3 Sheets—Sheet 1.

C. BROWNING.

MACHINE FOR MAKING HORSESHOES.

No. 182,268. Patented Sept. 19, 1876.

Fig. 1.

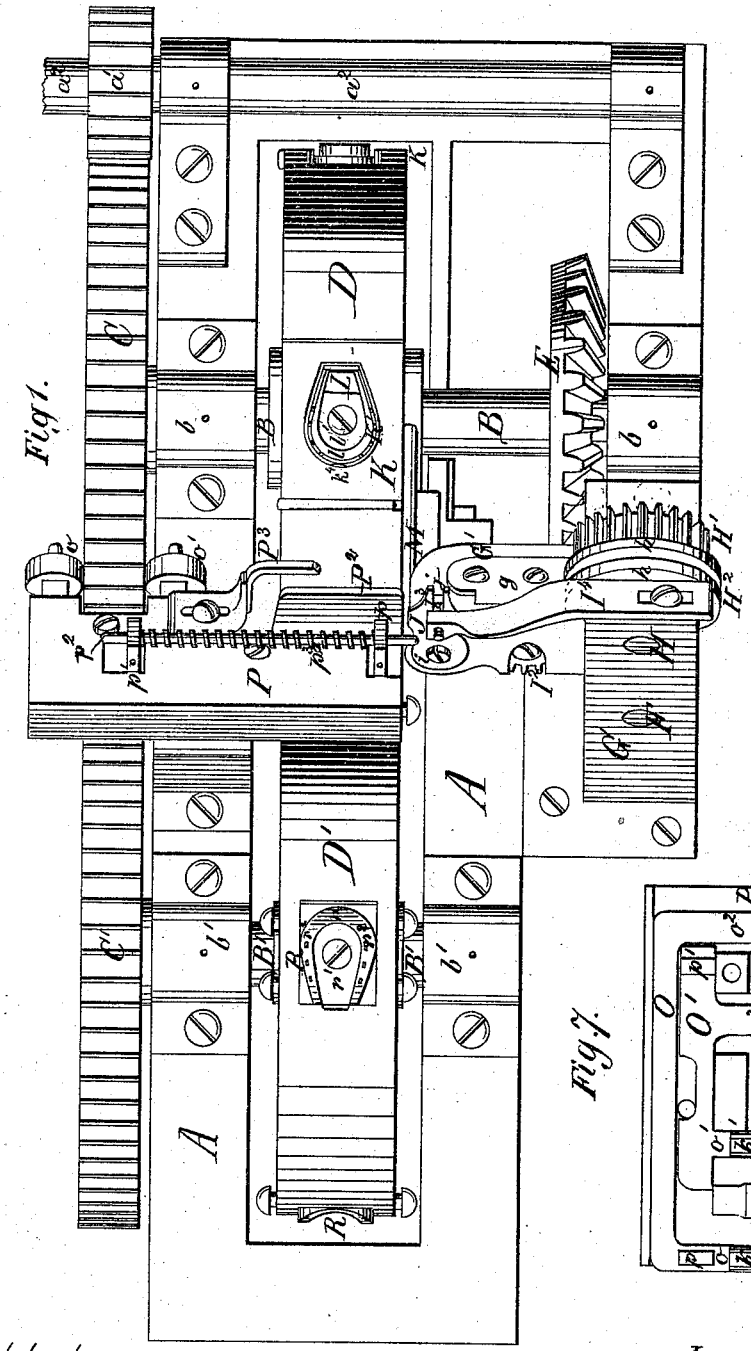
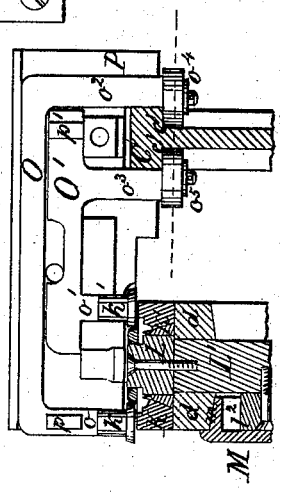


Fig. 7.



