

Griffiths & Shields,

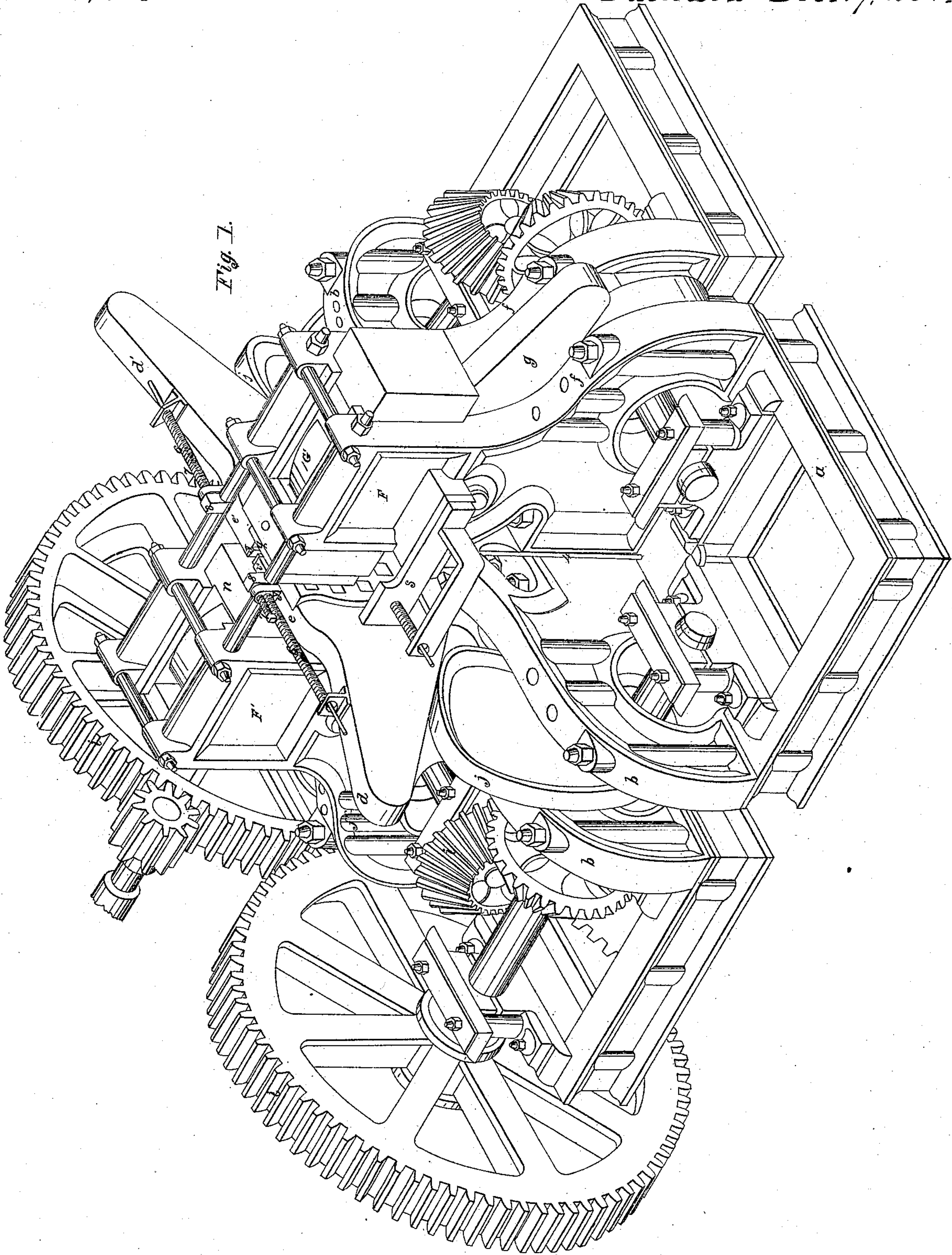
Horseshoe Machine,

Sheet 1-2 Sheets.

N^o 12,112.

Patented Dec. 19, 1854.

Fig. 1.



