

Jan. 6, 1942.

W. H. KLOCKE

2,269,313

METHOD OF MAKING DOUBLE WALLED ARTICLES AND THE LIKE

Filed Feb. 10, 1940

3 Sheets-Sheet 1

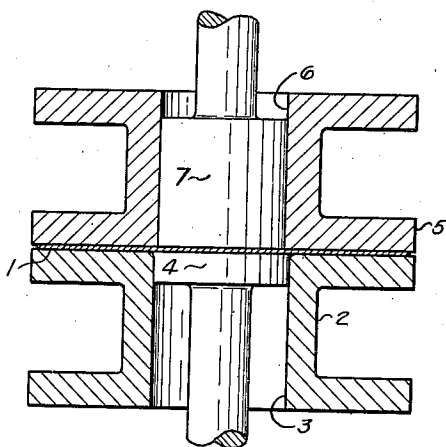


Fig. 1

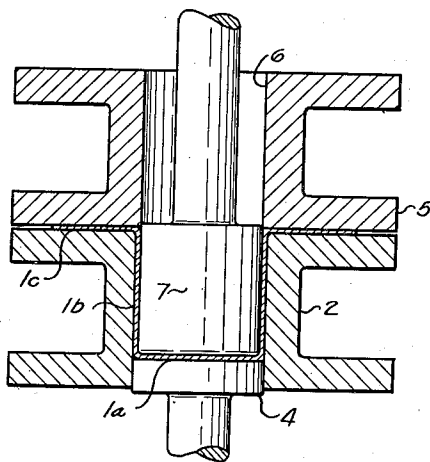


Fig. 2

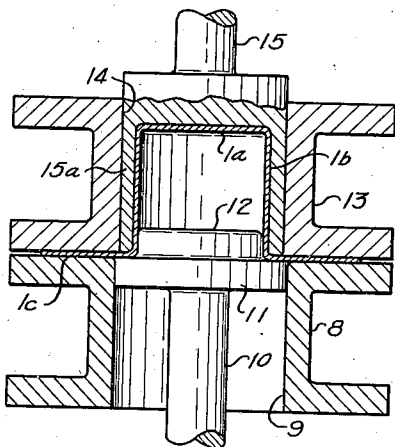


Fig. 3

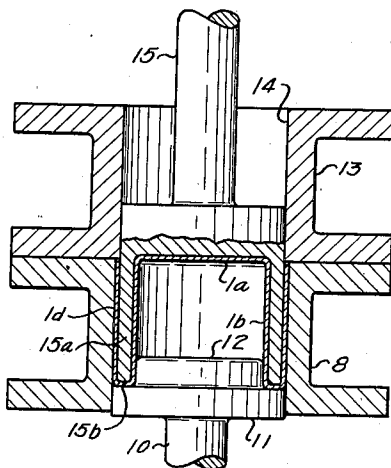


Fig. 4

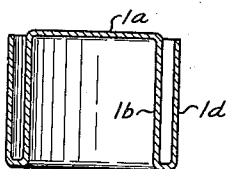


Fig. 5

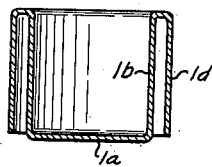


Fig. 8

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3 Sheets-Sheet 2

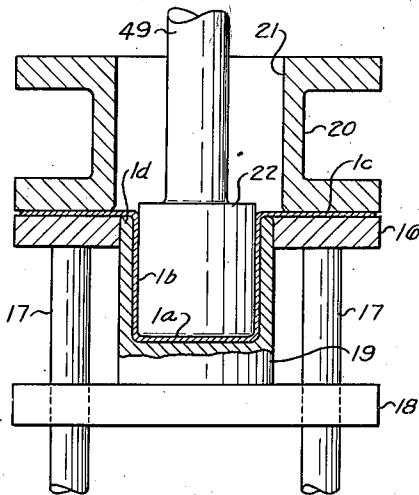


Fig. 6

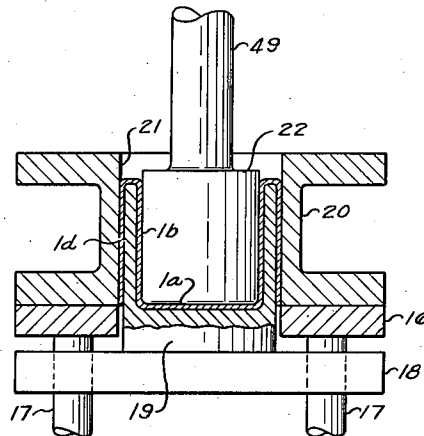


Fig. 7

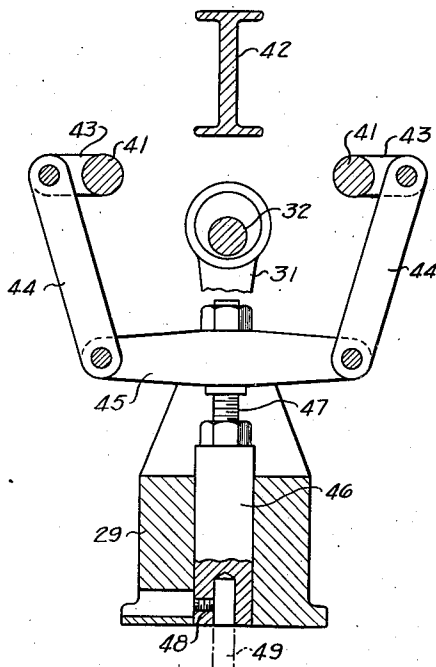


Fig. 11

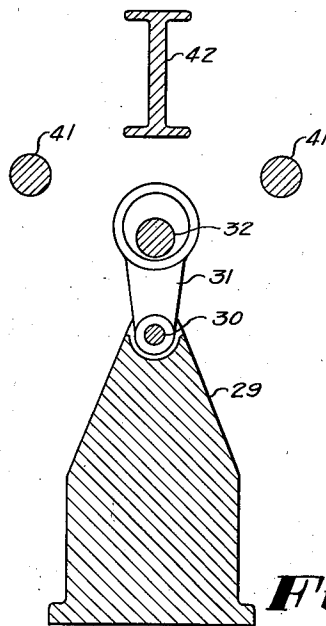


Fig. 12

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3 Sheets-Sheet 3

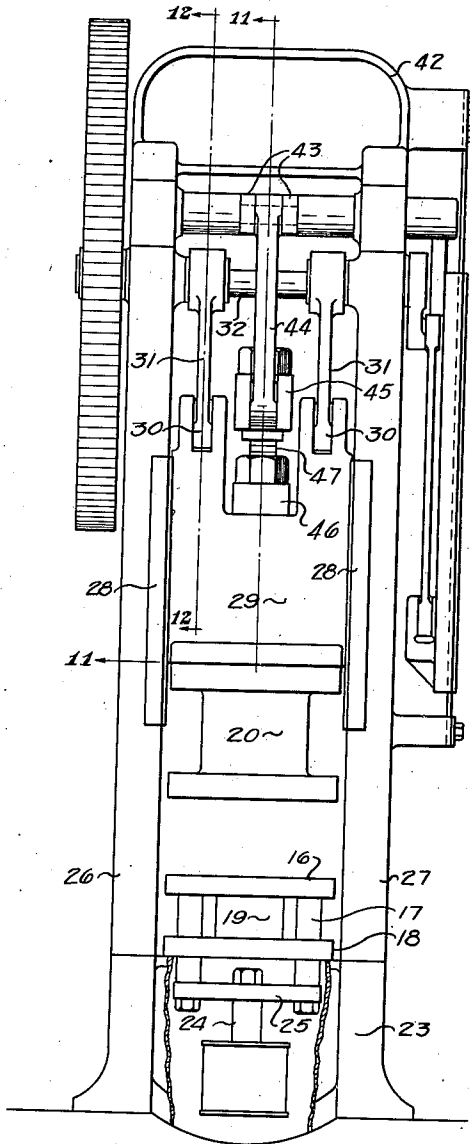


Fig. 9

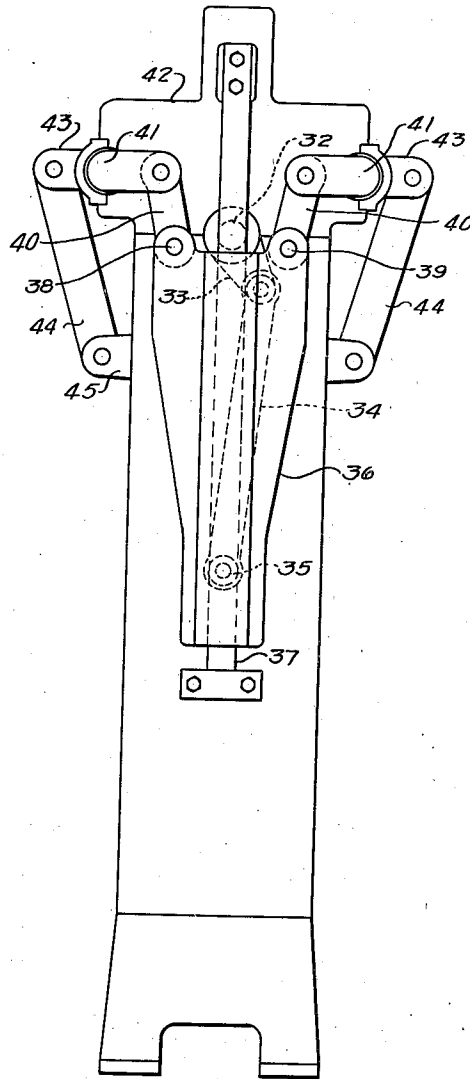


Fig. 10

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UNITED STATES PATENT OFFICE

