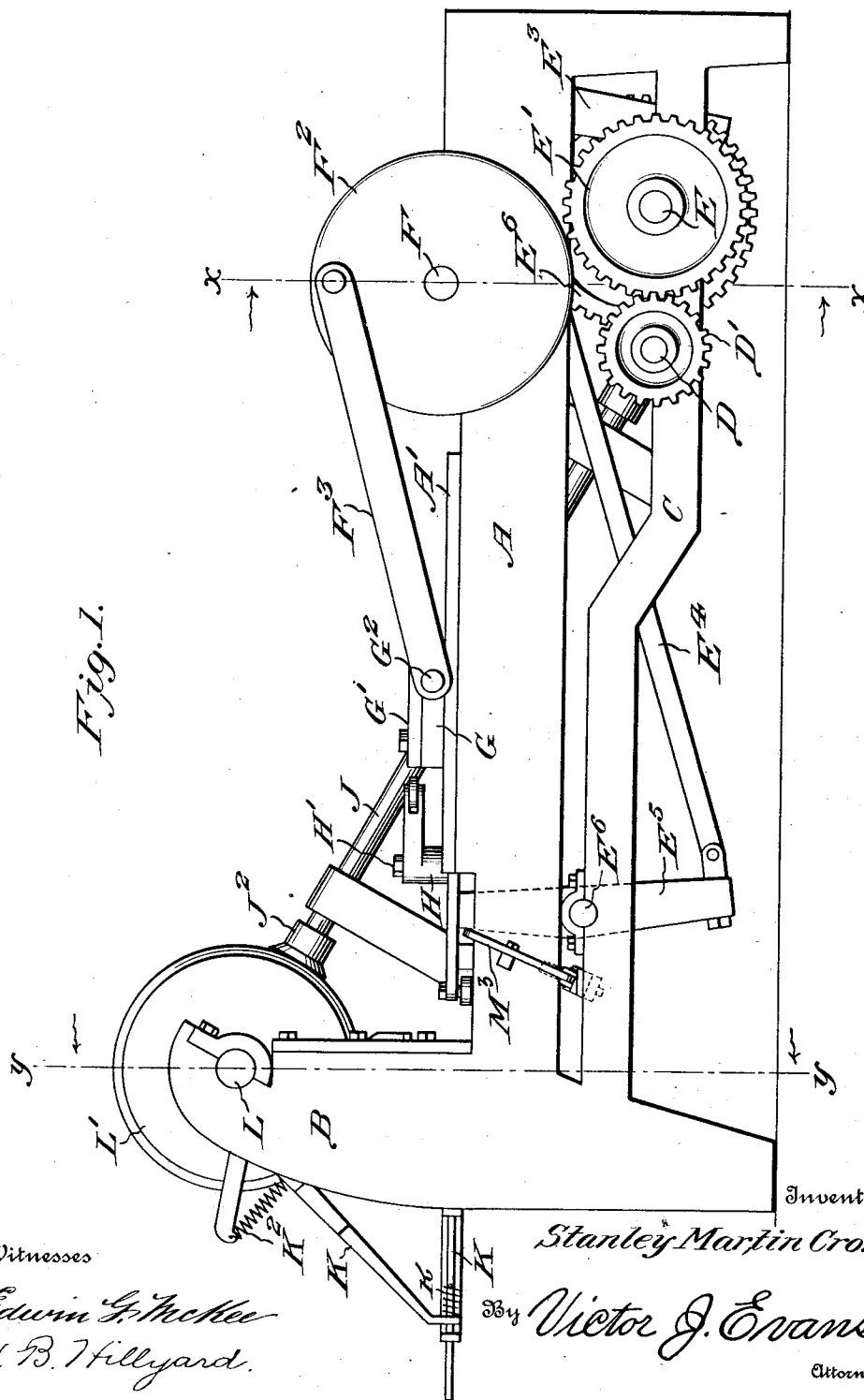


1,063,779.

S. M. CRONE.
HORSESHOE FORMING MACHINE.
APPLICATION FILED MAR. 4, 1911.

Patented June 3, 1913.

