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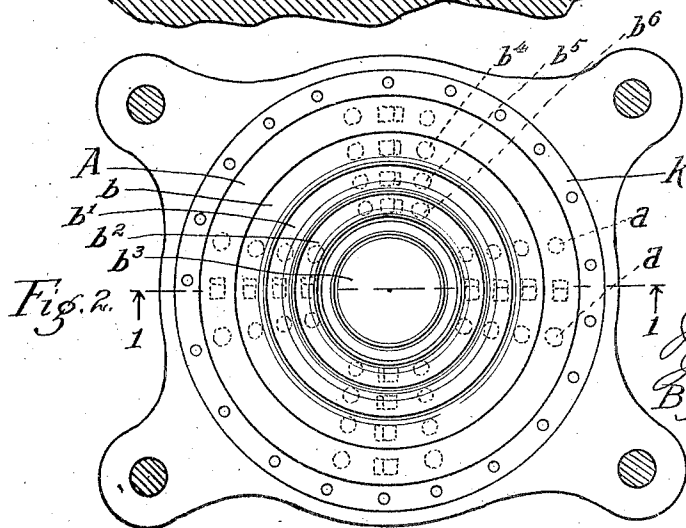
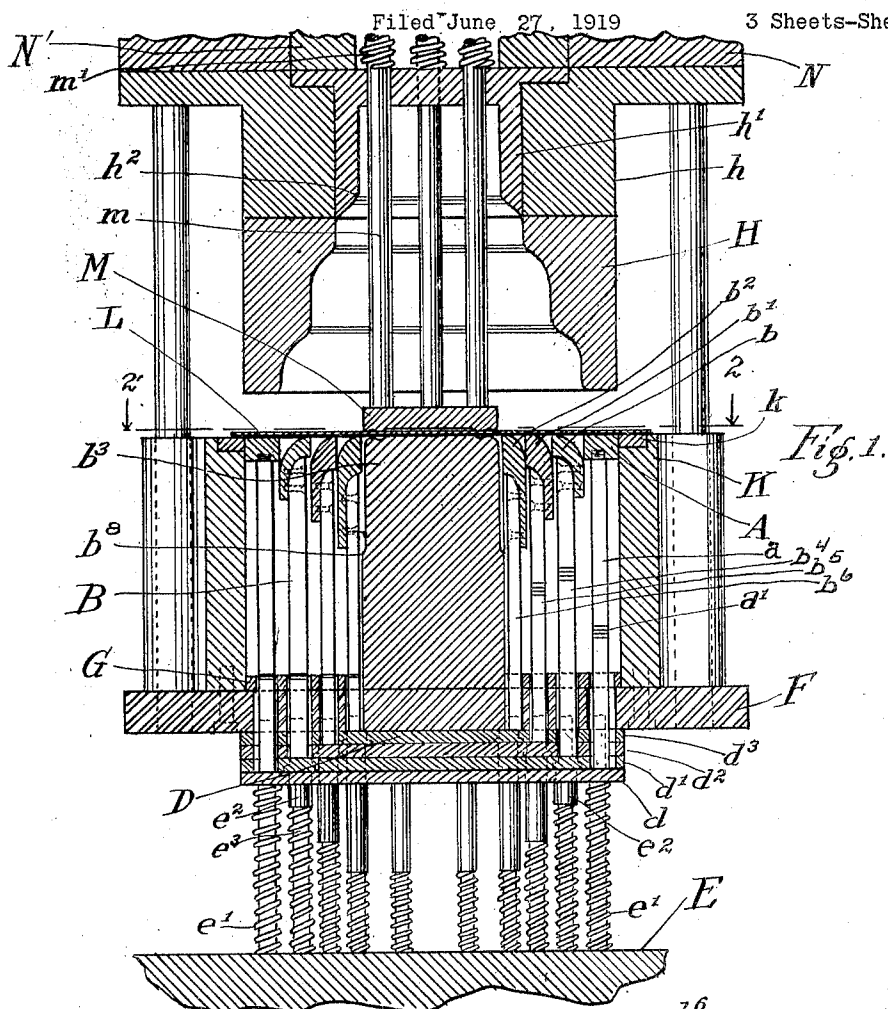
1,453,652

