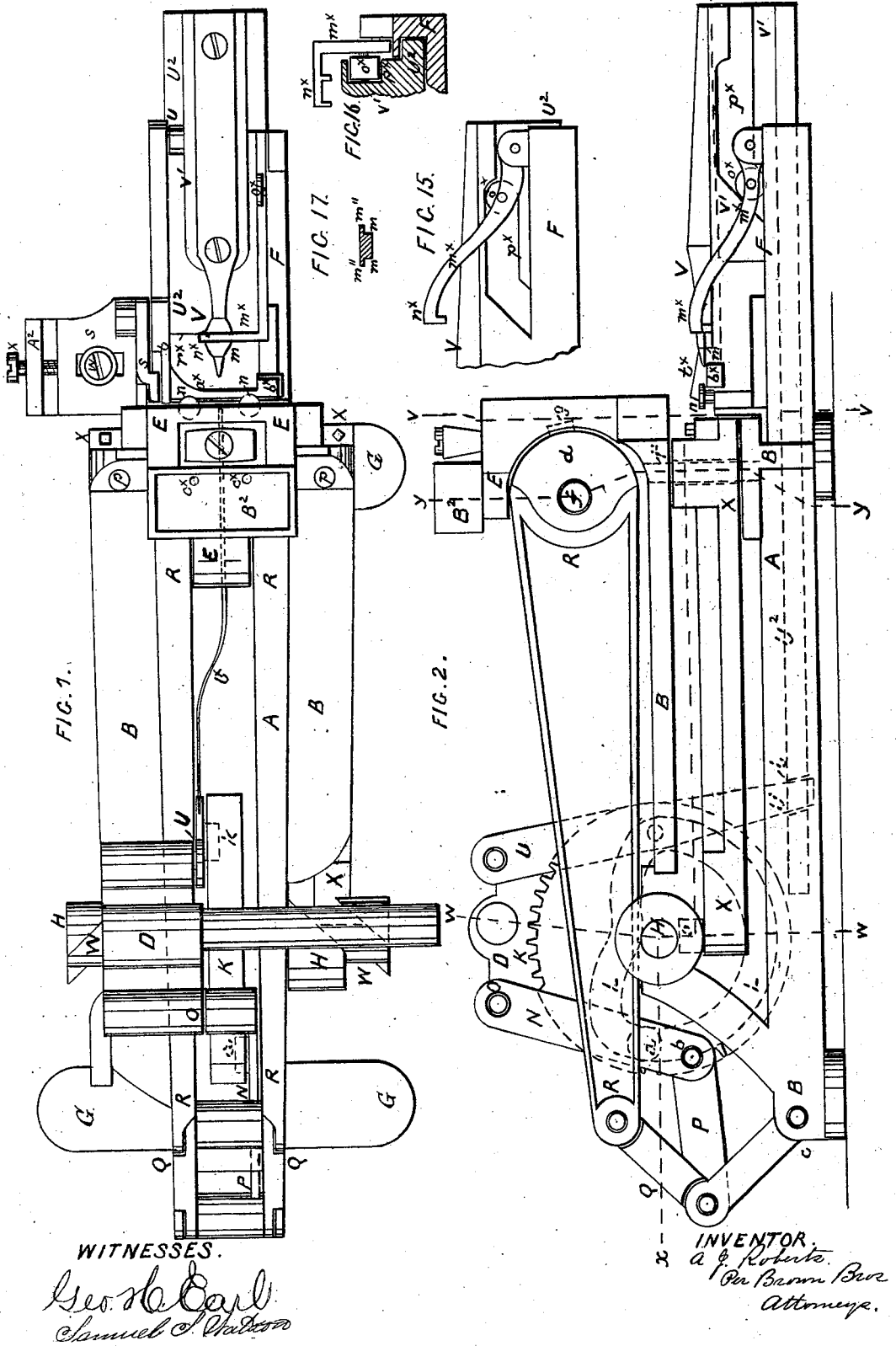
3 Sheets—Sheet 1.

