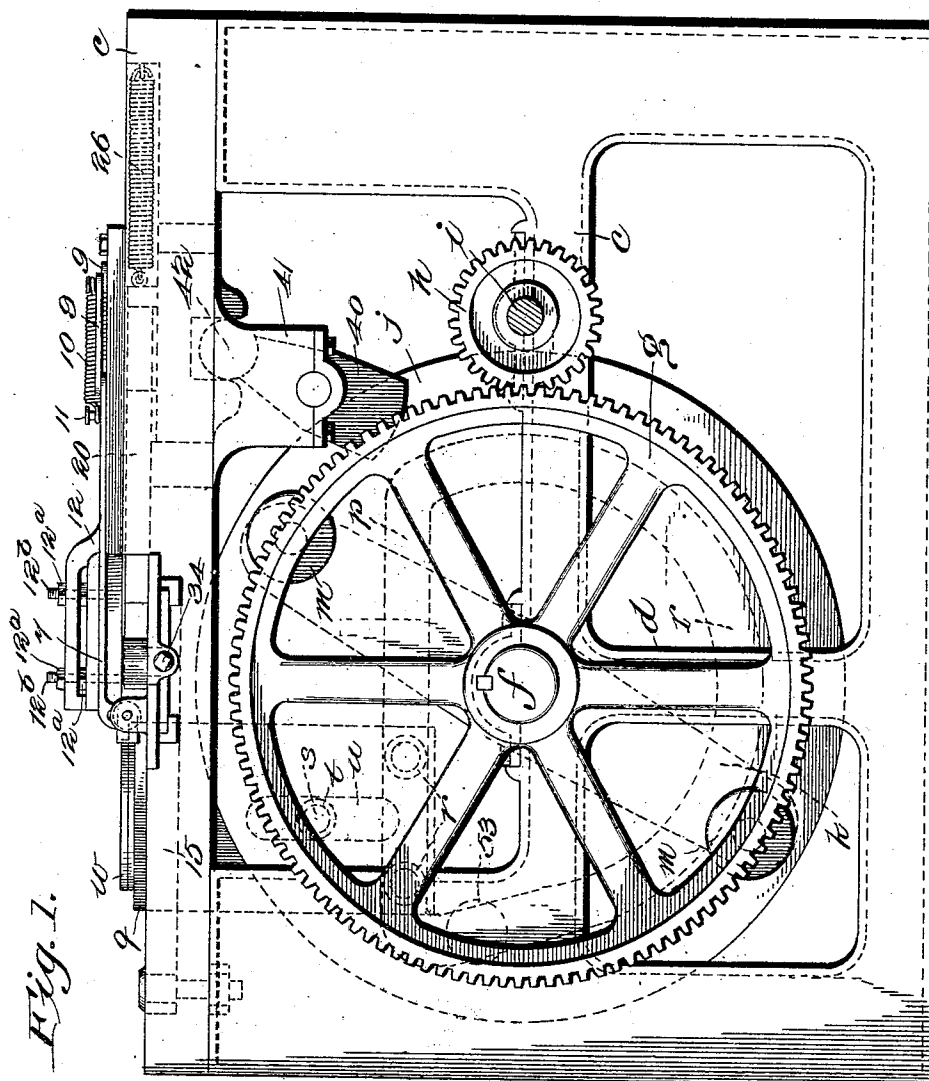


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Patented Nov. 9, 1909.

