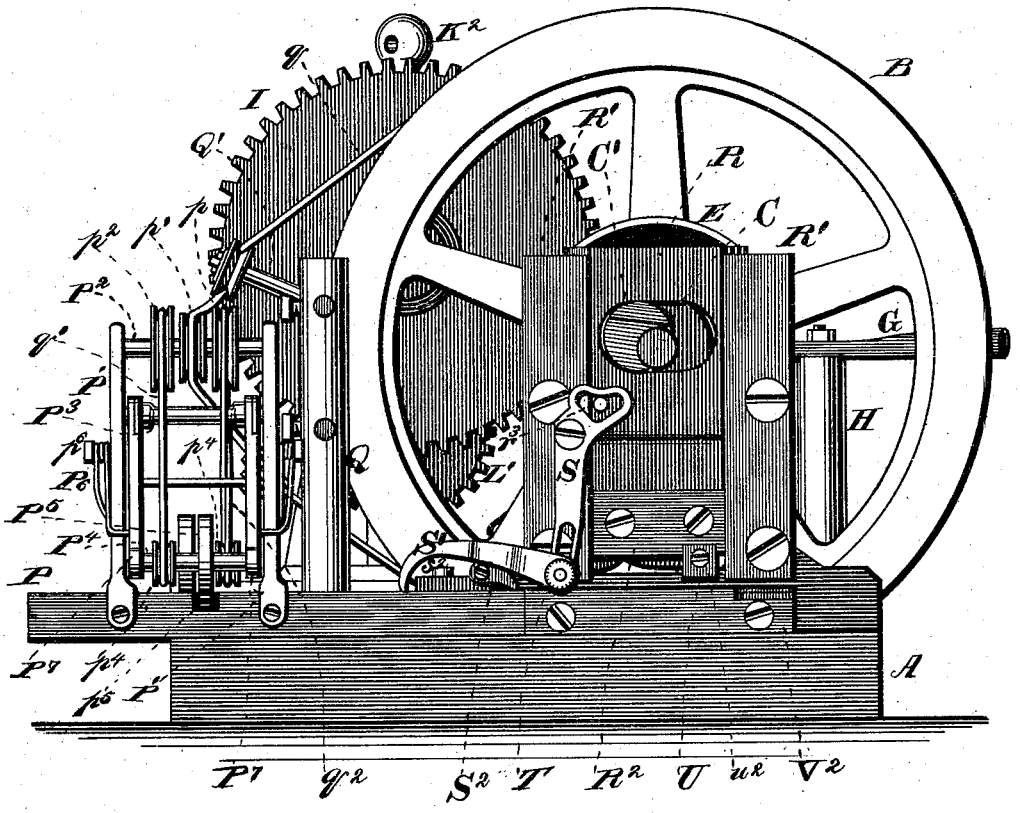
5 Sheets—Sheet 1.

D. I. PRUNER.

MACHINES FOR MAKING HORSESHOE-NAILS.

No. 194,464. Patented Aug. 21, 1877.

Fig. 1.



WITNESSES.

Robt. Everett

George C. Upham

INVENTOR.

David I. Pruner,

Munn & Co.

ATTORNEYS.

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D. I. PRUNER.

