

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4 Sheets—Sheet 2.

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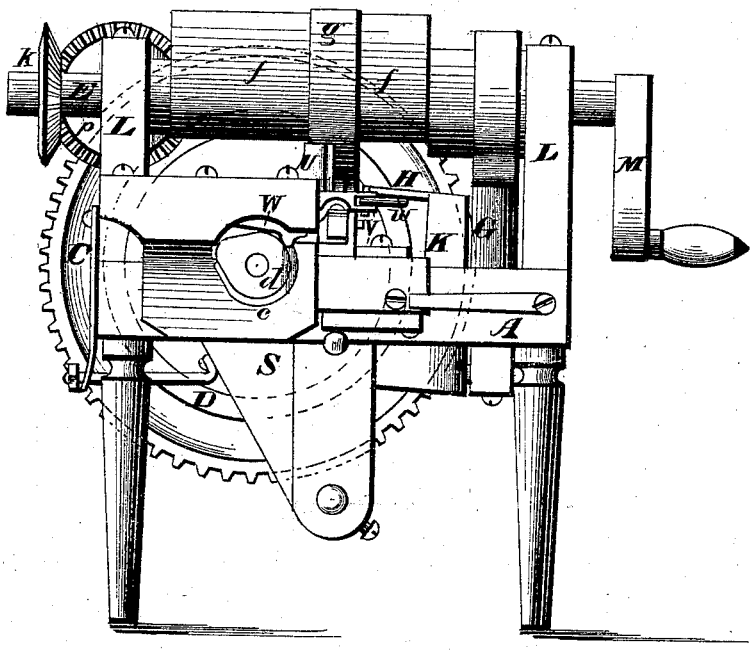
Fig. 3.



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4 Sheets—Sheet 3.

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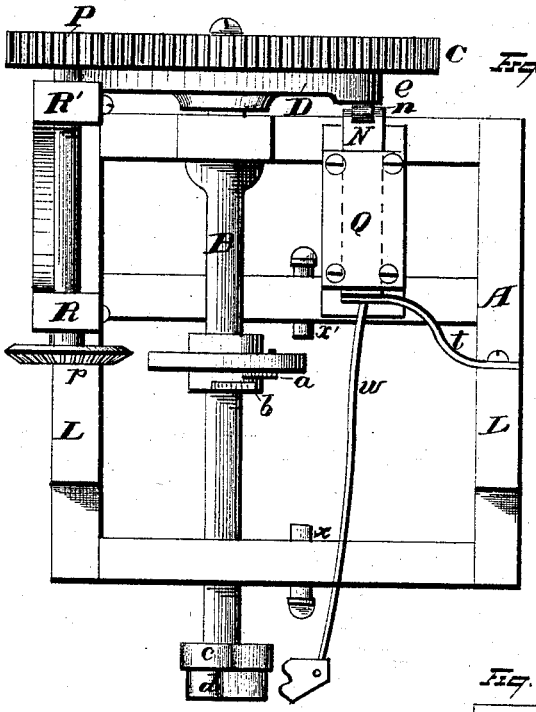

Fig. 4.

Fig. 5.

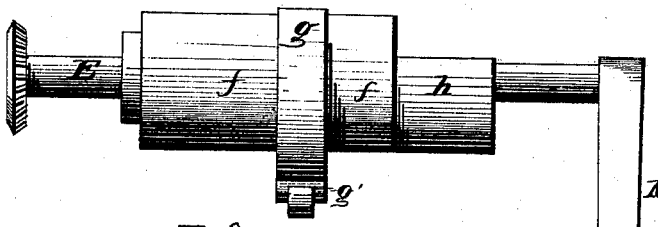

Fig. 6.

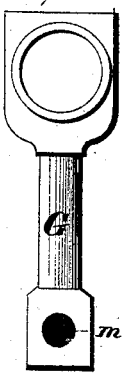

Fig. 7.