2,269,313

METHOD OF MAKING DOUBLE WALLED ARTICLES AND THE LIKE

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Application February 10, 1940, Serial No. 318,298

1 Claim. (Cl. 113—51)

This invention relates to a novel method of making double-walled articles and the like.

In the manufacture of double-walled articles, such as bathtubs, broilers, roasters, lamp sockets, munition shells, and the like, it has heretofore been customary to draw a blank to provide a cup-shaped portion and a flange extending outwardly from such cup-shaped portion, and then, by a redrawing operation, involving the use of a drawing punch, move said cup-shaped portion in such a manner as to draw said flange into a second wall, parallel with the wall of said cup-shaped portion.

This practice results in the setting up of a considerable friction between the blank and the nose of the drawing punch, resulting in rapid wear of this portion of the punch.

It is a primary object of the present invention to provide a novel method of making articles of the aforesaid character, whereby the friction between the article being formed and the dies is reduced to a minimum, and the life of the dies increased to a considerable degree.

A further object of the invention is to provide a novel press which is particularly adapted for the practice of the aforesaid method.

A still further object of the invention is to provide a novel arrangement of press parts, whereby articles of the aforesaid character can be produced in commercially large quantities at relatively low cost.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means and steps hereinafter fully described and particularly pointed out in the claim; the annexed drawings and the following description setting forth in detail certain means and one mode of carrying out the invention, such disclosed means and mode illustrating however, but one of various ways in which the principle of the invention may be used.