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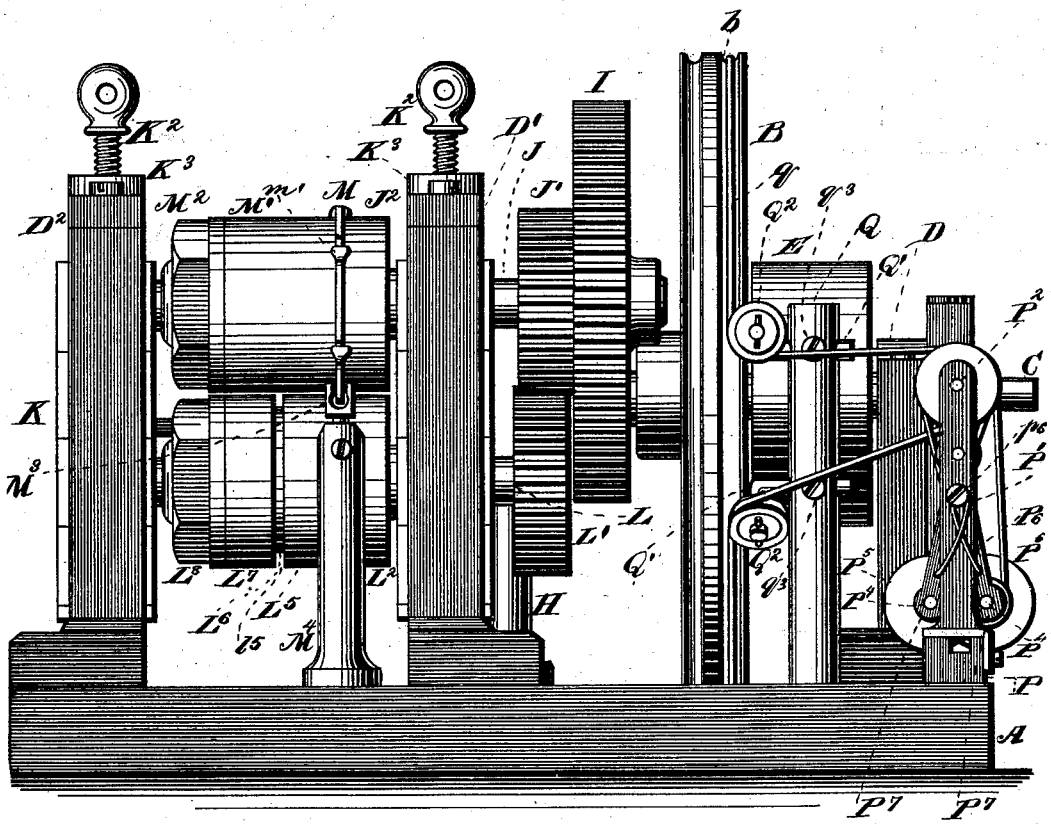
No. 194,464. Patented Aug. 21, 1877.

Fig. 2.



WITNESSES

Robert Everett

George C. Upham

INVENTOR.

David I. Pruner.

Munn & Smith & Co.

ATTORNEYS.

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D. I. PRUNER.

MACHINES FOR MAKING HORSESHOE-NAILS.

No. 194,464. Patented Aug. 21, 1877.

Fig. 3.

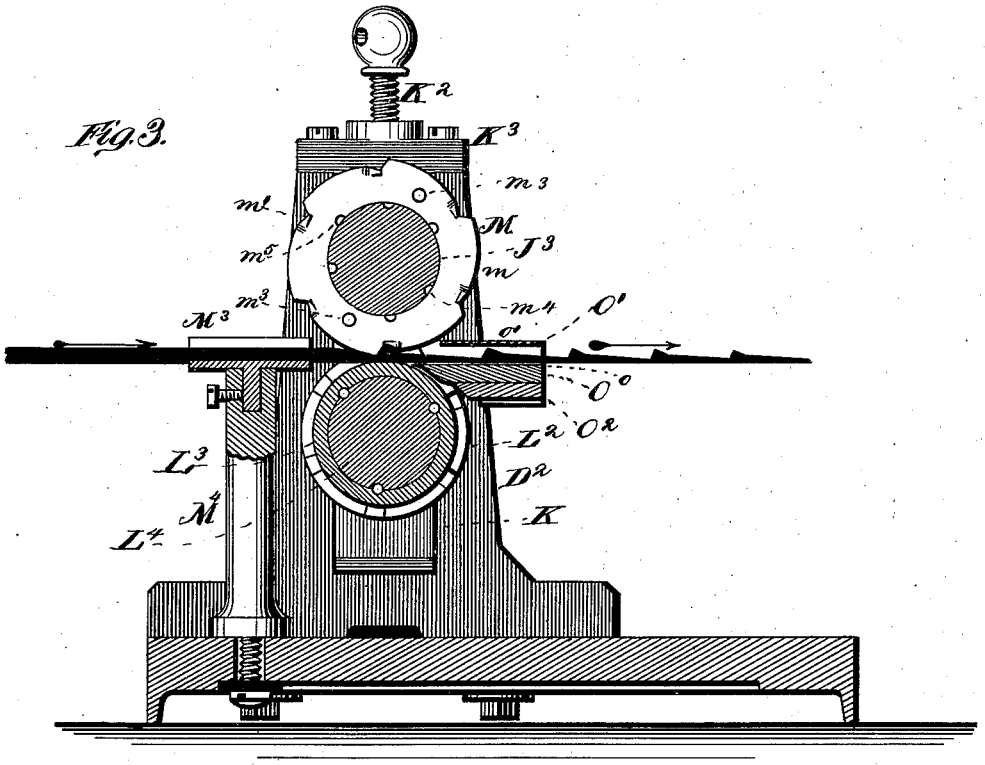

Fig. 4.