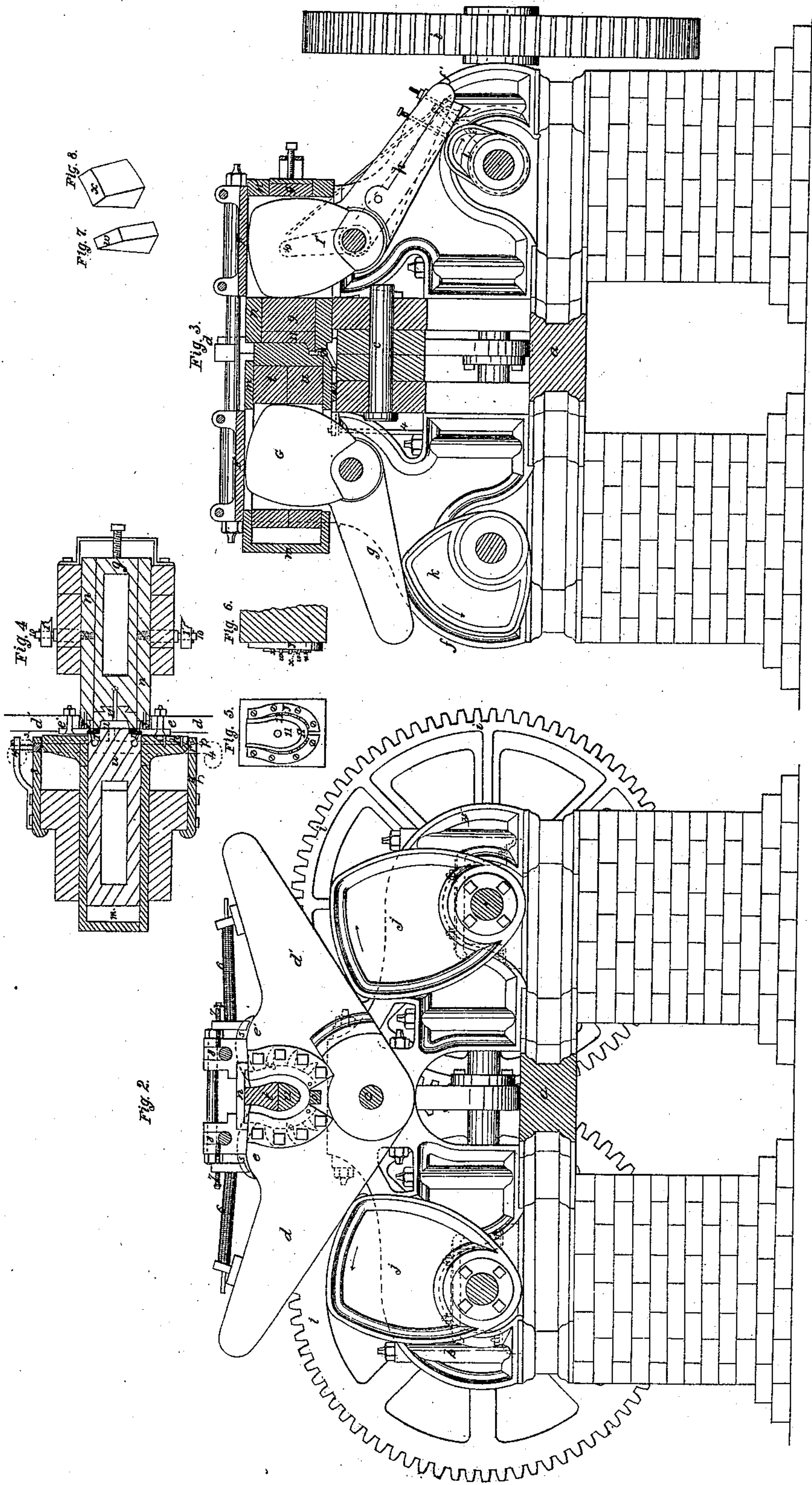
Griffiths & Shields.

Sheet 2-28 sheets.

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UNITED STATES PATENT OFFICE.

ROBERT GRIFFITHS, OF ALLEGHENY, PENNSYLVANIA, AND GEORGE SHIELD, OF CINCINNATI, OHIO, ASSIGNORS TO ROBERT GRIFFITHS.

MACHINE FOR FORGING HORSESHOES.

Specification of Letters Patent No. 12,112, dated December 19, 1854.

