

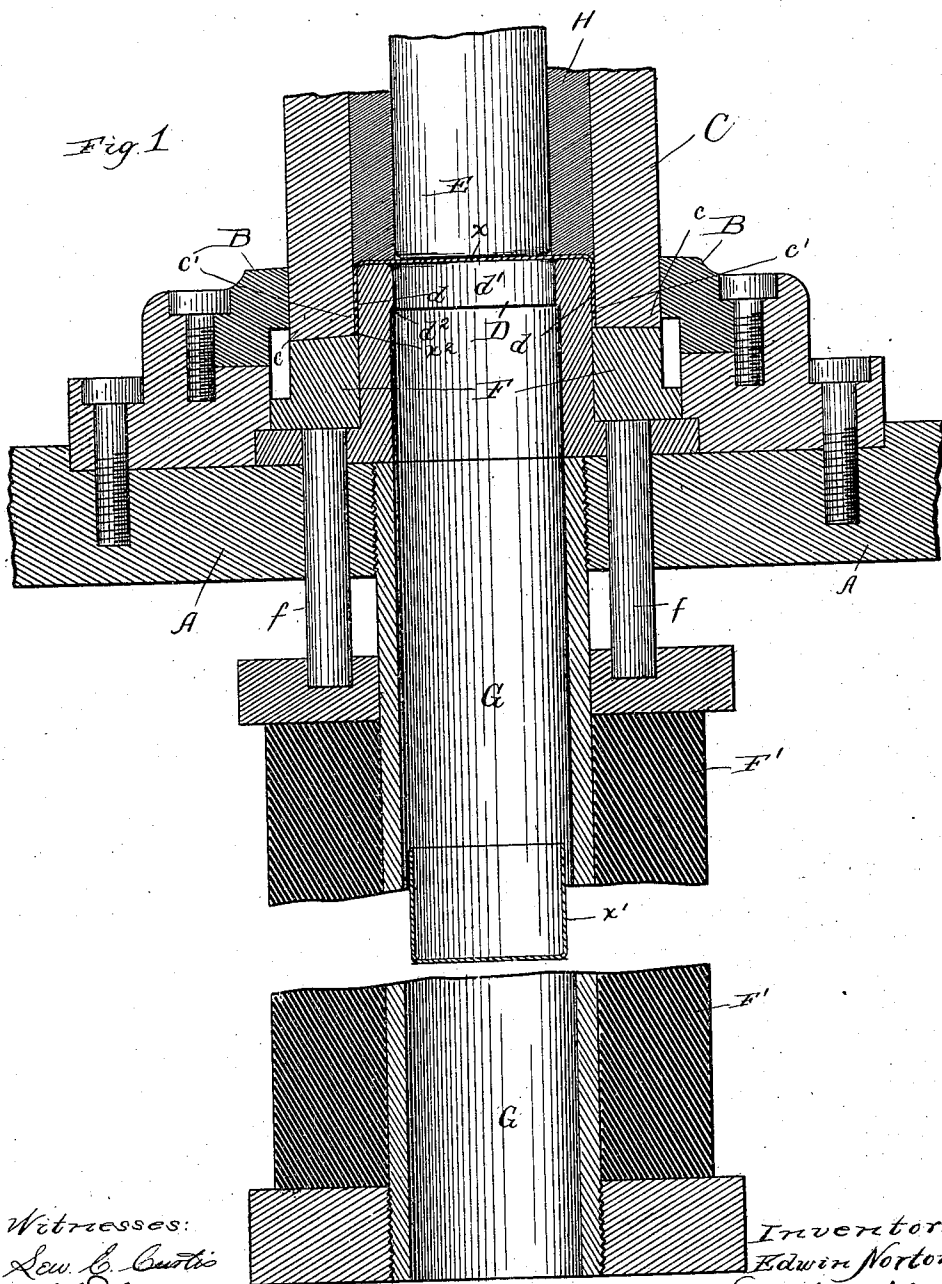
(No Model.)

2 Sheets—Sheet 1.

E. NORTON.
DIE FOR DRAWING SHEET METAL.

No. 460,594.

Patented Oct. 6, 1891.



Witnesses:
Lew. C. Curtis
A. M. Munday.