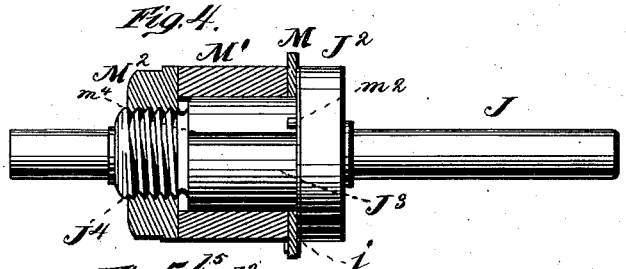

Fig. 5.

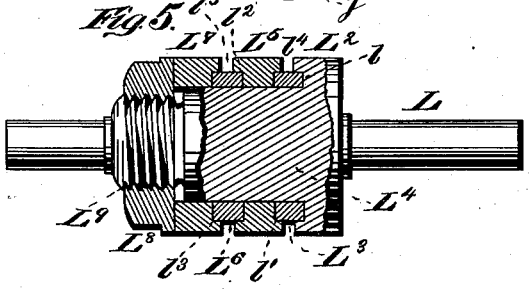

Fig. 6.

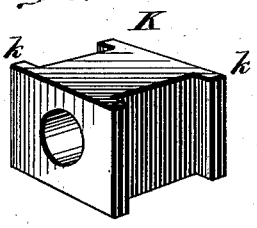

Fig. 7

WITNESSES

Robert Gorrett

George E. Upham

INVENTOR.

David I. Pruner.

Gilmore & Smith & Co.

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MACHINES FOR MAKING HORSESHOE-NAILS.

No. 194,464. Patented Aug. 21, 1877.

Fig. 8.

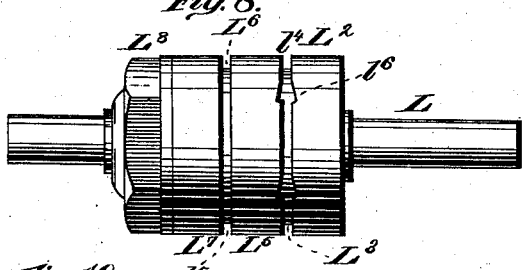


Fig. 9.

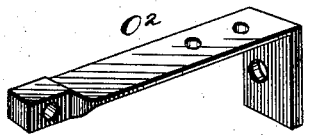


Fig. 10.

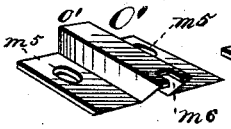


Fig. 11.

Fig. 12.

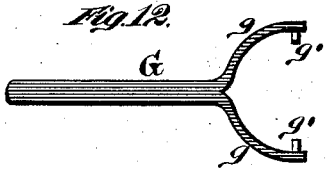


Fig. 14.

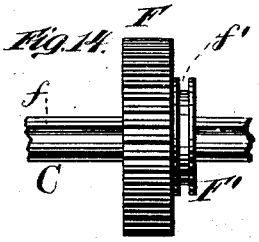


Fig. 13.

Fig. 15.

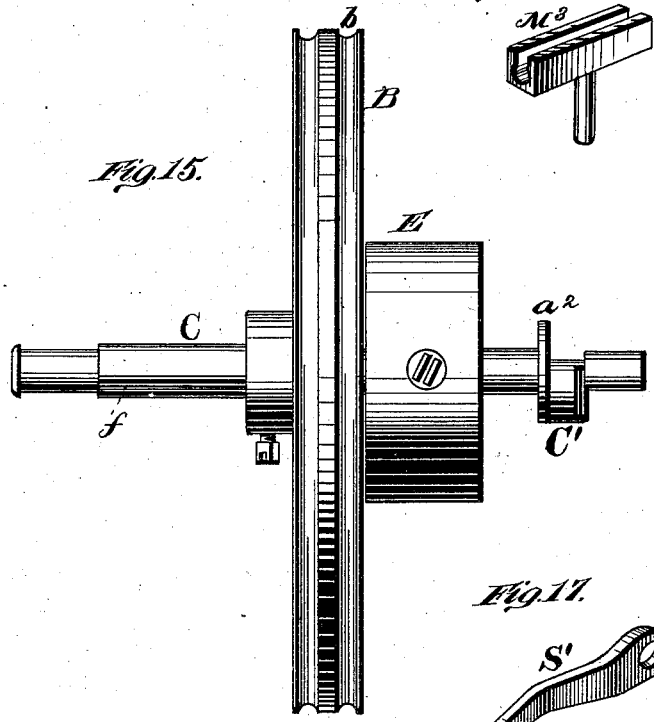


Fig. 16.

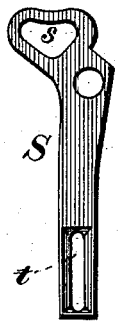


Fig. 17.