To all whom it may concern:

Be it known that we, ROBERT GRIFFITHS, of Allegheny city, in the county of Allegheny and State of Pennsylvania, and
5 GEORGE SHIELD, of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Machinery for Making Horseshoes; and we do declare the following to be a full,
10 clear, and exact description thereof, reference being had to the accompanying drawings, and to letters of reference marked thereon, forming a part of this specification, and in which—

15 Figure 1, is a perspective view of the entire machine. Fig. 2, is a vertical section parallel to, and immediately in front of, the bending jaws. Fig. 3, is a vertical section, in the plane of motion of the punching
20 grooving and swaging mechanism. Fig. 4, is a horizontal section through the cutting, forcing up, bending, swaging, and grooving and punching apparatus. Fig. 5, is a face view of the punching and swaging blocks.
25 Fig. 6, is a side view of the same. Fig. 7, is a perspective view of a punching bit. Fig. 8, is a perspective view of a grooving bit.

Our invention consists in an arrangement of mechanism, whereby the heated bar, when
30 once put into the machine, undergoes the several operations, of cutting to a suitable length, bending, swaging or stamping to a proper width and thickness in its several parts, grooving to embed the nail heads, and
35 punching the nail holes, successively, and before it leaves the machine, and has reference more particularly, to the secure retention or gripping of the bar, during the performance of the several operations above
40 enumerated; also to the method of preventing the bar from bending laterally, during the operation of turning it around the former; to the making the bending jaws and swaging block, subservient to the secure
45 retention of the shoe, and confinement of its outer margin, during the process of grooving and punching; to the manner of imparting to the shoe, the desired width and thickness at every part, and of grooving and
50 punching the nail holes, whilst the shoe is clamped edgewise and flatwise, by the mechanism which formed it; also to a detachable arrangement of the punching and grooving bits, and clamping shoulders or bosses, ad-

mitting of the substitution and rearrange- 55
ment of any or all of the punching and grooving bits; and to the manner of adjusting the proximity of the swaging and
punching dies, to the former and bending
jaws, in order to regulate the thickness of 60
the various sized shoes; to the manner of liberating the shoe when completed, by causing the punching and grooving bits to recede suddenly, after performing their work,
and the former which gives the internal con- 65
tour to the shoe to be withdrawn, before the shoe is released from the grip of the bending jaws and swaging block, in order that the shoe may drop freely, the movement it is released by said bending jaws; and lastly 70
the application of a current of water, to all parts of the machine which come in contact with the heated metal.

To enable others to make and use our machine, we proceed to describe its construction and operation. 75

(a) are different portions of the bed-plate, on which, are erected standards (b) which support the journals (c) of the bending levers (d d', e e'), hereinafter more particularly described; at right angles to these 80
standards are others (f f'), also bolted on the bed plate, which afford journal bearing to the shearing gripping and forcing up lever (g), and to the swaging lever (h); and 85
the grooving and punching levers (1').

(i) are the several parts of a set of gearing, giving simultaneous and uniform rotation to the axis of six cams, two of which (j) operate the bending levers (d d'), the 90
one (k) operates the cutting and gripping lever (g), and the one (l) the swaging lever (h), and the two drop cams (2) one on either side of the cam (l), outside of the standards (f f'), give momentary action to 95
the grooving and punching levers (1'); these cams are of such form and size, as to produce the several operations of gripping, cutting, bending, swaging, punching, &c., hereinafter more fully described; the upper 100
portions of the standards (f f'), are formed into guide frames (F F') for the sliding boxes (m, n), having motion horizontally toward and from each other; the box (m) has attached to one of its vertical edges on 105
the advancing end, a cutter or shearing bit (p') which is bolted to a bracket (q) projecting from the side of the frame (F);

this bracket is perforated by a slot (r), of suitable size and position in rear of the cutting bit (p'), (said bit forming one vertical side of the slot,) for the insertion of the heated bar, and its support during the severance of the portion, of which the shoe is to be formed; projecting from the other side of the frame (F), and parallel to the bracket (q), is another bracket (s) supporting a spring stop (3), against which the end of the bar strikes when inserted into the machine, to gage the necessary length to form the shoe, this spring stop (3) being inclined obliquely, in the direction of the travel of the severed piece of the bar, as it proceeds into its position over the bending jaws, serves to hold it endwise until it is firmly gripped at its center, both edgewise and flatwise by the gripper (o), and carried by it into the aforesaid position.