4 SHEETS—SHEET 1.



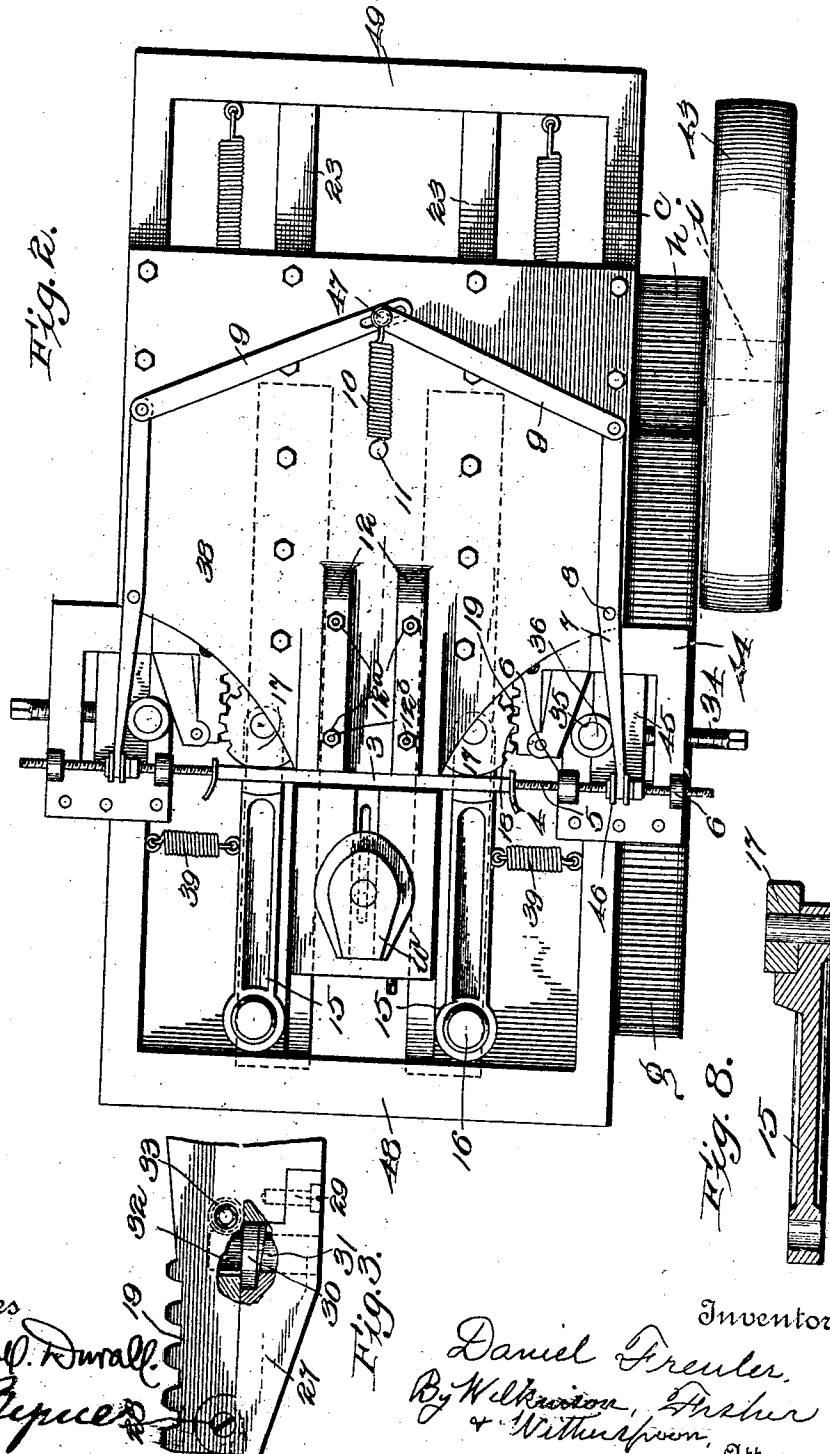
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

