Device for Metal Drawing

Paul E. Flowers, Mount Gilead, Ohio, assignor to
The Hydraulie Development Corporation, Inc.,
Wilmington, Del., a corporation of Delaware

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This invention relates to metal working and, in particular, to sheet metal drawing.

It is an object to provide a press in which a single resilient member is adapted simultaneously to perform two functions, namely, to actuate clamping means for holding a sheet metal piece during the shaping operation, and to actuate a punch or die for shaping the said sheet metal piece.

It is a still further object to provide a clamping press which is adapted to selectively vary the clamping pressure for clamping the work piece to be drawn without any changes in the clamping means proper.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawing, in which:

Figure 1 diagrammatically illustrates, in spaced relationship to each other, the various elements for carrying out the method according to the invention.

Figure 2 shows the various elements of Figure 1 in assembled position just prior to the beginning of the actual pressing operation.

Figure 3 illustrates the actual pressing operation of the assembly of Figure 2.

Figure 4 is a view similar to that of Figure 3, showing a slight modification for obtaining a different clamping pressure on different parts of the work piece to be shaped.

Figure 5 is a top view of a press bed with differently shaped dies.

General arrangement

The assembly for performing the new method of metal drawing according to the invention comprises substantially a rubber pad operatively connected to the press plunger and adapted, when the latter is advanced, to exert pressure simultaneously on a die or punch which shapes a work piece to be drawn, and also on clamping means which hold the work piece during the drawing operation.

Due to the yieldable characteristics of a rubber pad, the latter when engaging the clamping means and pressing the same against the work piece yields laterally, while maintaining a predetermined pressure on the clamping means, whereas that portion of the rubber pad engaging the die or punch presses the latter into the cooperating die supporting the work piece so as to shape the same.

Structural arrangement

Referring now to the drawing in detail, 1 designates a press bed carrying a bolster plate 2 which in its turn supports a die 3. The die 3 is adapted to receive the work piece 4 which, during the clamping operation, is held at its marginal portions by clamping means 5, which may consist of a single piece or a plurality of parts. 6 designates a punch or die for engagement with the work piece 4 and which, in cooperation with the die 3, shapes the work piece.

The punch or die 6 is advanced into the die 3 by means of the rubber pad 7 arranged in a pad holder 8 which is connected in any desired manner to the press plunger or press platen 9. The press plunger or platen 9 may be reciprocated in any desired manner, either mechanically or hydraulically and may form a part of any desired standard press.

To perform a drawing operation, the operator places the die 3 on the bolster plate 2, then places the work piece 4 on top of the die 3 and thereafter arranges the clamping means or blankholder 5 on the rim portions of the work piece 4 preferably so that the inner edges of the blankholder 5 do not materially protrude toward the inside beyond the inner contour of the die 3. Preferably the die 3 and blankholder 5 are provided with aligning means, not shown, for properly locating the blankholder with respect to the die 3. If the elements 3, 4 and 5 have been properly arranged, the punch or die 6 is placed on top of the work piece 4 within the blankholder means 5. Then the press plunger or platen 9 is advanced in any desired manner so that the rubber pad 7 engages simultaneously the punch 6 and the blankholder means 5.

Just before the start of the actual pressing operation, the elements will occupy the position shown in Figure 2.

When further pressure is exerted upon the press plunger or platen 9, the rubber pad 7 will press the blankholder means 5 firmly against the rim portions of the work piece 4 so as to clamp the same between the blankholder means 5 and the die 3. On the other hand, the rubber pad 7 conveys pressure to the punch 6 and advances the same so as to cause the punch 6 to draw the work piece 4 in conformity with the inner contour of the die 3. The pressure exerted by the rubber pad on the blankholder means 5 is such as to allow a slipping of the marginal portions of the work piece to a desired extent, thereby preventing wrinkling of the work piece during the drawing operation.

The pressure at which the marginal portions of the work piece are held clamped between the die 3 and blankholder means 5 may be varied in a simple manner by merely decreasing or increasing the corresponding area of the blankholder means to which the pressure is conveyed from the rubber pad. For instance, with regard to Figure 4, it will be seen that the area 10 of the blankholder means 11 is larger than the area 12 of the blankholder means 11 so that the right-hand end of the work piece 4 will be clamped.
at a higher pressure than the left end of the said work piece.

The assembly shown in the drawing may be used for pressing single parts or for simultaneously pressing also a plurality of parts, for instance, the rubber pad 7 of Figure 3 may be considered integral with the rubber pad of Figure 4 so that Figure 3 constitutes a section along the line 1—1 of Figure 5, while Figure 4 may be considered a section along the line 4—4 of Figure 5.

If it is desired to use the press not as a drawing press but merely as a forging press, all that is necessary is to remove the clamping means 5 and to replace the die 3 by a corresponding die. It is not even necessary to use the punch 6 if the rubber pad 7 is used. Otherwise, the rubber pad 7 and punch 6 may be replaced by a corresponding punch connected to the press plunger or platen 9.

It will be understood that I desire to comprehend within my invention such modifications as come within the scope of the claims and the invention.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a press, a female die having a cavity and arranged to support a metal sheet on its upper surface, a clamping member overlying the upper surface of said die and adapted to clamp the metal sheet against the surface of said die, a rigid male die member fitting within the clamping member and of such size and shape as to substantially fill the space within the female die, and resilient means overlying the clamping member and male die and adapted simultaneously to exert clamping pressure on the clamping member and shaping pressure on the male die.

2. In a press, a female die having a cavity and arranged to support a planar metal sheet on its upper surface, a clamping member overlying the upper surface of said die and adapted to clamp the metal sheet against the surface of said die, a rigid male die member fitting within the clamping member and of such size and shape as to substantially fill the space within the female die, and resilient means overlying the clamping member and male die and adapted simultaneously to exert clamping pressure on the clamping member and shaping pressure on the male die.

3. In a press, a female die having an open space and adapted to support the rim portion of a planar sheet of material on its upper surface, a clamping member overlying the upper surface of said die and adapted to clamp the sheet of material against the surface of said die, a rigid male die member fitting within the clamping member and of such size and shape as to substantially fill the space within the female die, and resilient means reciprocally mounted in said press and operable simultaneously to engage said clamping member and male die for exerting clamping pressure upon the rim portions of the work piece and to engage the male die for advancing the same to shape the work piece, said clamping member having areas of varied configuration engaged by said resilient means for conveying different pressures upon different rim portions of said work piece.

4. In a press, a female die having a cavity and arranged to support a planar metal sheet on its upper surface, a clamping member overlying the upper surface of said die and adapted to clamp the metal sheet against the surface of said die, a rigid male die member fitting within the clamping member and of such size and shape as to substantially fill the space within the female die, and a rubber pad overlying the clamping member and male die and adapted simultaneously to exert clamping pressure on the clamping member and shaping pressure on the die, the portion of the clamping member receiving pressure from said rubber pad being of irregular shape so that different parts of said member are subjected to different pressures.

PAUL E. FLOWERS.