Feb. 4, 1969 R. H. ANDERSON ET AL 3,425,260

DOUBLE ACTION PRESS TOOL

Filed Aug. 18, 1966 Sheet 1 of 2

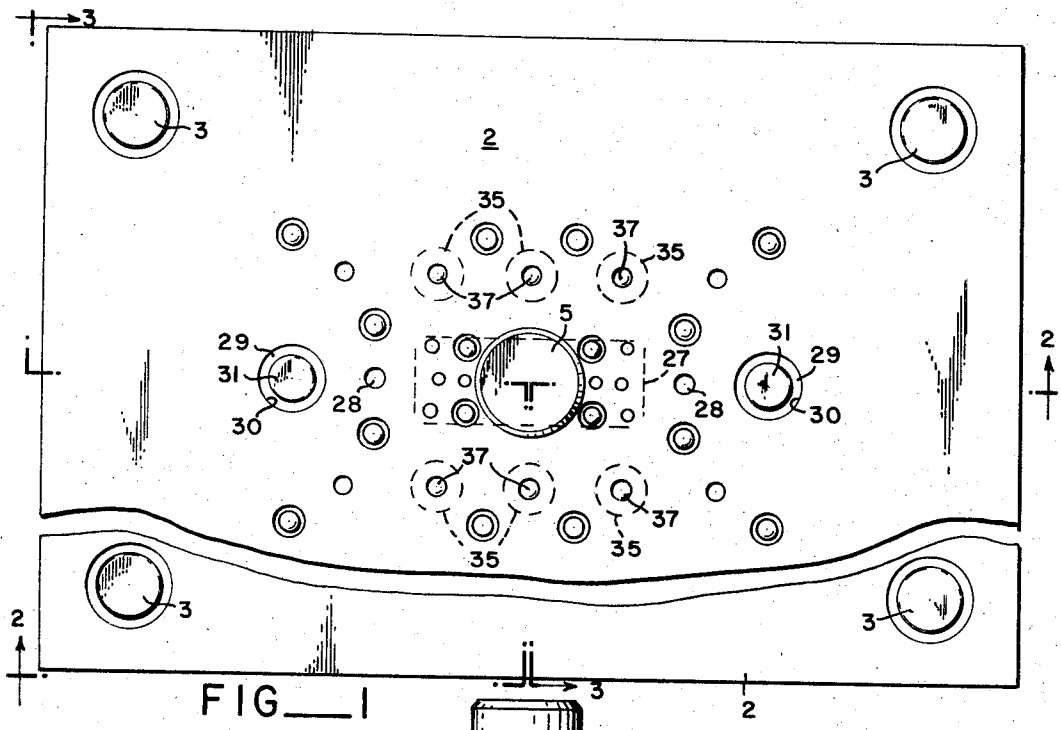


FIG. 1

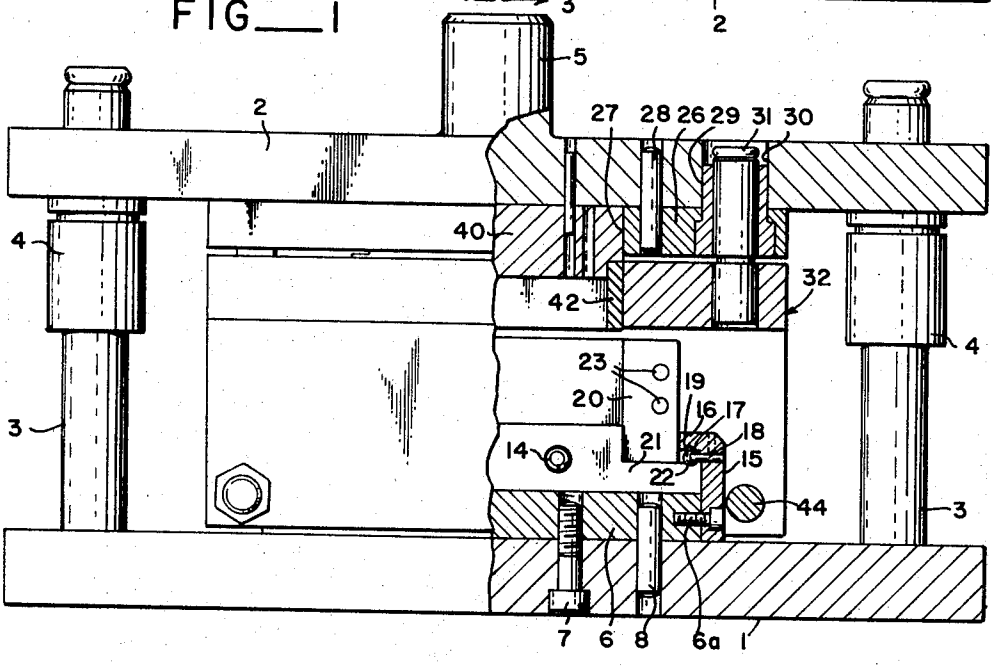


FIG. 2

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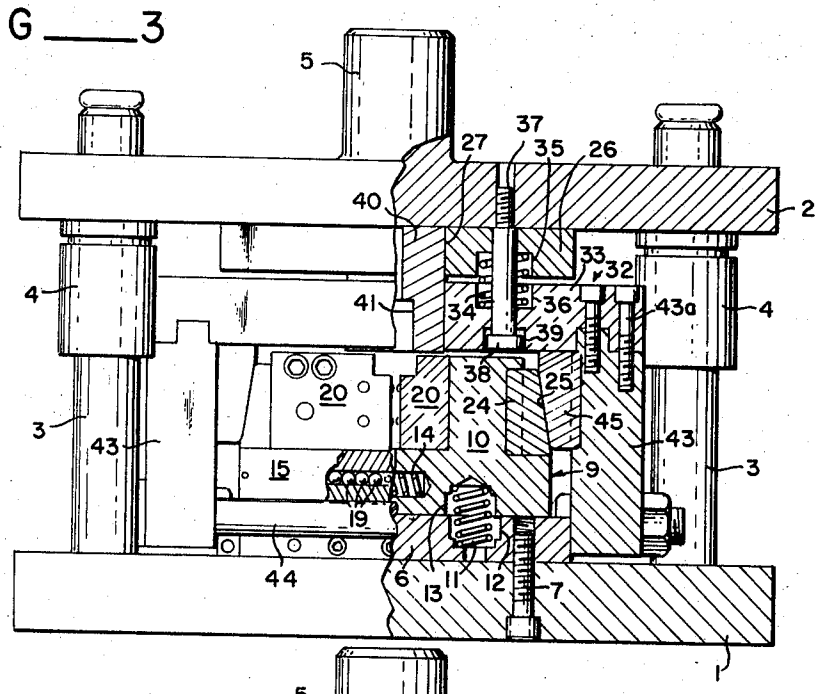
