

948,470.

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HORSESHOE MACHINE.
APPLICATION FILED NOV. 23, 1905.

Patented Feb. 8, 1910.

3 SHEETS—SHEET 1.

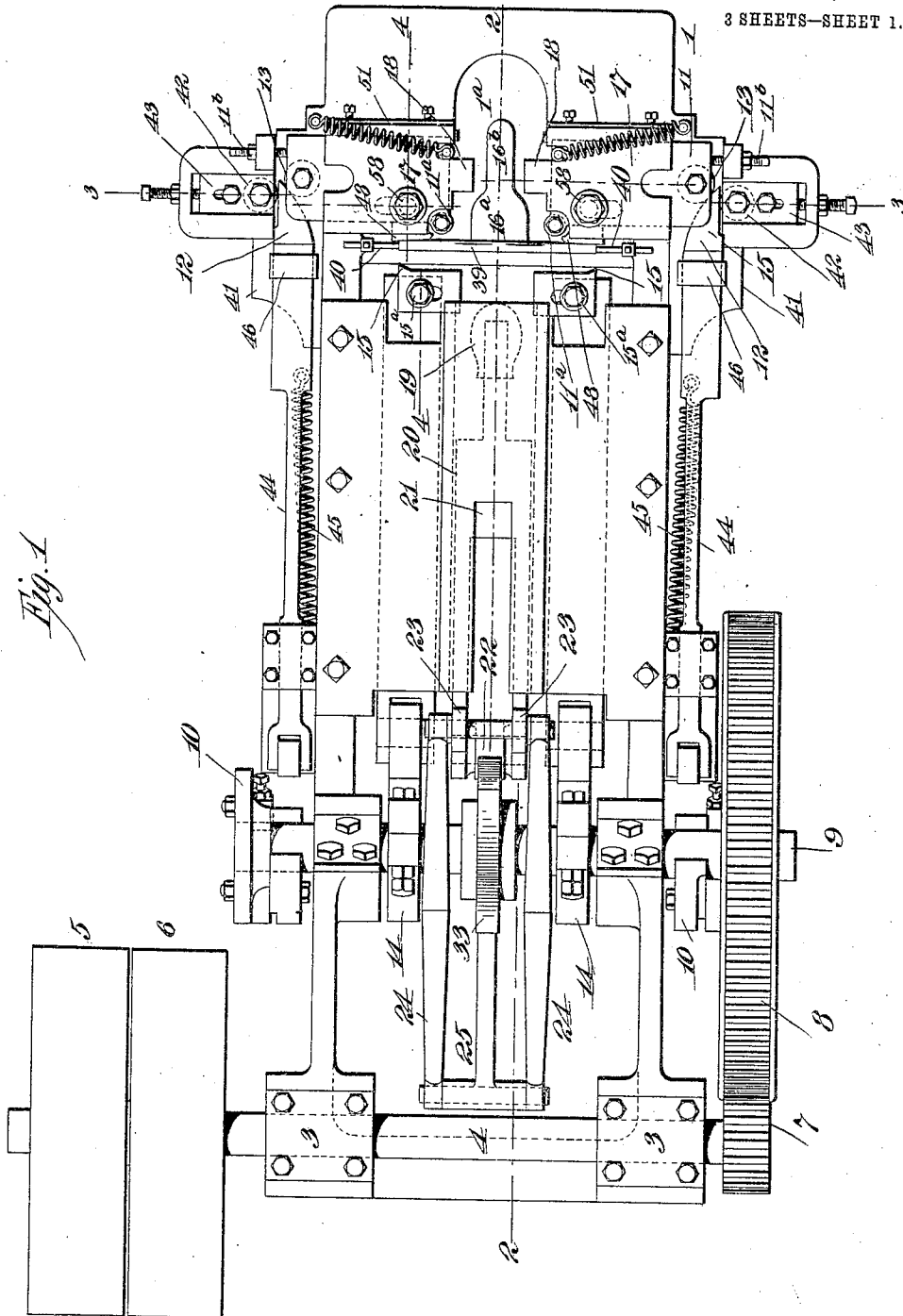


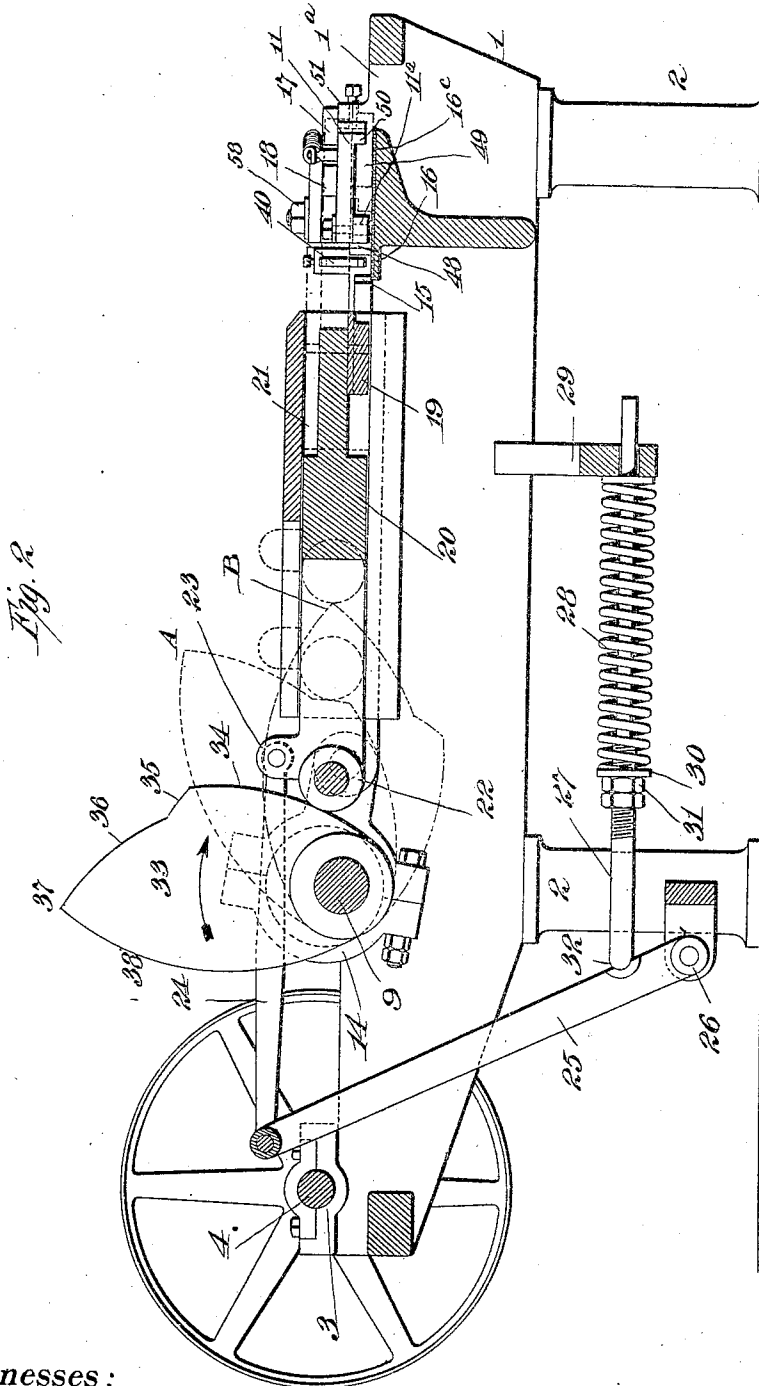
Fig. 1

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3 SHEETS—SHEET 2.



