Nov. 6, 1928. 1,690,419

P. H. McCAIN

MACHINE FOR HEADING BLANKS

Filed March 17, 1924

Fig. 1

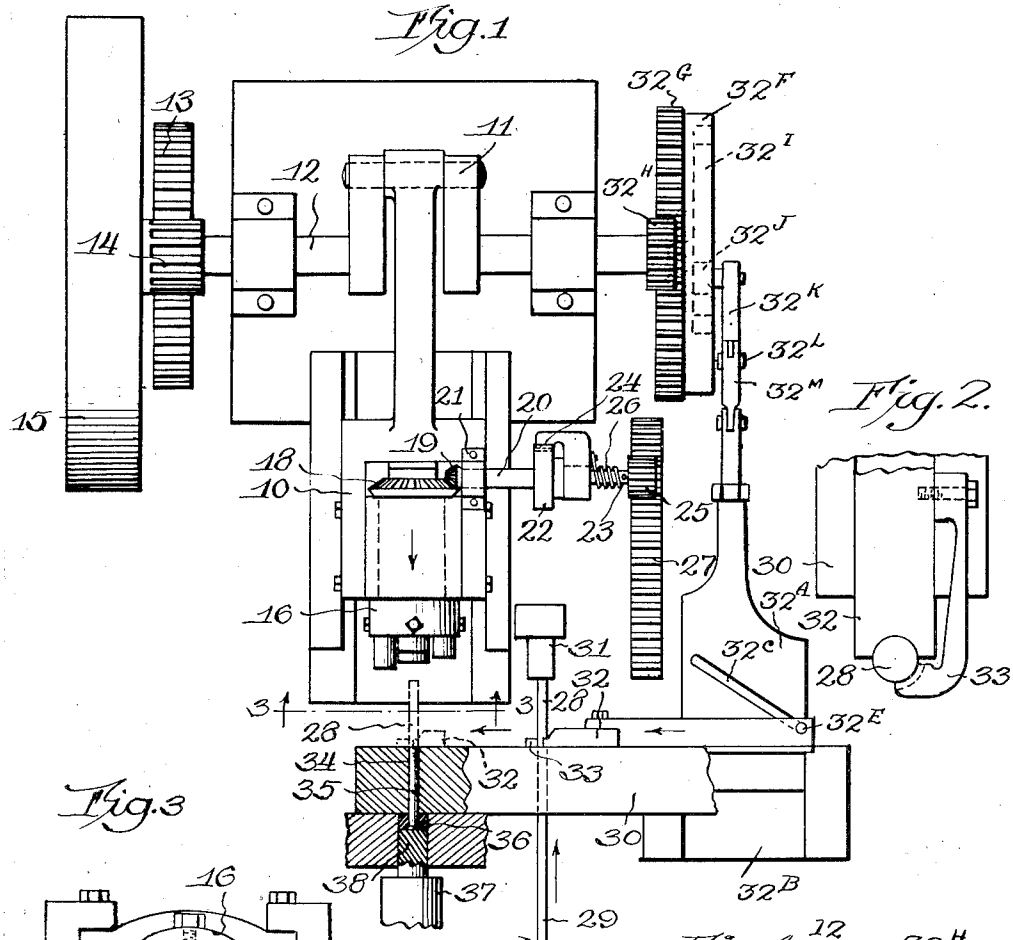


Fig. 2.

Fig. 3

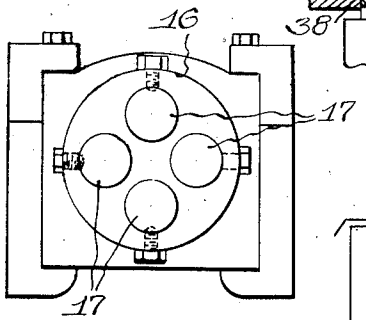


Fig. 4.

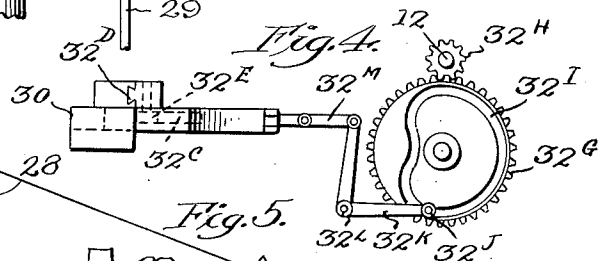
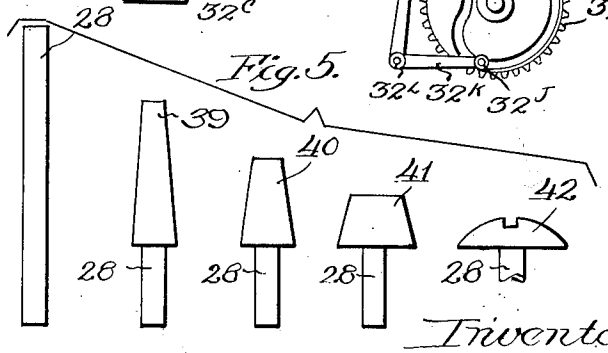


Fig. 5.