A. J. ROBERTS.

Machine for Making Horseshoes.

No. 197,566. Patented Nov. 27, 1877.



WITNESSES.

Geo. H. Earl

Samuel S. Watson

INVENTOR.

A. J. Roberts.

Per Brown Bros

Attorneys.

A. J. ROBERTS.

Machine for Making Horseshoes.

No. 197,566. **Patented Nov. 27, 1877.**

FIG. 3.

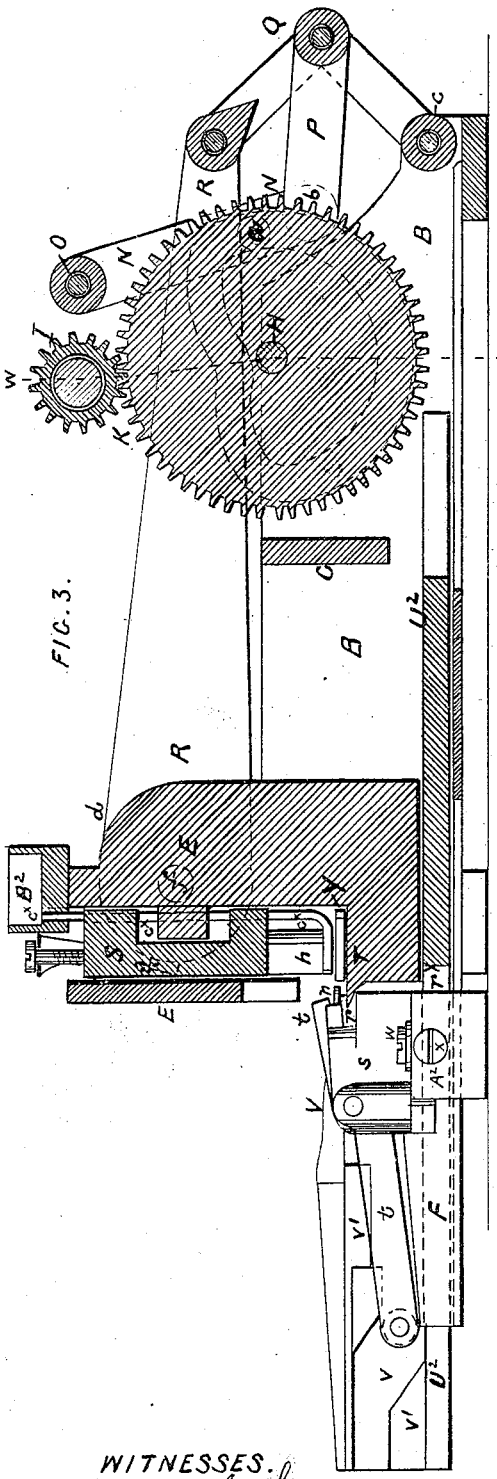


FIG. 4.

