May 12, 1931. R. L. WILCOX 1,805,124

UPSETTING MECHANISM

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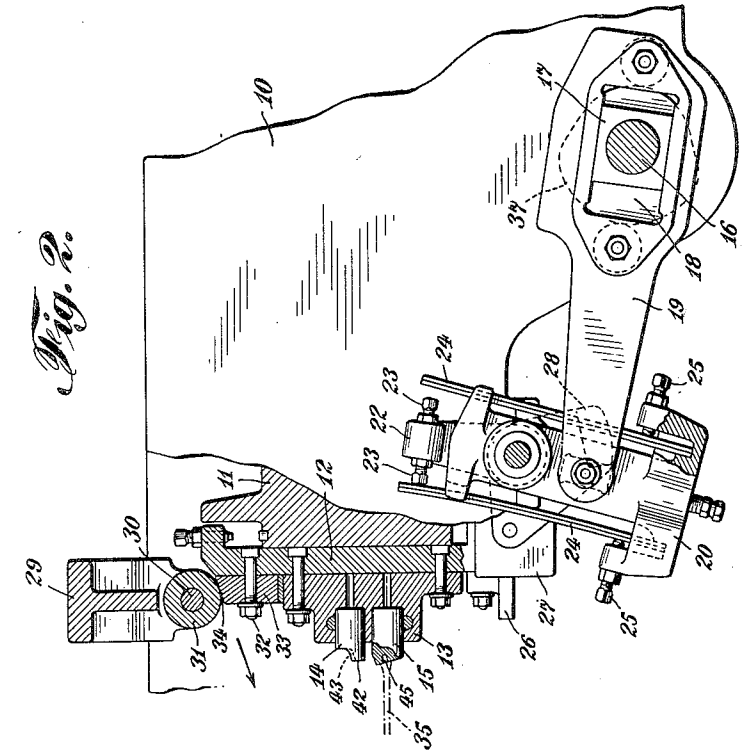

Fig. 2.

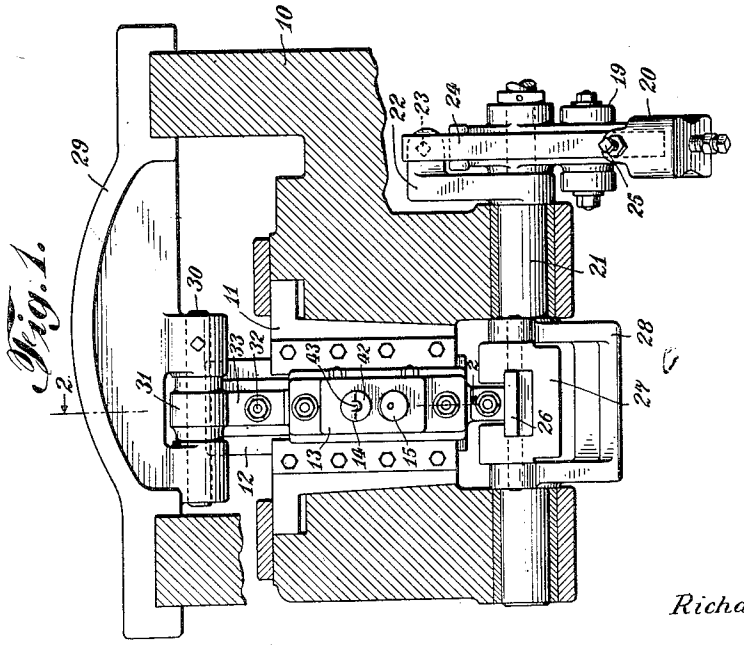

Fig. 1.

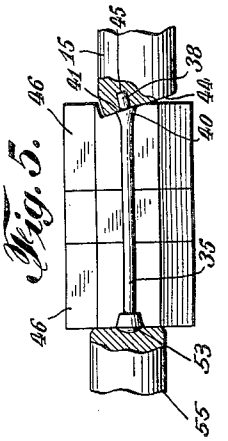

Fig. 5.

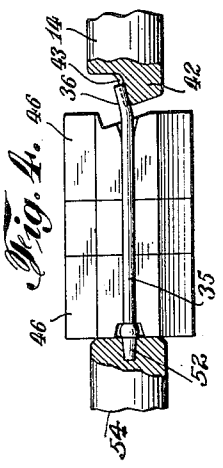

Fig. 4.

