(No Model.) 2 Sheets—Sheet 1.

A. W. PAULL & G. F. BUTTERS.

DRAWING SHEET METAL ARTICLES.

No. 344,459. Patented June 29, 1886.

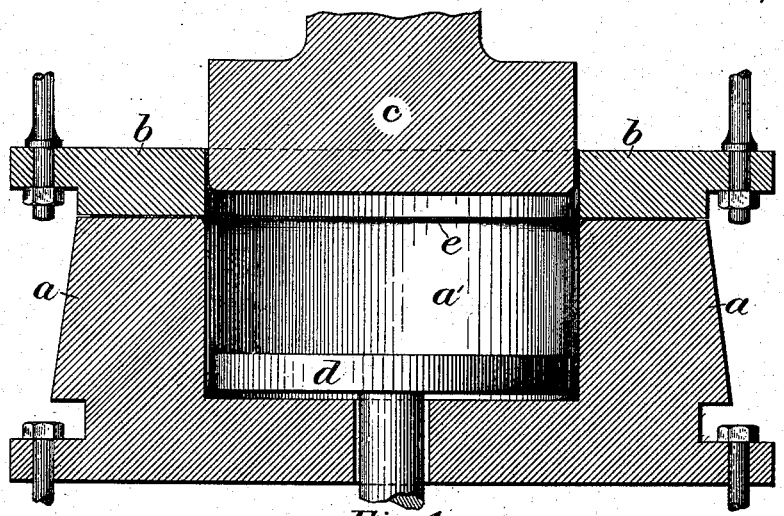

Fig. 1.

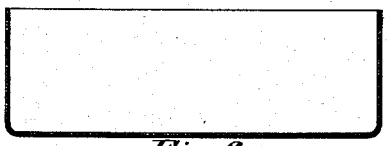

Fig. 2.

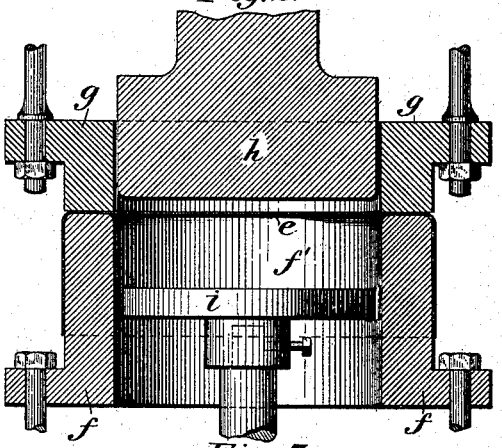

Fig. 3.

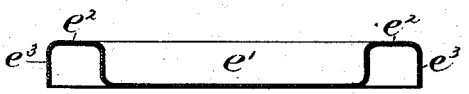

Fig. 4.

Witnesses.

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(No Model.) 2 Sheets—Sheet 2.

A. W. PAULL & G. F. BUTTERS.

DRAWING SHEET METAL ARTICLES.

No. 344,459. Patented June 29, 1886.

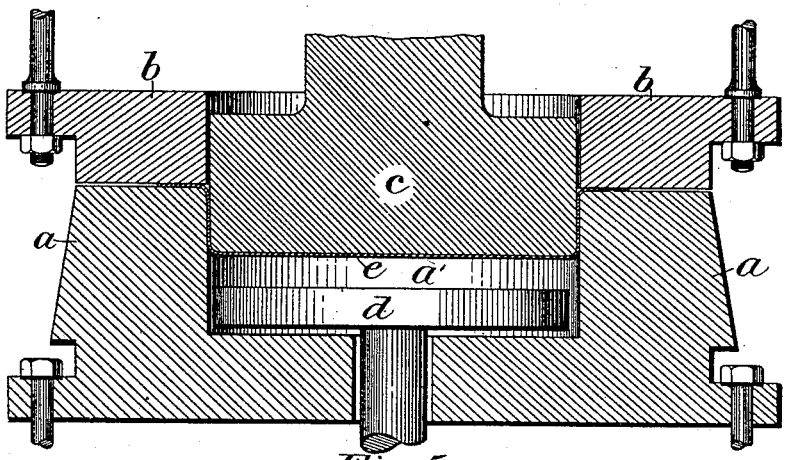

Fig. 5.

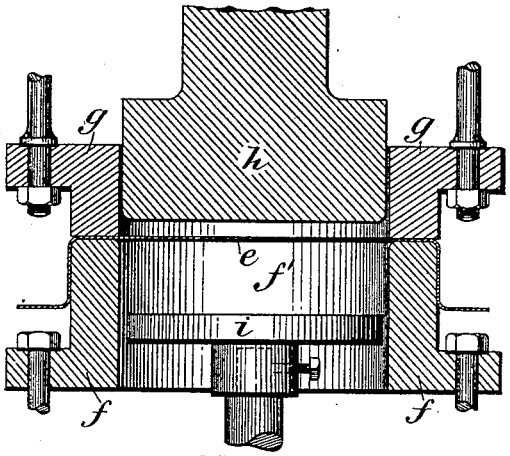

Fig. 6.

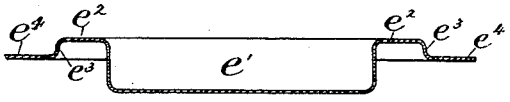

Fig. 7.

Witnesses
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UNITED STATES PATENT OFFICE.

ARCHIBALD W. PAULL AND GEORGE F. BUTTERS, OF WHEELING, WEST VIRGINIA; SAID BUTTERS ASSIGNOR TO SAID PAULL.

DRAWING SHEET-METAL ARTICLES.