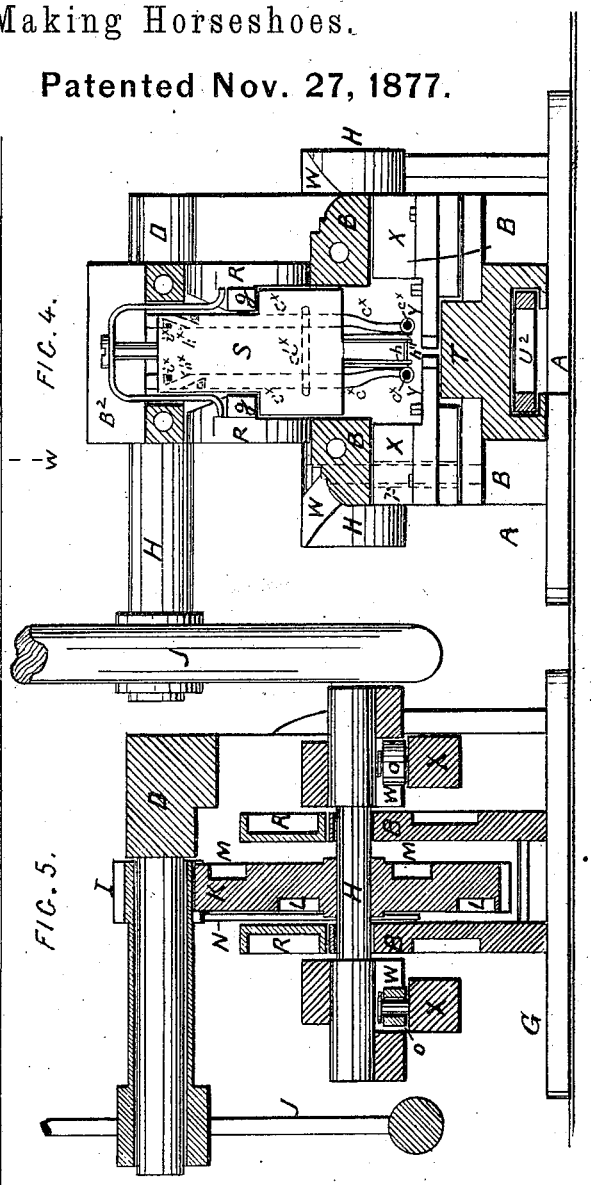


FIG. 5.

WITNESSES.

Geo. H. Earle

Samuel S. Baldwin

INVENTOR.

A. J. Roberts

Per Brown Bro.

Attorneys.

3 Sheets—Sheet 3.

A. J. ROBERTS.

Machine for Making Horseshoes.

No. 197,566. **Patented Nov. 27, 1877.**

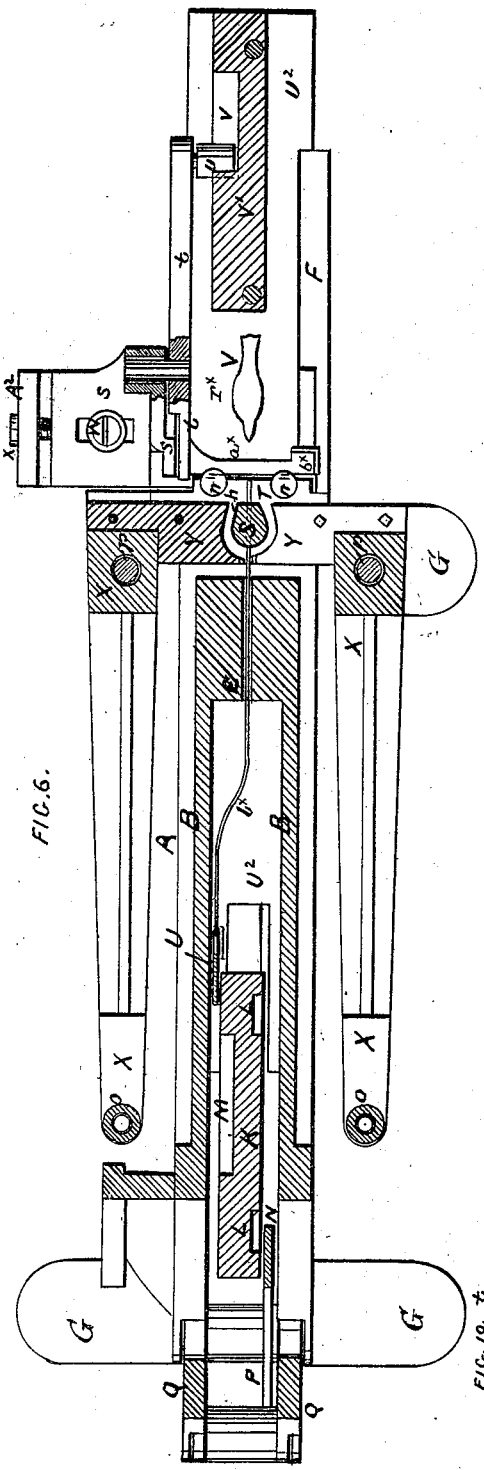


FIG. 6.

