

June 24, 1930.

J. S. REID

1,768,294

PRESS

Filed Oct. 10, 1928

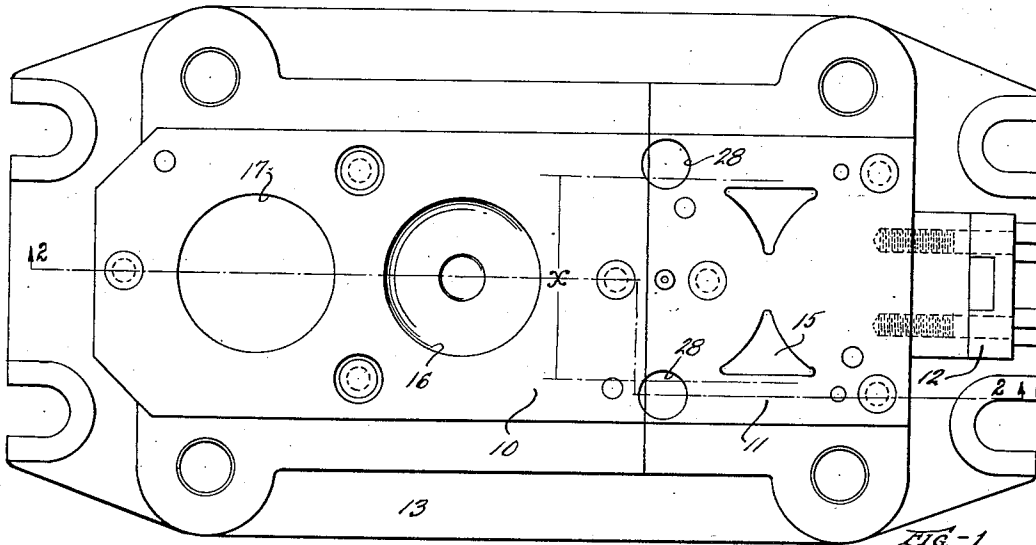
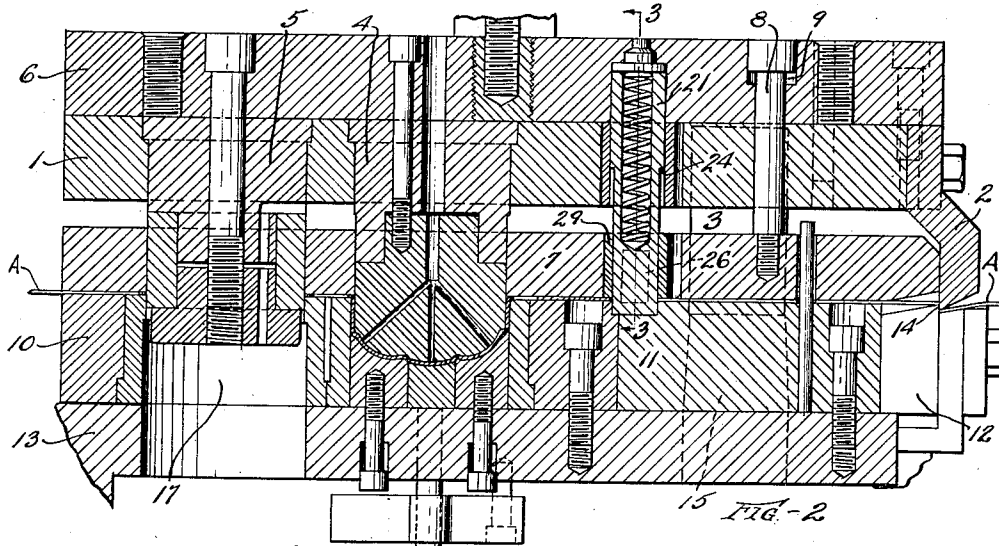
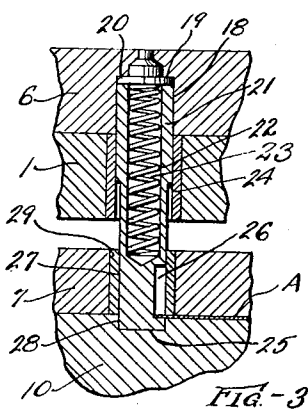
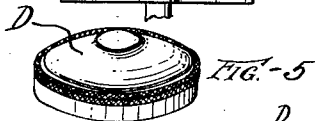
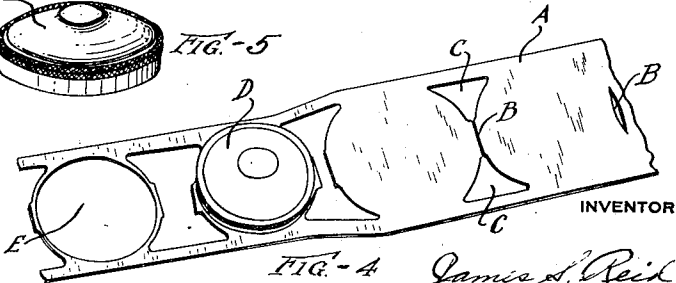


FIG. 4 James S. Reid
BY Brockett, Hyde, Higley & Meyer

ATTORNEYS

UNITED STATES PATENT OFFICE

JAMES S. REID, OF CLEVELAND, OHIO, ASSIGNOR TO THE EATON AXLE AND SPRING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO

PRESS

Application filed October 10, 1928. Serial No. 311,528.