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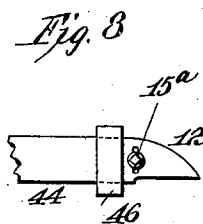
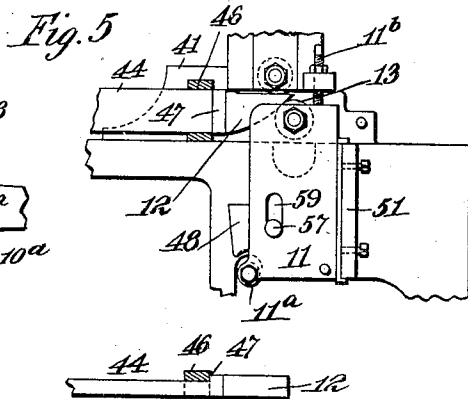
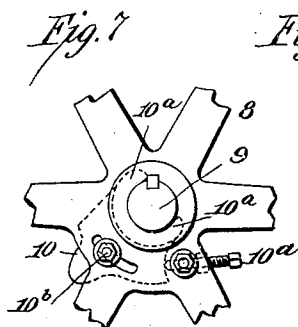
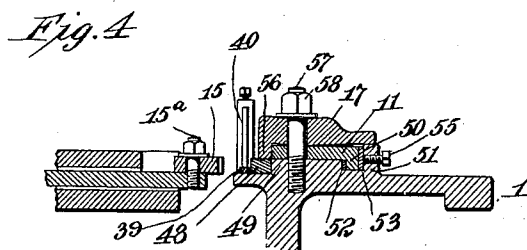
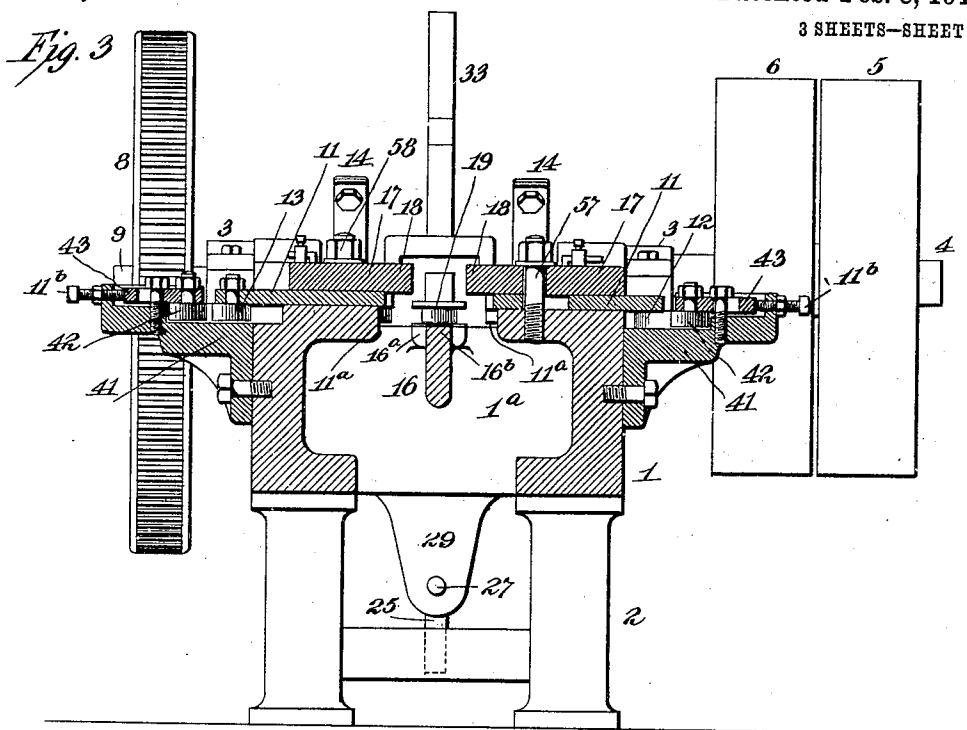
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3 SHEETS—SHEET 3.



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Fig. 6.

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UNITED STATES PATENT OFFICE.

ARTHUR SMITH, OF EASTON, PENNSYLVANIA; ELIZABETH M. SMITH AND JOHN ERNEST SMITH EXECUTORS OF SAID ARTHUR SMITH, DECEASED.

HORSESHOE-MACHINE.

948,470.

Specification of Letters Patent.

Patented Feb. 8, 1910.

Application filed November 23, 1905. Serial No. 288,644.

To all whom it may concern:

Be it known that I, ARTHUR SMITH, a citizen of the United States, residing in Easton, county of Northampton, State of Pennsylvania, have invented a certain new and useful Improvement in Horseshoe-Machines, of which the following is a description.

The object I have in view is to construct a machine for squeezing the ends of billets, and bending and forming them in the manufacture of horse shoes, which machine will be composed of few moving parts, will be expeditious in operation, not liable to get out of order, can be operated at a minimum expense, and may be readily adjusted to compensate for wear and to accommodate different sizes and styles of shoes.

This machine is designed to squeeze, bend and form shoes from creased or uncreased billets cut to the proper length. By the act of squeezing that portion of each billet which is to form the heel is thickened and shaped, by bending the billet is curved to U-shape, and by forming it the heels are brought together to make the complete shoe. These terms "squeezing", "bending" and "forming" are well understood in the art of horse shoe making.

By the present invention the three operations are carried on in a single machine, which may be adjusted for wear and to accommodate different sized billets, and which may be operated at a minimum expense. I attain these objects partly by operating the bending die by means of a cam having a quick return, and an idle period, so that the operator will have a maximum time to adjust billets, by providing mechanism for always insuring the ejection of the finished shoe, by providing forming means which will smoothly form the shoe without distortion, and by other mechanism as will more fully appear in the accompanying drawings and specifications and claims.