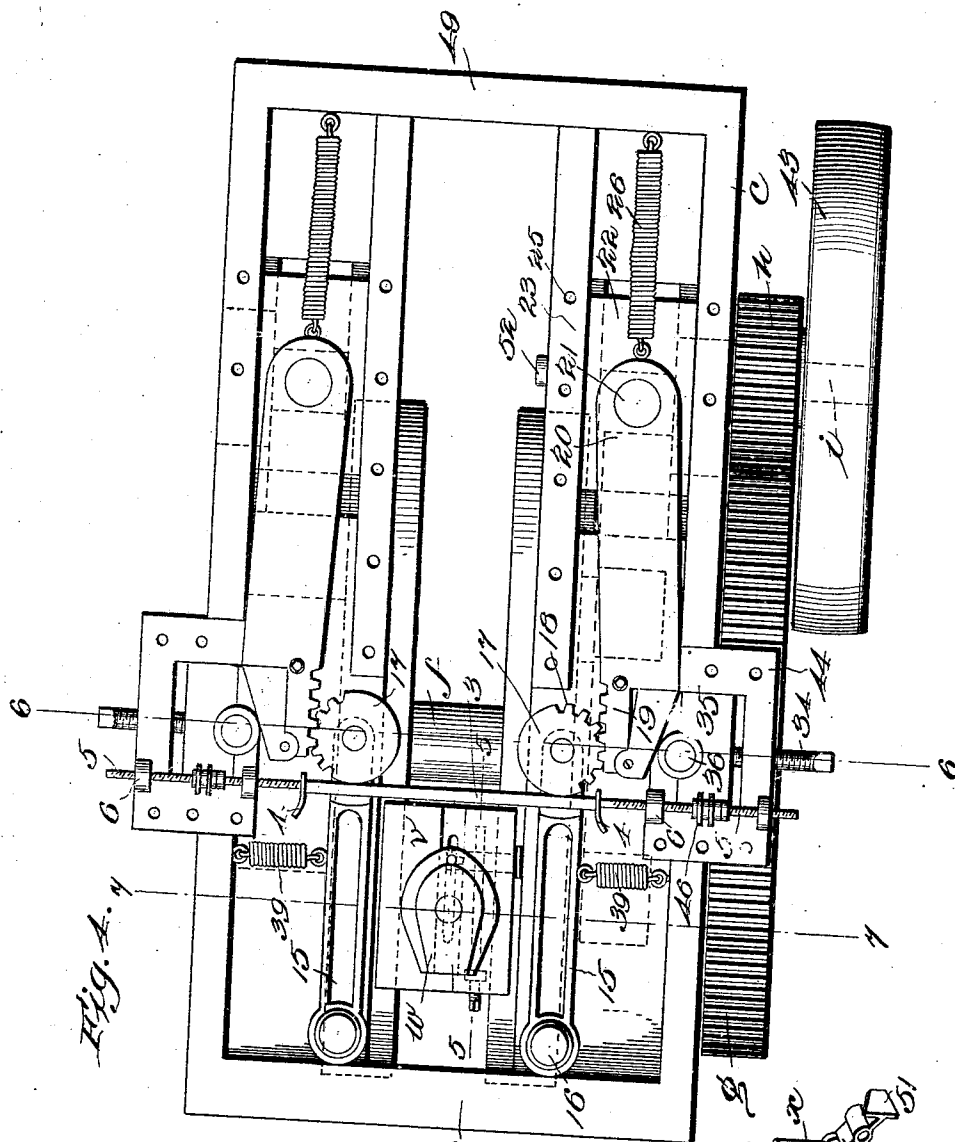


Fig. 4.

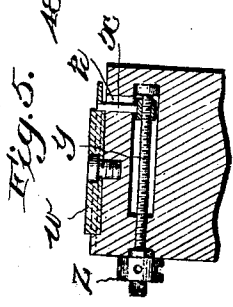


Fig. 5.