In said annexed drawings—

Fig. 1 is a fragmentary cross-sectional view of press parts, and showing a blank in position to be subjected to a drawing operation by a method commonly used for making double-walled articles;

Fig. 2 is a view similar to Fig. 1, but showing the parts of the press at the conclusion of the drawing operation;

Fig. 3 is a view similar to Fig. 1, but showing the drawn article about to be subjected to a redrawing operation;

Fig. 4 is a view similar to Fig. 3, but showing the parts of the press at the conclusion of the redrawing operation;

Fig. 5 is a cross-sectional view of the finished article resulting from the method illustrated in Figs. 1 to 4, inclusive;

Fig. 6 is a view of press parts embodying the

novel feature of the invention, and showing a drawn article about to be subject to the redrawing operation by the method of the present invention;

Fig. 7 is a view similar to Fig. 6, but showing the press parts at the conclusion of the redrawing operation;

Fig. 8 is a cross-sectional view of the finished article resulting from the method illustrated in Figs. 1, 2, 6 and 7;

Fig. 9 is a front elevation of a toggle press which is adapted for the practice of the redrawing operation of the present invention;

Fig. 10 is a side elevational view of the press shown in Fig. 9;

Fig. 11 is a fragmentary vertical cross-sectional view, taken on the line 11—11 of Fig. 9; and

Fig. 12 is a fragmentary vertical cross-sectional view, taken on the line 12—12 of Fig. 9.

Referring more particularly to Figs. 1 to 5 inclusive, which illustrate a method commonly used for making double-walled articles, such, for example, as bathtubs, broilers, munition shells, etc., a blank 1, of any desired contour, and used, in this instance, for producing a shell, is placed upon a die 2 having a central opening 3, within which a knockout member 4 is mounted for reciprocal movement. The blank 1 is preliminarily clamped to the upper surface of the die 2 by means of a blank holder 5 having a central opening 6, which is smaller in its dimensions than the opening by an amount substantially equal to twice the thickness of the blank 1. A punch 7 is mounted for reciprocal movement in the opening 6 of the blank holder, said punch conforming in its external contour to the contour of the opening 6.

With the blank and press parts positioned, as shown in Fig. 1, the punch 7 and knockout member 4 are caused to simultaneously descend to the position shown in Fig. 2, as a result of which the blank has imparted thereto the cup-shaped form shown in Fig. 2, consisting of a bottom or base 1a, a side wall 1b, and an outwardly extending flange 1c, which lies in a plane parallel with the bottom 1a.

The drawn shell is then placed in another press in an inverted position, as shown in Fig. 3, with the flange 1c resting on a die 8, similar to the die 2, and having an opening 9 in which a combined knockout and pressure pad member 10 is mounted for reciprocal movement. The member 10 has a portion 11 which supports the radially inward portion of the flange 1c, and a portion 12 of smaller diameter which extends into the shell and engages the inner surface of the wall 1b of the shell. The shell is clamped to the die 8 by means of a blank holder 13 having an opening 14 in which a punch 15 is mounted for

reciprocal movement. The punch is made hollow for the reception of the shell, and has a cylindrical body portion 15a, which is interposed between the blank holder 13 and the wall 1b of the shell, and engages the flange 1c of the shell.

With the shell and press thus positioned, the member 10 and punch 15 are caused to move to the position shown in Fig. 4, thereby withdrawing the flange 1c of the shell from the space between the die 8 and holder 13 and forming therefrom a flange or second wall 1d, which is spaced from but parallel with the wall 1b of the wall. Following this redrawing operation, the punch is elevated, and the finished shell, as shown in Fig. 5, knocked out of the die 8 by means of the stripping action of the member 10.

It has been found that as a result of manufacturing shells by the foregoing method, that considerable friction is set up between the shell and the nose 15b of the punch, resulting in rapid wear of this portion of the punch.

The redrawing operation, in accordance with the present invention, as illustrated more or less diagrammatically in Figs. 6, 7 and 8, eliminates the wear of the nose of the punch, thereby increasing the life of the punch.