Witnesses:
James Martin Jr.
J. P. Theodore Laug

Inventor:
Clinton Browning
by
Mason, Fenwick & Lawrence.
Attys.

3 Sheets—Sheet 2.

C. BROWNING.

MACHINE FOR MAKING HORSESHOES.

No. 182,268. Patented Sept. 19, 1876.

Fig 2.

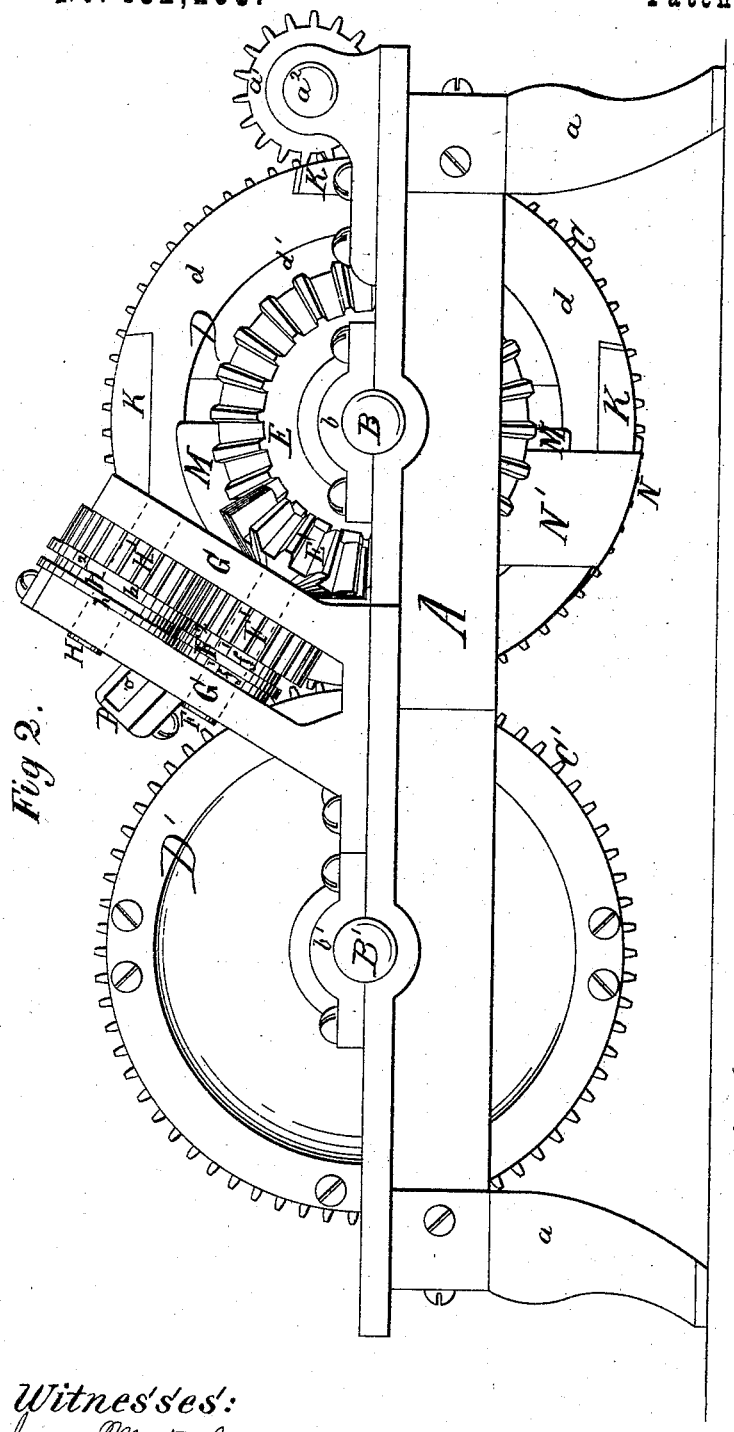


Fig 4.