Fig. 8.

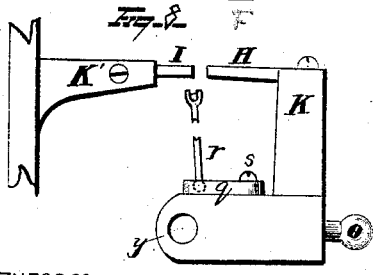

Fig. 9.

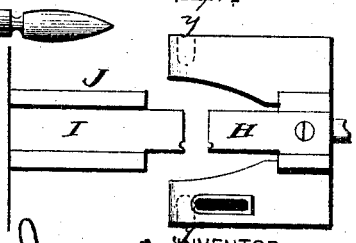

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Fig. 10

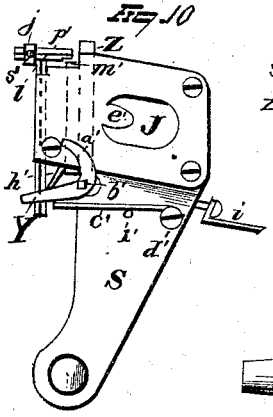


Fig. 11

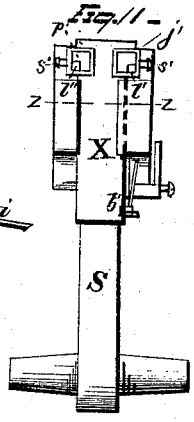


Fig. 12

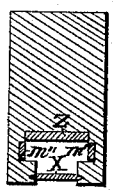


Fig. 13

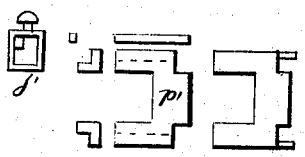


Fig. 14

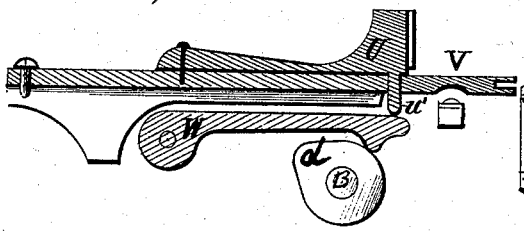


Fig. 16

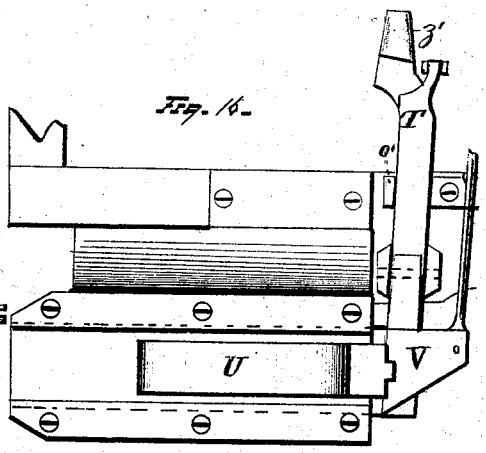


Fig. 15

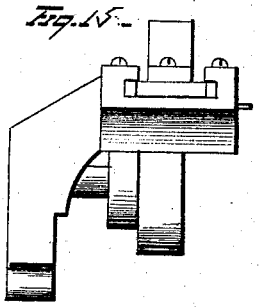
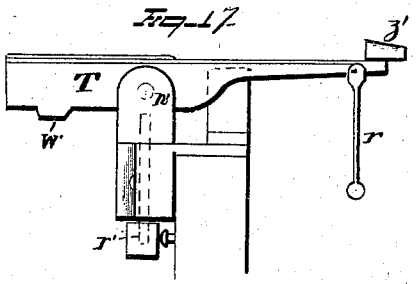


Fig. 17



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UNITED STATES PATENT OFFICE.

JAMES MILLS, OF KEESEVILLE, NEW YORK.

IMPROVEMENT IN MACHINES FOR FORGING HORSESHOE-NAILS.