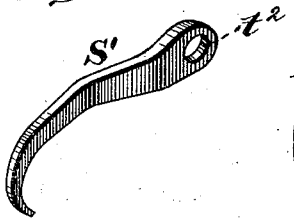
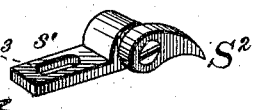


Fig. 18.

Fig. 19.



WITNESSES

Robert Gantt

George C. Upham

INVENTOR.

David I. Pruner.

Gilmore & Smith & Co.

ATTORNEYS.

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D. I. PRUNER.

MACHINES FOR MAKING HORSESHOE-NAILS.

No. 194,464. Patented Aug. 21, 1877.

Fig. 20.

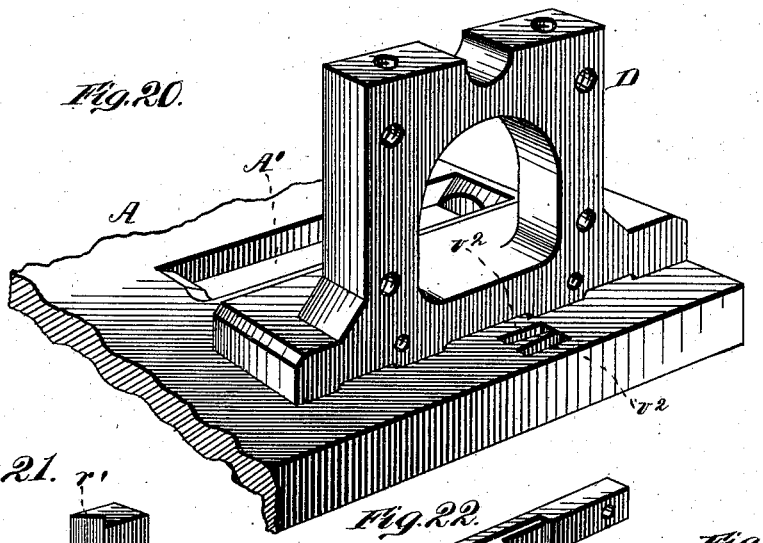

Fig. 21.

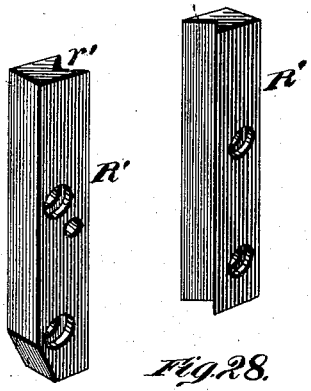

Fig. 22.

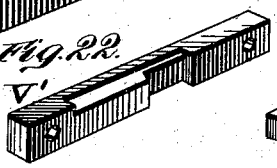

Fig. 23.

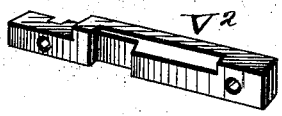

Fig. 24.

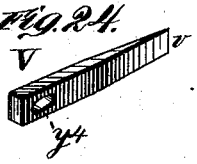

Fig. 25.

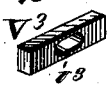

Fig. 26.

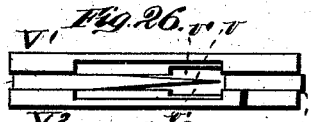

Fig. 27.

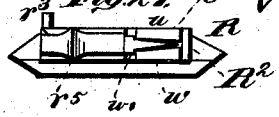

Fig. 28.

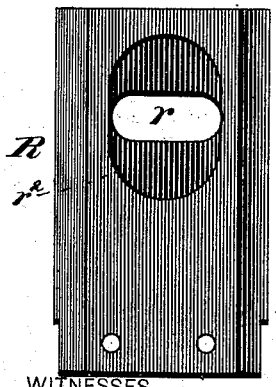

Fig. 29.

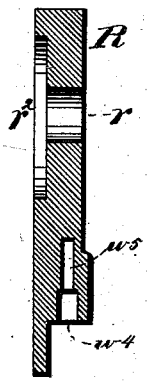

Fig. 30.

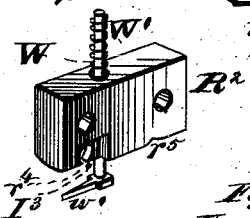

Fig. 31.

Fig. 32.

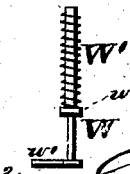

Fig. 33.

WITNESSES

Robert Everett

George C. Upham

INVENTOR.

David I. Pruner.

Gilmore, Smith & Co.

ATTORNEYS.

UNITED STATES PATENT OFFICE.

