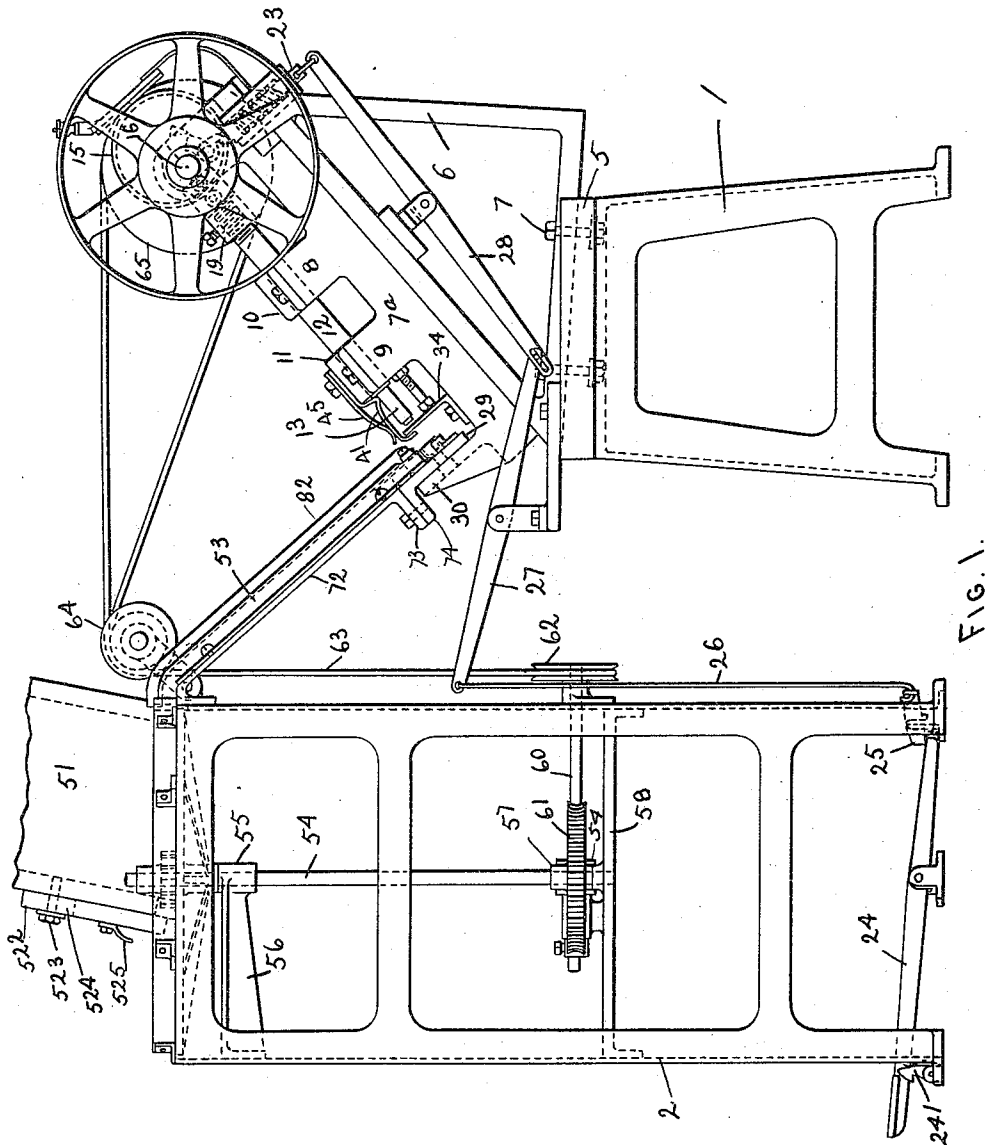


M. F. CAHILL.
MACHINE FOR PUNCHING OR SHAPING METALLIC BLANKS.
APPLICATION FILED JAN. 10, 1910. RENEWED OCT. 4, 1911.

1,016,932.

Patented Feb. 13, 1912.