Inventor:
Edwin Norton
By Munday, Evans & Adcock
Attorneys

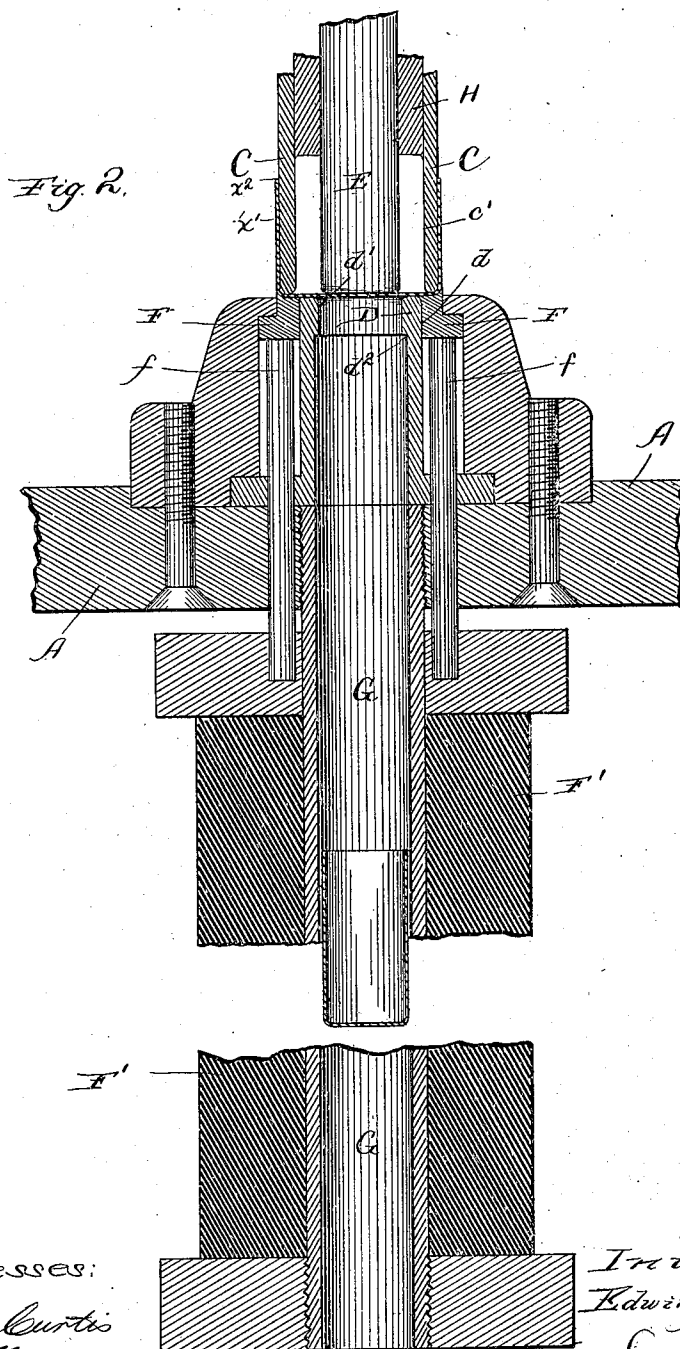
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Geo. C. Curtis
H. M. Munday,

Inventor:

Edwin Norton

By Munday, Evarts & Adcock
His Attorneys.

UNITED STATES PATENT OFFICE.

EDWIN NORTON, OF MAYWOOD, ASSIGNOR TO HIMSELF, AND OLIVER W. NORTON, OF CHICAGO, ILLINOIS.

DIE FOR DRAWING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 460,594, dated October 6, 1891.

Application filed December 31, 1890. Serial No. 376,379. (No model.)

To all whom it may concern:

Be it known that I, EDWIN NORTON, a citizen of the United States, residing in Maywood, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Drawing-Dies, of which the following is a specification.

My invention relates to dies for drawing metal into shapes.

My invention operates upon the principle of successively reversing the direction in which the metal is drawn, and at each successive drawing turning the shape previously drawn inside out, according to the invention of John W. Bodge, as fully set forth in his pending application, Serial No. 375,935, filed December 27, 1890.

My invention consists in a compound die operating to successively draw the metal in opposite directions, the shape drawn by the first action being turned inside out by the second action of the compound acting dies.

It also consists in the combination of a cutting-die with said compound drawing-die, operating to draw the metal in opposite directions.

It also consists in the combination, with the punch or male die and annular die for drawing and reducing the shape and turning it inside out, of a sleeve surrounding said annular die, so that the cylindrical or other wall of the metal shape to be turned inside out will be supported and guided both inside and out on the inside by the annular die and on the outside by said surrounding sleeve.

It also consists in the combination, with said punch and annular die, of a pushing ring adapted to push against the end or edge of the metal shape which is to be drawn and reduced by turning inside out, thereby facilitating the drawing operation and relieving the metal to be drawn from undue strain.

It also consists in the combination, with a punch and annular drawing-die for drawing inside out, of said pushing-ring and said sleeve surrounding said annular die.

It also consists in the novel devices and novel combination of parts and devices herein shown and described, and more particularly pointed out in the claims.

In the accompanying drawings, which form a part of this specification, and in which similar letters of reference indicate like parts, Figure 1 is a central vertical sectional view of a device embodying my invention; and Fig. 2 is a similar view on a smaller scale, showing the same device with the cutting-die omitted.

In the drawings, A represents the bed-plate of the press.

B is a female cutting-die secured thereto.

