2 Sheets—Sheet 1.

C. W. WOODFORD.

MACHINE FOR FINISHING HORSESHOE NAILS.

No. 189,589. Patented April 17, 1877.

Fig. 1.

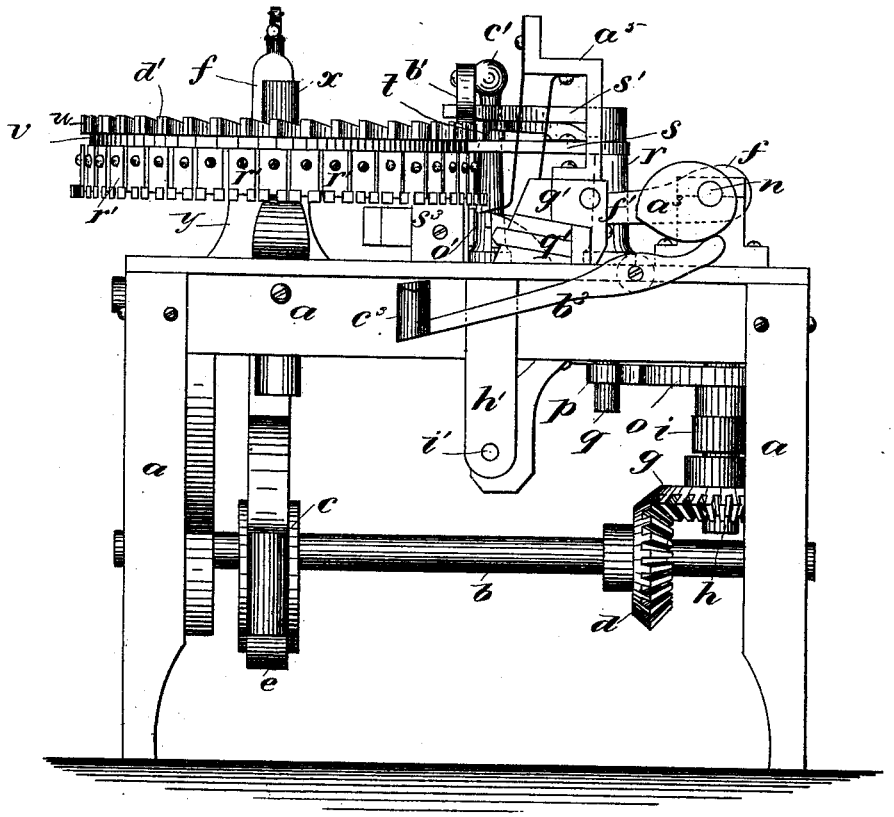


Fig. 2.

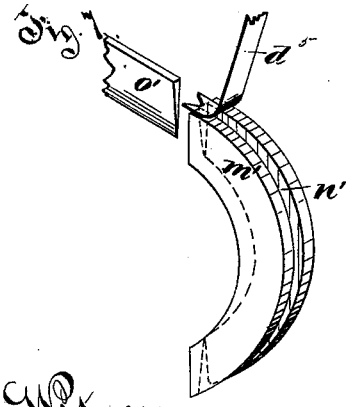


Fig. 3.

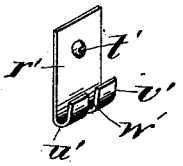
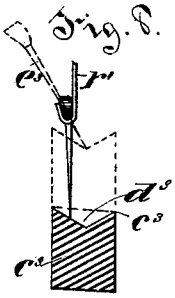


Fig. 4.



Witnesses:
Charles G. L. Simpson
Johnas Conant

C. W. Woodford
Inventor.

2 Sheets—Sheet 2.

C. W. WOODFORD.

MACHINE FOR FINISHING HORSESHOE NAILS.

No. 189,589. Patented April 17, 1877.

Fig. 2.