J. H. AUBLE ET AL

METHOD AND APPARATUS FOR FORMING SHEET METAL ARTICLES

Filed June 27, 1919

3 Sheets-Sheet 1



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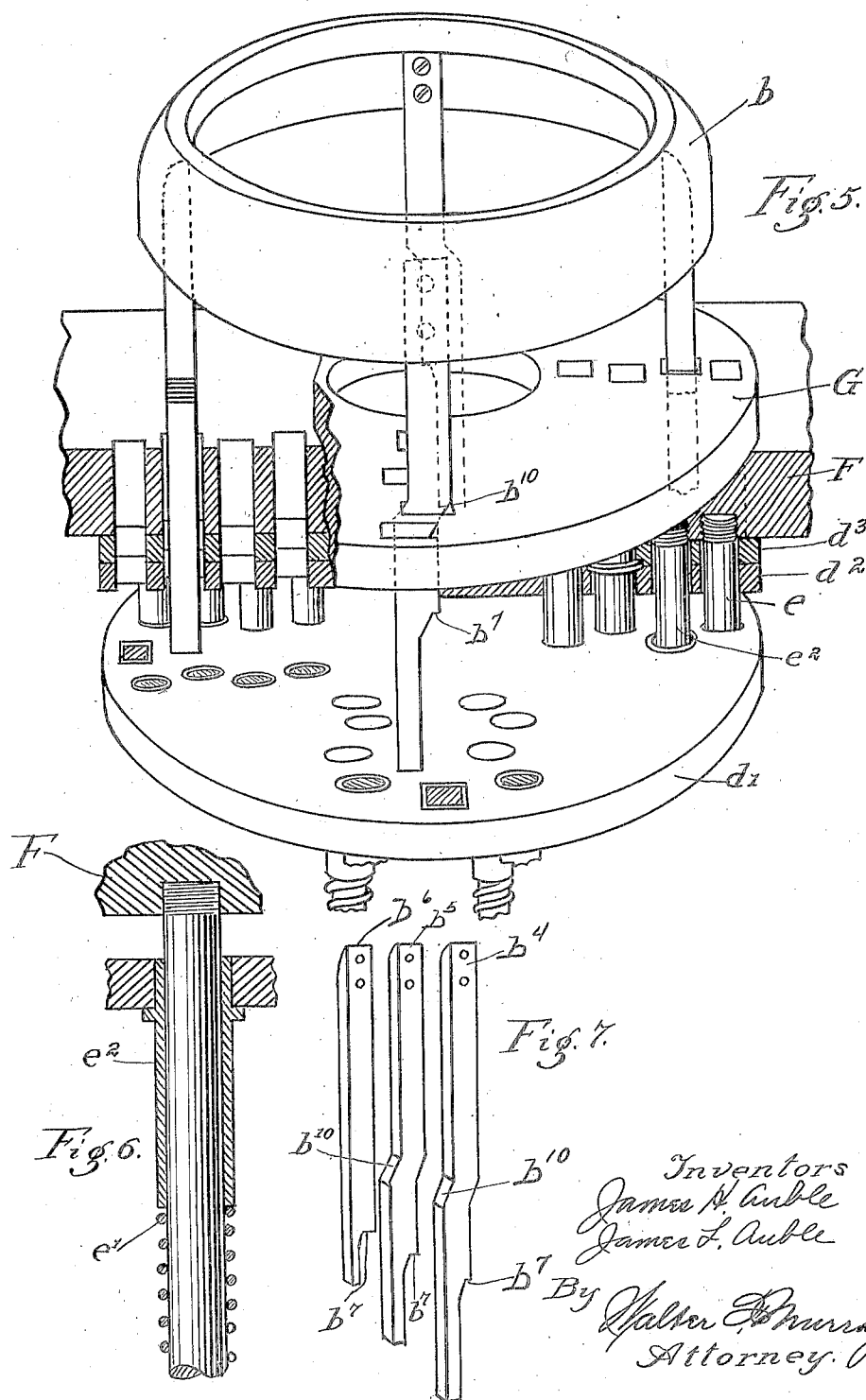
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

JAMES H. AUBLE AND JAMES L. AUBLE, OF CINCINNATI, OHIO, ASSIGNORS TO THE AUBLE DIE AND STAMPING COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

METHOD AND APPARATUS FOR FORMING SHEET-METAL ARTICLES.

Application filed June 27, 1919. Serial No. 307,153.