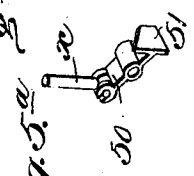
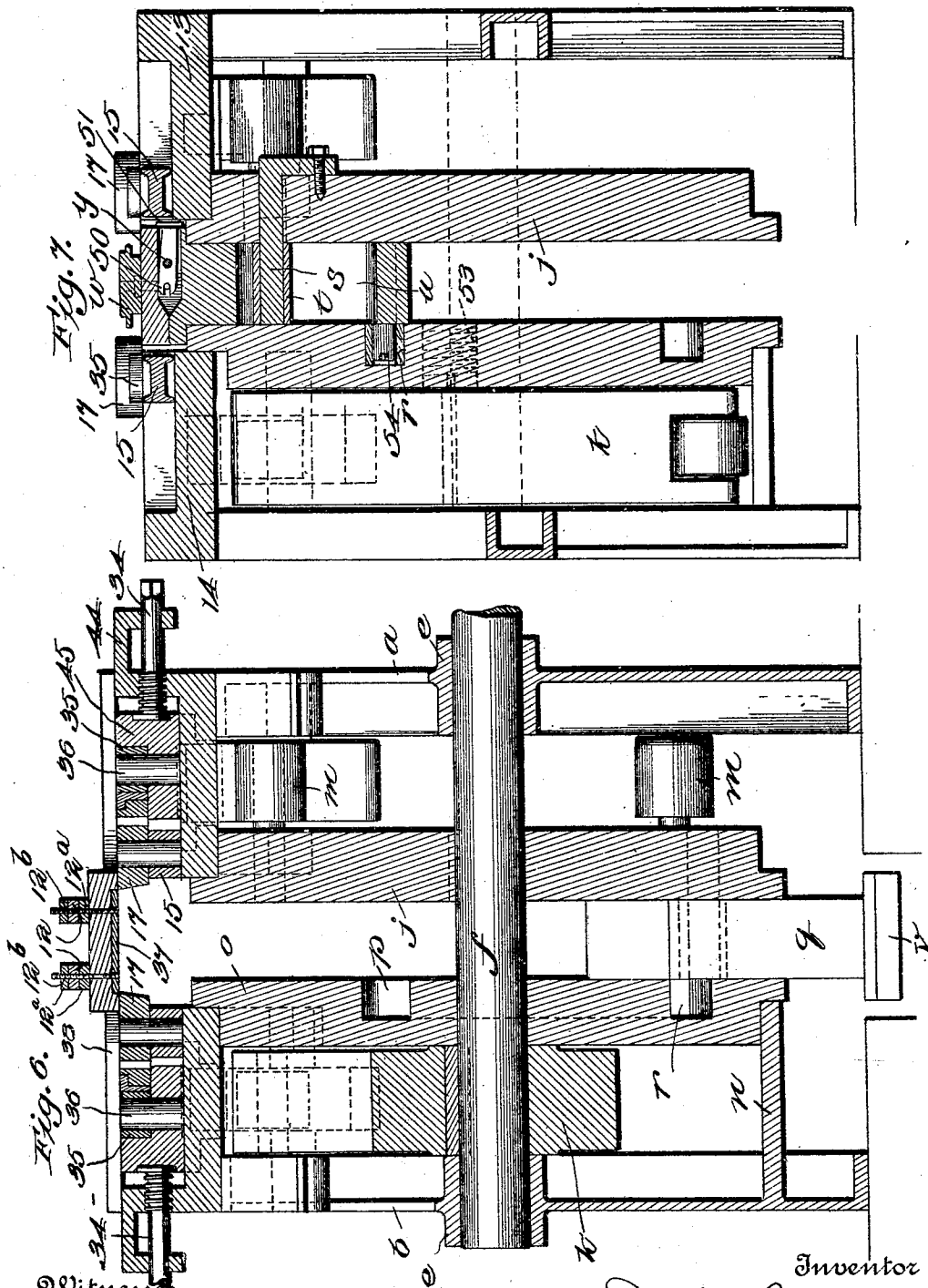


Fig. 5a.

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UNITED STATES PATENT OFFICE.

DANIEL FREULER, OF CHATTANOOGA, TENNESSEE.

HORSESHOE-BENDING MACHINE.

939,901.

Specification of Letters Patent.

Patented Nov. 9, 1909.

Application filed December 26, 1908. Serial No. 469,358.

To all whom it may concern:

Be it known that I, DANIEL FREULER, a citizen of the United States, residing at Chattanooga, in the county of Hamilton and State of Tennessee, have invented certain new and useful Improvements in Horseshoe-Bending Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in horse shoe bending machines, and the object of my invention is to provide a simple and easily operated rotary bending machine for the purpose of bending blanks into horse shoes.

With this object in view my invention consists in the construction and combinations of parts as hereinafter described and claimed.

In the accompanying drawings—Figure 1 is a side view of my improved machine, the driving shaft being in section. Fig. 2 is a top plan view of the same. Fig. 3 is a detail showing the construction of the rack cam. Fig. 4 is a plan view of the machine with the top plate removed. Fig. 5 is a longitudinal section through the top of the former, on the line 5—5 of Fig. 4. Fig. 5^a is a perspective view of the kick-off device. Fig. 6 is a vertical cross section on the line 6—6 of Fig. 4, the gear wheel being omitted. Fig. 7 is a similar cross section taken through the center of the former, on the line 7—7 of Fig. 4. Fig. 8 is a cross section of one of the compressing rolls and its supporting arm.