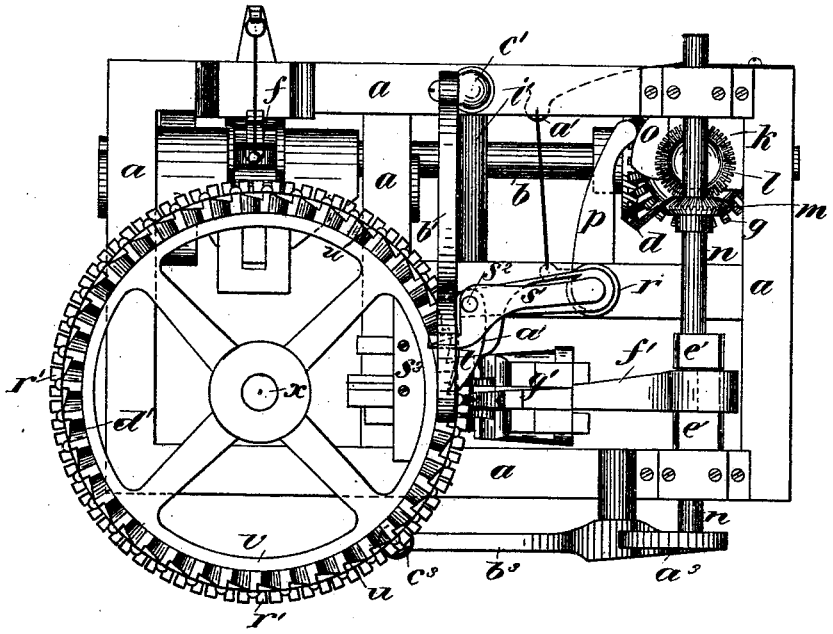


Fig. 4

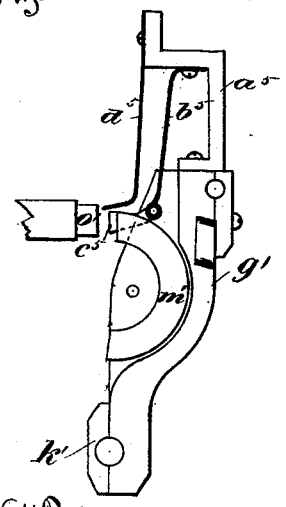


Fig. 5

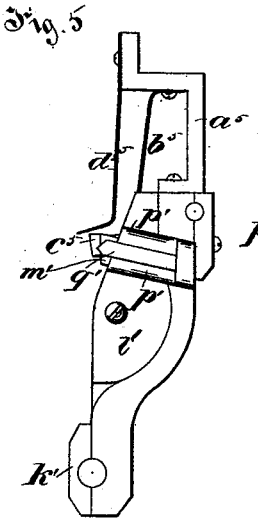
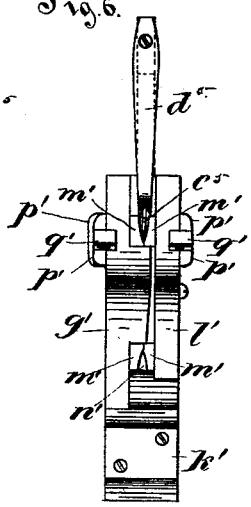


Fig. 6.



Witnesses

Charles L. L. Simpson

John A. Crane

C. W. Woodford

Inventor:

UNITED STATES PATENT OFFICE.

CHARLES W. WOODFORD, OF MONTREAL, QUEBEC, CANADA.

IMPROVEMENT IN MACHINES FOR FINISHING HORSESHOE-NAILS.

Specification forming part of Letters Patent No. **189,589**, dated April 17, 1877; application filed January 29, 1877.

To all whom it may concern:

Be it known that I, CHARLES WELLINGTON WOODFORD, of the city and district of Montreal, Province of Quebec, Canada, have invented certain new and useful Improvements in Machines for Finishing Horseshoe-Nails, and dies for the same; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention has reference to improvements on those machines which are now in use, in which nail-blanks, or partly-formed horseshoe-nails, are introduced, and are in some cases first rolled or elongated, and afterward pass to another part of the machine, where their points are beveled and clipped, giving the desired finish thereto, and in other cases the machines are arranged to only act as above upon the points of the nails, the rolling or otherwise forming the body of the blank and preparation of the point ready to be beveled and clipped having been performed by another machine previous to its introduction to the punching-machine for the purpose of finishing the points; and the nature of my invention consists in the construction and arrangement of the clipping-dies and rest for carrying the same, and the hooks for holding the blanks, and in the construction and combination of parts, as will be hereinafter more fully set forth.

In the drawing hereunto annexed similar letters of reference indicate like parts.

Figure 1 is a side elevation of my invention. Fig. 2 is a plan of Fig. 1. Fig. 3 is a detail of hooks. Fig. 4 is a detail of rest and dies. Fig. 5 is a detail of rest and dies. Fig. 6 is a detail of rest and dies. Fig. 7 is a detail of punch and pointing-dies. Fig. 8 is a detail of nail-discharging mechanism.