Inventor,
Paul H. McCain,
By R. F. Jochum & Atty.

Patented Nov. 6, 1928. 1,690,419

UNITED STATES PATENT OFFICE.

PAUL H. McCAIN, OF CHICAGO, ILLINOIS, ASSIGNOR TO ECONOMY SCREW CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

MACHINE FOR HEADING BLANKS.

Application filed March 17, 1924. Serial No. 699,770.

This invention relates to improvements in machines for heading blanks for bolts, screws and the like, and one of the objects of the invention is to provide an improved machine of this character by means of the use of which there may be formed upon a blank a head which is abnormally large or in which head more material is employed than has heretofore been possible. This is accomplished by reason of the fact that the head is formed in four steps of a swaging or pressing operation, through the medium of four punches mounted upon a rotatable support carried by the reciprocating ram or plunger of the press.

The rotatable support is automatically shifted at predetermined times in the cycle of operation of the plunger, and the support being rotatable will permit the press to be of a compact construction.

Heretofore, heads have been formed by means of dies carried by a reciprocating plunger and which dies have been mounted for sliding movement upon the plunger in a plane transverse to the plane of reciprocation of the plunger, and by reason of this fact the prior machines form the heads in three steps of operation, with the result that abnormal heads or heads containing an extra amount of material cannot be formed on the bolt or screw.

It is one of the objects of the present invention to provide a simple and compact machine of this character in which the four punches or tools will be automatically brought into position to operate upon the blank to perform the successive steps in the swaging or pressing operation of forming the head.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawing illustrating this invention, and in which

Figure 1 is a view in side elevation, partly in section of a machine constructed in accordance with the principles of this invention, parts of the machine being omitted.

Figure 2 is a top plan view of the cutting punch and holding clamp for severing the blank from the stock and transferring the same to a position to be engaged by the punches.

Figure 3 is a detail view as taken on line 3—3, Figure 1.

Figure 4 is a detail right hand elevation of Figure 1, with parts omitted and on a reduced scale.

Figure 5 illustrates the different shapes of the blank in the steps of operation of forming the same.

Referring more particularly to the drawing the numeral 10 designates a reciprocating plunger or ram which is operated through the medium of a crank 11 on a shaft 12, and this shaft is rotated through the medium of gears 13 and 14, by means of a suitable drive pulley 15 which is given its motion from any suitable source, not shown.

Carried by the ram 10 is a rotatable punch carrying support 16 which has removably mounted thereupon four punches 17, the active faces of which are of any suitable configuration according to the shape head it is desired to form. The support 16 is adapted to be intermittently rotated at a predetermined time in the cycle of operation of the ram 10, in any desired or suitable manner but preferably through the medium of a gear 18 which is connected with the support 16. Meshing with the gear 18 is another gear 19 carried by a shaft 20 journaled in a suitable bearing 21 and carried by the shaft 20 is a one toothed gear 22. A co-axial shaft 23 co-operates with the shaft 20 and carries a pawl or finger 24 adapted to co-operate with the one toothed gear 22. On the shaft 23 is a pinion 25, and a spring 26 is provided for controlling the action of the pawl or finger 24. The actuating mechanism for the support 16 is bodily reciprocable with the ram 10 and arranged in the path of movement of the pinion 25 is a rack 27, the pawl or finger 24 being so arranged that the cylinder 16 will be maintained in its adjusted position on the forward stroke of the ram, and when the ram 10 is retracted the pinion 25 will move the finger or pawl 24 in a direction to co-operate with the one toothed gear 22 to impart one step of rotation to the cylinder 16 to position another one of the punches 17 to engage the work on the next advancing movement of the plunger or ram; that is, the parts operate with a ratchet movement to impart a step-by-step rotative movement to the cylinder or support 16. Details of

the ratchet mechanism are not illustrated, inasmuch as construction suitable for the purpose is well within the knowledge of the average mechanic.

The blank 28 which is to be headed is cut from the stock 29, which latter is preferably wire of any desired configuration in cross section and is fed through a guide 30 in any suitable manner to engage a stop 31. A cutter 32 having a clamping arm or finger 33 connected therewith is then advanced to sever the projecting end of the stock which forms the blank 28. When the blank is severed the cutter and clamping element 33 are then advanced to position the blank 28 over a forming recess 34 and in a position to be engaged by one of the punches 17 when the ram 10 is advanced. Any suitable means may be provided for reciprocating the cutter member 32 and to that end there may be provided a member 32^A slidable in a suitable guideway 32^B and having an inclined or cam slot 32^C in its body.

The member or cutter 32 reciprocates upon the guide 30 in any suitable manner, such as by means of a dove tail groove connection 32^D.