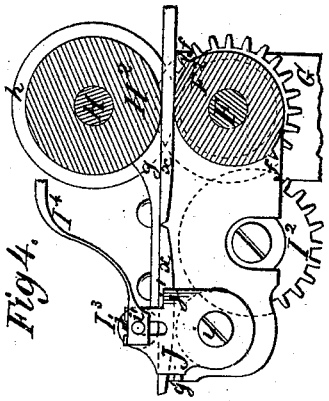


Fig 5.

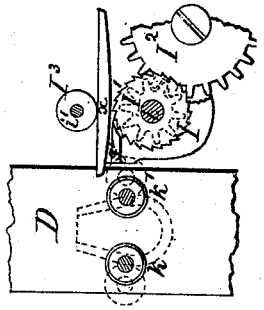
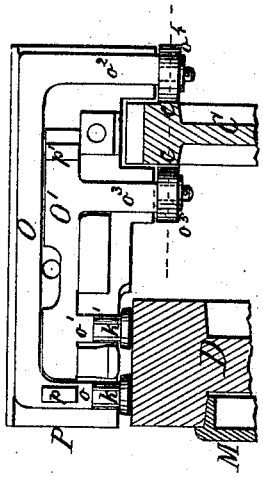


Fig 6.



Witnesses:
James Martin Jr.
J. P. Theodore Lang.

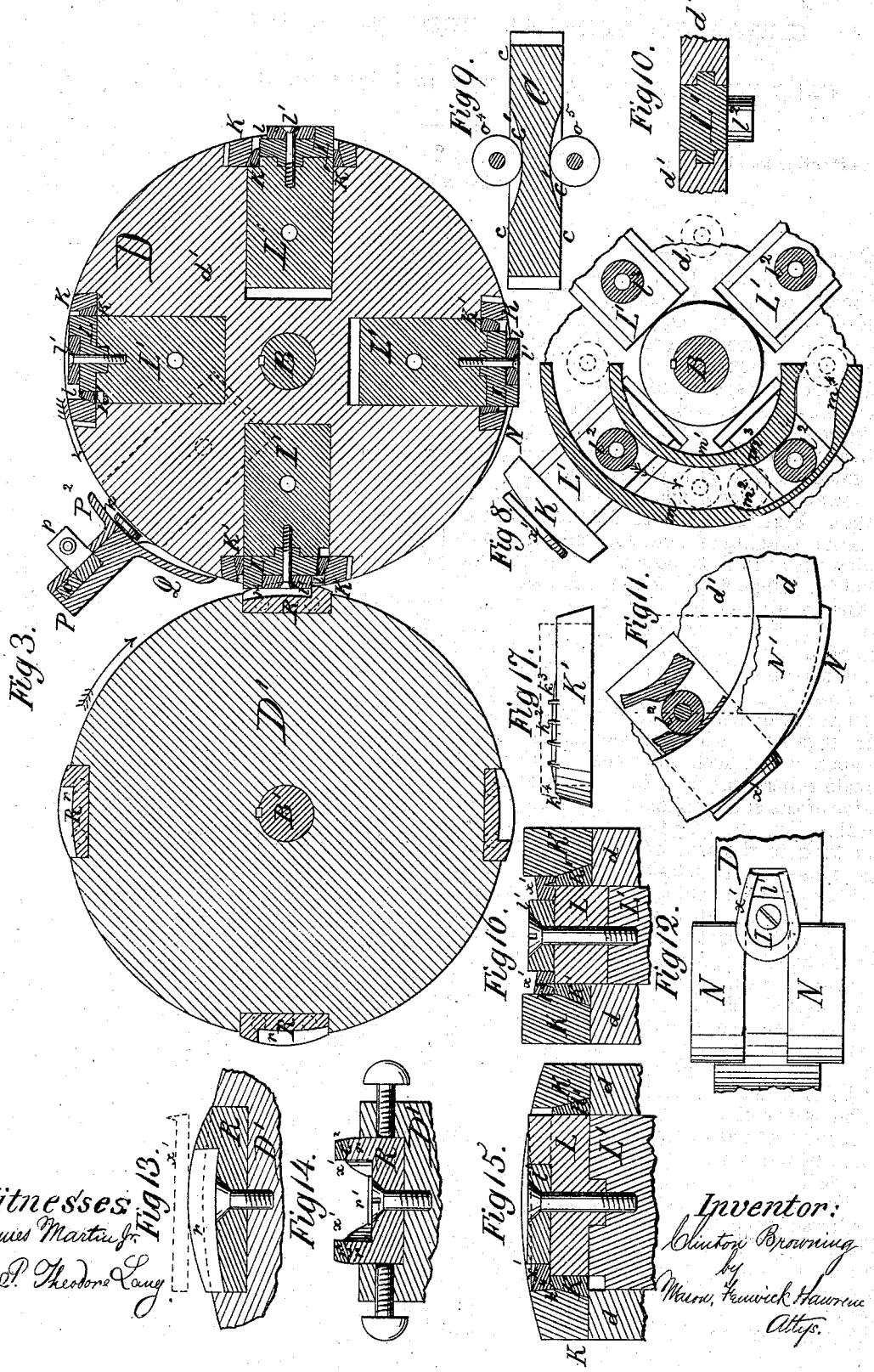
Inventor:
Clinton Browning
by
Macon, Fennick & Laurence,
attys.