The machine is supported on a rectangular frame, as viewed from above, having end pieces 48 and 49, the whole being supported on the side frames *a* and *b*. These side frames are open at the center and each is provided with a horizontal cross beam *c* and an upright cross beam *d*, at the junction of which are formed bearings *e* for the reception of the main shaft *f*, on which is fastened a large gear wheel *g*, which gear wheel meshes with a pinion *h* on the shaft *i* which is driven by any suitable power and has upon it a fly wheel pulley 43. Fixed to the shaft *f* is a wheel or disk *j* on which are fixed projecting pins each carrying at its end a roller *m*.

Supported on an extension *n* of the frame *b* and securely fixed against movement is a cam plate *o* provided with a groove *p*. This groove, as shown in dotted lines in Fig. 1, has a horizontal portion, and an approximately circular portion, and this groove serves to guide the movement of the former. This cam has an opening, ordinarily closed by a plug 53, located in line with the groove *p*.

The former *q* is adapted to move around between the wheel *j* and the cam plate *o*. It is provided with extending pins 54 screwed into the former and carrying rollers *r* which enter the groove *p*. The former *q* is driven by means of a pin *s* bent and bolted to the plate *j* as shown in Fig. 7. The free end of this pin is provided with a roller *t* which is adapted to engage in a long vertical slot *u* in the former *q*. From the construction described it is evident that the rotation of the wheel *j* will carry the former and its die around the shaft *f* in the path determined by the cam groove *p*.

The former is shown in top plan view in Figs. 2 and 4. Its general shape is of a parallelepipedon of metal having a long slot *u* and a top *v*.

On the top of the former is the forming die *w* shaped in the form of a horseshoe, as shown in Fig. 4. This forming die is provided with an adjustable kick-off device shown in Figs. 5 and 5^a, in which *x* represents a pin projecting through and downwardly from the die *w* and having its lower end pivotally mounted on the forked end of an arm 50, which at its center engages a screw *y* provided with a head *z*. The pin *x* works in a slot 2 in the top of the former.

3 represents one of the blanks which are cut to the required length and fed, one at a time, at suitable intervals, into the machine, either by hand, or by any suitable feeding mechanism. The blanks are held between the ends 4, of movable screw-threaded rods 5 which are adapted to slide freely in bearings 6, on the top of the machine, and whose position is governed by means of the levers 7, pivoted as at 8 to the top of the machine. Pivottally connected to the other end of each of these levers is a link 9, which in turn is connected to a spring 10, the tendency of which is to bring the links 9, toward the pin 11, to which one end of the spring is fas-

tened, which thereby tends to force the supports 4, toward each other, confining the blank 3 between them. The blank is held at the ends by the stops 4, and rests upon the arms 15 and against the rollers 17. The links 9 overlap and their overlapping ends are slotted, as shown in Fig. 2. Through these slots passes a pin 47 to which one end of the spring 10 is fastened. The levers 7 each have a forked end engaging a flanged roller 46 adjustably mounted on one of the rods 5.

The means for bending the blanks around the die *w* will next be described. Supported on the frames *a* and *b* are the horizontal frames 13 and 14 which are cut away so that they are L-shaped. Pivotaly mounted on each of these frames is a bar or arm 15, supported by a pivot 16, and having mounted on its other enlarged end, which is located over the main shaft *j*, a roller 17, smooth on one side and provided with ratchet teeth 18 on the other, which ratchet teeth engage with the rack 19, against which the roller is held by the spring 39. The smooth faces of the rollers 17 are beveled downwardly as shown in Fig. 6. This rack 19 is mounted on the end of a swinging arm 20 mounted on a pin 21, which pin is supported by a plate 22 adapted to slide freely between the outer part of the frame 13, and an inner under cut guide 23 for said plate, secured by pins 25 to the upper and inner part of the plate or frame 13 whereby with the cover plate 38 an efficient guide is formed governing the movement of the plate 22. 26 represents a spring attached to the plate 22 and to the main frame of the machine which normally holds the parts in the position shown in Fig. 4. The plate 22 is moved, against the tension of the spring 26, by the lever 40, pivotally mounted in a bracket 41 on the main frame, which lever has a rounded head 42 engaging with lugs depending from the bottom of the plate 22. This lever is operated by one of the rollers *m* on the disk *j*.