3 SHEETS—SHEET 1.



WITNESSES:

A. E. Ellis
M. B. Baker

INVENTOR:

Michael F. Cahill,
By his Attorney,
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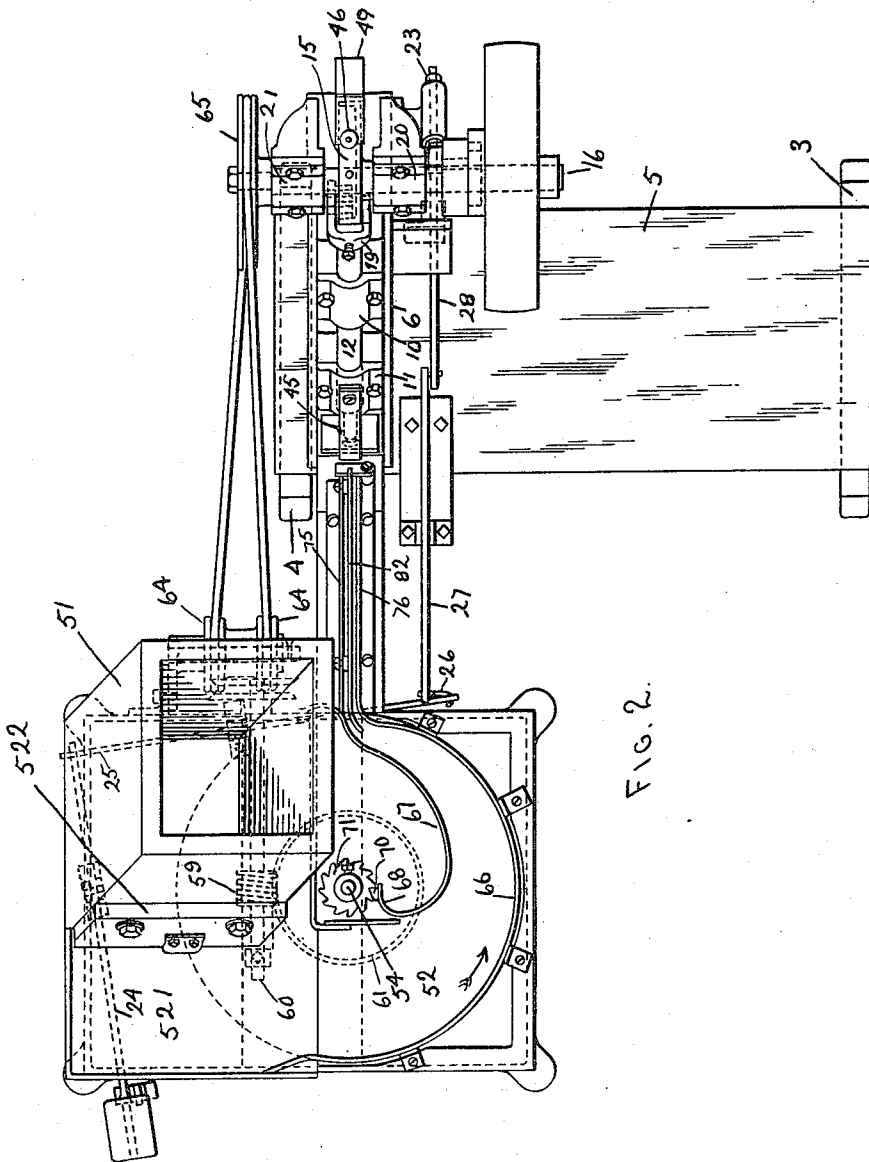


FIG. 2.

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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR PUNCHING OR SHAPING METALLIC BLANKS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, MICHAEL F. CAHILL, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Machines for Punching or Shaping Metallic Blanks; 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 a punching press for punching or forming metallic articles and more particularly to a machine for punching or shaping cups or shells used in the manufacture of ferrules for tool handles and for other purposes.

In the present embodiment of the invention it is shown as a machine particularly adapted for punching a piece from the closed end of a cup or shell in the manufacture of ferrules, but it will readily be understood that it may be employed in performing a punching operation in any kind of metallic blank and that by substituting other dies for those shown the metallic blanks may be struck up and shaped instead of being punched.

The object of the present invention is to produce a simple and automatic machine comprising means for receiving and feeding or delivering the blanks to the dies, to provide a simple and rapidly operating dying out mechanism, and to combine therewith means for insuring the rapid discharge of the finished articles from the machine.

To the above ends the present invention consists of the devices and combinations of devices which will be hereinafter described and claimed.