DAVID I. PRUNER, OF McVEYTOWN, PENNSYLVANIA, ASSIGNOR TO HIMSELF, ABRAM S. VALENTINE, GEORGE VALENTINE, AND GEORGE A. FAIRLAMB, OF SAME PLACE.

IMPROVEMENT IN MACHINES FOR MAKING HORSESHOE-NAILS.

Specification forming part of Letters Patent No. **194,464**, dated August 21, 1877; application filed February 2, 1877.

To all whom it may concern:

Be it known that I, DAVID I. PRUNER, of McVeytown, in the county of Mifflin and State of Pennsylvania, have invented a new and valuable Improvement in Horseshoe-Nail Machine; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a representation of a side elevation of my horseshoe-nail machine. Fig. 2 is a front elevation thereof, and Fig. 3 is a central vertical sectional view of the same. Figs. 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, and 33 are detail views of my machine.

This invention relates to machines used for manufacturing horseshoe-nails.

The nature of said invention consists, first, in the construction and arrangement of devices for rolling and forming the nail-blanks, as hereinafter described; secondly, in certain polishing devices and means for feeding said blanks in continuous strips through the machine; thirdly, in certain devices for cutting off the separate nails, as hereinafter described; and, finally, in divers auxiliary devices and means of adjustment.

In the accompanying drawings, A designates the bed-plate or base-plate of my machine, which is slotted transversely at A′, near one end, as shown in Fig. 20, to allow the rotation of a large fly-wheel, B. (Shown in Figs. 1, 2, and 15.) The shaft C of said wheel turns in boxes or bearings on two standards, D D^1, which are cast with, or otherwise rigidly attached to, said bed-plate A. The bearing attached to standard D is on top of the same, said standard D being located near one of the corners of said bed-plate, while the said bearings, attached to standard D^1, is on a rearward extension of the same, said standard D^1 being located near the front of the middle of said bed-plate. Standard D^1 is taller than standard D. D^2 designates a third standard, parallel to, and a counterpart of, D^1, and diagonally opposite to D.

Said shaft C carries a belt-wheel, E, whereby power is applied to the machine from any suitable motor. Said belt-wheel is arranged between fly-wheel B and the outer bearing of said shaft. The latter also carries a longitudinally-shifting gear-wheel, F, (shown in detail in Fig. 14,) which is secured upon the same by a spline or feather, *f*. The shifting of said gear-wheel F is effected by means of a horizontally-operating lever, G, which is pivoted upon a standard, H, and provided with two clutching-arms, *g g*, having inwardly-extending studs *g′ g′*, which set into a circumferential groove, *f′*, of a collar, F′, which is attached to cog-wheel F. When shifted close to fly-wheel B this cog-wheel F engages with a similar but larger wheel, I, on the projecting end of a shaft, J, which is journaled in bearing-blocks upheld by standards D^1 D^2. Said standards are vertically slotted from their tops nearly down to bed-plate A, these slots or open middle spaces being made broad enough to receive metal blocks K, each one of which is provided with guide-flanges *k k*, as shown in Fig. 6. These flanges set on each side of said standards, which serve as frames to keep said blocks in place above one another, and also as guides to direct their downward movement when successively introduced from above. The arrangement of said block is shown in Fig. 2. They are four in number in each series, the second and fourth being solid, and the first and third perforated from side to side, as shown in Fig. 6, to serve as bearings for shafts J and L.

Said shaft J is journaled in the upper pair of said bearing-blocks, and carries a gear-wheel, J^1, (arranged close to gear-wheel I,) which meshes with and turns a similar wheel, L^1, at the end of a shaft, L, which is similarly journaled in the third pair of said bearing-blocks K. Shaft J carries the male die for forming the nail-blanks, and shaft L carries the female die complementary thereto. The construction and attachment of said dies are as follows:

On shaft J is formed a shoulder or collar,

J^2, in one piece therewith or rigidly attached thereto. J^3 designates a drum or enlargement of shaft J, contiguous to said shoulder or collar, and between the same and a screw-threaded enlargement, J^4, of said shaft J. M designates an annular die, which sets near to collar J^2, a thin packing, *j*, being interposed, and is provided on its periphery with a series of alternating curved inclined die-bars, *m*, and notches m^1, said ring being broadened at the bases of said notches to form nail-heads. M^1 designates a sleeve slipped upon drum J^3 and M^2, a nut engaging with the screw-threaded enlargement J^4, so as to clamp die M against collar or shoulder J^2, thus preventing the displacement of said die while in operation. Said die is prevented from turning upon said shaft by means of two studs (one of which, marked m^2, is shown in Fig. 4) formed on or attached to the side of collar or shoulder J^2. Said studs set into small recesses or sockets m^3 m^3 in the side of die M. Instead of this means of attachment drum J^3 and die M may be correspondingly grooved at m^4 m^4 and m^5 m^5 in lines parallel to the axis of shaft J. She said grooves are then made to register, and rods are driven into them, so as to lock the said die to its place. Several of said dies M may be used instead of one, the shaft J and drum J^3 being suitably extended, and said dies may be so varied in configuration as to produce nail-blanks of different sizes.