A pin 32^E projects from the member 32 and operates in the cam slot 32^C so that as the member 32^A is reciprocated the member and cutter 32 will be moved backwardly and forwardly. Any suitable means may be provided for reciprocating the member 32^A such as a cam 32^F connected with a gear 32^G for rotation therewith and with the gear 32^G a gear 32^H carried by the shaft 12 meshes. The gears 32^H and 32^G are of a four to one ratio, and the cam 32^F is provided with a cam slot 32^I for receiving a roller 32^J which operates therein. The roller 32^J is connected to one arm of a bell crank lever 32^K which is pivotally mounted as at 32^L. To the other end of the bell crank lever is connected one end of a link 32^M and the other end of the link is connected with the member 32^A so that as the cam 32^F rotates the member 32^A will be reciprocated and as before stated, the gears 32^H and 32^G are of a four to one ratio, with the result that the shaft 12 will make four complete revolutions to reciprocate the plunger 16 while the cam 32^F is making one revolution, thus permitting four steps of operation to be formed upon the blank 28 before another blank 28 is cut from the stock 29 are placed into position to be operated upon by the dies. A knock out pin 35 operates in the recess 34 and is provided with a head 36 to limit its movement in one direction. A plunger 37 operates so that the end 38 thereof will engage the head 36 of the knock out pin 35 at a predetermined time in the cycle of operation of the machine to knock out the completed work.

At the commencement of the operation, the parts will assume the position as shown in Figure 1. The blank 28 will be severed from the stock 29 as the cutter 32 advances and the blank will be carried in an upright position to the position shown in dotted lines in Figure 1, so that the end of the blank 28 will be in alinement with the recess 34. The plunger 10 is then advanced and one of the punches 17 will engage the blank 28 to first seat the blank in the recess 34 and retract the knock out pin 35, and upon the same stroke of the plunger 10 the end of the blank 28 will be upset by a swaging or pressing action so that the end will be shaped as at 39 in Figure 4. The plunger 10 is then retracted and during its retracting operation the rack 27 and pinion 25 will rotate the punch carrying member 16 with a ratchet movement one step of rotation to position another of the punches 17 in position to engage the partially shaped blank 28. Upon the second advancing movement of the plunger 10 the blank will be shaped as at 40 in Figure 4. Upon the next retracting action of the plunger the support 16 will be again rotated so that the plunger upon its forward movement will shape the blank as at 41 in Figure 4. The final stroke of the plunger 10 will impart the final shape 42 to the blank 28 and as the plunger 10 is retracted after the final stroke, the plunger 37 will be advanced to operate the knock out pin 35 to eject the completed blank from the recess 34. As the plunger 37 advances to knock out the work, the cutter 32 is advanced and will carry another blank 28 into the position shown in dotted lines in Figure 1, and this operation will also serve as a means for assisting in discharging the completed blank.

While the preferred form of apparatus has been herein shown, it is to be understood that various changes may be made in the details of construction and in the combination and arrangement of the several parts, within the scope of the claims, and therefore it is desired that the drawing submitted herewith shall be considered as being merely diagrammatic.

What is claimed as new is:—

1. A machine of the character described having a forming recess into which a blank is adapted to be inserted, means operating in timed relation with the plunger for positioning the end of the blank over the recess, a reciprocable plunger, a punch carrying support mounted upon the plunger for movement therewith and for rotatable movement with respect thereto and in a direction transverse to the direction of reciprocation of the plunger, a plurality of punches carried by said support, and means for intermittently rotating said punch carrying support to successively position the punches to act upon the blank, the last recited means embodying a gear connected with the punch carrying

support, an actuating gear meshing with the first said gear and means for intermittently rotating the actuating gear.

2. A machine of the character described having a forming recess into which a blank is adapted to be inserted, means for positioning the end of the blank over the recess, a reciprocable plunger, a punch carrying support mounted upon the plunger for movement therewith and for rotatable movement with respect thereto and in a direction transverse to the direction of reciprocation of the plunger, a plurality of punches carried by said support, and means for intermittently rotating said punch carrying member to successively position the punches to act upon the blank, the last recited means embodying a gear connected with the punch carrying support, an actuating gear meshing with the first said gear, a pinion connected with the actuating gear and a rack with which the pinion engages.

3. A machine of the character described having a forming recess into which a blank is adapted to be inserted, means for positioning the end of the blank over the recess, a reciprocable plunger, a punch carrying support mounted upon the plunger for movement therewith and for rotating movement with respect thereto and in a direction transverse to the direction of reciprocation of said plunger, a plurality of punches carried by said support, and means for intermittently rotating said punch carrying member to successively position the punches to act upon the blank, the last recited means embodying a gear connected with the punch carrying support, an actuating gear meshing with the first said gear, a pinion connected with the actuating gear, a rack with which the pinion engages and ratchet mechanism between the pinion and the said actuating gear.

In testimony whereof I have signed my name to this specification, on this 14th day of March, A. D. 1924.

PAUL H. McCAIN.