

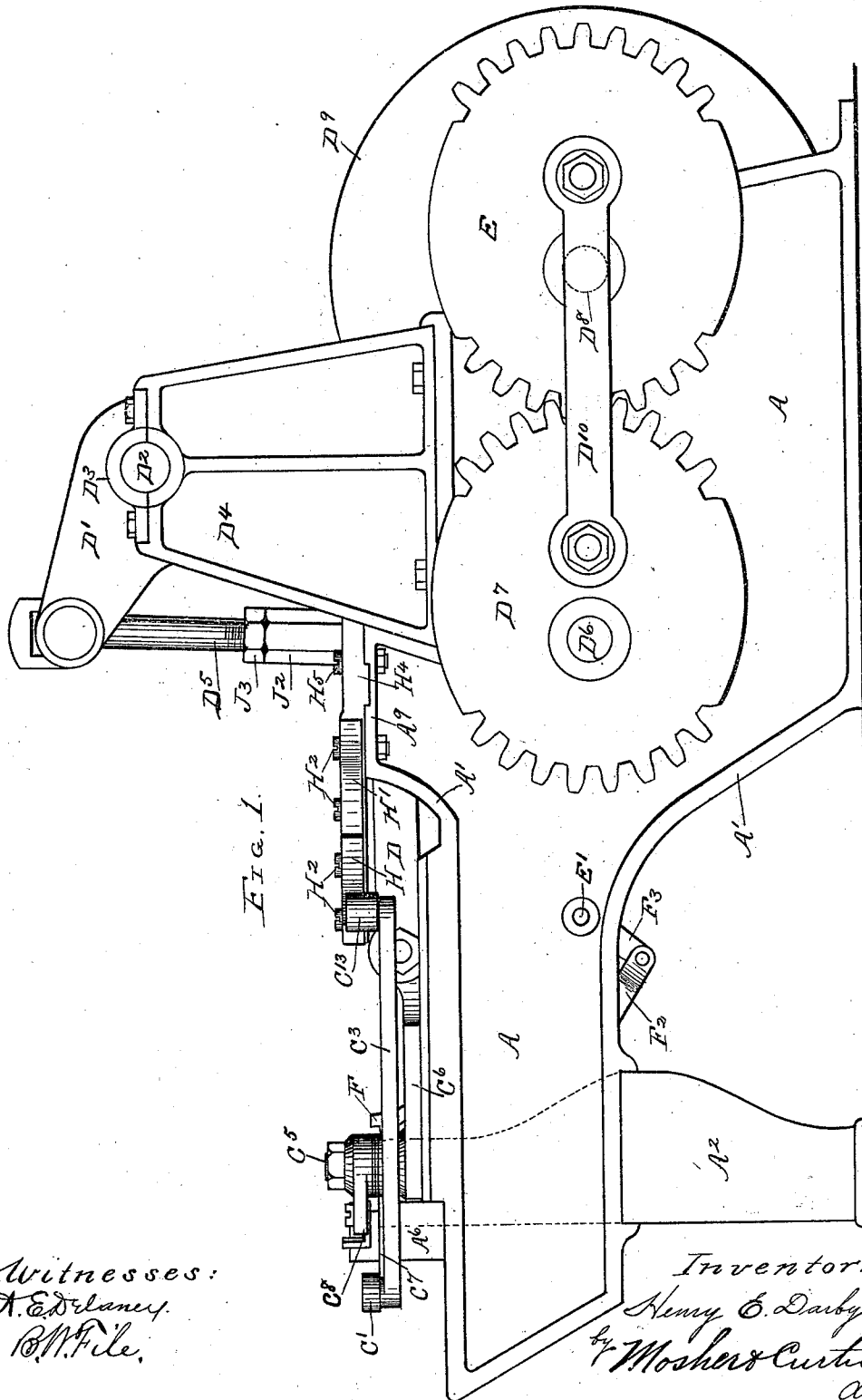
(No Model.)

3 Sheets—Sheet 1.

H. E. DARBY.
HORSESHOE BENDING MACHINE.

No. 513,455.

Patented Jan. 23, 1894.



