Dec. 1, 1942. R. L. WILCOX 2,303,780

UPSETTING MECHANISM

Filed Dec. 8, 1941 3 Sheets-Sheet 1

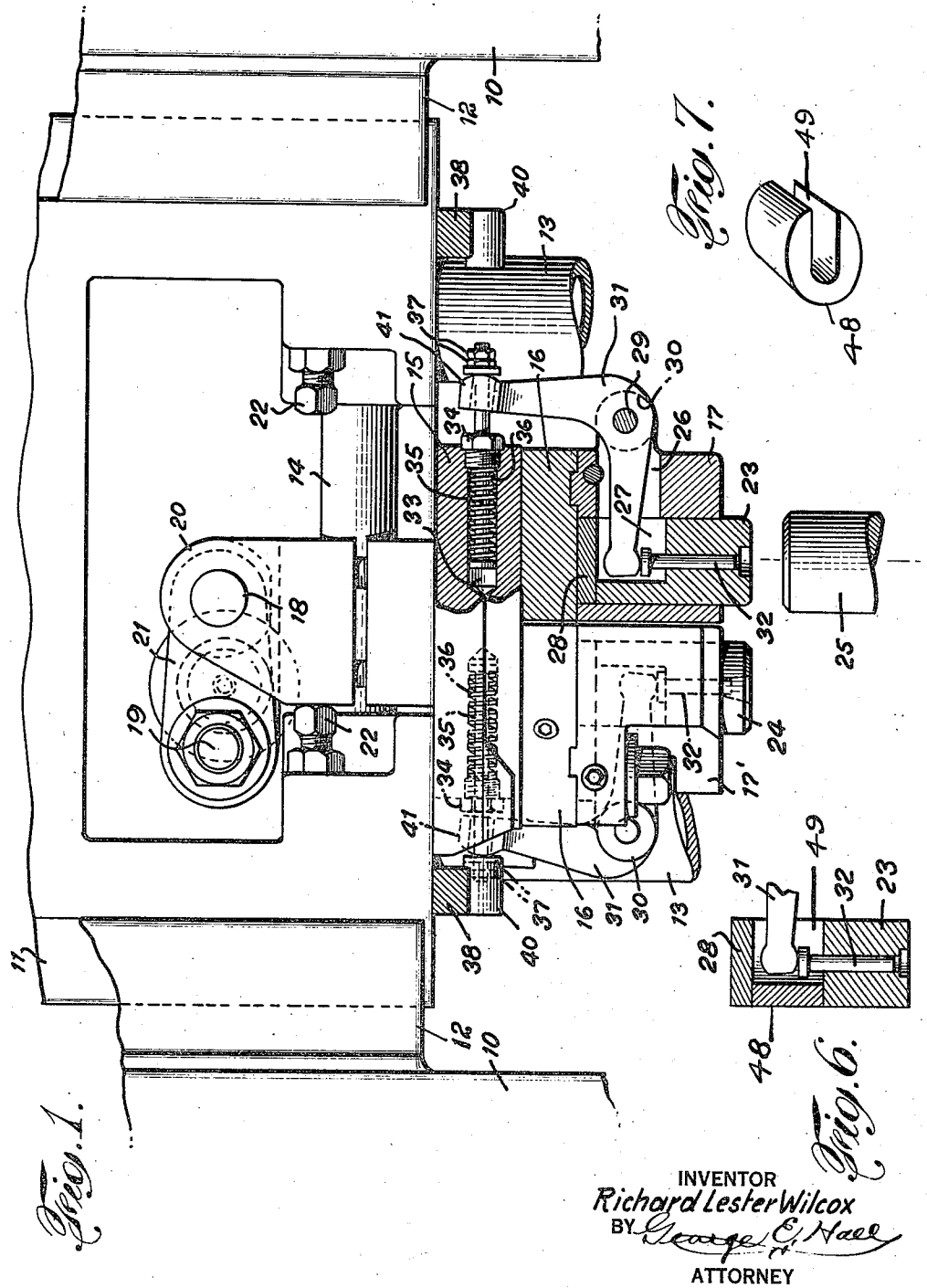


Fig. 1.

Fig. 7.

Fig. 6.