Specification forming part of Letters Patent No. **182,843**, dated October 3, 1876; application filed July 7, 1876.

To all whom it may concern:

Be it known that I, JAMES MILLS, of Keeseville, in the county of Essex and State of New York, have invented certain new and useful Improvements in Horseshoe-Nail Machine; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improved horseshoe-nail machine.

Figure 1 is a side elevation of the machine. Fig. 2 is a plan view, with hammer-shaft removed. Fig. 3 is an end elevation of the machine; Fig. 4, a plan view, with the necessary parts removed to show the position of the several cams. Fig. 5 is a view of the hammer carrying and operating shaft. Figs. 6 and 7 are views of the rod or pitman connecting shaft and striking-hammer detached. Figs. 8 and 9 are detail views of the hammer-shank and hammer. Figs. 10 and 11 are detail side and front views respectively of the anvil and cutter carrier, with anvil and cutter in position. Fig. 12 is a sectional view of the above at the line 2 2 of Fig. 11. Fig. 13 represents end and top views of movable cutter and cutter-holder and frame, with screw for securing the same. Fig. 14 is a longitudinal section of the nail-blank griper, straightener, and releaser, showing manner of operation. Fig. 15 is an end view of above at *z* of Fig. 14. Fig. 16 is a plan view of devices shown in Fig. 14, and of nose-piece lever. Fig. 17 is a side view of nose-piece lever, with devices for moving it vertically and laterally.

The invention consists in the parts and combinations as hereinafter specified and claimed, wherein—

A represents the frame of the machine, which may be of any suitable construction or material. B is the cam-shaft carrying main cog-wheel C, the preferred proportions of which to the pinion P are as ten to one. It also carries cam-wheel D for straightening nail-blank, and the four cams *a*, *b*, *c*, and *d*, for operating cutter anvil, nose-piece lever, and for releasing nail-blank. The cam *e* on wheel D is so formed that a slight primary impulse is given to the mechanism for straightening the kink in the nail-blank until just before the finishing of a nail, when it suddenly increases, imparting a quick jerking motion, whereby the kink in the nail-blank is sufficiently removed. E is the hammer-carrying and hammer-operating shaft. It is provided with two cylinders, *f* and *h*, rigidly attached and eccentrically placed to its axis, and the hammer-carrying cylinder *g*, centrically placed.

The purpose of cylinder *f* is to counterbalance the eccentricity of cylinder *h*. Motion is imparted directly to the shaft E, which, through the medium of beveled gear *k* and *p* and pinion P on shaft O, imparts motion to the main cog-wheel C on shaft B. F is the revolving rolling-hammer, whose shaft is journaled in short standards *g'* projecting from the periphery of cylinder *g*. G is the pitman, which imparts motion to the oscillating striking-hammer H. On one end of it is fixed the sleeve *l*, which fits over the eccentrically-placed cylinder *h*, while the other end has formed in it the socket *m* in which rests the pin *o* of the hammer-shank K. H is the oscillating striking-hammer attached to its shank K. I is the stationary hammer or die fixed to its shank or bracket K'. The lower part of the hammer-shank K is formed into two arms provided with sockets, in which work the pins *x x'* fastened to the frame of the machine. It has also the pin *o*, which works in the socket *m* of the pitman, as before stated.

L L' are two standards fixed on the frame of the machine, in which rest the journals of shaft E. M is a crank on said shaft, to which the power is applied. N is a bar, sliding in box Q or other suitable bearing, and provided at its slotted end with a small friction-wheel, *n*, or its equivalent, which bears against the surface of cam-wheel D, the cam *e* whereof, when it comes in contact with the friction-wheel, causes the bar to slide, and at the same time to move the griping-jaws U and V, with the latter of which the sliding bar is connected by the rod *w* a corresponding distance. The purpose accomplished by this will be hereinafter set forth. The spring *t* or its equivalent, fixed to standard L and pressing against the

inner end of the sliding bar, returns it to its position, when the cam *e* has passed beyond the friction-wheel *n*.