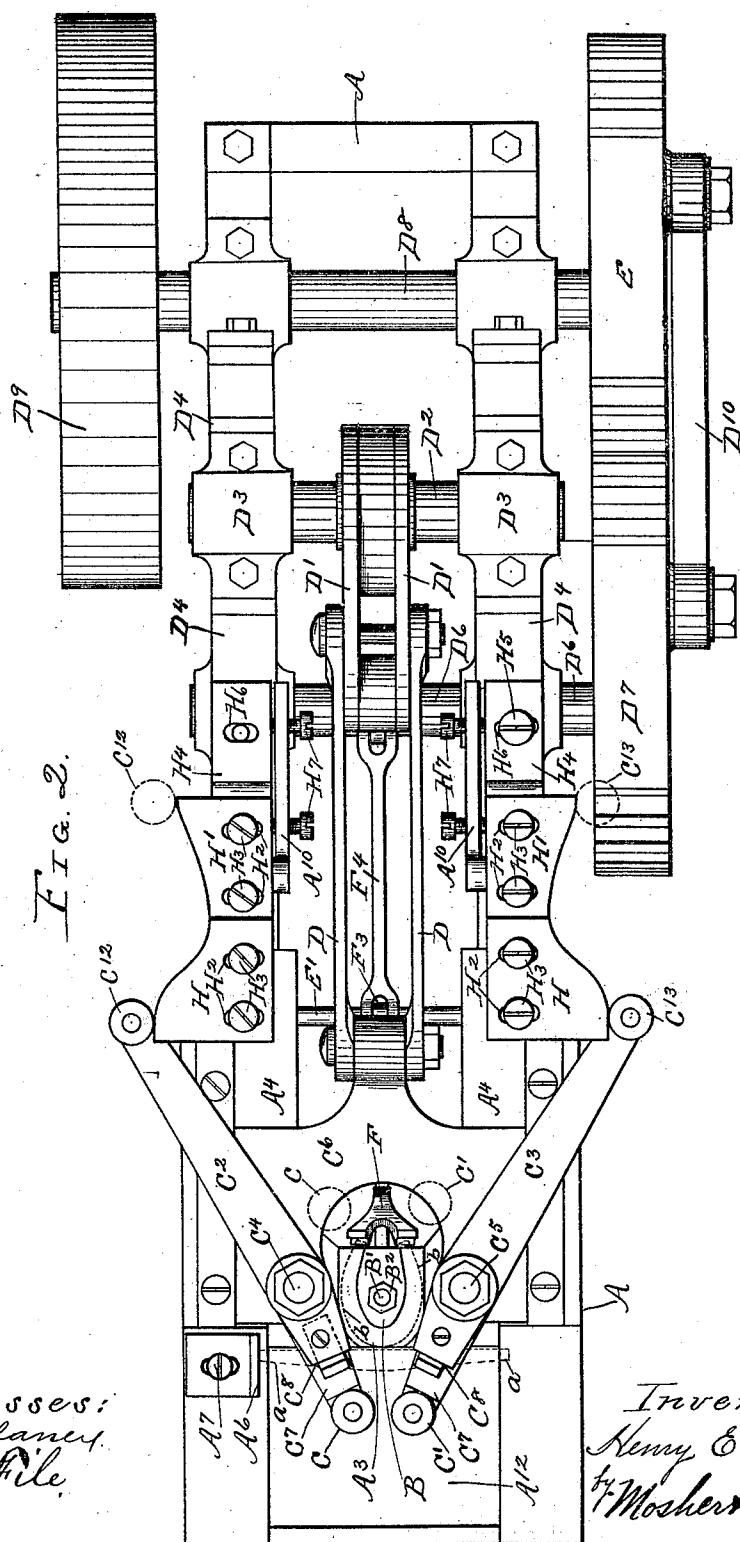
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Witnesses:
A. Edlauer
B.W. File