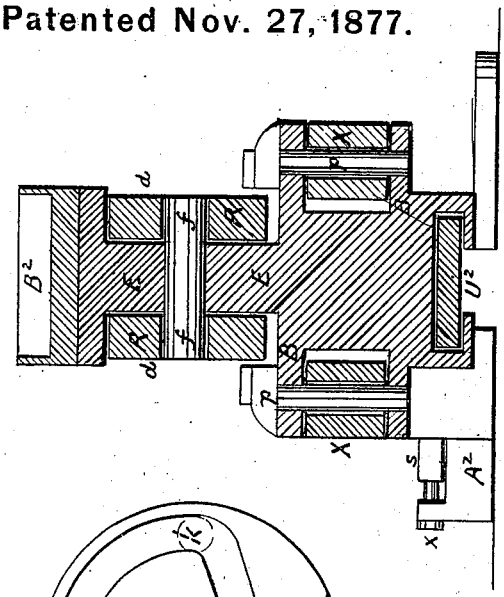


FIG. 7.

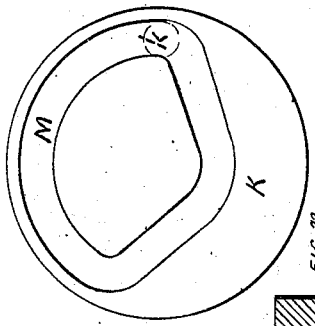


FIG. 9.

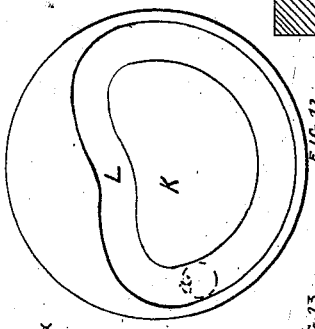


FIG. 8.

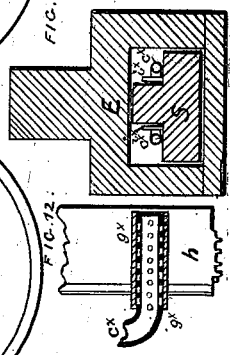


FIG. 11.

FIG. 12.

FIG. 13.

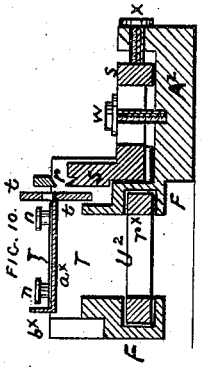


FIG. 10.

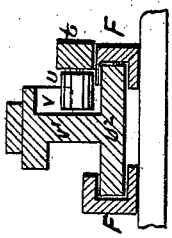


FIG. 14.

WITNESSES.

Geo. H. Earl

Samuel S. Watson

INVENTOR.

A. J. Roberts

By Brown Bros

Attorneys.

UNITED STATES PATENT OFFICE.

ANDREW JACKSON ROBERTS, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN MACHINES FOR MAKING HORSESHOES.

Specification forming part of Letters Patent No. **197,566**, dated November 27, 1877; application filed March 27, 1877.

To all whom it may concern:

Be it known that I, ANDREW JACKSON ROBERTS, of Boston, in the county of Suffolk and State of Massachusetts, have invented Improvements in Horseshoe-Machines, of which the following is a specification:

This invention relates more particularly to horseshoe-machines such as described and shown in the specification and drawings accompanying my now pending application for Letters Patent of the United States; and it consists in Improvements in the construction and arrangement of the several parts making up the said machine, whereby the said machine is rendered more efficient, positive, and effective, and compact and rigid, all of which will appear from the detail description thereof hereinafter given.