Letter *a* is any suitable frame-work for holding the parts together and carrying them in the ordinary way. *b* is the driving or main shaft of the machine, rotated in any ordinary manner. Upon shaft *b* are situated the eccentric *c* and gear-wheel *d*. On the eccentric is a strap, *e*, to which is attached the mechanism *f*, for rolling the blanks, and as the construction of it does not form any part of the subject-matter of the present application, it is not necessary to describe it further than to say that it may be made substantially in the forms at present in use in similar machines. The beveled gear *d* engages with the beveled gear *g*, rotating the vertical shaft *h*, which is carried in brackets *i k*, forming part of the frame *a*. On the upper end of the shaft *h* is secured the beveled gear *l*, intermeshing with the beveled gear-wheel *m*, secured on the shaft *n*, whereby the same is caused to revolve with the revolution of the shaft *h*. The above-mentioned gears are so proportioned that each of the shafts *b*, *h*, and *n* will make one revolution at the same time. On the shaft *h* is a cam, *o*, operating an arm, *p*. This arm is attached on the vertical spindle *q*, carried in a bearing and sleeve, *r*, of the frame.

To the top of the spindle *q* is attached a double arm, $s\ s^1$, between which is pivoted at s^2 a pawl, *t*, acting upon the peripheral teeth *u* of a wheel, *v*. This wheel is secured on a shaft, *x*, carried in a bracket and sleeve, *y*, of the frame *a*, so that as the cam *o* actuates the arm *p* and arms $s\ s^1$, the wheel *v* is caused to advance one tooth, *u*, for each revolution of the shaft *h*. The pawl *t* and arm *p* are arranged, in the usual way, with bearing-springs a^1 to keep their contact. b^1 is a pawl, attached to the rigid standard c^1 of the frame *a*, and is arranged to engage with the teeth d^1 on the upper edge of the periphery of the wheel *v*. It is arranged to be actuated by the extremity of the arm s^1, which trips it up just before the pawl *t* causes the wheel to advance, and allowing it to fall again after the wheel has been partly advanced one tooth, so that the momentum of the wheel may not be able to carry it too far.

In the parts, and construction and arrangement of them in so far as they have been hereinbefore described, they are as heretofore and at present in use.

On the shaft *n* a crank, e^1, is formed, attached by a connecting-rod, f', to a pivoted rest, g', causing the same to vibrate in the arc of a circle back and forth at each revolution of the crank e^1. On each side of the frame *a* is attached or formed with it a bracket, h', receiving a shaft, i', extending across under the frame *a*, and serving as a pivot or trunnion for the rest g' to vibrate upon. This shaft should be of such proportions as to cause

it to be perfectly rigid, or be otherwise arranged for that purpose.

The particular construction of the rest g' will be more clearly seen in Figs. 4, 5, and 6.

At the lower extremity is formed a cramp, k', for attaching it securely to the shaft i. One part l' of the side is made separate and attached to g' by a bolt. In Fig. 4 the plate l' is removed, and in Figs. 5 and 6 it is shown in place. In the body g', and under the plate l', a recess or groove is cut in the form of a segment of an annulus to receive the similarly-formed halves of the die m'. These are best made a "snug fit" in the recess or groove, and are of such width that when the plate l' is put in place and bolted down it serves as a cramp for securing the die m' rigidly to the rest g'.

The construction of the die m' m' is as follows:

I take a ring of steel and turn it true on all sides to the right size to form the die, and on one side I turn on it a bevel; I then cut the ring across its diameter and turn the two beveled sides toward one another, and, if desired, "dowel" or otherwise secure the two parts together. Thus the bevel gives the acute-angle space n' the exact shape that is required to be given to the points of the nails, and in making the bevel it must be formed for that object. As these halves of the die require to be sharpened it is only necessary to grind a flat, or rather a wedge-shaped, piece off their ends for that purpose, when they may be returned again to the rest g', and be readjusted in place.

It is evident that this form of die m' may be produced by turning a ring or segment of a ring to form the two parts m' m' in one piece, and cut in it recess n', without departing substantially from the subject-matter of this part of my invention. If made in this form, in a complete ring, the same may be cut in two and one part used at a time; but for the purposes of economy of cost, and for having the two sides exactly alike, I prefer to make the dies as herein first above described.

In the part of the frame a, and under the wheel V, opposite to where the die m' is situated when in place in the machine, is formed a rest, s^3, of ordinary construction, for holding a punch or punch-die, o', also of ordinary construction, as shown in the drawings. Its relative position with the die m' will be clearly understood by Fig. 7. On the plate l', and on the opposite side of the rest g', lugs p' are formed for holding the beveling tools or dies q', ordinary bed-dies being formed in the rest s^3, (holding the punch o',) as at present in use, for the nails to rest upon while being operated upon by the dies q'.