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FIG 3



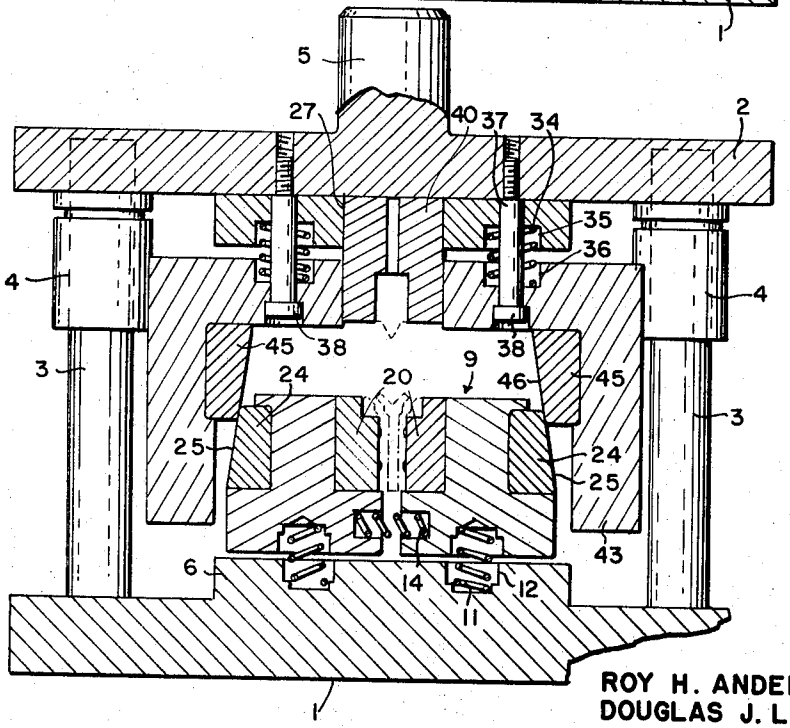


FIG 4

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DOUBLE ACTION PRESS TOOL

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Int. Cl. B21j 9/20; B21d 22/22, 24/06