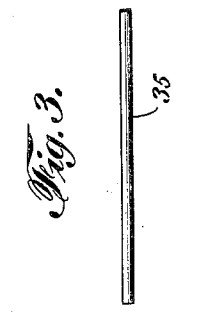

Fig. 3.

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Fig. 2.

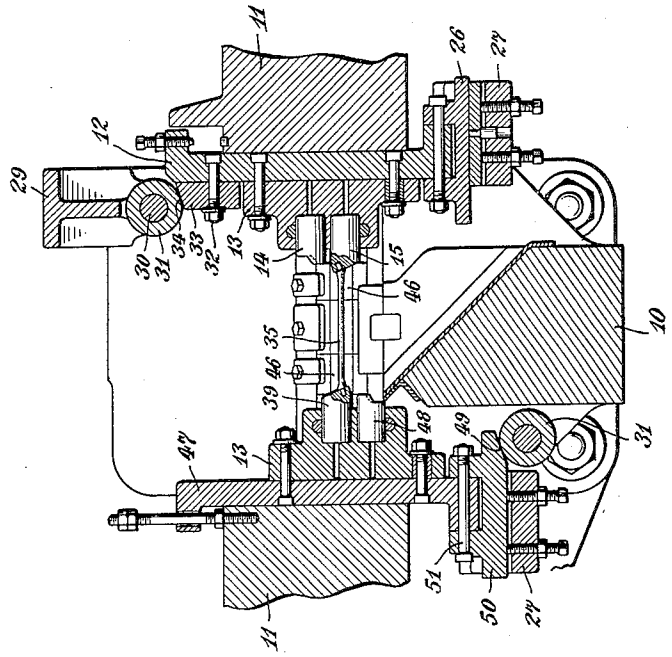
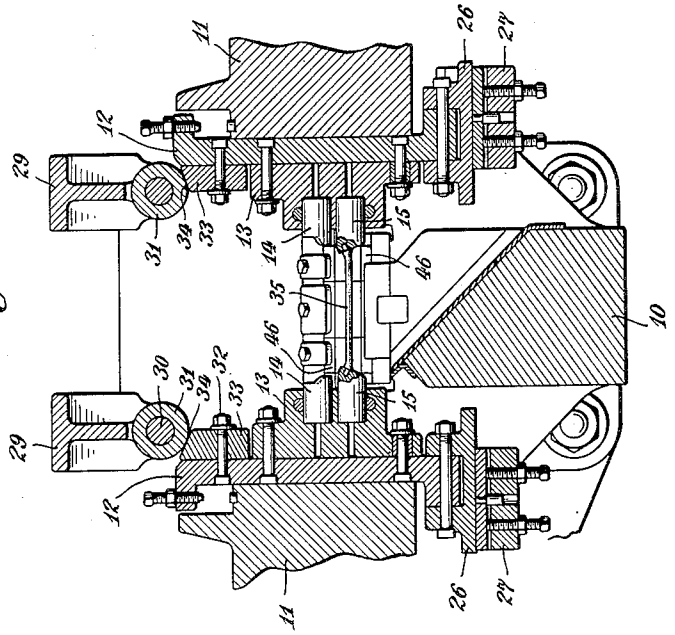



Fig. 6.

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Patented May 12, 1931 1,805,124

# UNITED STATES PATENT OFFICE

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## UPSETTING MECHANISM

Application filed May 23, 1927. Serial No. 193,648.

This invention relates to upsetting mechanism and particularly to a method and means for upsetting a workpiece or blank, at an angle to its axis, and preferably to accomplish this result by holding the workpiece in a line that is at substantially a right angle to the punch slide as is usual in such machines.

Among other aims and objects of the invention may be recited the provision of a method and means substantially as described, that is adapted for application to an upsetting machine or header of the ordinary type with the minimum addition of parts thereto, and wherein the blank is normally held in a position wherein its axis is substantially parallel with that of the punches.

My improved method and the means for effecting the same will be apparent from an inspection of the accompanying drawings in connection with the description, hereinafter contained, and wherein one of the means for accomplishing the purposes of my invention is disclosed for an understanding of the same.