Shaft L is provided with a collar, L^2, fixed thereon, which is similar to collar J^2, and is provided on its inner face with an angular groove, *l*, in which sets the nearer edge of a ring, L^3, surrounding a smooth drum, L^4, similar to J^3. The other edge of said ring L^3 sets into a recess, l^1, (similar to *l*,) in the side of a collar or an annular partition, L^5, as shown in Fig. 5. The other side of said collar or annular partition is similarly recessed at l^2. L^6 is a ring similar to L^3, which sets partly into said recess l^2, and partly into a recess, l^3, of a third collar, L^7. L^8 designates a clamping-nut, which works upon screw-threaded enlargement L^9 of shaft L, and operates to hold the aforesaid parts together. Since said rings L^3 and L^6 are not of so great external diameter as the collars L^2, L^5, and L^7, the outer face of each one of said rings forms the bottom of an annular female die, or groove of which the said collars form the sides. One of said annular dies, l^4, is arranged under the male annular die M, and co-operates therewith in forming the nail-blanks. The outer die or groove l^5 is used as a gage to determine the accuracy of the width of the nail-rods before subjecting them to the pressure of die M. Said groove l^5 is opposite to smooth sleeve M^1, and its sides are perfectly smooth. The sides of die-groove l^4 are, however, provided with notches or recesses l^6, as shown in Fig. 8. These recesses or notches constitute enlargements of said die, and their shape and arrangement is such that they co-operate with notches *m* in forming the heads of the nails upon the blanks. In case the male die is duplicated or further multiplied in number, as above stated, these female dies must be correspondingly repeated upon the same shaft L, the necessary modifications of said shaft being made, and in case the configuration of any of said male dies is changed, so as to produce nails of different sizes, the intervals between enlargements l^6 must be correspondingly changed.

The heated metal bar constituting the blank is first run through between sleeve M^1 and groove l^5, so as to insure its being of the proper width. It is then fed to the said forming-dies through a guideway, M^3, on a standard, M^4, and delivered by said dies, after forming, to a discharge passage or chute, consisting of an under plate, O, (shown in Fig. 11,) and an upper plate, O^1. (Shown in Fig. 10.) Said upper plate has a raised middle casing, o^1, which sets above a middle bar, *o*, on under plate O, leaving space between them for the passage of a nail-blank. Bar *o* is provided with a projecting tongue, o^2, which sets into groove l^4, and is slightly curved on the top of its point, so as to guide said blank without resistance between said bar and casing. Said upper plate is slotted at m^5 m^5, so that it may be moved nearer to or farther from the male die M, and is recessed at m^6, so as to allow the rotation of said die, while preventing the escape of the nail-blanks before entering the discharge-passage. Plates O and O^1 are attached to a cross-bar, O^2, secured to standards D^2 D^2, and shown in Fig. 9.

The distance between the aforesaid male and female dies may be increased by inserting one or more plates, K^1, Fig. 7, between blocks K. Said bearing-blocks K are held in place by clamping-screws K^2 K^2, which work through screw-tapped caps K^3 K^3, and bear against the top of the uppermost block of each series. The aforesaid bearings, dies, &c., may be readily separated into their constituent parts, and cleaned in detail. When shifting-wheel F is thrown out of engagement with wheel I the aforesaid nail-forming apparatus is no longer operated.

The nail-blank strip is then conveyed to a long guideway, P, arranged transversely upon one end of bed-plate A, and projecting beyond one side thereof. On said guideway are secured two standards, P^1 P^1, in the upper ends of which a small shaft, P^2, is journaled, said shaft carrying three grooved pulleys, *p* p^1 p^2. P^3 designates a second shaft similarly journaled below P^2, and bearing two hanging frames, which are so jointed above that they diverge at their lower ends. Said lower ends are provided with cross-shafts P^4 P^4, one on each frame, and each one of said shafts is provided with a small grooved pulley, p^4, and a larger emery-wheel, P^5. Said emery-wheels turn in recesses of guideway P, one of which recesses, marked p^5, is shown in Fig. 1, and they grind upon the opposite upper edges of the nail-blank, as the latter is fed be-

tween them, in such a manner as to remove all irregularities and roughness left by the forming process hereinbefore described, while not injuring the desirable part of said blank. Said emery-wheels are held to their work partly by their weight, but more effectually by the action of springs P^6 P^6, with one of which each standard P^1 is provided. The middle part of each one of said springs is wound about a stud, p^6, on said standard, and the ends of said springs are set into small sockets near the lower ends of the swinging frames P^7 P^7, and operate to draw said lower ends toward each other. The number, form, and arrangement of said springs may be considerably varied without departing from the spirit of my invention.