The present invention is illustrated in the accompanying drawings, in which:—

Figure 1 shows a machine in side elevation with a portion of the upper part of the hopper broken away. Fig. 2 shows a top plan view of the machine. Fig. 3 shows a cross section through the delivering end of the race-way taken on the line A—B, in Fig. 4. Fig. 4 shows a top plan view of the race-way and with a portion of the delivery table. Fig. 5 shows a longitudinal vertical section through the race-way and showing a portion of the delivery table. Fig. 6 shows a longitudinal vertical sectional view

illustrating the coöperation of the lower end of the race-way with the punching dies, and also showing the stripping and ejecting device. Fig. 7 shows a horizontal sectional view through the main shaft of the machine and illustrating the mechanism for operating the reciprocating plunger carrying the punch. Fig. 8 shows in partial side elevation and vertical section the punch mechanism and illustrating the operation of the ejecting device. Fig. 9 shows a sectional detail of the adjustable connection of the punch plunger and its head.

Similar reference characters will be employed throughout the specification and drawings to designate corresponding parts.

The machine comprises a frame of suitable size and construction to support the operating parts, and as shown in Fig. 1, this frame in the machine as illustrated, embodies a stand or table 1, to support the punching mechanism, and a stand or table 2 to support the feeding mechanism.

The stand or table 1 comprises the end frames 3 and 4, to which is bolted a top or table 5. Mounted upon the top or table 5 is a substantially triangular frame 6, held thereto by the bolts 7, which frame 6 supports the casting 7^a, constituting the supporting frame of the main shaft and the punching mechanism, as will be described. The frame 7^a has upon its upper surface the integrally formed supporting bearings 8 and 9 which, together with the bearing members 10 and 11, guide and support the plunger 12 carrying the male die, or as shown, the punching member 13, which is removably fitted in a bearing 14 at the lower end of the plunger 12.

The plunger 12 is reciprocated in its bearings, the line of reciprocation being preferably at an angle of forty-five degrees, as shown, and the movement of the plunger 12 is preferably positive in both directions and is imparted by an eccentric 15 mounted upon the shaft 16, which eccentric is arranged to be engaged both upon its inner and outer surfaces respectively by the rolls 17 and 18 carried by the head 19, adjustably secured to the upper end of the plunger 12, the arrangement being such that a rotation of the shaft 16 will impart positive reciprocations to the plunger 12, carrying the punch 13.

This shaft 16 rotates in bearings 20 and 21 supported at the upper end of the casting

7^a, and it carries a loose belt pulley 22, which is constantly driven by a belt from any suitable source of power and is arranged to be connected at the will of the operator to the shaft 16 by any suitable form of clutch mechanism 23, controlled by a foot treadle 24, through the lever 25, rod 26, levers 27 and 28, or in any suitable manner, the arrangement being such that a depression of the foot treadle 24 will, through the instrumentalities just described, control the connection of the belt pulley 22 with the shaft 16 and its automatic disconnection therefrom when the foot treadle is released.

15 To hold the foot treadle depressed there is provided a spring catch 241 arranged to engage the treadle and as long as it is in engagement with the treadle the machine will be in operation.

20 I do not herein describe the clutch mechanism in detail, as the same in and of itself forms no part of the present invention, and it may consist of any usual form of start and stop mechanism.

25 From the foregoing it will be seen that the rotation of the shaft 16 will impart rapid positive reciprocations to the plunger 12. The punch or die 13 coöperates with the female die 29 supported upon a bracket 30 constituting an integral part of the casting 7^a, and in the illustrated embodiment is provided with an aperture 31 in line with the reduced end 32 of the punch 13, the cup or shell to be punched being supported over the aperture 31 and in line with the reciprocating punch 13, which, as it is thrown down, punches a disk from the closed end of the cup which disk passes through the aperture 31 and through an aperture 33 in the bracket 30 and thence from the machine into a suitable receptacle (not shown) placed to receive the same.

As the plunger 12 and punch 13 is retracted it carries with it the punched shell, which will be stripped off of the end of the punch 13 by a stripper plate 34 attached by means of a bolt 35 to the casting 7^a and which is provided with an aperture 36 through which the punch 13 reciprocates, the aperture 36 being of substantially the same diameter as the punch 13 but of less diameter than the punched shell, the result being that as the punch 13 is drawn back, the punched shell will be stripped therefrom by the stripper plate 34, the stripper plate 34 being positioned at such a point with relation to the backward or upward movement of the punch as to insure the stripping of the punched shell therefrom before it reaches the extreme of its upward movement.

The stripper plate 34 is supported and braced by an adjustable threaded rod 37 which is tapped into a threaded bearing 38 in the projection 9 and is held in its ad-

justed position by means of a set nut 39 with its head 40 in contact with the rear of the stripper plate.