4 SHEETS—SHEET 1.



Witnesses
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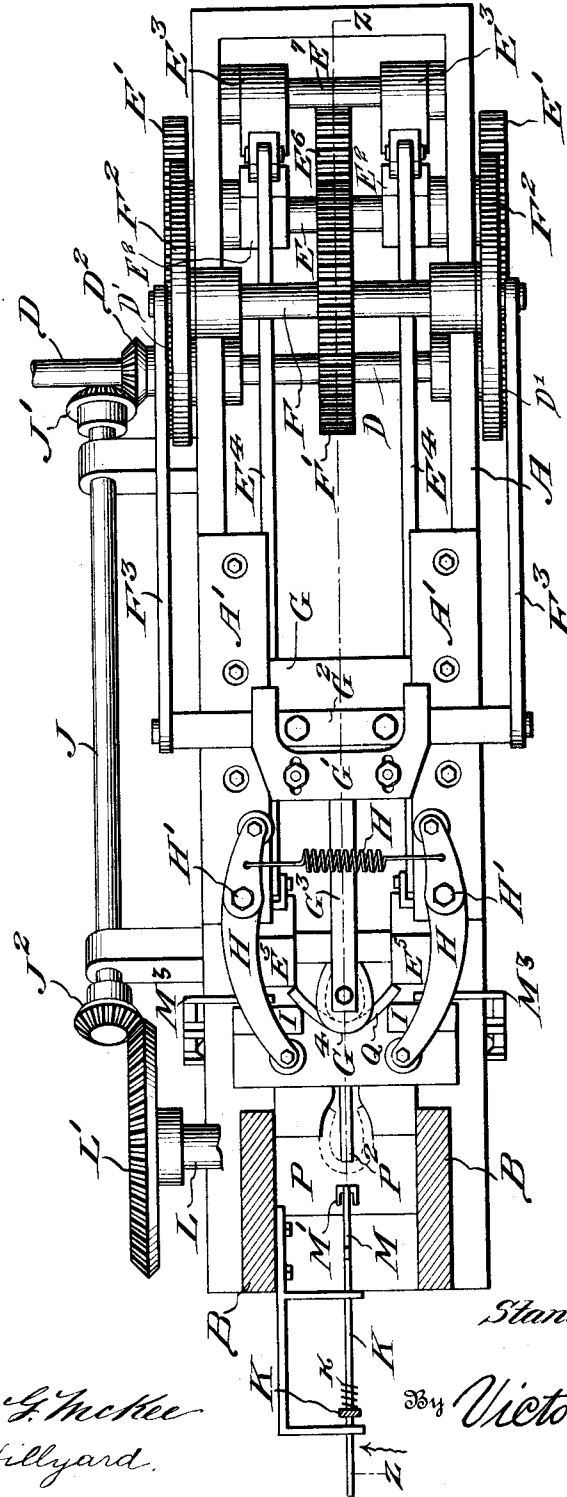
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Fig. 2.



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4 SHEETS—SHEET 3.