In Plate 1, Figure 1 is a plan view of my improvements in horseshoe-machines; Fig. 2, a side elevation; Figs. 15, 16, and 17, detail views, hereinafter referred to. In Plate 2, Fig. 3 is in part a central longitudinal vertical section and in part a side view. Fig. 4 is a transverse vertical section on line *v v*, Fig. 2, Plate 1; Fig. 5, a transverse vertical section on line *w w*, Fig. 2, Plate 1. In Plate 3, Fig. 6 is a longitudinal horizontal section, substantially on line *x x*, Fig. 2, Plate 1. Fig. 7 is a transverse vertical section on line *y y*, Fig. 2, Plate 1; Figs. 8, 9, 10, 11, 12, 13, and 14, detail views, to be hereinafter referred to.

In the drawings, A represents a frame-work of suitable construction to receive, carry, and support the various working parts of the machine; and it consists, in substance, of two main parallel side frames, B B, which are braced in any suitable manner by cross-bars C, and have two upright extensions, D and E, and a horizontal guideway, F, and side extensions G. His the driving-shaft of the machine, shown as driven from a pinion gear-wheel, I, of a balance-wheel, J, which works in a gear-wheel, K, of the shaft H. The driving-shaft H turns in suitable bearings at one end of the side frames B B, and its gear-wheel K is between said frames. L is a cam-groove in one face of the driving gear-wheel K, and M a cam-groove in the opposite face of same wheel. These cam-grooves L and M are shown, respectively, in Figs. 8 and 9. N is a vertical lever-arm hanging from a fulcrum, O, of the upright frame-extension D, and engaging, by its friction-roll *a*, with the cam-groove L, and pivoted at *b* to a rod, P, which is connected and pivoted to the middle joint of a vertical toggle-lever frame, Q, which, at its lower end, *c*, is hung to the side frames B B, and at its upper end to and between one end of two similar lever-beams, R R, which are arranged in parallel lines, and at their ends *d* are each hung upon a fulcrum, *f*, of the upright-frame extension or post E, one upon each side thereof. The lever-beams R R interlock by projections or teeth *g* with a head-block, S, which is arranged for a vertical movement in the post E, and at its lower end carries the creasing and nail-hole-punching die *h* and pressing-face *h''* for the shoe.

The rotation of the cam L through the connecting parts above described works the block S up and down within the post E, and the cam L is shaped so that in each of its rotations the head-block S will be continuously at its highest position for two-thirds of the rotation, and will be continuously moving up and down for the remaining one-third of the revolution. The vertical movement of said head is of sufficient length for its creasing and punching die *h* and pressing-face *h''*, to act as desired on the horseshoe made in the machine, and which is brought below it, and is on the stationary table or anvil-block T of the machine, as will hereinafter appear.

The arrangement of the toggle-lever frame Q is such that under the action of the cam L it exerts its greatest power in the downward travel of the head-block S with its creasing and punching die *h* and pressing-face *h''*.

U is a vertical lever-arm hanging from a fulcrum of the upright frame-extension D, and engaging by its friction-roll *k* with the cam-groove M, and at its lower end interlocked with a notch, *l*, of a bar or frame, U^2, arranged to slide horizontally in suitable guideways of the main side frames B B, and also of the horizontal guideway F, which, as before stated, is a part of the main frame-work A.

This horizontal slide U^2 projects to the front of the head-block S, and it carries a former, V, which has its edge *m* of the contour of the inner edge of a horseshoe, and is arranged to move through the throat made by the two

flanged vertical rollers, *n*, which are located upon the table or anvil-block T, just in front of the head-block S, to come under the pressing-face *h''* of the die *h*, carried by said block, and there to rest on the anvil, with its projecting flange *m''* overlapping the upper surface of the shoe, which is bent about the former in passing inwardly through the throat made by the roller *n*, as will hereinafter appear, and within the line of action of the creasing and nail-hole punches of the die *h* upon the horse-shoe.

The rotation of the cam M, through the connection of parts above described, works the former V inwardly and outwardly through the throat formed by the rollers *n*, and the cam M is shaped so that in each of its revolutions the former V will be continuously moving in for one-sixth of the rotation, and will be then continuously stationary at its innermost position for one-third of the same rotation, after which it will be continously moving out for the next sixth of the same revolution, and then will be continuously stationary at its outermost position for the remaining one-third of the same rotation, and also for the former V to be carried sufficiently away from the throat formed by the rollers *n* to allow the operation of parts which feed the metal bar to the machine, and place it in position across said throat for the action of the former V, as will hereinafter appear.