The rotation of said emery-wheels P^5 P^5 is produced by the following means: Fly-wheel B, already described, is provided with a peripheral groove, *b*, (shown in Fig. 15,) whereby it is adapted to operate as a driving-wheel also. In said groove sets an endless band, *q*, which passes over the middle grooved pulley p^1 on shaft P^2, already described. From the other pulleys *p* and p^2 on said shaft extend two other endless bands, q^1 q^2, over the respective emery-wheel turning pulleys p^4 p^4. Thus the rotation of said fly-wheel B is transmitted to said emery-wheels P^5 with the result stated. Said fly-wheel may have an additional peripheral groove. The long endless band *q* is kept taut, and its direction properly changed by the following means: Q designates a cylindrical standard, (shown in Fig. 2,) to which bent rods Q^1 Q^1 are detachably secured by passing the horizontal parts of the same through perforations in said standard or post, and clamping them there by set-screws q^3 q^3, so that said rods may be fastened in any degree of longitudinal or rotary adjustment. The bent ends of said rods are provided with terminal journals, on which turn grooved pulleys Q^2 Q^2, as shown in Figs. 1 and 2. Said pulleys are inclined so as to allow the endless power transmitting band *q* to pass through their grooves respectively above and below, in making the necessary rectangular change of motion. By adjusting rods Q^1 Q^1 toward said band *q*, as already described, the said band is tightened, thus insuring the transmission of motion to shaft P^2. This will be found especially useful when the said endless band *q* has been stretched by long use. The rotary adjustment of said rods Q^1 Q^1 allows the grooves of said pulleys Q^2 Q^2 to be presented in precisely the proper position to the inclination of said band *q*.

The continuous nail-blank is fed through said guideways P by the following devices: On shaft C, outside of bearing-standard D, is formed a cam, C′, which operates in a horizontally-elongated aperture or slot, *r*, in a vertically-moving slide, R. (Shown in detail in Figs. 28 an 29.) Said slide is doubly beveled at each edge, so as to fit into V-shaped vertical guide-grooves r^1 of long guiding-blocks R^1, (shown in detail in Fig. 21,) which are secured in an upright position to standard D. The rear of said slide R is provided with a vertical oblong recess, r^2, Fig. 28, to allow the rotation of a collar, a^2, on shaft A, Fig. 15, as the said slide rises and falls. Said collar a^2 prevents the shaft A from slipping back through standard D. As said slide R descends and rises a stud, r^3, on the front thereof, works in a heart-shaped opening, *s*, in the short upper arm of a lever, S, of the first kind which is pivoted to one of said vertical guide-blocks R^1. The end of the lower long arm of said lever is pivotally connected to a feeding hook or finger, S, and hook S^1 being shown in detail, respectively, in Figs. 16 and 17. The arrangement of the above-described parts is such that at each descent of slide R the said hook S^1 is caused to reach back the length of one nail and grasp the nail-blank by one of the heads formed thereon, already described, and the rising of said slide R causes the said continuous blank to be drawn forward the length of one nail, and thus fed to the cutting devices hereinafter described. The said blank is retained in position during the backward reaching of said hook S^1 by a dog, S^2, which is pivoted to the side of a block, s^1, secured on guide-way P by set-screw s^2.

When the distance between the nail-heads formed on the blanks is increased or diminished by changing the dies, as hereinbefore described, it becomes necessary to make the action of the above-described feeding-hook S^1 and retaining-dog S^2 conform to said changes. Accordingly the lower end of lever S is provided with a vertical slot, *t*, Fig. 16, through which a small screw, t^1, Fig. 18, is caused to pass from the rear. An internally screw-threaded tube or set-nut, T, Fig. 18, is then passed through a perforation, t^2, in the butt of hook S^1, Fig. 17, and screwed home on screw t^1. By means of these devices the rear end of said hook may be adjusted up or down in said slot *t*, and clamped at any desired point of such adjustment, so as to lengthen or shorten the reach of said hook.

In like manner block s^1 is provided with a longitudinal slot, s^3, Fig. 19, which allows it to be correspondingly adjusted forward or backward.