In the drawings Figure 1 is a plan view of a complete machine embodying my invention. Fig. 2 is a section taken on the lines 2, 2, of Fig. 1. Fig. 3 is a transverse section taken on the lines 3, 3, of Fig. 1. Fig. 4 is a detail sectional view of a portion of the mechanism taken on the lines 4, 4, of Fig. 1. Fig. 5 is a plan view of the same detail, but with a portion removed. Fig.

6 is a side view of one of the cams and actuating rods. Fig. 7 is a detail of the adjustable cam, and Fig. 8 is a detail of a modified means of attachment of the forming plate cams.

In all of the views like parts are designated by the same reference characters.

In carrying out my invention I provide a frame 1, which includes a horizontal member or table, all being preferably formed of a single casting. The support 1 is mounted upon standards or legs 2, so that it may be raised to an elevation which will be convenient. The frame carries bearings 3 for a shaft 4. This shaft carries fast and loose pulleys 5 and 6 and a suitable driving belt and belt-shifter (not shown), and is geared through the pinion 7 and the gear 8, which is on a second shaft 9. This second shaft carries the cams 10, 10, for actuating the forming dies 11 through the agency of the cams 12 and rollers 13. The shaft carries also the eccentrics 14 for actuating the squeezing dies 15.

16 is the table upon which the shoe is bent, and 17 the cover having ears 18 for preventing the dies from flying upward while the shoe is being bent and formed between the dies. This table is in the form of an overhanging shoulder, as shown, projecting into a cutaway portion 1^a of the main frame. The table has an enlarged portion 16^a adjacent to its point of support and a narrower portion 16^b beyond. The wider part 16^a is sufficiently wide to support a shoe upon it in a horizontal position. The narrow portion 16^b is sufficiently narrow to permit the shoe to straddle it and lie in a vertical position after being formed, so that it may be ejected through the cutaway portion 1^a. The length of the table is such that when the shoes are being formed they will rest upon the portion 16^b with their heels upon the part 16^a. The top of the table carries a bearing plate 16^c of harder metal, such as steel, to take up wear from the cast iron table.

The bending die 19 is carried by a sliding member 20, which works within the recess 21 so as to be guided. The member 20 carries an anti-friction roller 22 and ears 23. To the latter are connected links 24, which are joined to an arm 25. This arm 25 is pivoted at 26 and is engaged by a rod 27, the latter being moved by a spring 28. A support hav-

ing an opening for the passage of the rod 27 serves as a guide and support therefor, and also as an abutment for one extremity of the spring 28. The other extremity engages with a washer 30 held upon the rod 27 by the nuts 31. The end of the rod 27 where it engages with the arm 25 is rounded at 32 and enters a counter-sunk portion formed in the arm. By this arrangement the rod 27 will always truly engage with the arm irrespective of the position of the latter. This mechanism as described constitutes a retracting means for the slide 20, and also a means for causing the roller 22 to always engage with the cam.

The main driving cam 33 is carried upon the shaft 9 and rotates therewith and in engagement with the roller 22, as shown in Fig. 2. This cam is of irregular shape, having a curved portion 34, a straight or nearly straight sharply inclined portion 35, a second curved portion 36, on one side ending in a point 37 and a single curved portion 38 on the other side. The portion 34 is for the purpose of advancing the die into engagement with the billet and for preliminarily bending the same. The sharply inclined portion 35 is for the purpose of moving the die while the billet is being formed by means of the forming rollers 11^a, which will be described. The portion 36 is for the purpose of moving the die and with it the billet beyond the engagement of the dies, and the point 37 is for the purpose of giving a blow or jar to the die as well as to the entire machine to eject the billet from the table 16.

The forming dies 11 are each in the shape of a broad flat plate, having a roller 11^a at one corner for engaging with the billet and for causing the actual forming. The other end of the plate carries the roller 13 for engagement with the cam 12. These plates sliding within grooves between the table 1 and the plate 17, would have a tendency to twist, but by making the plates of considerable width, as shown, this tendency will be successfully resisted. By employing a roller for doing the actual forming the billet is not scratched, or otherwise mutilated, as is the case where no roller is used.