In the drawings, wherein like numerals of reference indicate like parts in the several figures;

Figure 1 is a transverse sectional view of an upsetting machine or header of the ordinary type, having my improved mechanism connected therewith;

Figure 2 is a side elevation thereof partly in section, the parts in section being taken generally upon line 2—2 of Figure 1;

Figure 3 is a view of a workpiece as presented to the tools;

Figure 4 is a side elevation of a set of dies, and punches, with one form of workpiece therebetween, and after operation thereon by the first die in each set;

Figure 5 is a similar view after operations thereon by the finishing punches;

Figure 6 is a fragmentary sectional elevation of a double end header or upsetting machine illustrating one form of workpiece and the finishing dies in contact therewith; and

Figure 7 is a view similar to that shown in Figure 6, the structure being designed to produce another form of workpiece.

My improved method consists essentially in so operating the punch slide that in addition to its usual movement relative to the gate it has an independent movement thereon, whereby one or more of the punches as they move forward toward the dies travel in a path at an angle other than a right angle to the straight path movement of the punch slide.

In the drawings, 10 designates a fragmentary portion of the body member of an upsetting or heading machine of the usual type, having therein a gate 11, on the face of which is movably mounted the punch slide 12, and connected with which is the punch holder 13, having fixed therein, as is usual, the punches 14 and 15. This punch slide derives its movement relatively to the gate from a shaft 16, which carries a block 17 slidably mounted in the slot 18 in the connection arm 19, which is pivotally connected to the rock member 20 journaled on the rock shaft 21. Upon this shaft is fixed an arm 22, in which is threaded the stop screws 23.

The yielding plates 24 which are held in their lower ends in the rock member 20 by the screws 25 contact at their upper ends against the heads of the stop screws 23, and provide a flexible means for imparting the movement of the rock member 20 to the rock shaft 21 through the arm 22.

The foot plate 26, slidable in the cradle 27 connected with the yoke 28 on the rock shaft 21, provides a convenient connection between the punch slide and shaft, whereby the rocking movement of the shaft is transmitted into a straight line movement of the punch slide relatively to the gate, at the same time permitting reciprocatory movement of the latter.

In upsetting machines or headers of the ordinary type for straight heading, the movement of the punch slide is limited by stop screws or the like and is usually locked in these positions so as to be held rigid during the engagement of the punch with the workpiece. In my improved method and means the slide is not so locked when the final punch is performing its function, at which time the punch slide derives an independent movement against the action of the mechanism actuated from the shaft 16, which gives the punch its

reciprocatory movement. This mechanism comprises in part a supporting member 29, in which is a shaft 30 having thereon a cam roll 31.

Fixed to the punch slide near its upper end by the bolts 32 or the like, is a plate 33 havihg a cam face 34 thereon which during the movement of the punch slide contacts with the cam roll 31. The upper or first punch 14 is constructed with a projecting nose 42, the upper face of which is at an angle to the axis of the punch, and having a groove 43 therein. The lower or second punch 15 has an angular front face 44 with a recess 45 therein of substantially the same diameter as the workpiece 35 and occupying the same relative angle to its axis as does the groove 43 to the axis of the punch 14. These punches are shaped to produce the particular form of article illustrated herein. Other shaped dies will, of course, produce different forms of articles, and I therefore desire it to be understood that my invention is not limited to the forms of dies or finished article herein illustrated.

Dies of various forms and types may be used to support and hold the workpiece, those herein shown being designated 46, and are designed for double end heading. In such a case a second punch slide 47 is operatively mounted opposite the first mentioned punch slide and is provided with two punches 48 and 39.

Punches 14 and 48 engage the opposite ends of the workpiece at substantially the same time, likewise punches 15 and 39. As the path of travel of the punch 15 is at an angle to the axis of the workpiece, the recess 45 is located at a point above the axis of the punch, as is clearly shown in Figure 5.