W W are two similar cam-grooves on driving-shaft H, one at each end of its projecting ends.

X X are two similar horizontal levers, which are worked through their friction-rollers *o o* by the cam-groove W W, and are arranged on each side of the frame to turn in a horizontal plane on their respective fulcrums *p*.

These levers each carry a similar side former, Y, which together are situated, when the levers are suitably turned therefor, to act on the whole length of the outer edge of the shoe carried by the former V under the pressing and creasing and nail-punching die *h*.

The rotation of the cam-grooves W works or swings the side-former levers X horizontally on their respective fulcrums, and the shape of the cam-grooves W is such as to move the side formers Y simultaneously against the outer edge of the shoe on the former V, and under the plane of movement of the pressing-face and punching-die *h*, and there rest while the said face *h''* is pressing and the said die *h* is punching, and to move the said formers simultaneously away from their position against the shoe on the former V in time to release the shoe from their side pressure, and to open the way for the withdrawal of the shoe by the former V, as will hereinafter appear.

r is an opening in a block, *s*, through which to feed the metal bar from which the shoes are to be made into position across the roller-throat *n*.

t is a cutting-lever which is hung to block *s*, and, through its friction-roller *u*, is operated upon by the cam-groove *v*, in one side of the block *v'*, through which the former V is secured to its operating slide-bar U^2. The lever *t* has a knife-edge in position to pass by the inner end of the opening *r*, through which the metal bar is fed, and to there act, in connection with the edge of the lower wall of said opening, like shears to cut or sever the said bar at such place. The cam-groove *v* is shaped to work this knife-lever to cut the metal bar in the forward movement of the former V, and to lift the knife-lever *t* on the backward movement of the former V, and otherwise to hold the knife-lever stationary, as hereinafter set forth.

The block *s*, having opening *r*, and carrying knife-lever *t*, as above described, is arranged on a base-block, A^2, provided with set-screw *w* and adjusting-screw *x*, so that the plane of the cut of the cutting-lever *t* may be set nearer to or farther from the central longitudinal axis of the machine, or, in other words, the central point of the throat formed by the rollers *n*. This arrangement of the block *s* on a base-block, A^2, consists in slotting the block *s*, to permit it to slide over the set-screw *w* on the base-block, and in the construction of the contact face of the block *s* with a rib which fits in a groove in the base-block for the guidance of the block *s* when moved in a straight line at right angles to the central longitudinal line of the machine.

$a^\times$ is a horizontal arm fixed to cutting-lever *t*, and projecting therefrom in front of and across and below the throat formed by the rollers *n* of the anvil-block T. This arm $a^\times$ is in line to receive the metal bar as it is fed through the opening *r*, to support it as it is so fed through, and its farther or outer end is walled, as at $b^\times$, making a stop to the forward feed of the metal bar through the opening, which wall is at a corresponding distance from the central point of the width of the throat formed by the rollers *n* to that of the cutting-plane of the knife-lever *t*.

In practice the arm $a^\times$ will be constructed so as to be lengthened and shortened, in order that its walled end $b^\times$ may be fixed at its proper relative distance from the central point of the throat formed by the rollers *n* on a change of the cutting-plane of the knife-lever *t*, by the adjustment of the block *s*, as has been described.

B^2 is a water-tank located on upright frame-extension E, and $c^\times$ two pipes or conductors, which lead from said tank down back of the die-carrying head S to the sides of the die *h*, where they are bent, as shown, to be horizontal, the one at one side and the other at the other side of the die, and, under the action of a spring-band, $d^\times$, to lie in contact with the sides of the die. The portions of these tubes lying against the die are perforated, as at $f^\times$, and covered with felt $g^\times$, (see Figs. 12 and 13,) and they serve to conduct water to the dies to keep them cool in their operation of punching and creasing.