3 Sheets—Sheet 3.

C. BROWNING.

MACHINE FOR MAKING HORSESHOES.

No. 182,268. Patented Sept. 19, 1876.



Witnesses
James Martin Jr.
J. P. Theodore Long

Inventor:
Clinton Browning
by
Munn, Fenwick & Howson
Attys.

UNITED STATES PATENT OFFICE.

CLINTON BROWNING, OF SHORT CREEK, WEST VIRGINIA.

IMPROVEMENT IN MACHINES FOR MAKING HORSESHOES.

Specification forming part of Letters Patent No. **182,268**, dated September 19, 1876; application filed June 19, 1876.

To all whom it may concern:

Be it known that I, CLINTON BROWNING, of Short Creek, in the county of Ohio and State of West Virginia, have invented new and useful Improvements in Horseshoe-Machines, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a top view of my improved horseshoe-machine. Fig. 2 is a side elevation of the same. Fig. 3 is a cross-section through the forming-wheels and the dies attached thereto. Figs. 4 and 5 are detailed views of the blank shaping and cutting rollers, in connection with the feed-motion of the forming-cylinders. Figs. 6 and 7 are detailed views of the bending-rollers and their operating-gear. Fig. 8 is a detailed view, in part section, of the guideway for the operating-rollers of the movable dies in the bending and forming wheel. Fig. 9 is a transverse section through the operating-rollers of the bending-gear, together with a segmental section of the main gear-wheel, upon the rim of which the said rollers travel. Fig. 10 is a transverse section of the sliding shanks of the above said movable dies, showing the manner of embedding them in the web of the forming-wheel. Figs. 11 and 12 are detailed views, illustrating the manner of detaching a finished horseshoe from the movable dies of the forming-wheel. Fig. 13 is a longitudinal section of one of the dies fastened to the pressure-wheel. Fig. 14 is a transverse section of the same. Fig. 15 is a longitudinal section of the dies on the forming-wheel. Fig. 16 is a transverse section of the same. Fig. 17 is an elevation of the die which forms the creases and prints for the holes of the horseshoe-nails.

The nature of my invention consists of certain constructions, combinations, and arrangements of parts, as hereinafter described and specifically claimed, whereby an improved machine for making horseshoes from straight iron bars is produced.

The object of my invention is to make a horseshoe so complete and perfect that it is at once a marketable article as it leaves the machine.