In operation, the punch 14 first engages the workpiece 35, which is held in the dies 46. As the gate moves forward the outer end of the work piece 35 enters the grooves 43 in the punch 14 and by engagement with the floor thereof, such end is bent, turned or deflected at an angle to its axis, leaving, after the operation, an offset portion 36, substantially as shown in Figure 4. The punch 14 is then withdrawn, the punch slide moves upwardly through the action of the connection arm 19 and associated parts and during the forward movement of the gate, the cam face 34 on the plate 33 contacts with the cam roll 31. The continued pressure of the punch slide actuating mechanism and forward movement of the gate causes the punch slide and the punch 15 associated therewith to move downwardly a limited distance. This gives movement to the punch 15 in an angular path, substantially parallel with the angularity of the cam face 34. During this action one of the sets of plates 24 yields sufficiently to permit the supplemental movement of the punch slide and without impairing the travel of the connection arm 19, which is positively moved by the cam 37 on the shaft 16. This angular travel of the punch 15 takes place when forming the article illustrated herein during the engagement of the punch with the workpiece, at which time the bent or offset portion 36 enters the recess 45 in said punch. The workpiece is thus subjected to the pressure of the punch 15 while moving in this angular path, and thus upsetting the blank at an angle to its axis and thereby producing the article shaped substantially as shown in Figure 5. During the withdrawal of the gate 11 the punch slides moves upwardly again as the plates 24 assume their normal position, the cam face 34 retaining its contact with the cam roll 31 until moved out of engagement therewith. At this time the plates 24 are restored to their substantially normal positions and the punch slide is moved downwardly through the action of the connection arm 19, the operations being repeated as before.

In the finished article herein illustrated, a tenon 38 is formed on the end of the workpiece and is substantially the same diameter, the adjacent portion 40 being upset to conform to the shape of the opening in the die 46 with the face 41 thereon at substantially a right angle to the axis of the tenon 38. Thus, there is no upsetting at the extreme end of the workpiece, but at a point adjacent thereto. This, however, is only one of the many forms of articles that may be produced by this method and means, and the upsetting of the blank may be at the extreme end if desired.

The punches 48 and 39 perform operations on the workpiece in the same manner and with the same result as is now well known in the art, the punch 54 first producing a cone head 52 and the punch 55 the finished head 53.

In Figures 6 and 7 I have illustrated my improved mechanism as applied to a double end header or upsetting machine, wherein there are two gates that move toward and away from each other and produce finished workpieces substantially as shown herein.

In Figure 6 the cam rolls 31 are both above the punch slide. In Figure 7 one cam roll is above the punch slide and the other below. The angular upsetting at the ends of the workpiece, as shown in this latter figure, projects in opposite directions. The cam 49 in Figure 7 is formed on the shoe 50 connected with the punch slide by the bolt 51. Thus, by various arrangements of the punch slides, workpieces can be produced with an angular upset portion at either or both ends and project in any direction, as may be desired.

There are minor changes and alterations that may be made within my invention, and I would therefore have it understood that I do not limit myself to the exact construction

herein shown and described, but claim all that falls fairly within the spirit and scope of the appended claims.

What I claim as new is:

1. The method of automatically upsetting a rod by first rigidly gripping the rod at a distance back of its end, then applying lateral pressure to one side of that portion of the rod projecting beyond the gripping means to bend such portion at an angle to that part thereof within the gripping means and finally, while the rod is still retained by the gripping means, apply upsetting pressure to the outer end of the bent portion of the rod in a path substantially parallel to the axis of the turned portion to upset the same.

2. The method of automatically upsetting a rod by first rigidly gripping the rod at a distance back of its end, then applying lateral pressure to one side of that portion of the rod projecting beyond the gripping means, the extent of area of such lateral pressure determining the degree of angularity of such turned portion and finally, while the rod is still retained by the gripping means, applying upsetting pressure thereto at an angle inclined to that portion thereof within the gripping means to upset the same.

3. The method of automatically upsetting a rod by first rigidly gripping the rod at a distance back of its end, then applying lateral pressure to one side of that portion of the rod projecting beyond the gripping means, said pressure being first applied at or near the outer end of the bent portion and progressively extending along the side thereof, the extent of the area of such lateral pressure determining the degree of angularity of such turned portion and finally, while the rod is still retained by the gripping means, applying upsetting pressure thereto at an angle inclined to that portion thereof within the gripping means to upset the same.

In testimony whereof, I have hereunto affixed my signature.

RICHARD LESTER WILCOX.