INVENTOR
Richard Lester Wilcox
BY George E. Hall
ATTORNEY

Dec. 1, 1942. R. L. WILCOX 2,303,780

UPSETTING MECHANISM

Filed Dec. 8, 1941 3 Sheets-Sheet 2

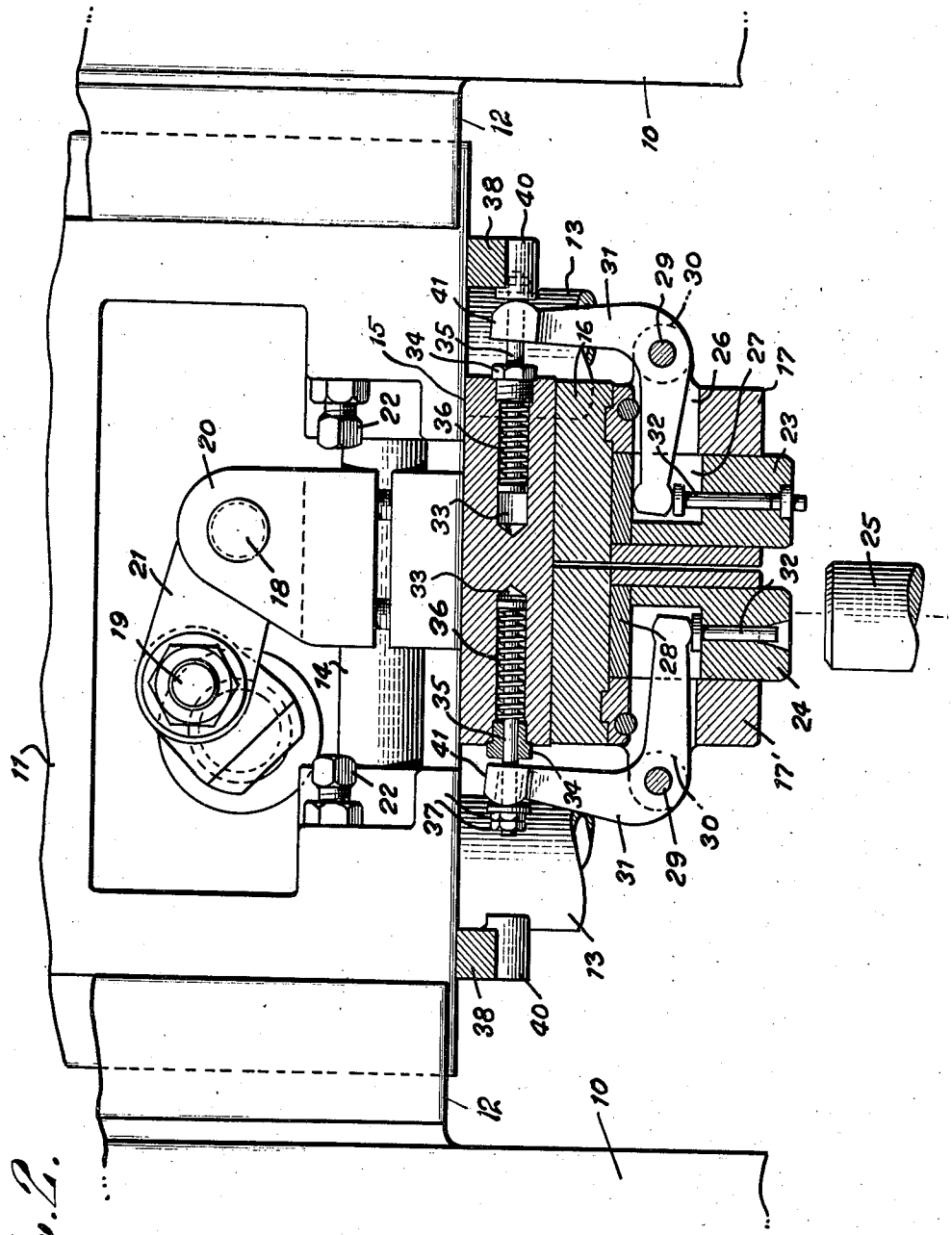


Fig. 2.

INVENTOR
Richard Lester Wilcox
BY George E. Hall
ATTORNEY

Dec. 1, 1942. R. L. WILCOX 2,303,780

UPSETTING MECHANISM

Filed Dec. 8, 1941 3 Sheets-Sheet 3

Fig. 4.

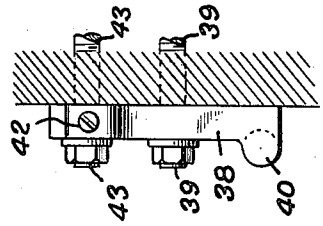


Fig. 5.