To enable others skilled in the art to understand my invention, I will proceed to describe it.

In the accompanying drawings, A represents a suitable frame, supported by legs *a*. Across the said frame A two shafts, B B′, are embedded in bearings *b b b′ b′*. The former, B, being the main shaft, has a toothed gear-wheel, C, fastened to it, which drives another gear-wheel, C′, on the shaft B′, of the same diameter and number of teeth. The gear-wheel C is driven by a pinion, a^1, on a shaft, a^2, which receives its power from the line-shafting of the building. The shaft B has also a die-wheel, D, which is in contact with another die-wheel, D′, on the shaft B′, both die-wheels being of the same diameter. The shaft B has a bevel-wheel, E, which drives another bevel-wheel, E′, on a shaft, F, in an inclined frame, G. The shaft F has a gear-wheel, F^1, which drives another gear-wheel, H^1, on another shaft, H, both gear-wheels being of the same size. Next to the said gear-wheels are two rollers—one, F^2, on the shaft F, and the other, H^2, on the shaft H, Fig. 4. The lower roller, F^2, is provided with knife-edges, *f*, wherewith it separates the iron bar placed upon it. The periphery between the knife-edges *f* is not concentric to the shaft F, but of smaller radius in the middle, whereby the blank piece *x* for the shoes is made broader in the middle than at both ends.

The upper roller H^2 is concentric, and has two side flanges, *h*, wherewith to keep the iron bar in position while being rolled. The lower roller F^2 has two corresponding receding flanges, *f′*, to strengthen it, and to fill the space between the frame G and the wheel F^1. Both rollers have slightly-grooved surfaces, whereby the corners of the blanks are rounded for the purpose of avoiding the formation of ridges or ragged edges during the finishing operation. The blanks *x* leave the rollers F^2 and H^2 in a horizontal direction along a horizontal guide-arm, *g*, which extends between the flanges *h h*, and causes the blanks to leave the said flanges and move toward the feed-roller I. The feed-roller I is a roughened surfaced roller, and is connected with a pinion, I^1, which receives its motion from the wheel F^1, by means of an intermediate gear, I^2. Be-

tween the feed-roller I and its pinion a pivoted plate, J, is fitted loosely upon their common shaft *i*. The said plate J has a vertical slot, *j*, and a flaring lip, *j'*, which latter serves to readily take up any laterally-bent blanks and guide them to the feed-roller. Above the feed-roller I is a pressure-roller, I^3, fastened to the end of a spring, I^4, so that its shaft *i'* can travel freely up and down in the slot *j*, and thus adapt itself to varying thicknesses of the blanks, and at the same time, by the power of the spring I^4, insures the said blanks against slipping on the feed-roller. The said wheels I^1 and I^2 are attached to an extension, G', of the frame G. There is also a small guide-block, *g'*, between the feed-roller and the wheel D, whereby the blank *x* is supported and prevented from downward motion. The blank is moved upon the wheel D, and settles upon the bending-rollers *k* k^1. The wheel D is provided with a very strong rim, *d*, and web *d'*. The rim *d* has a number of die-plates, K, inserted in its face. The said die-plates have openings corresponding in size and shape with the outside of a finished horseshoe. A continuous hollow steel die, K', is, by means of a tapering fit or joint, firmly inserted from below into the described opening of the die-plate K, with which its upper surface forms a step of the depth of the intended horseshoe. The inside of the said steel die forms a line very nearly concentric with the outside, and about midway of the breadth of the horseshoe. The opposing inner sides at the right and left of the steel die K' are provided with raised knife-edges k^2, and nail-hole punches k^3, which serve to provide the horseshoe with the side creases and the marks for the nail-holes. The space inside of the steel die K^1 is occupied by a movable die, L, which has a projection for forming the inside of the horseshoe, and a step, *l*, which, in its normal position, is flush with the main surface of the steel die K^1, and represents the complementary width of the bottom face of the horseshoe. The curved part of said projection of the movable die is, by preference, a piece of hardened iron or steel, l^1, which does not wear as fast as cast-iron. The said front piece l^1 and the die L are fastened to a shank, L', which is fitted by means of a dovetail or groove and tongue, as seen in Fig. 10, into the web of the wheel D in a radial direction. The said shank L' is provided with a friction-roller, l^2, which, during the first part of the revolution of the wheel D, is guided between the raised rims *m* m^1, as seen in Fig. 8, of a guide-plate, M, fastened to the frame A.