Inventor:
Henry C. Darby
by Mosher & Curtis
Attys

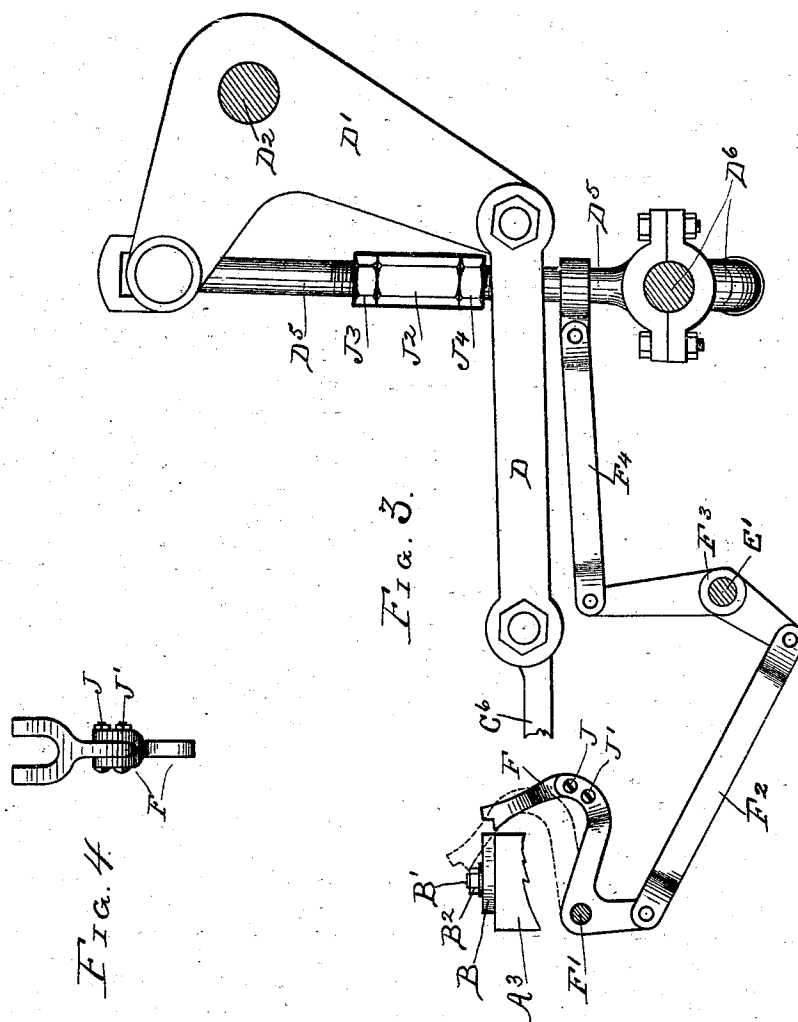
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HORSESHOE BENDING MACHINE.

No. 513,455.

Patented Jan. 23, 1894.



Witnesses:
A. Ed. Stanley.
B. M. Fife.

Inventor:
Henry E. Darby
by Mosher & Curtis
Atty's.

UNITED STATES PATENT OFFICE.

HENRY E. DARBY, OF TROY, NEW YORK, ASSIGNOR OF ONE-HALF TO JOHN A. MCGARRY, OF RICHMOND, VIRGINIA.

HORSESHOE-BENDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 513,455, dated January 23, 1894.

Application filed June 28, 1893. Serial No. 479,006. (No model.)

To all whom it may concern:

Be it known that I, HENRY E. DARBY, a citizen of the United States, residing at Troy, county of Rensselaer, and State of New York, have invented certain new and useful Improvements in Horseshoe-Bending Machines, of which the following is a specification.

My invention relates to such improvements and consists of the novel construction and combination of parts hereinafter described and subsequently claimed.

Reference may be had to the accompanying drawings, and the letters of reference marked thereon, which form a part of this specification.

Similar letters refer to similar parts in the several figures therein.

Figure 1 of the drawings is a view in side elevation of my improved horse-shoe-bending machine. Fig. 2 is a top plan view of the same. Fig. 3 is a view in side elevation of a portion of my improved machine showing the relative position of the stripper and its actuating mechanism, the several shafts being shown in section. Fig. 4 is a view in rear elevation of the stripper-head and supporting lever detached.