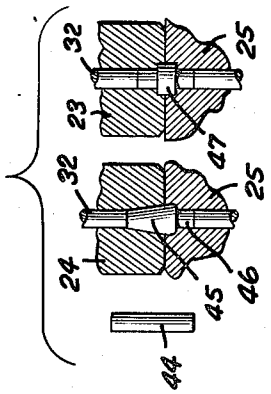
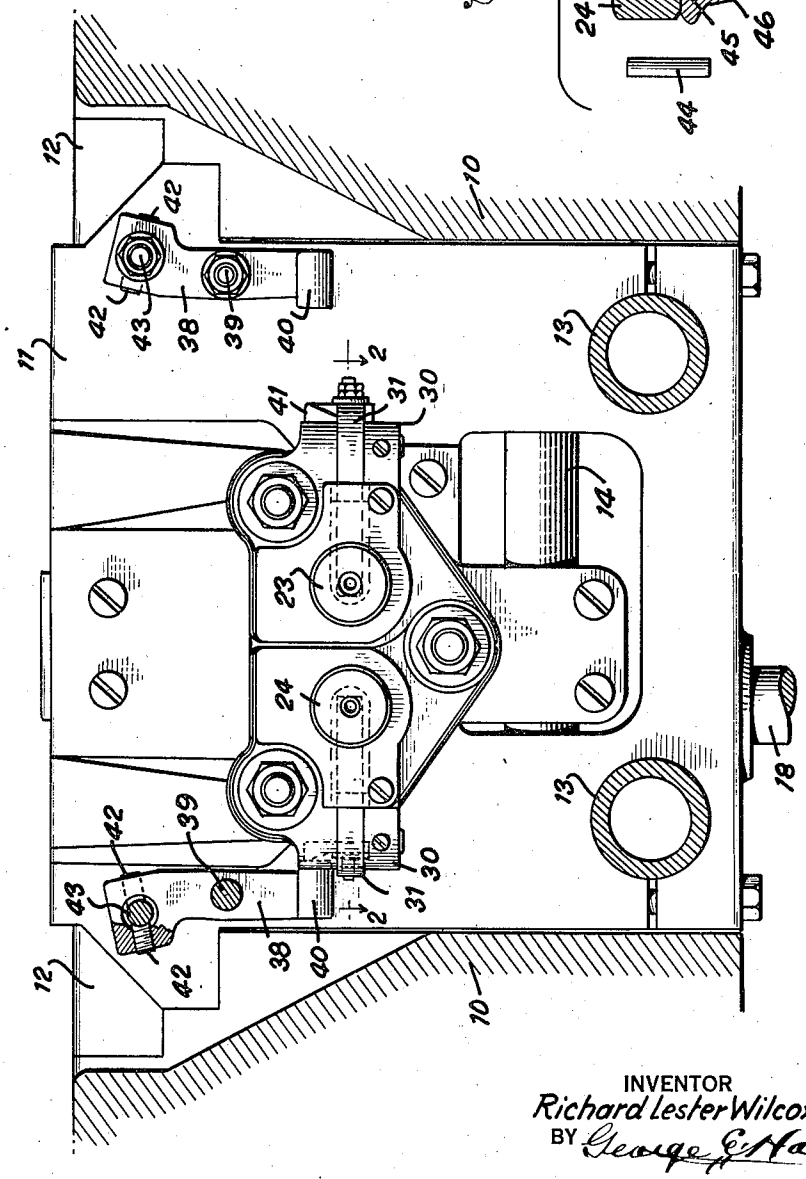


Fig. 3.



INVENTOR
Richard Lester Wilcox
BY George E. Hall
ATTORNEY

Patented Dec. 1, 1942 2,303,780

UNITED STATES PATENT OFFICE

2,303,780

UPSETTING MECHANISM

Richard Lester Wilcox, Waterbury, Conn., assignor to The Waterbury Farrel Foundry and Machine Company, Waterbury, Conn., a corporation of Connecticut

Application December 8, 1941, Serial No. 422,023

31 Claims. (Cl. 10—12)

This invention relates to new and useful improvements in upsetting mechanism, more particularly to mechanism for holding a workpiece in proper relation to the tools during the action thereof and for clearing the punch of a workpiece if held therein.