As the machine is run at a very high speed, it is necessary to insure the ejection of the punched shell from the machine quickly so as to obviate any liability of the punch at its next downward movement coming in contact with the punched shell, and to secure this result I have provided a striking device arranged to quickly strike the punched shell at the instant it is stripped off of the punch and to deliver thereto a sharp blow to insure its ejection from the machine, and in the machine of the drawings this striking device is operated in one direction by the reciprocating plunger carrying the punch, the arrangement being such that as the plunger descends it will remove the striking device from the path of movement of the punch and as it ascends it will permit the striking device to act upon the punched shell. In the machine of the drawings this striking device consists of a spring arm 41 provided with a bend or shoulder 42 arranged in the path of movement of the lower end of the plunger 12, the arm 41 being fastened at its rear end by a screw 43 to the bearing plate 11 and at its forward end carrying a downturned striker 44. The whole is made of spring metal and will be quickly thrown to the position shown in Fig. 8 upon the retraction of the plunger 12, thus causing the striker 44 to strike the punched shell as it is stripped off by the stripper plate 34, but in order to insure the quick action of the striker, I prefer to back it up by a leaf spring 45 which is also secured in position by the screw 43. The arrangement is such that as the plunger 12 is forced downward the lower end of the plunger will engage the shoulder 42 and move the striker and its spring to the position shown in Fig. 6 of the drawings, but as the plunger 12 is moved backward or upward, when its lower end passes above the shoulder 42, the striker and its spring will be quickly moved to the position shown in Fig. 8, thus causing the striker 44 to deliver a quick sharp blow to the punched shell, insuring that it will be ejected from the machine and with no liability of its remaining in the path of movement of the punch 13.

In order to lubricate the inner and outer surfaces of the eccentric 15, I have provided a lubricating device, which consists of an oil receptacle 46 carried by a plate 47, the plate 47 carrying upon its under surface a fibrous pad 48 arranged to receive oil from the oil receptacle 46 and to deposit it upon the outer surface of the flange of the eccentric 15, which flange is provided with apertures leading to the inner surface, and the fibrous pad 48 is held yieldingly in contact with the outer surface of the eccentric by means of a

spring arm 49 to which the plate 47 is connected and which spring arm 49 is at its lower end 50 attached to the under surface of the casting 7^a.

5 As the punch is operated very rapidly, it is of course necessary to insure an automatic and constant feed of the blanks or cups in position to be operated upon by the punch, and to secure this result the machine of the
10 drawings embodies feeding mechanism which will now be described.

The frame or standard 2 supports a hopper 51 into which a mass of the blanks or cups to be punched are placed. The hopper
15 51 is inclined slightly relatively to the perpendicular to facilitate the discharge of the blanks or cups at the bottom and is open at its bottom and discharges onto a sorting table 521, which forms the bottom of the
20 hopper, the blanks or cups emerging beneath a gate 522 loosely mounted for a vertical movement at the front of the hopper by means of the bolts 523 which pass
25 through slots 524 in the gate, the arrangement being such that the operator may raise the gate and permit a number of the blanks or cups to be discharged upon the top of the sorting table 521. The gate may be provided with a suitable handle 525 by means
30 of which it may be raised. From the sorting table 521 the operator passes the blanks or cups to a revolving table 52 which carries the blanks or cups about in the direction of the arrow shown in Fig. 2 to the race-way
35 53. The revolving table 52 is mounted upon the upper end of a vertical shaft 54 having a bearing 55 carried by an arm 56 and a bearing 57 carried by a cross brace 58 and the shaft 54 when revolved will impart a
40 constant revolving movement to the circular table 52 by means of a worm 59 carried by a shaft 60, which worm engages a worm wheel 61 carried by the shaft 54. The shaft 60 is revolved by means of a pulley 62 which receives a belt or cord 63 running over idle
45 pulleys 64 and driven by a grooved pulley 65 carried by the main shaft 16. Thus a constant revolving movement will be imparted to the table 52 in the direction of the arrow shown in Fig. 2.