The front of slide R is recessed at the bottom to receive a block, R^2, Fig. 30, which forms a bed for a reciprocating female cutting and pointing die, U, formed in two parts, as shown in Fig. 31. Said parts or blades *u* u^1 are attached to one another and to an intervening tongue, I^3, of block R^2 by means of a screw, u^2. (Shown in Fig. 1.) The lower parts of the opposite faces of said blades *u* u^1 diverge so as to form a V-shaped opening. Said slide R, block R^2, and die U operate together as one piece, stamping down said die upon its complementary male die V, (shown in detail in Fig. 24,) which is set between blocks V^1 V^2, that form a continuation of guideway P. Said male die is provided in front with a V-

shaped cutting-blade, *v*, which sets within a rectangular space formed by corresponding recesses v^1 v^1 in the opposite faces of blocks V^1 V^2. Said space receives said female die U when the latter descends. Said male and female dies operate together to cut each nail from the blank as the same is fed forward, and in so doing they form a sharp point thereon. The scraps of metal severed from said blank at each cutting fall down through said recesses v^1 v^1 and through similar openings v^2 v^2 (arranged directly below the same) in bed-plate A, as shown in Fig. 20. Said scraps are thus entirely removed from my apparatus.

To adapt it for making nails of different sizes the male die V is provided with a longitudinal slot, y^4, through which passes the screw or bolt which clamps it between blocks V^1 V^2. A little in front of the point or blade *v* is a rectangular block, V^3, provided with edges, as shown in Fig. 25, and slotted at v^3, so that it can be moved toward or from said blade and clamped in the same manner as said die V.

The adjustability of the male and female cutting-dies above described allows them to cut nails of different sizes.

In order to prevent the nails from adhering to blades *u* w^1 I provide a rod, W, (shown in detail in Fig. 32,) which is provided with a shoulder or fixed collar, *w*, about the middle of its length or a little below the same, and with a pointed freeing-plate, w^1, that just fits in the space between said blades *u* w^1. Said rod passes up through the contracted lower part w^2 of a vertical passage, w^3, in block or upper die-bed R^2, and into an extension, w^4, of said passage in the lower part of vertically-sliding plate R, as shown in Fig. 29. The upper part w^5 of said extension w^4 is contracted for the shank of the rod W. The said rod W is provided with a surrounding helical spring, W′, which sets within the cylindrical space formed by parts w^3 and w^4 of said passages, and bear against shoulder or collar *w*. When the upper female cutting-die descends, plate w^1 comes into contact with the top of the nail, and is forced upward against the resistance of spring W′, so as to allow the proper coaction between the said male and female cutting-dies. When the said female die rises, the said spring W′ forces the said rod W and plate w^1 downward, thereby freeing the nail from blades *u* w^1. Instead of spring W′ I may use a cam on shaft A, operating positively on the freeing-rod W. The under side of die-block R^2 is recessed at r^5, so as to avoid crushing the nail-head, and the said lower bed-blocks V^1 V^2 are recessed, on their upper sides, to receive said die-block R^2 when it descends. Each nail, after it is cut and pointed, is expelled from the apparatus by the feeding forward of the continuous nail-blank, already described.

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

1. The combination of male-forming die M, shaft J, sleeve M^1, collar J^2, and clamping-nut M^2 with shaft L, partition L^5, collars L^2, rings L^3 L^6, and nut, substantially as and for the purpose set forth.

2. In a machine for making horseshoe-nails, the combination of a rotating male and female die, as described, with feeding guideway M^3, slotted upper plate O^1, having casing o^1, and under plate O, having bar *o*, with guiding extension or tongue o^2, substantially as and for the purpose set forth.

3. In a machine for forming and cutting horseshoe-nails, a pair of suspended emery-wheels, arranged so as to grind the blanks before they are cut, and combined with springs P^6, for keeping wheels in contact with the blanks, substantially as and for the purpose set forth.

4. The combination of guideway P, standards P^1 P^1, frames P^7 P^7, shafts P^2 P^3, with operating-pulleys and emery-wheels, substantially as and for the purpose set forth.

5. Vertically-reciprocating slide R, in combination with lever S, feeding-hook S^1, retaining-dog S^2, and guideway P, substantially as and for the purpose set forth.

6. Vertically-reciprocating slide R, in combination with lever S, slotted at *t*, feeding-hook S^1, slotted block t^2, and retaining-dog S^2, substantially as and for the purpose set forth.

7. Rod W, having spring W′ and freeing-plate w^1, in combination with recessed slide R and recessed blocks R^1 R^1, die-blades *u* w^1, and male die V, substantially as and for the purpose set forth.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

DAVID I. PRUNER.

Witnesses:
WM. FUREY,
J. K. SHOEMAKER.