In headers, upsetting machines or the like, a workpiece is usually upset by companion tools, one a die and the other a punch. The tools function by moving one toward the other, generally the punch. The workpiece being presented to the die, and while therein, is subjected to pressure blows by one or more punches successively moved into line therewith.

In the manufacture of some bolts, nuts and similar objects, two or more punch blows are required. In such case the workpiece is partially upset by the first blow and completed at the second blow, provided only two blows are required.

After a punch has partially upset the workpiece, the blank upon occasion remains in the punch and is withdrawn from the die. This is abnormal, as the workpiece should remain in the die and the punch withdrawn therefrom. The position of the punches after their withdrawal is shifted so that the next succeeding punch is moved into line with the die and engages the workpiece as it travels toward the die, provided the workpiece is still in the die. If, however, the workpiece has been withdrawn from the die by the first punch and remains therein, it will strike the tools or some other part during the next forward movement of the workpiece, injuring the tools and frequently breaking them, so that they must be replaced, and stopping the machine by jamming the workpiece in an abnormal position. In such case, production is delayed by the length of time it takes for the operator to remove the tools and the workpiece, this latter being usually accomplished by driving or drilling it out of its obstruction position. The same injurious action results if perchance the workpiece is withdrawn from the die and remains in the second punch. To prevent this action is an object of the invention. This is accomplished by associating a mechanism with each punch, which will prevent the workpiece from being withdrawn from the die and retained in the punch, but if perchance it is so withdrawn and retained, it will be ejected therefrom. The probability of a workpiece remaining in the punch is increased if the area of frictional contact of the workpiece with the walls of the orifice or opening in the punch is greater than a similar contact with the walls of the orifice or opening in the die.

Other objects of this invention will be apparent from the following description and accompanying drawings.

To these ends the invention consists in the upsetting mechanism, having certain details of construction and combinations of parts, as will be hereinafter described and more particularly pointed out in the claims.

Referring to the drawings, in which like numerals of reference indicate like parts in the several figures;

Figure 1 is a fragmentary view of a portion of an upsetting mechanism, header or the like, having this improved mechanism associated therewith;

Figure 2 is a similar view with some of the parts in different relative positions, the parts in section being taken generally upon line 2—2 of Figure 3;

Figure 3 is a front view of a portion of the body or frame of the upsetting machine, header or the like, and of the gate and associated parts;

Figure 4 is a fragmentary side view of a portion of the gate and of the stop mechanism;

Figure 5 is a fragmentary view of the workpiece as presented to the tools and as shaped by successive operations thereon;

Figure 6 is a sectional view of another form of punch and associated mechanism; and

Figure 7 is a perspective view of the spacer.

This invention is illustrated as applied to an upsetting machine, header or the like, of the same general type as is disclosed in the application of the applicant and serially designated Number 413,447, but not limited thereto.

In the drawings, the numeral 10 indicates a portion of the body or frame of an upsetting machine, header or the like; 11 the gate mounted to reciprocate therein; 12 the gibs which are secured to the frame; and 13 rods or the like, to which the gate is secured, and that are slidably mounted in the body or frame.

Fixed upon the cross bars 14, slidably mounted in the gate 11, is the carrier slide 15, having movably mounted thereon the backing plates 16, to each of which is secured a punch holder 17. This carrier slide is reciprocated across the face of the gate by an oscillating crank shaft 18 and a link 21, between the crank 19 on the shaft and the lug 20 on the carrier slide 15. The limits of movement of the carrier slide 15 are determined by the adjustable stop screws 22.

The punch holders 17 are adjustable with respect to the carrier slide 15 and to each other. They are alike, except that one (17) is a right

hand, and the other (17'), is a left hand punch holder. A punch 23 is in the punch holder 17 and a punch 24 is in the punch holder 17', each punch being held rigid by any conventional means. As the carrier slide reciprocates across the face of the gate it alternately presents the punches 23 and 24 in line with the die 25 that is held in a fixed position. This die, however, in practice, is positioned more distant from the punches than as herein shown, to permit a longer stroke of the gate. As illustrated in Figure 1, the punch 23 is in alignment with the die 25, and in Figure 2 the punch 24 is slightly out of alignment therewith, the carrier slide not having completed its travel to the right, as shown in the drawings.

In each punch holder is an opening 26, which registers with an opening 27 in the rear end of the punch, which abuts against a backing plate 28.