A— is the frame of the machine provided with the strengthening flange or rib A'— and a supporting leg A²— under its forward end. The anvil A³— is secured to or made a part of such leg and supports the forming-die B— detachably secured to the anvil by the bolt B'— and nut B²—. The bending-jaws C— and C'— extend rearwardly in the form of operating arms C²— and C³— which are fulcrumed upon pivots C⁴— and C⁵— fixed in the carrier C⁶— movable upon the slideway A⁴— formed on the main frame. The jaws are each provided with an underlying support C⁷— adapted to support the horse-shoe blanks at the proper level to engage the fixed forming-die as the blanks are severally engaged by the jaws when the jaw-supporting carrier is moved backward. That portion of the jaws which engages a blank is made in the form of a friction-roller in the usual manner. Each of the jaws is also provided with an overlying guide C⁸— which overlies the blank while it is being bent to form the toe-portion of the shoe, and keeps all parts of the blank in ap-

proximately the same horizontal plane. These guides are adjustably secured to the jaws by the screw-threaded bolts C⁴— and C⁵—. The blanks are preferably inserted from the side between their supports and guides and pushed through to the stop A⁶— which is adjustably secured to the main frame by means of the screw-threaded bolt A⁷—.

The dotted lines a— represent the position of a blank in engagement with the stop between its supports and guides in position to be bent around the forming-die by the bending jaws. The slide-carriage which carries the bending-jaws is connected by the links D— with one arm of the bell-crank lever D'— mounted upon the shaft D²— supported in bearing D³— in the uprights D⁴— erected from the main frame. The other arm of the bell-crank lever is connected by pitman D⁵— with the crank-shaft D⁶—. The crank-shaft has its bearings in the main frame and is provided with an elliptical gear-wheel D⁷— fixed thereon to engage with a similar gear E—, fixed upon the drive-shaft D⁸— which has its bearings in the main frame and is provided with the drive-wheel D⁹— fixed thereon. The elliptical gear-wheels are connected by the rod D¹⁰— and each is provided with teeth on the segments bisected by its major axis, as shown, and in the usual manner. The pitman also serves to actuate the stripper or clearer F— which is a rock-lever fulcrumed upon the shaft F'— supported by the main frame. The short arm of the stripper-lever is connected by link F²— with the short arm of the rock-lever F³— mounted upon shaft E'— supported by the main frame, and the long arm of the latter lever is connected with the pitman by the link F⁴— as shown in Fig. 3.

The reciprocating movements imparted to the slide-carrier by the mechanism above described cause the jaw-pivots to reciprocate in straight lines, but the jaw-rolls which engage the blanks have a curved path determined by the shape and position of the stationary pattern-cams H— and H'—.

The friction-rolls C¹²— and C¹³— on the jaw-arms travel along the curved surfaces of the cams, and when the slide-carrier reaches the limit of its backward movement they occupy the position indicated by the dotted cir-

cles C¹²— and C¹³— in Fig. 2; and the blank-engaging rolls on the jaws occupy the position indicated by the dotted circles C—, C'— in the same figure.

5 The position of the blank after it has been bent and formed on the forming-die is indicated by the dotted lines b— in Fig. 2.

The cams H— are shaped to give the desired form to the bend in the toe of the shoe, and the cams H'— to give the desired form to the heel of the shoe. If the jaws are opened to their limit when forming the toe-bend, as heretofore practiced, an imperfect bend is formed caused by the great resistance of the wide middle part of the blank which prevents it from taking the shape of the former. By closing the jaws and first engaging the blank near its middle part, that part is first bent to the shape of the former. Then by allowing the jaws to gradually open under control of the descending cams H—, H'—, the bend and form given the toe portion of the successive shoes are uniform and correct. After making the toe-bend, the jaws are partially closed to form the heel-portion of the shoe by means of the ascending cams H'—, H'—.

The several cams are made detachable and adjustable so that by changing or adjusting the position of the cams, any desired form or size of shoe may be obtained with my improved machine.

The cams are provided with elongated bolt-holes H²— adapted to receive the bolts H³— by which they are detachably and adjustably secured to the cam-bar H⁴—. The cam-bar is also adjustably secured to the main frame by means of the attaching-bolts H⁵— passing through holes in the flange A⁹— and elongated bolt-holes H⁶— in the bar, and the adjusting-screws H⁷— inserted in screw-threaded apertures in the vertical flange A¹⁰— on the main frame.