An outward-leading step, m^2, in the rim *m*, and a similar step, m^3, in the rim m^1, serve to move the die L, and the thereon-formed horseshoe above the surface of the wheel D, so that the wedge-shaped stripping-plates N may, without jamming or catching against the sides of the horseshoe, lift it freely off the die. The said stripping-plates N are fastened to shanks or sheets N', which are attached to the frame A in a suitable manner. The distance between the plates N is such as to permit a free passage of the die L between them. Before the rollers l^2 leave the guide-plate they are moved up toward the center of the wheel D, and the dies L are thereby moved completely within the circumference of the said wheel, thus stripping off the finished horseshoe, which, having been acted upon by the pressing-die of die-wheel D, falls to the ground.

The bending-rollers *k* k^1 are pivoted to the arms *o* o^1 of two sliding bars, O O', which are arranged in a parallel direction in a bearing-box, P, suitably fastened to the frame A. The bar O extends to the outside of the wheel C, where it has arm, o^2, with a roller, o^4, at its end, and the bar O' extends to the inner face of the wheel C, where it has an arm, o^3, with a roller, o^5, at its end. The bar O' has a stand, p^1, and the arm *o* of the bar O has a stand, *p*, the openings in which are in a parallel line with the said bars, and the stands *p* p^1 support a rod, p^2, with a tension-spring, p^3, pressing the stands apart, and thereby forcing the rollers o^4 o^5 upon the sides *c* of the rim of the wheel C. The said sides *c* are parallel, except opposite the dies L, where they are provided with notches *c'* of such formation that the thereby-created change of motion of the rollers *k* k^1 is strictly accordant with the outside shape of the horseshoe bent by the described motion around the die L.

A shield, P^2, concentric to the periphery of the wheel D upon the top of the bearing-box P, prevents the horseshoe-blank from tilting while it is being bent, and an arm, P^3, fastened to the same top prevents the blank from passing beyond its central position upon the wheel D before it is bent. The so-bent horseshoe is carried down by the die L, which, in so doing, is gradually drawn in by the guide M, followed in the latter movement by the horseshoe *x'*, which is gradually depressed into the die-plate K by the shield Q, eccentric to the periphery of the wheel D, forming a lower extremity of the bearing-box P.

The wheel C' on the shaft B moves with the same speed as the wheel C, for reasons above stated, and, therefore, the die-wheel D' is provided with an equal number of die-plates as the die-wheel D, which is driven by wheel C. And the die-plates R of the die-wheel D' are provided with raised horseshoe-molds *r* and with pits r^1, for the reception of the dies L on the die-wheel D. The surfaces of the step *l* and the die K' being straight, the surface of the mold *r* is in a longitudinal direction, so curved as to form, with the said opposing straight surfaces, in passing each other, the desired thickness of a finished horseshoe. The protruding knife-edges k^2 and nail-punches k^3 are thus forced into the metal of the horseshoe, and, at the same time, a toe-shield may be formed by "breaking" or removing the front corner k^4 of the skeleton die

K′. To prevent crowding of the metal around the nail-punches k^3, and to facilitate the opening of the thereby-formed nail-marks, the molds r are provided with notches r^2, which serve to provide the horseshoe with corresponding projections in line with the marked nail-holes. The horseshoer can thereby easily adjust the horseshoe upon his swage when he wants to punch the nail-holes through, and thereby secure straight holes and save his "drift" from bending or upsetting upon the swage or anvil face.