Pivotally mounted upon a pintle 29 in lugs 30 on each punch holder, is a rock lever 31, the forward end of which projects through the opening 26 into the opening 27 and engages the inner end of a pin 32. The forward position of this pin is limited by the engagement of the head thereof with a wall of the opening 27, at which time the outer end projects into the opening or orifice in the face of the punch.

The punches may be shorter in length than as shown in Figures 1 and 2. Such a punch (23) is shown in Figure 6, with a spacer 48 between the punch and the backing plate 28. This spacer is preferably U-shape with a slot 49 in one side, into which projects the inner end of the pin 32 and one end of the rock lever 31. These parts are assembled by first placing the backing plate in the punch holder, then the spacer and finally the punch (23). In Figure 6 the shorter punch 23 is illustrated, but a shorter punch 24 is equally applicable.

In each end of the carrier slide 15 is a hole 33, closed by a hollow nut 34 threaded therein. Projecting through this nut and into the hole 33 is a spring pin 35, having a head thereon of substantially the same diameter as the hole 33 and between which and the nut 34 is a coil spring 36. This spring pin projects through the slotted end of the rearwardly projecting arm of the rock lever 31 with nuts 37 threaded upon the outer end thereof, which provide means for varying the tension of the spring 36.

Upon the face of the gate 11 and at opposite sides of the center thereof a stop lever 38 is mounted upon a fixed stud 39. This stop lever is positioned so that a lug 40 thereon is in the path of the lug 41 upon the rock lever 31. The position of the lug 40 about the axis of the stud 39 is varied and held in its adjusted positions by screws 42 in the stop lever 38 that engages a stud 43 fixed in the gate 11 and projects through an enlarged opening in the stop lever.

In Figure 5, the numeral 44 designates the workpiece as presented to the die 25 and punch 24, and thereby shaped substantially as shown, with a coned portion 45 partly in the die 25, but principally in the punch 24, with a relatively short shank 46 entirely within the die 25. As the punch 24 advances toward the die, the outer end of the workpiece in the die engages the pin 32 and forces the same rearwardly against the tension of th spring 36.

There is a much larger area of surface of the coned portion 45 in the punch 24 than there is of that portion of the blank within the die 25, with resulting tendency of the workpiece to remain within the punch 24 and to be withdrawn from the die 25. In such cases it would be disastrous to the tools to have the blank remain in the punch 24 and then be carried with it. This is prevented in the invention herein by the pressure of the knockout pin 32 against the outer end of the workpiece (Fig. 5) under the tension of spring 36, which is sufficient to free the punch from its frictional hold upon the workpiece. If, however, the workpiece should remain in the punch 24, it is forcibly ejected therefrom by the pin through the engagement of the lug 41 on the lever, against the lug 40 on the lever 38.

In Figures 1 and 2 the gate 11 is in approximately its rear position and the lug 41 on the rock lever 31, associated with the punch 24 is in engagement with the lug 40. The pin 32 is now moved to its forward position and the workpiece, if any, has been ejected from the punch 24 at a point where it is free to escape without damage or injury to the tools or becoming jammed in the machine. When the parts are in this position the link 21 is at such an angle to the crank pin that there is a very powerful toggle action moving the carrier slide 15 as the crank pin 19 and link 21 are approaching its dead center position where the greatest power is obtained. Consequently, the power exerted in moving the pin 32 outwardly, places practically no additional duty upon the crank shaft 18 over that required in operating the carrier slide from one position to another.

In Figure 2, the parts are shown in their relative positions as the lug 41 on the rock lever 31 associated with the punch 23 has just contacted the lug 40, and the link 21 and crank pin 19 are approaching their approximate dead center positions.

The workpiece as shaped by the die 25 and punch 24 is then subjected to the pressure of the punch 23 which reshapes it to produce its completed and final form. In the form herein the coned portion now becomes an enlarged collar 47 between the ends of the workpiece.

Within the scope of the appended claims, changes and alterations may be made in the preferred embodiment of the invention, as herein described and illustrated in the accompanying drawings.

What is claimed as new is:

1. In mechanism of the character described; a punch holder, a punch fixed in the punch holder having an opening therein; a pin within the opening; and means movable with the punch and relatively thereto for imparting independent movement to the pin.

2. In mechanism of the character described; a movable punch having an opening therein; a pin within the opening; a second opening through the wall of the punch; and means movable with the punch and extending in part through said second opening for imparting movement to the pin.