ABSTRACT OF THE DISCLOSURE

This invention relates to the die-forming of parts in a punch press wherein the material to be formed by the press action is first laterally clamped in the die incident to downward movement of the ram prior to the impact to form the part.

The present invention relates generally to punch presses and more particularly to a punch press tool for use with a crank press or the like having a single ram for delivering a heavy blow. According to the present invention, a punch press tool or assembly is provided which transforms the action of a single ram into a double action to provide a lateral die clamping and work holding force punch or other tool.

Accordingly, the object of the present invention is to provide an improved press tool structure for obtaining which preceeds the normally vertical impact blow from a a double action from a single ram press.

A further object of the present invention is to provide a double action press tool of the character described which is adapted to clamp and hold a work piece between die halves while the work piece is struck.

Another object of the present invention is to provide a press tool of the character described which is capable of accommodating automatic and continuous feeding mechanisms and to properly index a work piece between the die halves to insure accurate forming.

Further objects and advantages of the present invention will become apparent to those skilled in the art from the following specification and appended claims and from the accompanying drawings wherein:

FIG. 1 is a top plan view of the present tool;

FIG. 2 is a cross sectional view taken along lines 2—2 of FIG. 1;

FIG. 3 is a cross sectional view taken along lines 3—3 of FIG. 1; and

FIG. 4 is a view similar to FIG. 3 illustrating the relationship of the various parts of the tool in the unactuated or released position.

Referring now to the drawings wherein like reference numerals indicate identical parts in the various views, the improved press tool includes a die base 1 which may be secured to the bolster plate of a press in a conventional manner. The punch block holder 2 is guided for vertical reciprocal movement relative to the die base 1 by means of the four guide pillars 3. The block 2 is guided on the pillars 3 by means of bushings 4 which slide on the pillars. The block 2 also includes a post 5 and it will be understood that the post 5 is connected to the ram of the press (not shown) in a conventional manner. Thus the block 2 which holds the punch, as will be presently explained, is moved downwardly toward the die base 1 which holds the work piece and die assembly.

A mounting plate 6 is carried on the top surface of the die base 1 and may be securely held thereon by a plurality of bolts 7 and shear pins 8, one of which is illustrated in FIG. 2. The plate 6 mounts the laterally movable die holder assemblies indicated generally at 9

in FIGS. 3 and 4. As will presently be explained, each of the assemblies 9 mounts a die half between which the work piece is clamped when the press is actuated. Each assembly 9 includes an elongated body portion 10 which is mounted on a plurality of helical compression springs 11. The springs 11 are seated in recesses 12 in the mounting plate 6 and corresponding recesses 13 in the assembly. Although only two such springs are shown in FIGS. 3 and 4, it will be understood that a plurality of such springs are mounted on each side of the center line of the plate 6 beneath the respective die holder assemblies. It will also be noted that the recesses 12 and 13 are somewhat larger in diameter than the outside diameter of the springs in order to allow the die holder assemblies to move laterally relative to the plate 6 in the closed position. The lateral flexing of the springs when the press is in the actuated position is shown in FIG. 3 and the unactuated position is shown in FIG. 4. In the unactuated position, the springs 11 normally support the assemblies 9 a slight distance above the plate as shown in FIG. 4. As is also shown in FIGS. 3 and 4, a plurality of laterally disposed helical compression springs 14, seated in suitable recesses in the respective die holder body portions 10, normally bias the assemblies 9 in opposite directions away from the center line of the tool. This relationship is shown most clearly in FIG. 4. Although only one such spring is shown in FIGS. 3 and 4, it will be understood that a plurality of such springs may be used along the length of the body portion 10 depending upon the separating force desired.