One end of the arm 20 is cut away, as best shown in Fig. 3, and to this cut away portion is pivotally attached an inclined portion 27 pivoted thereto by the pivot pin 28 and supported in any one of several possible positions by the screw 29. This inclined portion 27 can be adjusted around the pivot pin 28 by means of a cam 30, carried on a pin 31, which is provided with a worm gear 32, which is operated by a worm carried by the stub shaft 33.

44 represents a three-sided frame secured on top of the main frame. In the frame 44 is mounted an L-shaped bearing block 45, adapted to slide back and forth. This block may be adjusted in and out by means of the screw shaft 34, having a squared head. The block 45 is provided with an upwardly

projecting pin 36 on which is loosely mounted a roller 35. The inclined face 27 of the arm 20 engages this roller 35 when the plate 22 and arm 20 are moved by the lever 40. From the construction described it is obvious that a movement of the arm 20 to the left from the position shown in Fig. 4, will force the rollers 17 toward each other, and thereby force the blank 3 around the forming die *w*. The extent of movement of these rollers is governed by the inclined portion 27.

The operation is as follows: The parts being in the position shown in Fig. 2, the machine is started and the forming die *w* presses the blank 3 between the rollers 17, shaping it around the curved part of the die. When the die *w* has advanced so that its center is between the centers of the rollers 17, the lever 40 is struck by the roller *m* and the plates 22 and arms 20 are forced to the left, from the position shown in Fig. 2, against the tension of the spring 26. This forces the rollers 17 toward each other, bending the blank around the rear of the former die *w*. At the same time, owing to the shape of the rollers and their motion, the blank is swaged at the rear. It will also be noted that as the arms 20 are moved to the left, they rotate the rollers 17, which aids the swaging action.

It will of course be understood that the construction of the bending means, blank holding means, etc. is the same on both sides of the machine. It will also be understood that any number of formers may be used in a single machine, although, to avoid complicating the drawings, I have only shown one in the present application.

Fixedly mounted on the shaft on the left of the machine is an arm *k*, shown in dotted lines in Fig. 1. This arm has rollers, like the rollers *m*, pivotally attached thereto at its ends. This arm and the rollers carried thereby act in precisely the same manner as the disk *j* and rollers *m* thereon, to move the plates 22 to the left, from the position shown in Figs. 1 and 4.

On the top of the machine is mounted a plate 38, beneath which the blank is forced during the bending operation, and which plate is provided with upwardly projecting parallel arms 12. Through these arms and through the plate 38 project four bolts 12^b each having a nut 12^a about and below the corresponding arm. To the lower ends of these bolts is fastened a flat plate 37, made of hardened steel, which keeps the blank in place on top of the forming die *w*. The plate 37 may be adjusted up and down by the bolts 12^b and it may be easily removed when worn and a new one substituted.

The means for kicking the bent shoe off the die *w* is shown in Figs. 5 and 5^a. The arm 50, which revolves freely on the screw

y, is provided with a double cam 51 on its free end. This cam strikes a pin or roller 52 mounted on the machine frame, causing the arm 50 to turn on the screw *y*, thereby forcing the pin *x* upwardly, whereupon the pin *x* forces the shoe from the die *w*. The other side of the cam 51 then strikes another pin or roller (not shown) which restores the parts to the position shown in Fig. 5.

It should be noted that the plug 53, as shown in dotted lines on Fig. 1, is a little larger in diameter than the cam groove *p* and is located opposite to said groove near the left hand end of the horizontal portion of said groove. This renders it easy to remove the former and die without disturbing the main parts of the machine. All that it is necessary to do, is to unscrew the plug 53, unscrew the pins 54 successively, and slip them and the rollers *r* out through the hole in the cam *o*, left by the removal of the plug 53. The bolts holding the bent pin *s* are then removed and the pin taken out. The former and its die can then be easily removed from the machine.

The whole machine is so arranged that various kinds of adjustments may be readily performed, that the parts chiefly subjected to wear may be readily replaced and the whole machine may be easily assembled and taken apart.