The heel of the formed shoe, as shown by the dotted lines in Fig. 2, projects rearwardly of the forming-die in position to be engaged by the stripper-head, which in passing from the position shown by solid lines to that indicated by the dotted lines in Fig. 3, first lifts the heel of the shoe from the die and then throws the shoe forward into the opening A¹²— in the main frame, through which it descends by gravity leaving the die free to receive the next blank.

To remove the formed shoe from the die, the heel must be lifted above the narrow heel-part of the die, before a forward movement is imparted to the shoe; otherwise the arms forming the heel of the shoe would be spread by the wider toe-part of the die. It is necessary therefore, to pivot the stripper below and forwardly of the forming-die to give the requisite upward and forward movements at the proper times when a vibratory stripper is employed; and whatever the kind of movement, whether vibratory or reciprocatory, it must be first upward and then forward over the die, to first free the shoe from the heel of the form-

ing-die and then force the shoe laterally or forwardly off the die.

Various attempts have been heretofore made to construct a horizontal horseshoe-bending machine with a stationary forming-die, that is a machine having the face of its forming-die in a horizontal plane, and the bending-jaws movable in a horizontal plane; but the difficulty in removing the formed shoes from such a die caused the adoption of a movable die or the vertical form of machine wherein a reciprocating right-line movement of the stripper in a single direction only is all that is required to push the shoe from the die so that it will fall by gravity from the machine.

My improved form of stripper and operating mechanism enables me to employ the horizontal type of machine with a stationary forming-die which can be operated to do better work with greater convenience and certainty than the vertical type, or the horizontal type employing a movable forming-die, as is well known to those skilled in the art.

The movements of the stripper and jaw-carrier are so timed that the stripper engages the formed shoe while the jaws are at rest in their extreme rearward position, and remains in its extreme forward position while the jaws are passing the forming-die on their return to their extreme forward position, which latter position is the one shown by the solid lines in the drawings.

The object of the elliptical form of gears which connect the driving-shaft with the pitman-actuating crank-shaft is to produce a rapid movement of the jaw-carrier during its forward movement when the jaws are idle and a comparatively slow movement with corresponding increase of power during the rearward movement of the carrier when the jaws are bending the blank to form a shoe. The increased power is especially useful when the toe-benders engage the shoe-blanks near their middle part.

The stripper-head shown in rear elevation in Fig. 4, is detachably secured to the stripper lever by means of two bolts and nuts J— and J'—, which enables me to attach heads of different sizes and forms to correspond with the size and form of forming-die employed.

J²— is an adjusting-nut, shown in Fig. 3, having its ends respectively right and left hand threaded and adapted to receive the correspondingly threaded ends of the two-part pitman, whereby I am able to adjust the length of the pitman, to vary the movements of the jaw-carrier, by turning the nut.

J³— and J⁴— are lock-nuts for locking the parts in any adjusted position.

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

1. In a horseshoe-bending machine, the combination with a stationary forming-die and bending-jaws mounted upon a horizontally movable carrier, of a vibratory stripper piv-

oted below and forwardly of the forming-die, and mechanism for communicating vibratory movements to the stripper, whereby first an upward and then an upward and forward movement is imparted to the shoe by the stripper in removing the shoe from the die, substantially as described.

2. In a horseshoe-bending machine, the combination with a stationary forming-die and bending-jaws mounted upon a horizontally movable carrier, of a stripper movable up and down and transversely of the die, and mechanism for communicating up and down and transverse movements to the stripper, whereby the formed shoe is first lifted and released from the die by the upward movement of the stripper, and afterward removed from the die by a transverse movement of the stripper, substantially as described.

3. In a horseshoe-bending machine, the com-

bination with a stationary forming-die, bending-jaws mounted upon a movable carrier, and a pair of toe-bending cams, of a pair of segmental and link-connected elliptical gears, and operating connections between such gears and carrier, substantially as described.

4. In a horseshoe-bending machine, the combination with a fixed forming-die, a vibratory stripper, and bending-jaws mounted upon a movable carrier, of a pair of segmental and link-connected elliptical gears, and operating connections between such gears and the stripper and carrier, substantially as described.

In testimony whereof I have hereunto set my hand this 15th day of June, 1893.

HENRY E. DARBY.

Witnesses:

GEO. A. MOSHER,
FRANK C. CURTIS.