This invention relates to so-called punch presses adapted to perform forming and drawing operations and the like on sheet metal work.

A press of the class described has head and bed members arranged for relative press-opening and press-closing movement, as upon a base, punch means being associated with one of the members and die means with the other whereby the punch means and die means have relative movement corresponding with that of the head and bed members, the punch means and die means being arranged to cooperate during press-closing movement to perform the desired operation or operations on the work, feeding means also ordinarily being incorporated in the press for advancing the work step by step.

The type of press to which reference is made, may be set up to perform in each cycle a number of operations upon the work, which is in the form of flat strip stock and advanced step by step through the press; in which case where another operation is to follow a drawing operation, the work must be withdrawn from the die in the direction of the punch. Obviously the work can only be advanced during those portions of the cycle in which the punch and die means are clear of each other, that is, when the punch means is not projecting into the die means.

Modern industrial conditions require the utmost speed in operating such a press, which requirement can only be met by arranging the press to function with the least possible duration of opening, both as to the speed with which the punch and die members recede from each other during the press-opening cycle, and speed of relative advance during the press-closing cycle, and also the instant of pause in wide open press position between these cycles. Where drawing operations are performed, and particularly if the depth of the draw is great, stripping the work from the die, since the work can at best be cleared from the die no faster than the punch is withdrawn, consumes a large part of the press-opening cycle.

It is an object of my invention to provide stripping means whereby the work is cleared

from the die at its limit of possible speed, that is, immediately with the withdrawal of the punch therefrom. For this purpose I associate the stripping means with the punch means instead of, as heretofore, with the die means. This is conveniently accomplished by arranging on the punch-holding means stripping fingers engageable with the side edges of the work which can thus be freely advanced between the fingers but must move therewith and consequently with the punch, to clear the die as the press is opened.

The exact nature of my invention together with further objects and advantages thereof will be apparent from the following description taken in connection with the accompanying drawings in which Fig. 1 is a plan view of an example of die means chosen for illustration of my invention and indicating in dot-dash lines the position of work thereon; Fig. 2 is a vertical section thereof as in the plane of line 2—2, Fig. 1 and including also the corresponding vertical section of punch means adapted for cooperation therewith, the parts being shown as in press-closed position; Fig. 3 is a vertical section as in the plane of line 3—3, Fig. 2, showing details of the stripping means which comprises my invention; Fig. 4 is a typical sample of the work shown in perspective as removed from the press on which the shown punch and die means have been set up; and Fig. 5 is a perspective view of the finished product, a closure cap.

With reference now to the drawings the punch means may comprise as shown the punch holder 1 in which a number of punch tools such as the shearing tongue 2, the punching tools 3, the drawing tool 4, and the trimming tool 5 are mounted, and which has associated therewith for the purpose, the backing plate 6. The punch means also includes a pad 7 through which the tools 3, 4, and 5 project, and which is associated with the tools for movement generally therewith as by means of screws 8. The connection between the pad 7 and the other parts of the punch means includes provision for lost motion as indicated by the clearances 9 under the heads of screws 8.

The die means comprises one or more die members 10, 11, and 12 depending on the punch members, and associated with the die block 13. In the example chosen for illustration the die means thus includes a shoulder 14 cooperative with the shearing tongue 12, openings 15 cooperative with the punch tool 3, a depression 16 corresponding with the head of the drawing tool 4, and opening 17 having its edge cooperative with the trimming tool 5.

As will be appreciated by one familiar with the art, the die means are ordinarily mounted upon the bed of the press and the punch means upon the head or ram thereof, the press being adapted, of course, to give these means relative parallel opening and closing movements. It will also be appreciated that resilient means are provided between the pad 7 and the other parts of the punch means whereby the pad is urged from the punch holder 1 to the limit allowed by the screws 8. Thus as the press is closed upon the work A the pad precedes the other portions of the die means in advancing toward the work, until the pad is in abutting relation therewith whereupon the other portions of the die means advance, against the action of the yieldable means interposed in effect between the pad and the other die means; so that as the punch tools perform their operations upon the work, it is firmly held between the die means and the pad. Thus Fig. 2 as already described, shows the pertinent parts in press-closed position, that is, after the operations of the working stroke have been performed.

Thus in the setup described and with reference to Fig. 4, the tools 2 and 12 have made the slit or cut B in the work, the tool 3 and the die opening 15 have cooperated to punch out the openings C, the drawing tool 4 has cooperated with the depression 16 to draw the metal, crowding and stretching the same into the cup-shaped form D, and the trimming tool 5 has cooperated with the opening 17 to trim the cup-shaped form D from the work blank projecting it downwards through the openings 17 as a completed cap; it being understood that the work has progressed from right to left, Fig. 2, and that the press has been operated and the work properly fed through five cycles of press operation.