Operation: The laborer receives a raw iron bar, heated in a furnace to a degree necessary for light forging, and places its end upon the roller F^2, right against one of the cutters f. The rollers F^2 H^2 impinge upon the bar, draw it in between them, and give it the form above described. The so-rolled part is then separated by the next knife f, and passed over to the feed-roller I, which, by aid of the pressure-roller I^3, delivers it upon the wheel D and the rollers k k^1, the arm P^3 stopping its progress beyond the right limits, and the concentric shield P^2 preventing its revolving. Shortly after one of the dies L, being sufficiently elevated by the guide M, strikes the said blank in the middle, and the depressions c' on the rim of the wheel C permit the rollers k k^1 to move apart and together again in such manner as to firmly bend the so-caught blank x around the die L. Upon further progress of the rotation of the wheel D the die L is drawn within the die-plate K, and the horseshoe is gradually forced into its recipient opening in the die-plate. Right after the said operation the die-plates K and R meet together, the die L enters the pit r^1, and the horseshoe is pressed, by the raised mold r, against the stop l, the skeleton die K′, the edges k^2, and punches k^3, whereby its form is finished. The die L is now, by means of the roller l^2 on its shank L′, and the rim projection of the guide M, pushed out until the finished horseshoe is beyond the surface of the die-wheel D, at which instant the plates N enter between the said horseshoe and the wheel D. When the plates N are nearly passed the die is, by means of the projection m^4 on the lower rim of the guide M, drawn back, and freed from the horseshoe, which is held down by the plates N, and finally dropped. The iron bar is very quickly taken up by the rollers F^2 H^2, so that it has no time to cool and injure the skeleton die K′. If the last piece of the bar should be too short for a horseshoe it will go through the rollers F^2 H^2, but it will not reach the feed-roller I, and, therefore drop to the ground.

The iron bars used for the above purpose are, in section, of trapezoidal form, or with one edge thinner than the other, the thin edge being at the inside of the horseshoe.

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

1. In a horseshoe-machine, the rollers F^2 and H^2, for shaping and cutting the blanks for horseshoes, substantially as hereinbefore set forth.

2. In a horseshoe-machine, the combination of feed-roller I, the pressure-roller I^3, the spring I^4 and the plate J, having a slot, j, and a flaring guide, j', substantially as set forth.

3. The bending-rollers k k^1, the core-die L, the shield P, and arm P^3, constructed and operating substantially as set forth.

4. The combination of the straight-faced die-plate K, having a depressed straight-faced skeleton die K′, the movable die L, having a straight-faced step l, and the die R, with a pressure-surface so curved that, by the co-operation of the said parts, a horseshoe with straight surfaces and the requisite variable thickness from toe to calk is produced, substantially as set forth.

5. The combination of the rollers k k^1, the bars O O′, the rollers o^4 o^5, the notches c in the rim of the wheel C, the stands p p^1, and the spring p^3, substantially as and for the purpose set forth.

6. The bearing-box P, having a shield, P^2, concentric to the periphery of the wheel D, shield Q, eccentric to said periphery, and a stopping-arm, P^3, substantially as and for the purpose set forth.

7. The die-plate K, having a continuous skeleton die for the formation of creases, nail-holes, and toe, inserted from below, and secured by a continuous tapering joint, substantially as set forth.

8. The combination of the die-plate K, the skeleton die K′, and the movable core-die L, constructed and operating substantially as set forth.

9. The plates N, the steps m^2 m^3 m^4, and the die L, constructed and operating substantially as set forth.

10. The combination of the continuous skeleton die K′, and the die R, whereby the horseshoe is provided with toe, creases, nail-holes, and relief countermarks of the nail-holes, substantially as set forth.

Witness my hand in the matter of my application for a patent for an improved horseshoe-machine, this 17th day of June, 1876.

CLINTON BROWNING.

Witnesses:

ALEXANDER LAING,

S. F. CRAWFORD.