3. In mechanism of the character described; a movable punch having an opening therein; a pin within the opening; a second opening through the wall of the punch; and spring actuated means movable with the punch and extending in part through said second opening for imparting movement to the pin.

4. In mechanism of the character described; a movable punch having an opening therein; a pin within the opening; a second opening through the wall of the punch; and means, com-

prising in part a rigid member, movable with the punch and extending in part through said second opening for imparting movement to the pin.

5. In mechanism of the character described; a movable punch having an opening therein; a pin within the opening; a second opening through the wall of the punch; and a pivotally mounted lever means movable with the punch and extending in part through said second opening for imparting movement to the pin.

6. In mechanism of the character described; tools for upsetting a workpiece, comprising a die, a punch holder and a punch fixed in the punch holder, the punch having a hole therein that receives a portion of the workpiece during the upsetting operation; a pin within the punch; means, movable with the punch and relatively thereto, for applying pressure to the workpiece while in the die and during the initial portion of the movement of the punch away from the die and whereby the workpiece is released from engagement with the punch.

7. In mechanism of the character described; a movable punch holder, a fixed punch having an opening therein; a pin within the opening; and separate mechanism, in part yielding and in part positive, for applying endwise pressure to the pin during relative movement of the punch, said mechanism being movable with the punch and relative thereto.

8. In mechanism of the character described; a movable punch holder; a fixed punch having an opening therein; a pin within the opening; and spring actuated means for applying endwise pressure to the pin to move the same in one direction within the opening.

9. In mechanism of the character described; a movable punch holder, a fixed punch having an opening therein; a pin within the opening; spring actuated means for applying endwise pressure to the pin to move the same in one direction within the opening; and means for applying a positive pressure to the pin for a portion of the movement of the punch.

10. In mechanism of the character described; a movable punch having an opening therein; a pin within the opening; lever means movable with the punch for imparting movement to the pin; and rigid means rigid with respect to the punch and in the path of the lever for rocking the lever.

11. In mechanism of the character described; a movable punch having an opening therein; a pin within the opening; lever means movable with the punch for moving the pin in one direction; and an adjustable member rigid with respect to the punch and in the path of the lever for rocking the same.

12. In mechanism of the character described; a punch holder, a fixed punch having an opening therein, movable axially and also perpendicular to its axis; a pin within the opening; and spring actuated lever mechanism for applying endwise pressure to the pin to move the same within the opening.

13. In mechanism of the character described; a punch having an opening therein, movable axially and also perpendicular to its axis; a pin within the opening; spring actuated mechanism for applying pressure to the pin; and a rigid member for applying pressure to the pin at and near the limits of movement of the punch perpendicular to its axis.

14. In mechanism of the character described; a punch having an opening therein, movable axially and also perpendicular to its axis; a pin within the opening; a lever movable with the punch; spring means for applying pressure to the pin through the lever; and rigid means at and near the limits of the movement of the punch perpendicular to its axis that engages and rocks the lever.

15. In mechanism of the character described; a punch having an opening therein that is movable parallel to its axis; a pin within the opening; toggle mechanism for moving the punch perpendicular to its axis; spring actuated mechanism for applying endwise pressure to the pin; and rigid means for applying pressure to the pin near and at the limits of the movement of the punch perpendicular to its axis.

16. In mechanism of the character described; a punch having an opening therein that is movable parallel to its axis; a pin within the opening; toggle mechanism for moving the punch perpendicular to its axis; spring actuated mechanism for applying endwise pressure to the pin; and rigid means for applying pressure to the pin near and at the limits of the movement of the punch perpendicular to its axis, said rigid means applying pressure to the pin when said toggle mechanism is nearly on dead center.

17. In mechanism of the character described; a movable punch holder, a fixed punch having an opening therein; a pin within the opening; spring means for applying pressure to the pin to move the same in one direction; independently actuated means for applying positive pressure to the pin for a portion of the movement of the punch; and means for varying the relative position of application of said positive pressure.

18. In mechanism of the character described; a fixed die; a punch holder, a fixed punch having an opening therein movable toward and away from the die; a pin within the opening; separate yielding and positive means for applying pressure to the pin, with the positive pressure applied when the punch is out of line with the die.

19. In mechanism of the character described; a punch holder; a fixed punch having an opening therein within the punch holder; a lever on a part separate from the punch but movable therewith having engagement with the pin; means for actuating the lever and thereby applying pressure to the pin; and means for moving the punch holder and punch as a unit.