What has thus far been described is in a sense typical of the prior art.

According to my invention I provide means for stripping the work from the depression 16, the means comprising a pair of stripping finger assemblies each as follows: The punch means is provided at one side with a bore 18 extending normal to the plane of the work having as seating on a shoulder 19 at the inner extremity thereof a washer 20. Slidably fitted within the

bore 18 is a stripping finger 21 bored out as at 22 to receive a coiled spring 23. The finger is turned down for a portion of its length to form the shoulder 24; its outer end 25 is preferably squared off as indicated and the finger is notched as at 26. The outer and smaller extremity of the finger 21 passes through an opening 27, indicated as fitted with the bushing 29, in the pad 7 so that the described relative movement between the pad and the other punch means may be accommodated.

The die means is provided with a cavity 28 into which the end of the finger 21 may project sufficiently that the outer end (lower end, Fig. 2) of the notch 26 may lie flush with the upper surface of the die member 11.

The position of the work on the die means is indicated by the dot-dash lines, Fig. 1, as is the relative location of the stripping fingers, by the cavities 28 shown in this figure. This indicated arrangement of the parts is such that the edges of the work strip will lie within the notches 26 of the oppositely disposed stripping fingers 21; and the parts are so proportioned that when in press-closed position the clearance between the shoulders 24 of the stripping fingers and the upper surface of the pad 7 adjacent the stripping finger—in this case the upper surface of the bushing in the pad through which the stripping finger projects—is substantially that of the depth of the depression 16 below the surface of the die member 10.

The operation as to the stripping fingers is, therefore, as follows: Assuming the parts in press-closed position as indicated Fig. 2, as the press opens the pad 7 and stripping fingers 21 remain stationary with the die means and the work A, the punch means rising until the clearance 9 is taken up; the pad 7 being maintained against the work by the usual resilient means to which reference has been made, and the stripping fingers being maintained in the position shown under the action of their springs 23 which are, of course, under compression.

When the clearance 9 is taken up the pad 7 is picked up and rises from the work. The stripping fingers 21, however, under the action of their springs 23 remains seated in the bottoms of their cavities 28. The press continues to open until, as the punch member 4 clears the die depression 16 the shoulders 24 of the stripping fingers are engaged by the upper surface of the bushings 29 whereupon the stripping fingers are picked up by the punch means and rise therewith. Since the work edges lie within the notches 26 of the stripping fingers the work also is caused to rise and that portion thereof within the depression 16 stripped and cleared therefrom.

The work may then be fed to the left, Fig. 2, until the cup-shaped deformation therein

registers with the opening 17 of the die means whereupon the press may close.

As the press closes all of the punch parts move downwardly, Fig. 2, until the ends of the stripping fingers bottom in the cavities 28. The punch means continue to advance compressing the springs 23 until the pad 7 engages the work; and thereafter the punch members operate on the work as described. Thus the edges of the work strip lie at all times between the opposed notches 26 of the stripping fingers.

It is desirable that the stripping fingers be located as close as possible to the depression 16. There is a limit to this proximity, however, as will be apparent from observation of Fig. 4, the deformation of the drawing operation bringing together the edges of the work strip in varying degrees so that the stripping fingers must be located far enough in advance to engage the strip before the relation of its edges is thus altered.

What I claim is:

1. In a press of the class described and having head and bed members arranged for relative press-opening and press-closing movement, punch means and die means associated respectively with said members for corresponding movement to perform a forming operation as the press is closed, and pad means arranged between said punch means and said die means and associated with said punch means to close upon the work in advance thereof, and stripper means associated with said punch means and extending through an opening in said pad means, to strip the work from said die means as the press is opened.

2. In a press of the class described and having head and bed members arranged for relative press-opening and press-closing movement, punch means and die means associated respectively with said members for corresponding movement to perform a forming operation as the press is closed, and stripper means associated with said punch means to strip the work from said die means as the press is opened and including a stripping finger having a work-engaging portion and mounted on said punch means for yielding movement relative thereto as the press is closed and limited movement relative thereto as the press is opened.

3. In a press of the class described and having head and bed members arranged for relative press-opening and press-closing movement, punch means and die means associated respectively with said members for corresponding movement to perform a forming operation as the press is closed, and pad means arranged between said punch means and said die means and associated with said punch means to close upon the work in advance thereof, and stripper means associated with said punch means and extending

through an opening in said pad means, to strip the work from said die means as the press is opened, said stripper means having a work-engaging portion and mounted on said punch means for yielding movement relative thereto as the press is closed, said pad and said stripper means having parts cooperative during press-opening movement to limit said relative movement of said stripper means.

In testimony whereof I hereby affix my signature.

JAMES S. REID.

70

80

85

90

95

100

105

110

115

120

125