The cams 12 rest and freely slide upon auxiliary or supplemental frames 41, bolted or otherwise fastened to the main frame. Each of these cams engages on its curved surface with the roller 13 and on its straight surface with the roller 42. This latter is also carried by a block 43 with a screw for adjustment. A projecting corner of the plate 11 rests upon the cam and keeps it seated. The cam is moved into engagement between the two rollers 13 and 42 by means of a connecting rod 44 actuated by the cam 10 and returned by a spring 45. A strap 46 keeps the free end of the rod down and an enlarged head 47 forms a shoulder for engaging with the

strap 46 to form a stop and limit the amount of the return movement of the rod. As shown in Figs. 5 and 6 the cams 12 are not in any way connected to the connecting rods 44, but simply rest upon the table and are prevented from moving upward by means of the projecting corner of the plate 11. The cams are very easily removed for replacement or repair by simply sliding inward the forming plates 11 to uncover the cams.

If desired the modification shown in Fig. 8 may be employed, in which the cam is secured to the connecting rod by means of a bolt 15^a, which works in a slot to allow for movement of the cam, depending upon the position of the abutment roller 42. This abutment roller may be adjusted as already described so as to vary the position of the forming plates 11 and to accommodate different sized shoes. The cams 15 will adjust themselves without further attention, so that the parts will be automatic in adjustment. A set screw 11^b serves to limit the outward movement of the plate 11.

48, 48, are wedge blocks which are used to adjust the amount of squeeze and to accommodate different lengths and thicknesses of billets, by serving as a backing to the action of the squeezing dies 15. They rest upon the frame 1 and back against a raised table 49, upon which the plates 11 slide. Each plate 11 has an offset 50 which slides between the sides of the table 49 and a raised ledge 51. Gibs 52, 53, are used to take up wear and adjusting screws which pass through the ledge 51 and engage with the gibs 53 adjust the position of the latter.

The cover plate 17 has a shoulder 56 which rests upon the block 48 and firmly holds the same in place. The other edge of the plate rests upon the ledge 51. The plate is held in position by means of a bolt 57, which is provided with a washer and nut 58, as shown, and by means of which it may be caused to engage with the ledge and with the block. The bolt 57 passes through a slot 59, made in the forming plate 11 intermediate its edges, so that the latter may freely slide within the opening between the table 49 and cover 17. The cover 17 is preferably formed of cast iron, which is slightly elastic, and is so adjusted in position by the bolt 57 and nut 58 that it is buckled or flexed, as shown, the bolt being intermediate its ends, as shown, permitting this to be done. When the machine is in operation and the parts become heated from contact with the hot billet the bolt 57 will expand and permit the cover to flatten somewhat, without, however, ceasing its close and intimate engagement with the block 48; which latter will be held firmly in position. The latter may be adjusted to accommodate different sized billets by first slacking the nut 58, which will relieve the grasp of the plate 17 upon the table.

The operation of the device is as follows: The heated billet 39 is placed upon the table 16 and alined in proper position by means of the adjustable rods 40, so that it will be properly supported. This is done while the die 19 is in the retracted position, and before the main cam has reached the position shown in full lines in Fig. 2, the shafts being continually turning. It is to be understood that the blocks 48 are first properly adjusted to a position determined by the character of the billet. Upon the further rotation of the shaft 9 the curved portion 34 of the cam engaging with the roller 22 will slide the member 20 and with it the die 19 into engagement with the billet. This movement will be comparatively rapid until the cam reaches a position to cause the inclined portion 35 to engage with the roller; at this point the movement will be slower. This is indicated by the dotted line position A in Fig. 2. The inclined portion 35 is preferably so arranged that it will serve to move the roller 22 and die 19 the proper distance to completely form the shoe. Upon the further rotation of the shaft 9 the roller 22 will engage with the curved portion 36 of the cam moving the bent and formed shoe over the table 16 so that it will ordinarily drop off of the table. After the cam reaches the position shown in dotted line position B the point of the cam will pass beyond the roller 22 and allow the latter to return. As, however, there will be more or less momentum of the member 20 and the die 19 in the direction away from the cam, and as the cam is rotating at a considerable rate of speed the roller will not keep in constant engagement with all of the surface of the cam. The roller will move backward at the same time the cam continues to turn and the roller will strike against the cam at a position some distance removed from the point. This will produce a decided blow upon the cam and will jar the entire machine a sufficient extent to disengage the shoe from the die and the table should it have a tendency to stick. The operation will be continued without interruption so long as the hot billets are placed upon the table. There will be no danger of the billets sticking to the die by being too hot as the blow of the roller upon the cam will be sufficient to dislodge it.