$h^{\times}$ is an incline on each water-tube $c^{\times}$, against which inclines bear pins $i^{\times}$ of the moving head-block S, and these inclines and the bearings of the pins $i^{\times}$ on them are such that in the downward movement of the head-block the tubes $c^{\times}$ will be forced from their bearing on the sides of the die h, and in the upward movement held from contact therewith, from the action of the spring-band $d^{\times}$, until the die has reached its uppermost position. From this operation of the head-block S on the tubes the die does not rub against the felted coverings of the tubes in the upward and downward movement.

The herein-described elastic connection of the water-tubes may be dispensed with, and the tubes and the head-block S constructed and arranged, together with inclines and pins, to operate the tubes positively in the upward movement of the head-block, the same as they are described as operated in its downward movement.

$l^{\times}$ is a rod hung to lever-arm U, through which the cam M operates the former V. This rod $l^{\times}$ extends through the frame-upright E, and into position to pass between the side former Y at their toe end, when said formers are opened from each other, and it travels with the former V—that is, as the former moves backward the rod moves forward, and vice versa.

$m^{\times}$ is a lever hung to guideway-extension F of the main side-frames B, and bent so as to straddle at its end $n^{\times}$ the former V, and to be operated upon through its friction-roller $o^{\times}$ by the cam-groove $p^{\times}$ of the block v', through which the former V is fastened to the slide-bar U^2. This cam $p^{\times}$ is shaped to throw the lever $m^{\times}$ so as to knock off the shoe from the former V at the proper time, and at all other times to hold the said lever stationary and in its normal position. (Shown in Fig. 15, Plate 1.)

$r^{\times}$ is a hole through slide-bar U^2 for the escape of the shoes knocked off of the former by the operation of the knocking-off lever $m^{\times}$.

The metal blank may be fed in any suitable manner across the throat formed by the rollers n, and for this purpose feed mechanism such as shown and described in my other pending application may be employed.

The mechanism herein described operates as follows: The knife-lever t cuts the metal bar into lengths equal to the distance between the stationary part of the cutting-shears and the end wall $b^{\times}$ of the arm $a^{\times}$. The arm $a^{\times}$ holds the cut-off bar, and as the knife t lifts, it is lifted up into the plane of travel of the former V in season for the former V to take it and carry it through the throat formed by the rollers n, by which it is bent around the edge m, and thus made into the form of a horseshoe, and finally carry it under the pressing, punching, and creasing die $h\ h''$ into position to be operated upon by it and by the side formers Y Y, and by their combined action the shoe is pressed on all sides, and its top and bottom, and punched and creased. The side formers Y Y, and pressing, punching, and creasing die $h\ h''$, now move away from the completed horseshoe, which is carried out by the former V, which is assisted by the then forward movement of the pusher-rod $l^{\times}$ and knocked from the former V by the knocker-off lever $m^{\times}$ falling out of the machine through the opening $r^{\times}$.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The cams L M and W W of a common shaft, H, in combination with the punching and creasing die-head S, which is connected with cam L through toggle-lever frame Q, connecting-rod P, and lever N, the sliding former V, which is connected with cam M through slide-bar U^2 and lever U, and the side formers Y, carried by levers X, which are operated upon by the cams W W, all as described, and as and for the joint operation specified, upon a metal bar to form and make the same into a horseshoe, as described.

2. The arm $a^{\times}$, having abutment $b^{\times}$, combined with the bar cut-off lever t, so as to receive the bar as cut off, and to lift it into the plane of operation of the horseshoe-former V, all as described, for the purpose specified.

3. The vertically-moving head-block S, constructed with the punching-die h and pressing-face, in combination with the former V, anvil T, formers Y, the pusher-rod $l^{\times}$, lever U, and the cam K, the whole constructed and arranged to operate substantially as described.

A. J. ROBERTS.

Witnesses:
EDWIN W. BROWN,
GEO. H. EARL.