O is the shaft, which, through the medium of the beveled gear *p* and pinion P thereon, transmits motion from shaft E to B. R R′ are standards fixed on the frame of the machine for the support of shaft O. S is the anvil and cutter carrier pivoted at its lower end to the frame of the machine, and provided with opening J, through which the shaft B passes. It carries the anvil to and from other devices, which will be hereinafter described. *m′* and *m″* are the stationary cutters, secured thereto near the anvil, as shown.

The reciprocating cutters *l′* and *l″* are attached and held in place as follows: X is a plate or cutter handle, which slides in grooves in the anvil-carrier S, and has a top plate, *p′*. This top plate extends beyond both sides of the handle X, but is even with the edges thereof. It is rabbeted to one-half its thickness on the two edges at right angles to handle X, and thus on each side a short groove is formed between handle and top plate. The cutters *l′ l″* are placed herein, their upper and inside edges in contact with the rabbets, and a short part of their under side, near the middle, resting on the handle. A frame, *j′*, is then passed over the end of each cutter and its corresponding arm of the top plate, and by the screw *s′* the cutter is firmly securd. To one side of the anvil-carrier at *b′* is pivoted a lever, Y, having an arm, *a′*. This lever fits into a notch of the cutter-handle X, and depresses it when the cam *a* on shaft B comes in contact with the arm *a′*. Depressing the cutter-handle of course depresses the cutter at its upper end. *c′* is a spring, which presses the arm Y upward when cam *a* ceases to operate, and an adjustable stop, *h′*, limits its return movement. Into the opening J of the carrier S projects the cam *e′*, which operates in connection with the cam *b* on shaft B.

When, in the operation of the machine, the two cams *b* and *e′* cease to oppose each other, the anvil-carrier is drawn aside by means of a strong spring attached to frame A, and connected with the carrier by rod *i*. T is the lever which carries at its end the nose-piece *z′*. It rocks upon a fulcrum placed in standard *n′*, or it may be suitably journaled to the main frame, and has a vertical movement induced by the link *r*, which latter connects a stout spring or strap, secured on lever T, with an arm of the hammer-shank. The extent of the vertical movement of the lever T can be regulated by altering the position on the hammer-shank arm of the link-box *q*, which is effected by means of the set-screw *s*. Lateral motion can also be imparted to the lever T, when necessary, by means of a lever, *r′*, Fig. 17, which is connected with the standard *n′* by a rod passing through the frame of the machine. This lever *r′* bears on an adjustable screw, by means of which the lateral position of lever T is regulated, and it is held in place by a spring attached to the frame of the machine. A guard, *o′*, prevents the lever T from moving beyond a certain point. This may be adjusted as desired. The lever T has also a short arm, *w′*, extending laterally from its under side, which is acted on by the cam *c* on shaft B, for the purpose of dropping the nose-piece *z*. The nose-piece lever is lowered at every stroke of the revolving rolling-hammer by means of the link *r*, which connects an arm of the hammer-shank with one end of a spring or strap, the other end of which is fastened to the nose-piece lever, and rests on the upper surface thereof. Once in every revolution of the large cog-wheel, the nose-piece is further lowered or dropped by means of the cam *c*, which acts on the short arm *w′* of the nose-piece lever, depressing its other end, and moving it away from the spring or strap before mentioned.

U is the upper nail-blank griper, having on its under surface a pin, *u′*, which projects through griper V, and is acted on by cam-lever or nail-blank releaser W, which, in turn, is acted upon by cam *d* on shaft B, effecting the release of the nail-blank by lifting up griper U.

The lower nail-blank griper V fits in a groove wider than itself, so as to allow the requisite amount of lateral play to remove from the nail-blank the kink formed during the operation of hammering.