In accordance with the new method, the blank is first formed to provide a drawing shell in the manner shown in Figs. 1 and 2. Thereafter, the drawn shell, instead of being inverted, as in the old redrawing operation, is placed, as shown in Fig. 6, with its flange 1c resting on a Marquette pressure pad 16. Such a pressure pad is usually supported on plungers 17, which extend through openings in the bolster or bed 18 of the press, and are adapted to be normally maintained in elevated position by pneumatic means. The bed 18 of the press carries a die 19, in which the bottom 1a and wall 1b of the shell are disposed, the nose 1d of the die engaging the radially innermost portion of the flange 1c of the shell. The flange 1c is, in this case, clamped to the pad 16 by means of a drawing punch 20 having an opening 21 which is larger in its dimensions than the external diameter of the nose 1d by an amount substantially equal to twice the thickness of the metal of the shell.

Clamping the bottom 1a and 1b of the shell to the die 19 is a blank holder punch 22.

With the parts thus positioned, the punch 20 and pad 16 are caused to descend to the position shown in Fig. 7, thereby causing the flange 1c to be withdrawn from the space between the punch and pad and forming therefrom a flange, or second wall 1d, which is spaced from but parallel with the wall 1b of the shell. Following this redrawing operation, the finished shell, as illustrated in Fig. 8, is removed from the press.

It has been found that as a result of redrawing the shell by the operation depicted in Figs. 6 and 7, that friction of the nose 1d of the die 19 is eliminated, with a resultant increase in the life of the die.

The present elements illustrated in Figs. 6 and 7 may be incorporated in either a mechanically or hydraulically actuated press, but are preferably incorporated in a double action toggle-drawing press, as shown in Figs. 9, 10, 11 and 12, since this involves a minimum amount of modification of a standard toggle-drawing press.

The press comprises a base 23 upon which is mounted the bed 18, which has been described, the pad 16 being disposed above such bed and being reciprocable relatively to the latter, means for maintaining said pad in elevated position being shown in the form of a pneumatically operated ram 24 carrying a cross-plate 25, to which the plungers 17 which support the pad are secured. Mounted centrally of the bed 18 is the die 19.

The press further includes housings or uprights 26 and 27 provided with gibs 28 in which is slidably mounted a holder 29 for the drawing punch 20. The holder 29 is pivotally connected as at 30 to links 31, the upper ends of which are pivotally connected to the main drive shaft 32 of the press, in eccentric relation to the axis of the latter.

The shaft 32 is journaled in the uprights 26 and 27, and has secured to one end thereof a crank 33, which is pivotally secured at its outer end to an outside connection 34. The connection 34 is pivoted, as at 35, to a cross-head 36 mounted for vertical sliding movement on a guide 37 affixed to the press.

Pivotally secured, as at 38 and 39, to the upper end of the cross-head 36 are links 40, the upper ends of which are pivoted to rock shafts 41, which are journaled in the crown 42 of the press. The rockshafts 41 are provided centrally thereof with ears or lugs 43, to the outer ends of which are pivoted toggle links 44. The links 44 are pivotally connected at their lower ends to a yoke 45, which extends from the front to the rear of the press.

The yoke 45 carries a socket 46, which by means of a screw 47, is adjustable relatively to the yoke. The socket 46 has secured to its lower end, as by means of a set screw 48, the stem 49 of the blank holder punch 22.

The connections, in an actual press, have been so adjusted as to secure a stroke of eight inches for the punch 22 and a stroke of four and one-half inches for the drawing punch 20.

Although I have described a toggle press as best embodying the principles of the invention, it will be understood that they may also be embodied or incorporated in a hydraulic press.

Other forms may be employed embodying the features of my invention instead of the one herein explained, change being made as regards the means herein disclosed, provided the means stated by the following claim or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

In a method of making deep drawn, double-walled articles, the steps of clamping the rim of a blank between a die and a blank holder, drawing the center portion of the blank into said die by means of a punch, clamping said drawn center portion between a die and a blank holder punch and clamping the rim of the blank between a pressure pad and a drawing punch, and then moving said pressure pad and drawing punch while in clamping engagement with said rim to completely draw said rim about said second-named die into substantially parallel relation with the wall of the aforesaid drawn center portion.

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