The blanks or cups which are exposed upon the upper surface of the sorting table 521 (if as shown said blanks are in the form of cups), must all lie with their open ends
55 uppermost and therefore the operator turns those which do not fall in this position. The revolution of the table 52 carries the blanks or cups in the direction shown by the arrow between a guide wall 66 surrounding that
60 portion of the table 52 which is exposed to view and a movable wall 67, which I will call an agitator, it consisting of a curved spring strip fastened at one end to one of the side walls of the race-way and having a
65 curved end 68 carrying a beveled block or

tooth 70 arranged to be engaged by a ratchet wheel 71 carried by the upper end of the shaft 54, the arrangement being such that as the shaft 54 is revolved the ratchet wheel 71 will cause a vibration of the curved guide
70 or agitator 67 which insures against any liability of the blanks or cups jamming or sticking on their way to the race-way. The revolving table 52 carries the mass of blanks or cups between the guide wall 66 and the
75 agitator 67 to the race-way 53, which consists of a base plate 72 fastened at its upper end to the top of the stand 2 and at its lower end by means of a bracket 73 to the bracket 74 of the die plate 29. The race-way also
80 consists of the side strips 75 and 76, forming a continuation respectively of the guide wall 66 and the agitator 67 and spaced apart a sufficient distance to permit the blanks or cups to descend in a single line, the walls 75
85 and 76 being carried by plates 77 and 78 respectively, which are adjustably connected to the base plate 72 by means of the screws 79 which are tapped into threaded apertures in the base plate 72 and engage slots in the
90 plates 77 and 78, thus providing for the lateral adjustment of the side plates 75 and 76 to correspond to the diameter of the blanks or cups which are being fed, and to insure their descent in a single line.

It will be noted that the die plate 29 forms a portion of the lower end of the raceway and that the lowermost blank or cup in the line will be supported directly over the die or aperture 31 of the die plate 29, it resting upon
100 a V-shaped bracket 80 held by screws 81 to the front of the die plate 29, the arrangement being such that the lowermost blank in the line of blanks will be supported in the V-shaped bracket 80 directly over the die or
105 punch aperture 31. The punch 13 as it is drawn backward removes the punched shell, permitting the line of blanks or cups to drop by gravity to bring another in position to be operated upon by the dies.

In order to insure against the accidental dislodgment of the blanks or cups in the race-way I have provided a guard 82 consisting of a thin strip of metal supported
110 by the plate 75, it being connected thereto by the screws 83 and the spacing washers 84, which causes the guard 82 to be positioned along the central longitudinal line between the plates 75 and 76 and at a distance
115 above the bottom of the race-way corresponding to the depth of the blanks or cups, as clearly shown in Figs. 5 and 6 of the drawings. This guard prevents the accidental dislodgment of the line of blanks or cups and the over-riding or over-crowd-
120 ing of the same, insuring that they will be fed in a single line.

At the lower end of the race-way there is provided a pivoted finger 85 spanning the
125 space between the plates 75 and 76 and ex- 130

tending beneath the lower end of the guard 82 in position over the next to the last blank or cup in the line. This finger 85 prevents the displacement of the blank or cup next to the last in line as the latter is removed by the punch.

The plunger 12 is threaded at its upper end as shown at 121 and is received in a threaded chamber 122 of the head 19 and within the chamber 122 is a block 123 having a threaded inner face to engage the threaded end of the plunger 12, said block being acted upon by a set screw 124 tapped into a threaded aperture in the wall of the chamber 122. By loosening the set screw 124 the plunger 12 may be turned to secure the desired adjustment of said plunger with the head 19, after which the set screw will be set up, forcing the threaded block against the threaded end 121 of the plunger and securely holding it in its adjusted position.

In the operation of the machine the hopper 51 is filled with the blanks or cups to be operated upon by the dies, in the present instance with shells or cups to be punched. The operator standing at the left of the machine, as shown in Fig. 1, places his foot upon the treadle 24, and depresses it, engaging it with the catch 241, thus permitting the clutch to connect the belt pulley 22 and the shaft 16. By means of the shaft 16, the die plunger 12 is given rapid reciprocations, carrying the punch die 13 toward and from the die plate 29, and by means of the belt 63 the table 52 is revolved in the direction of the arrow shown in Fig. 2, and the agitator 67 is vibrated by means of the pawl 71 and the inclined tooth 70. The operator raises the gate 522 and permits a number of the blanks or cups to be discharged from the hopper onto the sorting table 521, whereupon those that fall with their closed end uppermost are turned over so that all of the blanks or cups as they are passed from the sorting table 521 to the revolving table 52 shall have their open ends uppermost. The revolving table 52 carries the blanks or cups around between the wall 66 and the agitator 67 and from the table 52 they are guided into the race-way 53 down which they will fall by gravity, the lowermost blank or cup in the line being received by and resting upon the bracket or rest 80, immediately over the die opening 31 in the die plate 29 and in line with the reciprocating die punch 13, and as the punch is moved downward it will engage the closed end of the blank or cup supported on the bracket 80 and punch from the closed end a circular disk, which passes through the openings 31 and 33. The punched cup (or tubular shell which results from this operation of punching) is carried backward with the punch 13 upon its return movement until it is arrested by the stripper plate 34,