On the top of the rest g' is attached a bracket, a^5, to which is attached a spring, b^5, having a pawl, c^5, pivoted to it, working in the acute-angled space n' of the die m' m'. d^5 is also a spring attached to the bracket a^5. This is of the configuration shown in Figs. 4, 5, and 6, and, as seen in the latter figure, its lower extremity has a V-shaped piece cut out of its end. This V of the spring d^5, coming in contact with the nail upon the punch o' in advance of the die m', adjusts and holds the nails in their proper position upon the punch, ready to receive the action of the die m', and as this takes place the pawl c^5 is forced back, as the point of the nail and end of the punch o' pass in between the ends of the die m'.

It is evident, by the circular formation of the die m' and its situation with regard to the punch o', that as the point of the punch and nail pass inward from the cutting-edges of the die m' the clearance increases, without any clearance being formed, particularly on the die, by reducing its halves for that purpose.

As the rest g' recedes, and the die m' becomes disengaged from the punch o', the spring b^5 and pawl c^5 push out the point of the nail, and free it from the die m'.

The wheel v is provided with hooks r^1, situated at equal distances around its periphery, and in fitting up the wheel care must be taken to make all the teeth u equal to one another; also, all the teeth d^1 equal to one another. Their number and that of the hooks r^1 will be equal. Thus, if the wheel is arranged for one hundred hooks r^1, there will be that number of teeth d^1 and u.

The construction of the hooks r^2 is more clearly shown in Fig. 3. Here the hooks are formed with a body, t^1, a comparatively horizontal part, u^2, and an upturned part, v'. In the center a slit, w', is formed by removing a portion of the parts u^1 and v'. This slit is for the reception of the nail-blanks, which are suspended by the head thereof, the feeding of the blanks to the hooks r^1 being done by hand or any other desired manner.

In the hooks that have heretofore been used in these machines they have been made only with a body and horizontal part, substantially the parts t^1 and u^1, without any upturning whatever, the part u^1 being perfectly flat and horizontal. This necessitates the use of an outer guard to keep the nails from falling out of the hooks by the vibration or jerking motion of the wheel v.

On the end of the shaft n' is secured a cam, a^3, actuating a lever, b^3, pivoted to the frame a, as shown. On the end of this lever is formed a cup, c^3. The cross-section of this is more clearly shown in Fig. 8. The sides of the recess d^3 are so inclined that the point of the nail will not rest upon them, but will at once slip into the center and bottom of the recess.

The cup is situated as shown, with its center of recess within the circle of revolution of the hooks r^1, and the position shown in full lines in Fig. 8 is that when the cup has just been raised to touch the point of the nail suspended by the hook. As the rise of the cup proceeds the point of the nail first finds the center of the recess d^3, and, as the raising action is continued to the position shown in dot-

ted lines in the figure, the nail is raised bodily to the position approximately indicated by the dotted line e^3, when it, as the cup descends, falls clear of the hooks, and is thus discharged from the machine.

In constructing and arranging the above mechanism the cams and contrivances herein described for causing the motion of the parts must be carefully set, to cause the parts to operate at the proper time.

It will also be borne in mind that the dies of the rolling mechanism will be set in the proper position to act upon a nail held by the hooks r^1 in one part of the circle of hooks, while the die m' and beveling-dies q' are arranged to act in another part of the circle of hooks, and they must be spaced off to agree with the position the nails are all successively brought to each time after the wheel v is advanced one tooth u by the pawl t. The cup c^3 must be also arranged with the same requirement in mind, the parts f, q, m', and c^3 all being arranged to act while the wheel v is stationary.

What I claim is as follows:

1. The annularly-shaped die m', having acute-angled space n', substantially as and for the purposes set forth.

2. The combination of the wheel v with hooks r^1, having horizontal part u^1, upturned ends v', and slit w, substantially as and for the purposes described.

3. The hooks r^1, constructed with upwardly-turned and slotted ends v', substantially as described, in combination with the cup c^3, constructed, arranged, and operated substantially as described, for the purposes set forth.

4. The annularly-shaped die m', having bevels forming acute-angled recess n', in combination with the punch o', substantially as and for the purposes set forth.

5. The combination of the vibrating rest g', constructed as described, with cramp k' and removable part l', and having a segmental annulus formed therein, with the annularly-shaped die m', having acute-angled spaces n', substantially as and for the purposes herein set forth.

Montreal, 19th day of January, A. D. 1877.

C. W. WOODFORD.

Witnesses:
CHARLES G. C. SIMPSON,
JOHN A. RENNIE.