The shape of the main cam is such that the bending die is held in retracted position during a comparatively long period of time, much longer than if cranks or eccentrics were used. This gives a greater time for the attendant to place a fresh billet in place, without slowing the operation of the machine and thereby reducing its output. I find in practice that this improved machine may be operated as fast as the previously operated crank machines, and the billets in-

troduced by a boy instead of a high priced man as required by the old machines, and the output will be as great if not greater.

The heels are formed by means of the die plates 11 and roller 11^a. These are moved in by engagement of the cams 10 with the connecting rods 34 and through the agency of the cams 15 and rollers 13 and 42, the plates 11 will be moved together at the proper moment forming the heel around the die 19. This movement of the die plates and rollers occurs while the die 19 is being moved by the inclined portions 35 of the cam 33. The projecting fingers 18 keep the forming plates down when they are extended, as they would have a tendency to rise owing to the lifting action of the beveled sides of the shoe upon the forming rollers.

The cams 10 are preferably made adjustable, as shown in Fig. 7, so as to accommodate different sizes and shapes of shoes. Each is provided with fingers 10^a which grasp the shaft 6 and a bolt 10^b which connects it to the gear 8, or to a disk 10^c. A bolt 10^d permits accurate adjustment. The squeezing dies 15 are adjustably connected to their supports by means of bolts 15^a engaging with slots, as shown. The squeezing is accomplished by means of the dies 15 and blocks 48. The dies and blocks are so adjusted that the ends of the billet will be upset between the two, and the desirable extra thickness at the heels thereby formed. The inclined edges of the dies acting upon the inclined blocks will cause this upsetting formation. These dies are moved so that the squeezing operation occurs before the bending and forming operations.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a horse shoe machine, the combination with the bending die, a movable support therefor, and a rotating cam for moving it outward, and a spring opposing the action of the cam, the cam having a point at its farthest position of out-throw, so that when it moves beyond the die support the spring will draw it back and deliver a blow against the cam and release the shoe from the die.

2. In a horse-shoe machine, the combination with a table and a bending die, covers above the table and large flat plates resting upon the table and below the covers, the said plates having each a roller at one corner for engagement with the billet, and means for sliding the plates, the width of the plates preventing them from being twisted.

3. In a horse shoe machine, the combination with a bending die, of sliding forming plates, each having rollers at one end, of adjustable abutment rollers, and cams, means

for moving the cams, the cams being freely connected to the moving means so as to permit of adjustment of the abutment rollers.

4. In a horse shoe machine, the combination with a bending die, of sliding forming plates, each having rollers at one end, of adjustable abutment rollers, and cams, means for moving the cams, the cams being freely connected to the moving means so as to permit of adjustment of the abutment rollers, the said cams resting upon a table and merely abutting against the moving means so that they can be removed without unfastening.
5. In a horse shoe machine, the combination with a table and a bending die, of sliding forming plates, rollers thereon, and adjustable abutment rollers, of free cams resting upon the table between the rollers, and covered by the forming plates, and rods for moving the cams, the said cams and rods merely abutting together.
6. A horseshoe machine having in combination adjustable blocks opposed to squeezing dies, a raised table and a cover plate, the blocks bearing against the raised table and being clamped between the table and cover plate, the said blocks forming a support for the cover plate, the faces of the blocks opposed to the dies being inclined, and means for laterally adjusting the blocks to the path of movement of the squeezing dies.
7. In a horse shoe machine, a table of such

a shape that one part of it will be wider than the opening between the heels of the shoe and another part narrower, in combination with the bending die, and the sliding forming dies so arranged that they will do the bending and forming operations, while the heels of the shoe are resting upon the wider portion, and means for moving the formed shoe along the table to cause it to straddle the table.

8. In a horse shoe machine, the combination with a support, of a sliding forming plate, a cover plate therefor, a squeezing block, the said block being clamped between the cover and support, and a securing bolt for the cover passing through it intermediate its ends, the said cover being formed of elastic material, whereby it may be flexed or buckled, so that it will always closely engage the block irrespective of expansion of the parts.

9. In a horse shoe machine, the combination with a sliding bending die, a cam for actuating it, a return lever, a rod engaging therewith, the said lever having a socket within which the rod engages, and a spring for engaging the rod and actuating the lever.

This specification signed and witnessed this 21st day of November, 1905.

ARTHUR SMITH.

Witnesses:

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