C is a die-block having a cutting edge or die c, which operates in conjunction with the female cutting-die B, and having a female drawing-die c', which operates in conjunction with the outer or male drawing-die face d of the annular die D. The annular die D has an inner face or periphery d', operating as a female drawing-die in conjunction with the punch or male drawing-die E, which reciprocates within the hollow die-block C.

F is the follower or presser-ring, surrounding the annular drawing-die D, and supported upon pins f from the rubber spring F'.

G is a metal tube secured to the bed-plate, and which supports the rubber spring F', and through which the shapes, drawn by the dies D E, are discharged. The annular die D has the usual projection or offset d² on its inner face to facilitate the discharge of the work.

The operation is as follows: A sheet of metal being placed across the face of the cutting-die B, the annular die-block C descends, thus causing its cutting-edge or die c to cut out the blank in the usual manner, and as the die-block continues to descend the blank is stamped or drawn down over the annular die D into the shape shown in Fig. 1 of the drawings. The next action is for the punch E to descend and draw the inverted shape x inside out over the end of said punch E and through the annular die D into the shape x'. During the first drawing operation of the compound die the follower or presser F serves its usual function of pressing against the blank, and keeping it smooth as it is drawn. During the reverse drawing or second operation the blank or shape x is guided and supported and kept smooth by the outer periphery of the annular die D, which supports it upon the inside, and also by the inner

periphery of the hollow die-block C, which guides and supports the shape x upon its outside. In this latter operation this die-block C serves simply as a surrounding sleeve to support and guide the cylindrical wall of the shape x upon the outside thereof during the reverse drawing operation, and it will be obvious to those skilled in the art that this combination or feature of my improvement may be practiced without using the die-block C, either as a cutting-die or as a female drawing-die for producing the first drawing operation—that is to say, this feature of my improvement may be used in conjunction with a punch and annular die for turning the shape inside out and entirely independent of the compound die or cutting-die.

By providing an independent follower or presser-sleeve H, surrounding the punch E and inside the hollow die-block C, I am enabled to withdraw the die-block C during the second or reverse drawing operation, and thus permit the spring follower or presser F to push against the end or edge x' of the shape x to facilitate the reverse drawing operation. This materially relieves the stock from strain during the second or reverse drawing operation. It will of course be readily understood by those skilled in the art that this pushing function of the ring F in the second or reverse drawing operation may be used entirely independently of the blank smoother or presser function, which the follower ring F has in the first drawing operation.

As shown in Fig. 2, the invention is applied to an already drawn shape, and no cutting-dies are of course employed in the compound die of Fig. 2.

My improved compound die may be attached to any well-known form of compound-acting press, or the several movable parts of the compound die may be moved by hand, if desired. As the construction of presses is well known to those skilled in the art, and as my present improvement relates simply to the dies, I have not thought it necessary to herein show or describe a press.

I claim—

1. The combination, with a punch, of a female drawing-die and an annular drawing-die having an outer periphery or face operating as a male die in conjunction with said female die and an inner periphery or face operating as a female die in conjunction with said punch, whereby the metal is drawn first in one direction and then in the opposite, the

shape first produced being turned inside out by the second operation, substantially as specified.

2. The compound die for first drawing a shape and then turning it inside out, and thus producing a deeper shape of smaller diameter, consisting of a hollow die-block C, an annular die D, adapted to reciprocate within the cavity of said hollow die C, and a punch E, adapted to reciprocate within said annular die D, said hollow die-block C operating in conjunction with the outer periphery or face of said annular die D to first draw the shape, and said punch E operating in conjunction with the inner periphery or face of said annular die to turn the shape inside out, and thus produce a smaller and deeper shape, substantially as specified.

3. The combination, with a cutting-die B, of hollow die-block C, having a cutting edge or die c, annular die D, and a punch or male die E, substantially as specified.

4. The combination, with a cutting-die B, of hollow die-block C, having a cutting edge or die c, annular die D, punch or male die E, and a follower or blank smoother F, substantially as specified.

5. The combination, with a punch and an annular die for drawing a metal shape by turning it inside out, of a sleeve surrounding said annular die to aid in supporting, guiding, and smoothing the peripheral wall of the shape to be drawn and reversed or turned inside out, substantially as specified.

6. The combination, with a punch or male die and an annular die for drawing a metal shape by turning it inside out, of a pusher ring or device surrounding said annular die and engaging the end or edge of the metal shape to be drawn to facilitate the drawing operation, substantially as specified.

7. The combination, with a punch or male die and an annular die for drawing a metal shape by turning it inside out, of a pusher ring or device surrounding said annular die and engaging the end or edge of the metal shape to be drawn to facilitate the drawing operation, and a sleeve or guide surrounding said annular die for supporting the peripheral wall of the shape to be drawn, substantially as specified.

EDWIN NORTON.

Witnesses:

H. M. MUNDAY,
EMMA HACK.