20. In mechanism of the character described; a gate; a carrier slide transversely movable thereon; a punch holder on the carrier slide and adjustable relative thereto; a fixed punch having an opening therein within the punch holder; and mechanism movable with the slide and independently of the punch for applying pressure to the pin.

21. In mechanism of the character described; a gate; a carrier slide transversely movable thereon; a punch holder on the carrier slide; a punch having an opening therein fixed within the punch holder; and mechanism movable with the slide and independently of the punch for applying pressure to the pin, said pressure being in part yielding and in part positive.

22. In mechanism of the character described; a gate; a carrier slide transversely movable thereon; a punch holder on the slide and adjustable relative thereto; a fixed punch having an opening therein within the punch holder; and means movable with and independently of the slide for applying pressure to the pin, in part yielding and in part positive, the positive pressure being

applied near and at the limits of the transverse movement of the carrier slide.

23. In mechanism of the character described; a gate; a carrier slide transversely movable thereon; plural punch holders on the slide, a fixed punch in each punch holder, each punch having an opening therein; a pin within each opening; separate mechanism applying pressure to each pin during the movement of the carrier slide; and supplemental mechanism movable with and independently of the slide for applying pressure alternately to each pin near and at the limits of the transverse movement of the carrier slide.

24. In mechanism of the character described; tools for upsetting a workpiece, comprising a die, a punch holder, and a fixed punch having a hole therein that receives a portion of the workpiece during the upsetting operation; a pin within the punch; means for applying pressure to the workpiece during the initial portion of the movement of the punch away from the die and whereby the workpiece is released from engagement with the punch; and means cooperating with the pressure means, whereby the pin will be positively moved outwardly relatively to the punch and eject the workpiece from the punch if it remains therein.

25. In mechanism of the character described; tools for upsetting a workpiece, comprising a die a punch holder and a fixed punch having a hole therein that receives a portion of the workpiece during the upsetting operation; a pin within the punch; means for applying pressure to the workpiece during the initial portion of the movement of the punch away from the die and whereby the workpiece is released from engagament with the punch; and means cooperating with the pressure means relatively to the punch, whereby the pin will be positively moved outwardly relatively to the punch and eject the workpiece from the punch if it remains therein and when the punch is out of alignment with the die.

26. In mechanism of the character described; tools for upsetting a workpiece, comprising a die, a punch holder, and a fixed punch in the punch holder, the die being fixed and the punch movable toward and away therefrom; and means to prevent the workpiece from being carried by the movable punch away from the die, comprising in part a pin movable within the punch, and means movable with and relative to the punch, that engages the workpiece in the die and applies pressure thereto.

27. In mechanism of the character described; tools for upsetting a workpiece, comprising a die, a punch holder, and a fixed punch in the punch holder, the die being fixed and the punch movable toward and away therefrom; means to prevent the workpiece from being carried by the movable punch away from the die, comprising in part a pin movable within the punch, and means movable with and relative to the punch, that engages the workpiece in the die and applies pressure thereto; and means for ejecting the workpiece from the punch if retained therein.

28. In mechanism of the character described; tools for upsetting a workpiece, comprising a die, a punch holder, and a fixed punch in the punch holder, the die being fixed and the punch movable toward and away therefrom; and means to hold the workpiece in the die while the punch is moving away therefrom, comprising in part a pin movable within the punch, and means movable with and relative to the punch, that engages the workpiece in the die and applies pressure thereto.

29. In mechanism of the character described; a punch holder; a punch fixed therein; a pin movable within the punch; a backing plate or the like; an open sided spacer between the punch and backing plate; and a lever that projects through the open side of the spacer and engaging the pin to apply pressure thereto.

30. In mechanism of the character described; a punch holder; a punch fixed therein; a backing plate or the like; and a substantially U-shape spacer between the punch and backing plate, the open side of the spacer being substantially parallel with the axis of the punch; and a lever that projects through the open side of the spacer and engaging the pin to apply pressure thereto.

31. In mechanism of the character described; a movable punch holder; a punch fixed therein; a backing plate in rear of the punch, a pin within the punch; a lever movable with the punch holder having engagement with the pin; and a spacer between the punch and backing plate, having one open side, into which projects both the pin and lever.

RICHARD LESTER WILCOX.