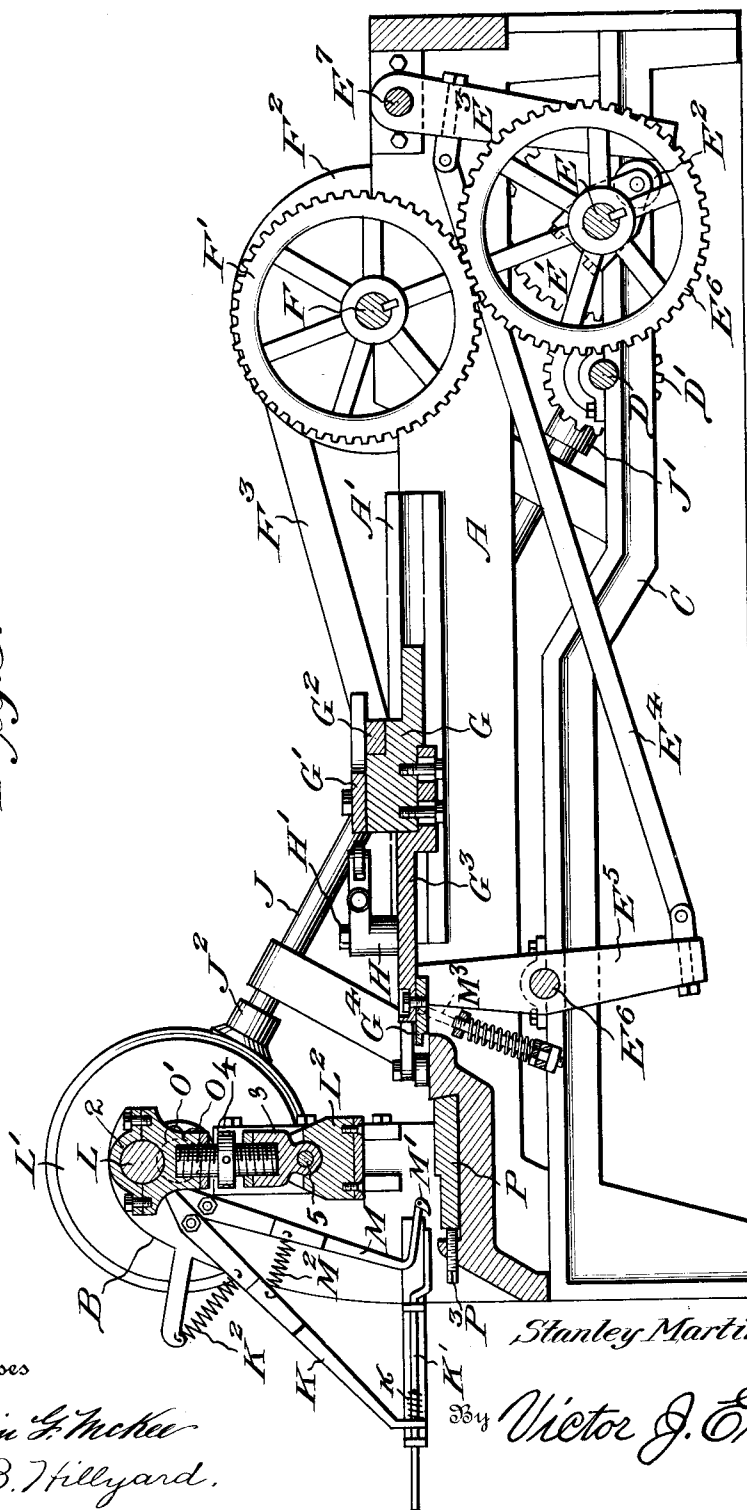
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Fig. 5.



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UNITED STATES PATENT OFFICE.

STANLEY MARTIN CRONE, OF FULLERTON, PENNSYLVANIA.

HORSESHOE-FORMING MACHINE.

1,063,779.

Specification of Letters Patent.

Patented June 3, 1913.

Application filed March 4, 1911. Serial No. 612,282.

To all whom it may concern:

Be it known that I, STANLEY M. CRONE, a citizen of the United States, residing at Fullerton, in the county of Lehigh and State of Pennsylvania, have invented new and useful Improvements in Horseshoe-Forming Machines, of which the following is a specification.

The invention is primarily designed to provide a machine for forming horseshoes from blanks or billets cut from a bar of metal, said billets or blanks being acted upon by successive steps in a single organized machine to form a complete horseshoe, the latter having its heel portions reduced in width and gradually thickened in depth and having the usual nail grooves, or creases, and nail openings.

It is to be understood that the invention may be adapted to metal working machines designed for bending and pressing work to obtain a given result, the present invention contemplating a machine embodying bending devices and pressing mechanism so that the blank may be given the required shape at one heating and the cost incident to handling and reheating overcome, since the machine embodies means for automatically transferring the work from the bending mechanism to the pressing mechanism, and means for automatically removing the completed article from the pressing mechanism, the several steps being performed in succession without requiring any intermediate handling or reheating.

The invention consists of the novel features, details of construction and combination of parts, which hereinafter will be more particularly set forth, illustrated in the accompanying drawings, and pointed out in the appended claims.

Referring to the drawings, forming a part of the application, Figure 1 is a side view of a metal working machine embodying the invention. Fig. 2 is a top plan view thereof. Fig. 3 is a transverse section on the line $x-x$ of Fig. 1, looking in the direction of the arrows. Fig. 4 is a transverse section on the line $y-y$ of Fig. 1, looking to the left, as indicated by the arrows. Fig. 5 is a central longitudinal section on the line $z-z$ of Fig. 2.

Corresponding and like parts are referred to in the following description, and indicated in all the views of the drawings, by

the same reference characters.