Fixed to the opposite ends of the mounting plate 6 are transversely directed end retention plates 15 which are secured to the plate 6 by means of screws or the like 6a as shown in FIG. 2. The plates 15 include a horizontal flange 16 the bottom face of which is provided with a transversely extending ball race 17. Each of the plates 15 also mounts a ball cage 18 which carries a plurality of antifriction ball members 19. Each end of each of the body elements 10 is provided with a transversely directed end plate 20 as seen in FIGS. 2 and 3 which is seated on an extended portion 21, the outer end of which is provided with a ball race 22 aligned with the race 17 and adapted to engage the antifriction balls 19. The balls 19 engage both races 17 and 22 when the press is in the unactuated position and the assemblies 9 are lifted by the springs 11. Thus, initial lateral movement of the assemblies 9 is facilitated by the action of the balls 19 on each end of the assemblies. Each end plate 20 is provided with a pair of indexing beads or protrusions 23 the purpose of which is to insure that the strip stock is properly positioned and aligned between the die halves. The dotted line portions of FIG. 4 shows the die block and punch block in position within each of the assemblies 9 and ready to receive strip stock or work piece.

Each of the body portions 10 of the assemblies 9 mounts a wedge plate 24 having an inclined cam surface 25 which is used to actuate the movable assemblies in the lateral direction as will be presently described.

Secured to the punch block holder 2 is an upper mounting plate 26 which may be generally rectangular and includes a centrally located rectangular opening 27 for the reception of a punch block. The plate 26 is bolted or otherwise fixed relative to the holder 2 and may be provided with shear pins 28 as shown in FIG. 2. The plate 26 is provided with two bushings 29 which extend upwardly into suitable holes 30 in the holder 2 for the reception of a second set of guide pillars 31. The pillars 31 are fixed to a vertically movable frame indicated generally at 32 which is utilized for exerting lateral pressure to close the movable assemblies 9. The frame 32 includes a top plate 33 having a central rectangular opening which

permits passage of the punch block presently to be described. A plurality of compression springs **34**, seated in the recesses **35** of the plate **26** and the recesses **36** of the plate **33**, act between the two plates and bias them apart. There are six such springs acting between the two plates with the location being indicated by the dotted line portion illustrating the recesses **35** in FIG. 1. In order to limit the movement of the plate **33** away from the plate **26**, each of the springs **34** is provided with a pin **37** which is screw threaded into the block holder **2** and has a head **38** which engages the bottom of the recess **39** in the plate **33**. As illustrated in FIG. 4, when the press is released, the springs **34** hold the assembly **32** in its extreme downward position with the heads **38** of the pins **37** contacting the bottom of the associated recesses.

The holder **40** for the punch or other tool is fixed to the punch block holder **2** by means of suitable bolts or the like and provides a cavity **41** which receives a set of punches or the like with plates **42** being secured to the holder **40** at opposite ends as shown in FIG. 2.

The movable pressure frame **32** includes a top plate **33** as previously described which is secured to side plates **43** by means of the bolts **43***a*. The plates **43** are connected near their lower ends at each end of the assembly by the connector bolts **44** in order to rigidify the frame and to sustain lateral pressures which are developed when the press ram is actuated. Each of the side plates **43** is provided with a wedge plate **45** which has an inclined cam surface **46** which cooperates with the associated cam face **25** of the wedge plate **24** to move the die holder assemblies **9** inwardly against pressure of the springs **14** in order to clamp the work piece and the die halves. The bolts **44** are designed to withstand the tensional stress on the frame during impact.

For operation, a plurality of punches are secured in the punch holder **40** in the position indicated in dotted lines in FIG. 4. Likewise the die halves are mounted in the assemblies **9** as shown in FIG. 4 and will be provided with a series of die cavities designed to cooperate with the plurality of punches. Strip stock or the like may then be advanced through the tool for progressive die forming operations. When the strip has been advanced to the proper position, and with the tool in the unactuated position shown in FIG. 4, the press ram is actuated. The initial downward movement of the ram causes the block **2** to begin its descent which results in immediate downward movement of the frame **32** with the force being transmitted through the six springs **34**. As the wedge plates **45** engage the wedge plates **24**, the assemblies **9** are forced inwardly against the pressure of the springs **14**. As the frame **32** continues downwardly, the assemblies **9** bottom or seat on the mounting plates **6** and the work piece is clamped between the assemblies and held there by the pressure transmitted through the springs **34**. As soon as the springs **34** are overcome, the holder **40** starts its descent relative to the frame **32**. The final impact of the punches on the work piece occurs as the block **2** descends further once the springs **34** are overcome. Thus, as shown in FIG. 3 the block **2** and the plate **26** move downwardly relative to the top plate **33** of the frame to deliver the blow of the press.