The gripper (o) is somewhat of a T form, lying horizontally under the end of the sliding box (m), the two corresponding outer ends being held by springs (4), which tend to hold it back until the sliding box (m) advances, in the progress of which, and about the time the bar is severed, it grips it at the center flatwise, between said box and the central projection of the gripper which turns upward, when the gripper is carried forward with the sliding box, and in its progress, is caused to rise on an inclined plane on the hub of the bending lever, and thus having a step in the angle, of suitable height to receive the width of the bar, grip it edgewise, between said step and the underside of the male former (u); the inner contour of the shoe is given by the mandrel or male former (u), and the block or shank to which it is attached is convex on its face around the former, in order to impart the usual concave form to the upper side of the shoe, (that is, the side applied to the horse's foot,) which is desirable in order to cause the main bearing or pressure of the shoe, when in use, to come against the hard outer portion of the hoof; the shank of this former, as also the sliding box containing it, have rectangular slots, passing vertically through them, for the insertion of the head (G) of the lever (g), this inner shank has about an inch play longitudinally within the box, so that both in advancing and receding, it has progressed somewhat before the box is carried with it, this enables the bar to be securely gripped, before the cutting bit has time to come into action.

The bending jaws ($e e'$) have bolted to them dies or bits, whose edges are curved to correspond with the desired external contour of the shoe, their working edges are also channeled or hollowed longitudinally, which serves a valuable purpose, a common and fatal objection has hitherto been urged

against machine made shoes, that they are not grooved and punched sufficiently near the outer edge, so that when in use, the nails come too near the quick of the hoof, this improper position of them has arisen from the liability of the metal to spread, and crack at the edge, when the punches were brought too near the outer margin of the shoe; this radical defect has been effectually remedied in our machine, by the simple application of channeled edges to the bending dies, and which by holding the stuff within its proper bounds, admits of the punching and grooving being done, at any desired proximity to its outer edge, to even a greater nicety than when made by hand; there are also pivoted to these dies at the lower corner, plates or cheeks, (5) on that side of the dies away from the male former (u), they are of the same curve on their edge, as that of the dies to which they are attached; when the levers are down, the upper corners of the cheeks, are forced forward by the springs (6) on the top of the levers ($d d'$) and continue in that relative position to the dies, until their edges have arrived at the intended position of the external margin of the shoe, when their further progress is arrested by the set screws (7) coming in contact with the stops (8), and the dies are allowed to advance, until their edges are even with those of the cheeks, by compressing the springs (6), the object of these cheeks it will be readily seen, is to prevent the bar from bending sideways, or slipping off the bending dies; acting for this purpose, in connection with the face plate of the shearing apparatus, on the other side of the said dies, during the operation of turning it around the former; the action of these bending jaws is so timed, by means of the cams &c., as to take place immediately after the severed bar has been advanced over the dies, by the mechanism before described the combined action of the bending jaws and male former, to shape the shoe, is conceived to be too obvious, to need more detailed description.

The frame (F') is also occupied by a sliding box (n), having a vertical slot through it, for the play of the lever (h), but it is not operated by said lever; through the center of this sliding box, longitudinally, is inserted another rectangular frame (9), through the slot in which the head of the lever (h) passes, and by which it is operated toward and from the male former; to the face end of this frame is attached, by dovetailed joint or otherwise, a former or swaging die (11), which when forced up or forward, fits around the male former (u), and presses the shoe over the whole extent of its face, from the line of the nail holes to its inner margin, and is so formed as to impart the proper relative width and

thickness to the shoe throughout, by the action of the lever (*h*) forcing it forward, while the opposite side of the shoe, is supported by the male former being held stationary, during that period of the revolution of the cam that operates it; the outer sliding box (*n*), which fits closely around the swaging die, is flat on its face, and is fitted with grooving and punching bits, arranged close around the aperture through which the swaging die works; these bits are held firmly in their place by clamps or bosses (*y*), that part in which they are placed, being cut out and beveled under, and the bits flaring outward at their base, so that when in place they form a curved dovetail joint, in the clamps and have a solid bearing square to the line of their motion on the face of the box; this box has a sudden and momentary motion imparted to it through the levers (*1'*), connected with it by arms (*10*) projecting through slots in either side of the frame (*F'*), and having a fulcrum common to both them and the lever (*h*), on the same shaft, and are operated by two drop cams (*2*); these as well as the one that operates the swaging die, are compound levers, so constructed, for the purpose of adjusting their action, to regulate and proportion, the thickness of the shoe to its other measurements with accuracy.