The frame work comprises a bed piece A, a supporting structure C and uprights B at one end of the bed piece A. A shaft D is located near one end of the frame and is mounted in suitable bearings and is adapted to be driven from a suitable source of power. Pinions D' are secured to opposite end portions of the shaft D and mesh with gear wheels E' secured to end portions of a shaft E mounted upon the framework and arranged parallel with the shaft D. A bevel pinion D^2 is likewise secured to the shaft D and meshes with a bevel pinion J' secured to the lower end of a shaft J, which is located at one side of the framework and inclines upwardly and rearwardly and has a bevel pinion J^2 at its upper end meshing with a bevel gear L' secured at one end to a transverse shaft L mounted in bearing at the upper ends of the uprights B. A shaft F, mounted upon the framework parallel with the shafts D and E, has a gear wheel F' eccentrically mounted thereon and in mesh with an eccentric gear wheel E^c secured to the shaft E. The eccentric gears F' and E^c are disposed so as to produce a varying degree of force or power during the bending operation. Crank wheels F^2 are secured to opposite ends of the shaft F and pitmen F^3 connect the same to opposite ends of a bar G^2 , which is bolted or otherwise secured to a cross head G arranged to slide in guides A' provided upon the bed A. A former G^4 is connected to the cross head G by means of a bar G^3 . A double cam G' is adjustably connected to the cross head G to move therewith and is adapted to be pressed between the forward ends of a pair of shaping levers H pivoted at H' to the bed A. A spring H of the helical type normally exerts a pressure to draw the forward ends of the levers H inward. The shaping levers H extend longitudinally of the machine and their forward ends are made thicker than the rear ends, both ends of the levers being provided with rollers so as to reduce the frictional resistance to the smallest amount possible. Fixed dies I are located upon opposite sides of the former G^4 and aline transversely. Movable dies E^5 are arranged to cooperate with the fixed dies I, the movable dies consisting of levers arranged vertically

and mounted upon a transverse shaft E⁶. Pendent levers E³ are located at the front end of the machine and are pivotally supported at E⁷ and are connected by means of rods or bars E⁴ to the lower ends of the pivoted levers E⁵, the upper ends of which constitute the movable dies adapted to cooperate with the fixed dies I. In the operation of the machine the lower ends of the pendent levers E³ are pressed forward by means of cams E² secured to the shaft E, said cams having rollers at their outer ends to reduce the friction and wear to the smallest amount possible. Centering devices M³ are located at opposite sides of the machine with their upper ends opposite the spaces formed between the fixed and the movable dies I and E⁵, said centering devices serving to properly position the billets or blanks when placing the same in position.

The press mechanism is located at the rear end of the machine and comprises a fixed die P held in place by means of a set screw P³. The movable die L² is directed in its vertical movements by suitable guides and is connected with the shaft L to be operated thereby. The upper surface of the die P is preferably plain, whereas the lower side of the die L² is shaped to provide the horseshoe with the nail grooves or creases and the nail openings. The blank or billet after being bent into the shape of a horseshoe is moved to a position upon the die P by means of the former G⁴, the partly formed horseshoe being supported by means of a bar or rib P² located centrally above the die P. The shaft L is provided with two cam projections O and O', which are adapted to engage the upper ends of the levers M and K. A push bar K' mounted in suitable guides is adapted to be engaged by the lower end of the lever K so as to properly position the partly completed horseshoe upon the die P. A spring k mounted upon the push bar K' transfers movement from the lever K to said push bar, thereby preventing sudden movement of the push bar which would tend to move the horseshoe too far forward upon the die P. After the horseshoe has been delivered upon the die P by means of the former G⁴ the cam O' engages with the upper end of the lever K and moves the latter, thereby pressing the push bar K' forward so as to move the horseshoe upon the die to a position to be engaged by the movable die L². The second lever M has a latch M' pivoted to its lower end, said latch being adapted to ride over the closed end of the horseshoe upon the forward movement of the lower end of the lever M and after the latch clears the horseshoe it drops so as to engage the same, whereby upon rearward movement of the lower end of the lever M the completed horseshoe is removed from the machine. The lever M is

adapted to be operated by the cam O. The lever K is drawn rearward by means of a spring K² and the lower end of the lever M is moved rearward by means of a coil spring M².