In reverse, releasing the pressure of the press ram allows the block **2** and the plate **26** to separate from the plate **33** of the frame as shown in FIG. 4 and, further upward movement releases the frame as the heads **38** of the pins **37** bottom in the recesses **39**. As the wedge plates **45** move upwardly, the assemblies **9** are gradually separated by the springs **14** and the upward bias of the springs **11** starts to raise the assemblies **9**. The antifriction rollers **19** facilitate further outward movement of the assemblies **9** to the position shown in FIG. 4. After the work piece has been indexed to the next station, the cycle is repeated.

From the foregoing, it will be apparent to those skilled in the art that the present invention provides new and useful improvements in double action press tools of the character described. The arrangement and types of structural components utilized within the invention may be subjected to numerous modifications well within the purview of this invention and applicant intends only to be limited to a liberal interpretation of the specification and appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A double action press tool comprising; a die base, a punch block for delivering an impact, means mounting said block for reciprocation relative to said base, laterally shiftable die assemblies on said base, a pressure frame for contacting and closing said die assemblies prior to impact by said punch block, and yieldable mounting means between said frame and said block, whereby movement of the block toward the base first moves said assemblies into clamping relation and an impact is delivered upon yielding of said yieldable mounting means.

2. The press tool according to claim **1** including: first spring means biasing said die assemblies apart, second spring means normally supporting said assemblies in a raised position, said means for contacting said die assemblies serving to limit the separation of the die assemblies and to move the assemblies together against the bias of said first spring means and to seat said assemblies on the base against the bias of said second spring means before impact of the punch block.

3. A double action press tool comprising: a die base, a punch block for mounting punch means and adapted for connection to a press ram, guide means mounting said block for reciprocation relative to said base, laterally shiftable die assemblies carried by said base for mounting separating die halves, pressure frame means carried by said block for contacting and moving said die assemblies into closed clamping relation, and yieldable mounting means between said frame and said block, whereby movement of the block toward the base first moves said assemblies into clamping relation and an impact is delivered upon yielding of said yieldable mounting means.

4. The press tool according to claim **3** including: first spring means biasing said die assemblies apart, second spring means normally supporting said assemblies in a raised position, and antifriction guide means on said base facilitating lateral movement of the assemblies while in the raised position, the force of said pressure frame serving to move the assemblies together against the bias of said first spring means and to seat said assemblies on said base against the bias of said second spring means before impact of the punch block.

5. The press tool according to claim **4** including: first cam means carried by each of said assemblies, and second cam means carried by said pressure frame, said second cam means being in contact with the respective cam means of the die assemblies to limit separation thereof, and cooperating cam surfaces on said first and second cam means for forcing the assemblies together in closed clamping relation upon movement of the punch block toward the die base.

6. The press tool according to claim **3** including: first cam means carried by each of said assemblies, and second cam means carried by said pressure frame, said second cam means being in contact with the respective cam means of the die assemblies to limit separation thereof, and cooperating cam surfaces on said first and second cam means for forcing the assemblies together in closed clamping relation upon movement of the punch block toward the die base.

7. The press tool according to claim **5** wherein: said yieldable mounting means between said frame and said block comprises; spring means acting between said block and said frame to bias said frame toward said die assemblies, guide means for guiding the movement of the frame relative to the block, and stop means limiting the movement of the frame away from the block when

the block is in the released position, the closing pressure of said frame on said die assemblies being transmitted through said last mentioned spring means.

8. The press tool according to claim 3 wherein: said yieldable mounting means between said frame and said block comprises; spring means acting between said block and said frame to bias said frame toward said die assemblies, guide means for guiding the movement of the frame relative to the block, and stop means limiting the movement of the frame away from the block when the block is in the released position, the closing pressure of said frame on said die assemblies being transmitted through said last mentioned spring means.

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U.S. Cl. X.R.

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