SPECIFICATION forming part of Letters Patent No. 344,459, dated June 29, 1886.

Application filed April 23, 1886. Serial No. 199,904. (No model.)

To all whom it may concern:

Be it known that we, ARCHIBALD W. PAULL and GEORGE F. BUTTERS, of Wheeling, in the county of Ohio and State of West Virginia, have invented a new and useful Improvement in Drawing Sheet-Metal Articles; and we do hereby declare the following to be a full, clear, and exact description thereof.

Our present invention consists of an improved method of producing cup-shaped articles of sheet metal having a reflexed flange extending around them without seam or joint, by drawing the same from a flat blank or piece of sheet metal.

To enable others skilled in the art to make use of our improvement, we will now describe it with reference to the accompanying drawings, in which—

Figure 1 is a vertical section of the dies and plunger by which the first step of our improved method is effected. Fig. 2 is a view of the blank after having been acted upon by the devices shown in Fig. 1. Fig. 3 is a view of the dies and plunger by which the second step of our improved method is effected. Fig. 4 is a view of the completed blank. Fig. 5 is a view of devices for forming a cup-shaped blank with a horizontal flange. Fig. 6 is a view of devices for producing a cup-shaped blank with a reflexed flange around it, and a horizontal flange at the outer edge of the reflexed flange, as shown in Fig. 7.

Like letters of reference indicate like parts in each.

In Fig. 1, *a* indicates the die, which is placed on a suitable bed-plate, and is provided with a die-cavity, *a'*.

b indicates the clamp or holding ring; *c*, the plunger, and *d* the vertically-moving discharging-bottom of the die.

The die, clamping-ring, and plunger are mounted in the usual way in a vertical drawing-press, and separate movements are given to the clamping-ring and plunger by means of separate cams placed on a shaft mounted above in the frame of the machine, and further description of the construction of the press will not be necessary, as it is old and well known.

A blank or piece of sheet metal, *e*, of suitable size, is placed on top of the die *a* over the cavity *a'*, as shown in Fig. 1. The clamping-ring *b* then descends and clamps the edge of the blank upon the top surface of the die *a*, and then the plunger *c* descends and forces the blank down into the die-cavity *a'*, drawing its edge from between the clamping-faces of the die *a* and ring *b*, thereby forming a shallow cup, as shown in Fig. 2. The plunger and ring are then retracted, and the article is then discharged from the die in the usual way. This operation constitutes the first step of our improved method. The blank is then submitted to the operation of the devices shown in Fig. 3, where *f* is the die, *g* the clamping-ring, *h* the plunger, and *i* the discharging-bottom of the die. The external diameter of the die *f* is such that when the cup-shaped blank, Fig. 2, is inverted it may be placed over the die, which will fit snugly in the cup, as shown in Fig. 3. The ring *g* then descends upon the bottom of the blank, and clamps the outer circle of its unflanged portion on the surface of the die *f* around the cavity *f'*, as shown in Fig. 3. Then the plunger *h* descends upon the central portion of the blank and forces it down into the cavity *f'* in the same direction as the flange e^3 extends, drawing the metal from between the clamping-faces of the die and ring until a cup, *e'*, of the desired depth is formed, which produces a blank like that shown in Fig. 4, having a horizontal flange, e^2, at the edge of the cup and a reflexed flange, e^3, of the desired width at the outer edge of the horizontal flange e^2.

If it is desired to produce a blank like that shown in Fig. 4, with a horizontal flange, e^4, around the reflexed flange e^3, as shown in Fig. 7, it can be done by stopping the descent of the plunger *c* before the edge of the blank *e* is drawn entirely from between the clamping-faces of the die *a* and ring *b*. This is illustrated in Fig. 5. The result of this operation is a cup-shaped blank having an outer horizontal flange, e^4, which blank, being inverted and placed on the die *f*, as shown in Fig. 6, is clamped between the die *f* and ring *g*, and acted upon by the plunger *h*, as before described with reference to Fig. 3, in the reverse direction to the first cup until a central cup, *e'*, of the desired depth is formed. The motion of the plunger *h* is not sufficient to draw the vertical sides e^3 of the blank entirely between

the die and ring, so that the result is a blank of the shape shown in Fig. 7, having a central cup, e', reflexed flange e^3, and outer horizontal flange, e^4.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The method of making deep cup-shaped articles of sheet metal having a reflexed flange extending around them, which consists, first, in drawing a blank of thin sheet metal into a flanged cup by pressing it through a die, and then placing it on a die in an inverted position, clamping the edge of the bottom of the cup between clamping-surfaces, and forcing the unclamped central portion into a die in the same direction as the flange extends until the flange is partially drawn between the clamping-faces, whereby a cup-shaped blank having an outer reflexed flange is produced, substantially as and for the purposes described.

2. The method of making deep cup-shaped articles of sheet metal having a reflexed flange and a horizontal flange outside of the latter, which consists, first, in drawing a blank of thin sheet metal into a flanged cup by clamping the edge of the blank between clamping-surfaces and pressing the central unclamped portion into a die until the clamped edges are partially drawn from between the clamping-surfaces, and then placing the cup on a die in an inverted position, clamping the edge of the bottom of the cup between clamping-surfaces, and forcing the central unclamped portion into a die in the reverse direction to the first cup until the said sides are partially drawn between the clamping-faces, substantially as and for the purposes described.

In testimony whereof we have hereunto set our hands this 25th day of February, A. D. 1886.

ARCHIBALD W. PAULL.
GEORGE F. BUTTERS.

Witnesses:
W. B. CORWIN,
THOMAS B. KERR.