The dies on the bending levers, are so formed as to squeeze the heels of the shoe, narrower than the toe, and by this, together with the swaging die before described, the relative proportions both of width and thickness, are produced throughout the different parts of the shoe; the sliding block or shank to which the male former is attached, is perforated with two holes, passing vertically through it, on each side of the central projection close in rear of the convex part which forms the under side of the shoe, and small branch holes from them, through said convex part, to meet the points of the punches when they have pierced the shoe; these are for a two-fold purpose, first, of affording an escape for any small particles, that may be cut out by the punches, and secondly, of admitting a stream of water to pass through, and strike the points of the punches when they have pierced the shoe, and thus preserving their temper, as well as that of the several dies which come in contact with the heated metal, rendering them by this means far more durable than they would otherwise be, and also of preventing any expansion of the male former, which would otherwise be liable to make it bind in the shoe and swaging die.

In operating the machine to form the shoe, a bar of iron of suitable size in breadth and thickness, and of convenient length, is first heated to a red or probably a white heat, it is then introduced into the machine

endwise, through the aperture (*r*) in the bracket (*q*), until its extremity reaches the spring stop (*3*) at the opposite side of the frame (*F*); when, the machine being in motion, the male former is first advanced, and grips the bar flatwise, between it and the gripper (*o*), the sliding box (*m*) with the face plate, then advances and severs the piece of metal the proper length for the shoe, and carries it forward, (in its travel the gripper is borne up, by rising the inclined periphery of the hub of the bending levers, and thus grips the bar, both, edgewise and flatwise), until it arrives in its position over the bending levers, which are then raised by the cams, and bend the bar around the former; the swaging die is next forced forward, and presses the shoe, imparting the proper proportions of width and thickness, as before described; and lastly the grooving and punching dies are advanced, and pierce the shoe, they being operated by drop cams, suddenly recede; during the operation of swaging and punching, the shoe is held stationary by the bending jaws, and former; the moment the punches have passed through the metal, they are each met by a jet of water, from the water passages, before described, which cools them, the shoe being now completed, and the punches, withdrawn, the former and swaging die next recede, then the bending jaws, when the shoe is left resting on the step of the gripper (*o*), free to fall to either side through the center of the machine.

Having thus fully described the nature, construction, and operation of the machine, what we claim therein as new, and desire to secure by Letters Patent, is—

1. The arrangement of the sliding former and rising gripper or their equivalents operated so as to grip the bar both edgewise and flatwise at its midlength, substantially as described.

2. The spring projecting plates or cheeks on the one side of the dies of the bending jaws, acting in connection with the face plate of the sliding shearing apparatus on their other side, for the purpose of preventing the metal from bending laterally, while being turned around the former.

3. We claim the channeled bending jaws for the purpose of confining the outer margin of the shoe during the process of grooving and punching; the side of the shoe being supported by the convex shoulders, of the male former substantially as set forth.

4. The arrangement herein described of the bending jaws and swaging die for the purpose of imparting the desired relative width and thickness at every part, and of clamping it when thus formed while it is grooved and punched by a separate die working around the swaging die.

5. The retaining of the shoe in the grip of the bending jaws by means of the cams which operate them having a portion of their periphery the arc of the circle described from their center of motion, or the equivalents of these devices, until the grooving and punching bits and male former are withdrawn; in order that the shoe may drop freely the moment it is released from said jaws.

In testimony whereof we have hereunto

set our hands before two subscribing witnesses.

ROBERT GRIFFITHS.
GEORGE SHIELD.

Witnesses to signature of R. Griffiths:

IRA REYNOLDS,
WM. M. SMITH.

Witnesses to signature of G. Shield:

GEO. H. KNIGHT,
D. H. J. AMES.