To all whom it may concern:

Be it known that we, JAMES H. AUBLE and JAMES L. AUBLE, citizens of the United States of America, and residents of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Methods and Apparatus for Forming Sheet-Metal Articles, of which the following is a specification.

10 An object of our invention is an apparatus by means of which sheet metal, that is low in tensile strength, may be shaped into articles having considerable depth, such as buckets, cups, etc.

15 Another object of our invention is an apparatus by means of which sheet metal articles of irregular form in cross section, may be formed.

20 Another object of our invention is an apparatus by means of which the edges of a sheet metal article may be trimmed and finished.

25 These and other objects are attained by the means described and claimed in the annexed specification and illustrated in the accompanying drawings, in which:—

Fig. 1, is a vertical sectional view of an apparatus embodying our invention and taken upon line 1—1 of Fig. 2.

30 Fig. 2, is a horizontal sectional view taken upon line 2—2 of Fig. 1, but with the blank retaining pad removed.

35 Fig. 3, is an enlarged view partly in elevation and partly in section of the collapsible dies, their yielding support plates, the floor and the movable support plate.

Fig. 4, is a sectional view taken upon line 4—4 of Fig. 3, but upon a reduced scale.

40 Fig. 5, is a fragmental perspective view of one of the collapsible dies, the support plate, the floor, and of the yielding support plates.

45 Fig. 6, is a detail view partly in section and partly in elevation of one of the posts which connect the floor and the base, and of the yielding support plate and its mounting means.

Fig. 7, is a detail view of the posts for actuating the support plate.

Referring to the parts.

50 The apparatus embodying our invention comprises a blank holder A, a series of concentric collapsible dies B, a series of yielding support plates D, a base E upon which the support plates are yieldingly mounted, a

floor F which supports a support plate G 55 which upholds each of the collapsible dies whilst the edges of the blank are being bent over it, and is moved automatically to permit a die to yield and to present the blank to the next die, and a movable die member H 60 for molding the metal over the collapsible dies.

The collapsible dies may be made of any irregular shape and of any reasonable number. For convenience in illustration we have 65 shown them as being circular in cross section and of comprising three collapsible dies b, b', b^2 , and of a fixed die b^3 .

The blank holder and each of the dies is supported upon one of the support plates 70 of the series D by means of posts which extend thru the movable support plate G, the floor F and the plates of the series D, which are intermediate the floor and the plate upon which the posts rest. The posts a of the 75 blank holder are supported by plate d , the posts b^4 of the die b rest upon the plate d' , posts b^5 of the die b' rest upon the plate d^2 and posts b^6 of the die b^2 rest upon the plate d^3 . The die b^3 rests upon the floor F. 80

The means for mounting plates d, d', d^2 and d^3 yieldingly upon the base E are as follows: A series of posts extend from the base E and are screw threaded at their upper ends to the floor F, extending thru perforations in the plates d, d', d^2 and d^3 . We 85 prefer to use eight of these posts for each of the plates. The outer ones e of these posts have mounted upon them coiled springs e' which bear at their lower ends against the 90 base E, and at their upper ends against the plate d . Plate d' has secured in it sleeves e^2 which have sliding engagement upon the posts e^3 and form abutments for coiled springs which bear at their lower end 95 against the base E. Similar sleeves and similar springs are provided for the plates d^2, d^3 .

The means by which the dies b, b', b^2 are held in place whilst the metal is being bent 100 over them and are successively released so as to descend under the pressure of the upper die member H, are as follows: Each of the posts b^4, b^5, b^6 , has in it a shoulder b^7 which rests upon the plate G adjacent to the perforation therein, thru which the post extends. The shoulders upon the posts b' are wider than the shoulders upon the posts b 105

and the shoulders upon the posts b^2 are wider than the shoulders upon the posts b^1 . This construction is illustrated in Figs. 4 and 7, wherein the perforations in the plate G are designated as follows: The perforations thru which posts b , b^2 extend are marked g' , g^2 , respectively. After the metal has been bent over the die, plate G is given a partial revolution to release the shoulders b^1 therefrom by off-sets b^{10} in the next series of posts, that is, shoulders on the posts of blank support A move plate G so as to release the shoulders on posts b^1 ; off-sets upon posts b^4 move the plate so as to release the shoulders on posts b^5 ; and off-sets on posts b^5 perform the same function for the shoulders upon the post b^6 .