In the operation of the machine power is applied to the shaft D and is transmitted therefrom to the several parts by the means herein set forth. The billets or blanks Q are cut from a bar of iron or steel into the required length. One of the billets is placed in position between the dies I and E⁵ and is positioned by means of the centering devices M³. The cams E² coming in contact with the lower ends of the levers E³ press the same forward and operate the movable dies, thereby compressing end portions of the blank Q so as to diminish the width thereof and increase the thickness, such as is required for the heel portions of a horseshoe. After the end portions of the blank have been reduced in width and increased in thickness the cross head G is moved rearward, thereby bringing the former G⁴ in contact with the blank Q and forcing said blank between the fixed dies I, thereby bending the blank. After the former has moved a given distance the cam G' moves between the forward ends of the levers H and spreads such ends, thereby causing the rear ends of the levers to move inward and to press the folded ends of the blank close against the sides of the former, the cam portions of the part G' being of such form as to insure the rear ends of the levers H pressing the folded ends of the blank close against the sides of the former G⁴. The movement of the former G⁴ is such as to carry the partly formed horseshoe over the die P and to deposit the same thereon. When the horseshoe clears the raised portion P² it drops from the former G⁴ and is received upon the die P. The former G⁴ now returns and at the same time the push bar K' is advanced to properly position the horseshoe upon the die P and an instant thereafter the movable die L² descends and gives the final shape to the horseshoe and as the die L² ascends the lower end of the lever M moves forward so as to carry the latch M' over the closed end of the horseshoe, after which the upper end of the lever M is released from the cam O and the spring M² coming into play draws the lower end of the lever M rearward and removes the completed shoe from the machine.

As indicated most clearly in Figs. 4 and 5 the die L² has adjustable connection with a crank portion of the shaft L to admit of its relative vertical adjustment to properly position the working parts for forming the nail openings and nail creases in the work. The connection embodies a bearing 2, a block 3 and a right and a left hand threaded screw 4. A pin 5 connects the block 3 with

the side members of the die L². The block 3 has a socket connection with the die L² to admit of a slight movement, thereby preventing binding or undue strain upon the several parts of the connection.

It is noted that the dies I serve in the dual capacity of compressing the end portions of the billet Q as well as bending said billet about the former G⁴. When the billet is placed in position its end portions are compressed between the dies I and E³, after which the former G⁴ is advanced, thereby bending the billet about the former, after which the bent end portions of the billet are forced against the sides of the former by means of the rollers at the ends of the shaping levers H. The end portions of the shaping levers are in different planes, as indicated most clearly in Figs. 1 and 5, thereby bringing the rear portions thereof in the plane of the cam G⁷, and their forward portions in the plane of the former G⁴.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the device which I now consider to be the embodiment thereof, I desire to have it understood that the device shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims appended hereto.

Having thus described the invention what is claimed as new, is:—

1. In a horseshoe forming machine, the combination of a die for receiving the blank after being bent into horseshoe form, mechanism for bending a billet into horseshoe shape, the same including a former ar-

ranged to move the blank and deposit the same upon the beforementioned die, a push bar arranged to move the horseshoe into proper position after being received upon the said die, and a movable die provided with means for forming nail grooves and nail openings in the horseshoe.

2. In a horseshoe forming machine, the combination of a die for receiving the blank after being bent into horseshoe form, mechanism for bending a billet into horseshoe shape, the same including a former arranged to move the blank and deposit the same upon the beforementioned die, a movable die provided with means for forming nail grooves and nail openings in the horseshoe, a push bar arranged to move the horseshoe into proper position after being received upon the said die, a lever for operating the push bar, and a spring interposed between said lever and push bar.

3. In a horseshoe forming machine, the combination of a die adapted to receive the blank after being bent into horseshoe form, mechanism for bending the billet into the shape of a horseshoe including a former arranged to deposit the horseshoe upon the beforementioned die, means for moving the horseshoe into proper position upon the die, a second die for completing the finish of the horseshoe, and means for removing the finished horseshoe from the die, the same including a reciprocatory pivoted latch which rides over the horseshoe and engages therewith so as to remove the horseshoe from the machine upon movement of the latch in the opposite direction.

In testimony whereof I affix my signature in presence of two witnesses.

STANLEY MARTIN CRONE.

Witnesses:

E. E. DIERENDERFER,
A. P. SCHAADT.