The operation of the machine is as follows: The nail-blank is presented to the anvil through the nose-piece *z′*, and is held firmly by the gripers U and V. It receives its first stroke from the striking-hammer H, while being held a short distance above the anvil by the nose-piece, and at the instant the revolving rolling hammer is in the elevated position. A half-revolution of shaft E brings the rolling-hammer into operation, and, through the medium of eccentric cylinder *h*, withdraws the striking-hammer, and, by means of link *r*, lowers the nose-piece so that the nail-blank rests on the anvil. Seven strokes by the rolling and eight by the striking hammer complete the hammering operation, which are delivered alternately with each other. At the instant of the eighth stroke by the striking-hammer, the cam *e* on wheel D operates the nail-blank gripers, forcing them outward, whereby the kink which has been formed in the nail-blank between the anvil and gripers, by the process of hammering, is removed. Immediately succeeding this operation, the cam *b* on shaft B, and the cam *e′* of the anvil-carrier, cease to oppose each other, and the anvil-carrier is drawn aside by spring *j*. This brings the hammered part of the nail-blank that has been formed into the shape of a nail, over the opening between anvil and movable cutter. At the next instant, the cam *c* on shaft B acts to drop the nose-piece, bringing the nail in position to be operated upon by

the cutters, which are at once brought into action by the cam *a* on shaft B, acting through the medium of lever Y on cutter-handle X, depressing the cutters *l' l''*, which latter can be placed parallel to stationary cutters *m' m''*, or at an angle therewith, to produce a shear-cut. The nail, thus severed at its head and point, drops out of the machine. At the instant that the cutters perform their part, the cam *d* on shaft B operates the nail-blank releaser W, which acts on the pin *w'* of the griper U, raising it from the surface of griper V, thus releasing the nail-blank, which is then fed forward for another operation.

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

1. The combination, with a striking-hammer and stationary hammer or die, of a revolving rolling-hammer and an anvil, vibrating in a plane transverse to the line of action of said rolling-hammer, substantially as and for the purpose described.

2. The combination, with a striking-hammer, a stationary hammer or die, and a revolving rolling-hammer, of an intermittently-oscillating anvil and cutter-carrier, constructed so that the cutters and anvil are alternately brought into operative position, substantially as and for the purpose described.

3. In a horseshoe-nail machine, the combination, with the feed-lever T, carrying nose-piece *z*, of the stationary and striking hammers or dies, and the combined anvil and cutter-carrier, intermittingly vibrating at right angles to the plane of action of the revolving hammer, substantially as described.

4. The combination of cam-wheel D, slide N, and griper-jaws U V, substantially as and for the purpose described.

5. The anvil-carrier S, having anvil Z, stationary cutters *m' m''*, cutter-holder X, lever Y, spring *c'*, and stop *h'*, substantially as and for the purpose described.

6. The anvil-carrier S, having cam *e'* and lever Y, in combination with shaft B, having cams *a* and *b*, substantially as and for the purpose described.

7. The combination, with the striking-hammer H, feed-lever T, and shaft B, provided with cam *c*, and carrying the oscillating anvil and cutters, of the revolving rolling hammer, substantially as and for the purpose described.

8. The combination, with the intermittingly-oscillating anvil-carrier S, of the stationary cutters *m' m''*, and movable cutters *l' l''*, arranged so that the nail is cut simultaneously at head and point, substantially as and for the purpose described.

9. The combination of gripers U V, nail-blank releaser W, and shaft B, having cam *d*, substantially as and for the purpose described.

10. The combination of nose-piece lever T with standard *n'* and lever *r'*, substantially as and for the purpose described.

11. The combination of shaft B, having cams *a b c d*, of anvil-carrier S, nose-piece lever T, and griper U, substantially as and for the purpose described.

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

JAMES MILLS.

Witnesses:
H. M. MITCHELL,
J. D. KINGSLAND.

2 erasures
words.