While I have thus described my invention I wish it to be distinctly understood that I do not limit myself to the exact details shown and described, as these might be varied widely without departing from the spirit of my invention.

I claim:

1. In a horse shoe bending machine, the combination of a former provided with a die, means for moving said former first in a straight path and then in a curved path, and devices which, as said former is moved in a straight line, bend a blank around said die, substantially as described.

2. In a horse shoe bending machine, the combination of a supporting frame, a disk mounted therein having a cam groove, part of said groove being straight and part curved, a disk mounted therein parallel to said cam, a former, carrying a die, located between said cam and said disk and provided with means projecting into the cam groove, means whereby the rotation of said disk moves said former and means for driving said disk, substantially as described.

3. In a horse shoe bending machine, the combination of a supporting frame, a disk fixedly supported thereon and having a cam groove, part of said groove being straight and part curved, a shaft mounted in said frame, a disk fixed on said shaft parallel to said cam, a former and die arranged to travel around said shaft in the space between said cam and disk, said former being

slotted and having means extending into the cam groove, a pin, carrying a roller located in the slot of the former and secured to said disk and means for rotating said shaft, substantially as described.

4. In a horse shoe bending machine, the combination of a supporting frame, a disk fixed thereto and having a cam groove on one face part of said groove being straight and part curved, a disk parallel to said cam, a former adapted to be moved in the space between said disk and cam and provided with a slot, pins, with rollers thereon, screwed into said former and entering the cam slot, a pin secured to said disk, carrying a roller in the slot of the former, said cam being provided with a removable plug located opposite to part of the groove, and means for operating said disk, substantially as described.

5. In a horse shoe bending machine, means for holding a blank, comprising a pair of slidable arms, having heads adapted to engage the blank, levers adjustably engaging said arms, links attached to said levers and a spring attached to said links and acting to force said heads toward each other, substantially as described.

6. In a horse shoe bending machine, the combination of a fixed disk having a cam groove on one face and a removable plug located in an opening in said cam communicating with said groove, and a former having pins screwed thereinto and carrying rollers, said pins and rollers entering said groove, whereby said former may be disengaged from said cam by removing said plug, pins and rollers, substantially as described.

7. In a horse shoe bending machine, the combination of a former having a slot therein and having pins carrying rollers screwed into one face, a cam having a groove in one face and a removable plug fitted in an opening opposite part of said groove, and an operating disk parallel to said cam and having a removable pin provided with a roller projecting into the slot of the former, substantially as described.

8. In a horse shoe bending machine, the combination of a former having a die, positive kick-off means including a pivot, an arm mounted on said pivot, having a cam-shaped head and a pin pivotally mounted on one end of said arm, and devices carried on the machine frame for striking said head at intervals, substantially as described.

9. In a horse shoe bending machine, the combination of a supporting frame having a pin thereon, a former having a die and adapted to be moved within said frame, and a positively acting kick-off device carried by said former and including a rod screwed into said former, an arm, having a cam-shaped head, engaging said rod and adapted

to strike said pin and a pin pivotally mounted on one end of said arm and passing through said die, substantially as described.

10. In a horse shoe bending machine, the
5 combination of a former, a pair of pivotally mounted rollers between which said former is adapted to pass, means for moving said former die between said rollers and devices operated by said means for moving said
10 rollers toward each other, including sliding plates, an arm pivotally mounted on each of said plates and engaging one of said rollers, said arms each having an inclined face and means engaging said inclined faces, substantially as described.
15

11. In a horse shoe bending machine, the combination of a cam having a groove on one face, a slotted former, having roller-carrying pins projecting into said slot, a
20 disk parallel to said cam and having a roller-carrying pin projecting into the slot

of the former, pivotally mounted rollers between which said former is adapted to pass, a shaft on which said disk is mounted, an arm secured to said shaft, rollers carried
25 by said arm and disk, and means for causing said rollers to move toward each other, including rollers carried by the machine frame, arms each having an inclined face, engaging one of said last named rollers,
30 plates to which said last named arms are pivotally secured, and levers for moving said plates, said levers being moved at intervals by the rollers on the disk and arm secured to said shaft, substantially as described.
35

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

DANIEL FREULER.

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