Blank holder A is surrounded by a cylindrical wall K which is mounted upon the floor F and has embedded in its upper end a cutting die k which cooperates with the outer edge of the die member H in severing the blank from a sheet of metal L. The blank is held in place upon the die b^3 by a pad M which is mounted upon posts m and is held yieldingly in contact with the die b^3 by means of springs m' .

Die member H consists of two blocks, the lower one, h , of which is attached to member N of the press, and of an upper block h' which is attached to member N' of the press. The lower member h has frusto conical recesses which correspond in contour to the contours of the dies b , b' and the member h' corresponds in contour to the contour of die b^2 . Member h has a rounded shoulder h^2 which cooperates with a shoulder b^8 in trimming off the edges of the metal. Shoulder b^8 is formed by reducing the upper end of die b^3 an amount equal to the thickness of the metal in the blank L.

In operation the sheet of metal being placed upon the dies and the blank holder, which are in the normal positions shown in Fig. 1, is held in place by the yielding pad M, then the press member N is lowered; first it severs the blank from the sheet by the action of the die h and the upper edges of the die k , the blank holder A descends because the pressure of the die member H thereon is conveyed thru the posts a , thru the plate e , and thence to the springs e' , causing them to contract and to permit the plate d to slide downward. This bends or molds the outer edges of the blank L over the die member b . When the walls of the recess in block h register with the die b , the off-sets a' in the post a , contact with the holes in the plate G and impart a slight rotation thereto so as to release the shoulders on the posts b^4 from the plate G and to permit the posts b^4 to slide thru the plate G and to cause the supporting springs d' to descend against the tension of the springs e' . The movement imparted to plate G by

off-sets a' will not release the shoulders on posts b^5 , b^6 because they are of a greater width than the shoulders on the posts b^4 . The blank will then be molded by the next recess in the upper die member H over the next die b' , which in turn will have the shoulders of its posts b^5 released from the plate G by the off-sets in posts b^4 . Off-sets in the posts b^4 similarly will release the shoulders in posts b^5 .

After the last recess in block h has registered with the die b' , the second press head N' descends and molds the metal over the fixed die b^3 . As the rounded shoulder h^2 registers with the square shoulder b^8 , a cut is made in the metal so as to trim off the edges thereof. This cut is made from the interior and trims off the edges evenly and smoothly.

Having thus described our invention, what we claim is:—

1. An apparatus for molding objects from sheet metal blanks comprising concentric dies, means adapted to mount them fixedly and a means adapted to be actuated by each die for releasing adjacent dies.

2. In an apparatus for forming sheet metal objects the combination of a series of telescoping dies, a series of yielding plates, a series of posts adapted to mount each die upon one of the yielding plates, an unyielding support for the posts, means adapted successively to release the posts from the unyielding support.

3. In an apparatus for forming sheet metal objects the combination of a base, a floor, a series of posts mounted upon the base and secured in the floor, a series of plates mounted reciprocally upon the posts, springs surrounding the posts and adapted to mount each of the plates yieldingly thereon, a support plate mounted upon the floor, a series of telescoping dies, posts extending from each die thru the support plate and the floor and resting upon a selected one of the yielding plates, shoulders upon the posts resting upon the support plate, each post having an off-set in it adapted to move the support plate and to release the shoulder of an adjacent die therefrom, and a die member adapted to cooperate with the telescoping dies in molding the sheet of metal thereover.

4. In an apparatus for forming sheet metal forms the combination of a fixed die, a series of telescoping dies surrounding the fixed die, means for mounting the telescoping dies yieldingly, a reciprocating die member adapted to cooperate with the telescoping dies and the fixed die and comprising a block having a recess with converging walls, and a yielding pad mounted within the recess and adapted to contact with the fixed die.

5. In an apparatus for forming sheet

metal objects the combination of a central die having at its upper end a reduced portion conforming to the shape and size of the article to be formed and forming with the
5 lower part of the die an angular shoulder, yielding telescoping dies surrounding the central die, a cooperating die member having a recess with walls that cooperate with the telescoping dies, and a reduced recess of
10 the contour and size conforming to the shape and the size of the exterior of the article to be formed and having a rounded shoulder adapted to cooperate with the angular shoulder of the central die in trimming off the edges of the article that has been
15 formed.

In testimony whereof, we have hereunto subscribed our names this 24th day of June, 1919.

JAMES H. AUBLE.
JAMES L. AUBLE.