when it will be stripped from the punch and will be struck a quick blow by the striker 44 and ejected from the machine, it falling into a suitable chute (not shown in the drawings), which conveys it to a receptacle placed in convenient position to receive the same. As the lowermost or punched blank or cup is drawn out from the line in the race-way, the line will drop the distance of one blank by gravity, bringing another one in position to be operated upon by the punch.

Having described my invention I claim as new and desire to protect by Letters Patent of the United States:—

1. In combination, a hopper, a fixed sorting table upon which said hopper discharges, a revolving table for receiving the blanks from the fixed sorting table, an inclined race-way, suitable guides leading the blanks from the revolving table to the race-way, one of said guides being movable, and means for moving said guide, substantially as described.

2. In combination, a revolving table, a race-way into which said table discharges, a movable guide, means for agitating said movable guide, a die plate at the lower end of said race-way, a rest or bracket on said die plate for supporting the lowermost blank in the line of blanks over the opening in the die plate and a reciprocating die, substantially as described.

3. In combination, a reciprocating plunger, a die carried by said plunger, a stripper plate through which said die passes and a striker located adjacent the stripper plate and actuated by the die plunger to strike the died out article as it is stripped from the die, substantially as described.

4. In combination, a reciprocating plunger, a die carried by said plunger, a stripper plate through which said die passes and a spring striker located adjacent the stripper plate to strike the died out article as it is stripped from the die, said striker being actuated by the die plunger, substantially as described.

5. In combination, a race-way, a rest at the lower end of said race-way for supporting the lowermost blank in the line of blanks in the race-way, and a guard transversely spanning the race-way above the next adjacent blank in the race-way, substantially as described.

6. A machine for punching or stamping metallic blanks having, in combination, a fixed female die, a movable male die cooperating therewith, a reciprocating plunger bearing the male die on one end, a head chambered to fit over the other end of the plunger, means engaging the head for reciprocating the plunger, means for relatively adjusting the plunger and head for the purpose of adjusting the dies relatively to each other comprising a screw-threaded connec-

tion between the end of the plunger and the plunger-receiving chamber of the head, and means for locking the plunger and head in adjusted position comprising a plate loosely fitted in a shallow recess in the wall of the chamber and having a threaded inner face for engaging the threads of the plunger and a set screw received through a laterally extending screw-threaded aperture in the head and adapted to be turned against said plate to force it against the threads of the plunger, substantially as described.

7. A machine for punching or shaping metallic blanks having, in combination, a fixed female die, a male die cooperating therewith, a reciprocating plunger bearing the male die, and means for reciprocating the plunger to actuate the dies comprising a driving shaft, an eccentric on the driving shaft having a laterally extending flange along its periphery, the outer surface of the flange forming the peripheral surface of the eccentric, a roll mounted on the head of the plunger in line with the axis of the plunger and bearing against the outer surface of the flange, a second roll mounted on the head of the plunger and bearing against the inner surface of the flange, substantially as described.

8. A machine for punching or shaping metallic blanks having, in combination, a fixed female die, a movable male die cooperating therewith, a reciprocating plunger

bearing the male die, means for reciprocating the plunger to operate the dies comprising a driving shaft, an eccentric on the shaft having a laterally extending flange along its periphery, an eccentric-engaging member mounted on the plunger in line with the axis of the plunger and bearing against the outer surface of the flange, and a second eccentric-engaging member mounted on the plunger and bearing against the inner surface of the flange, substantially as described.

9. A machine for punching or shaping metallic blanks having, in combination, a fixed female die, a movable male die cooperating therewith, a reciprocating plunger bearing the male die, means for reciprocating the plunger to operate the dies comprising a driving shaft, an eccentric on the shaft having a laterally extending flange along its periphery, an eccentric-engaging member mounted on the plunger and bearing against the outer surface of the flange, and a second eccentric-engaging member mounted on the plunger and bearing against the inner surface of the flange, substantially as described.

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

MICHAEL F. CAHILL.

Witnesses:

T. HART ANDERSON,
L. K. ALLEN.