

July 8, 1952

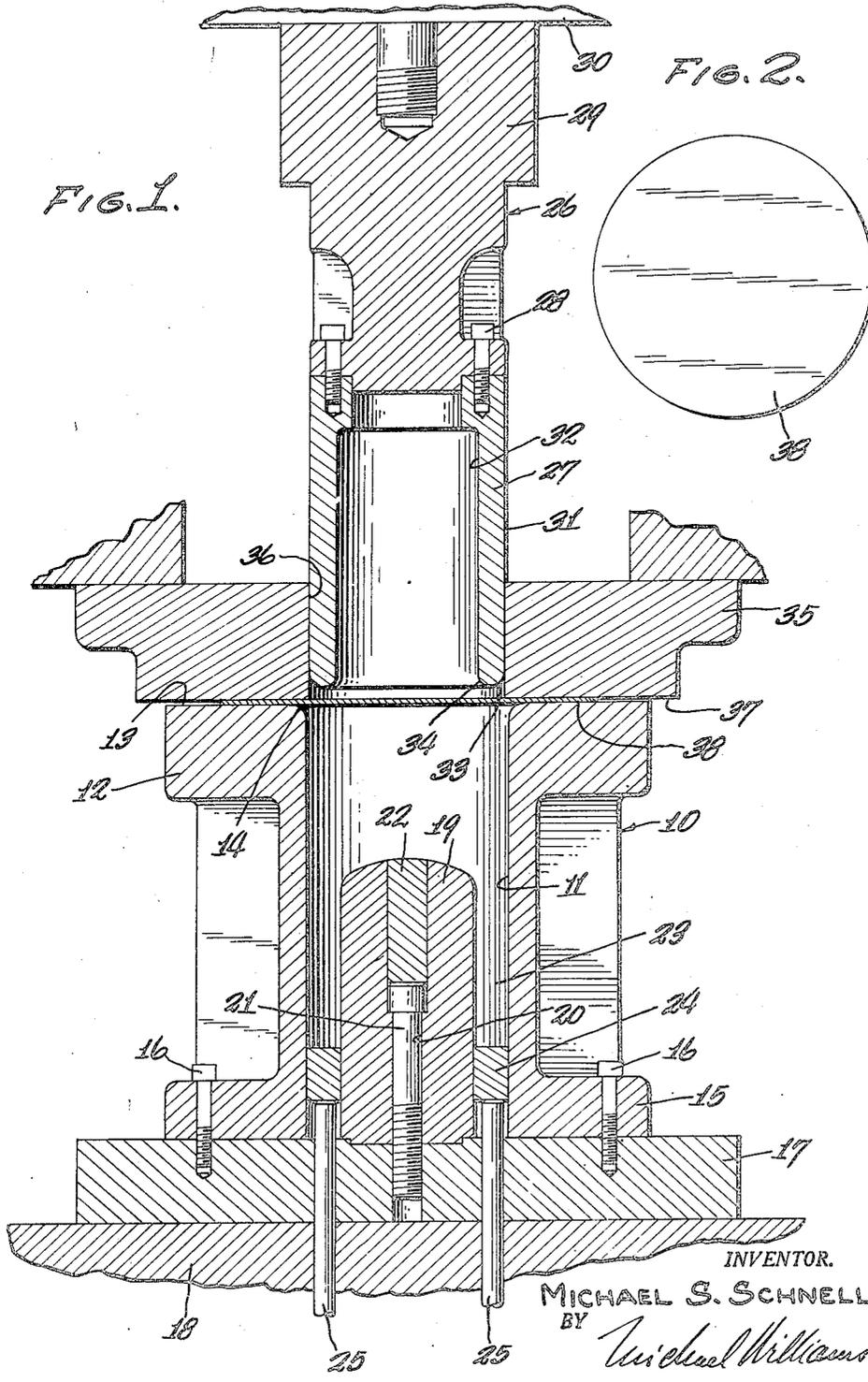
M. S. SCHNELL

2,602,411

MEANS FOR DRAWING MATERIAL

Filed Aug. 2, 1949

3 Sheets-Sheet 1



INVENTOR.
MICHAEL S. SCHNELL
BY *Michael Williams*
ATTORNEY

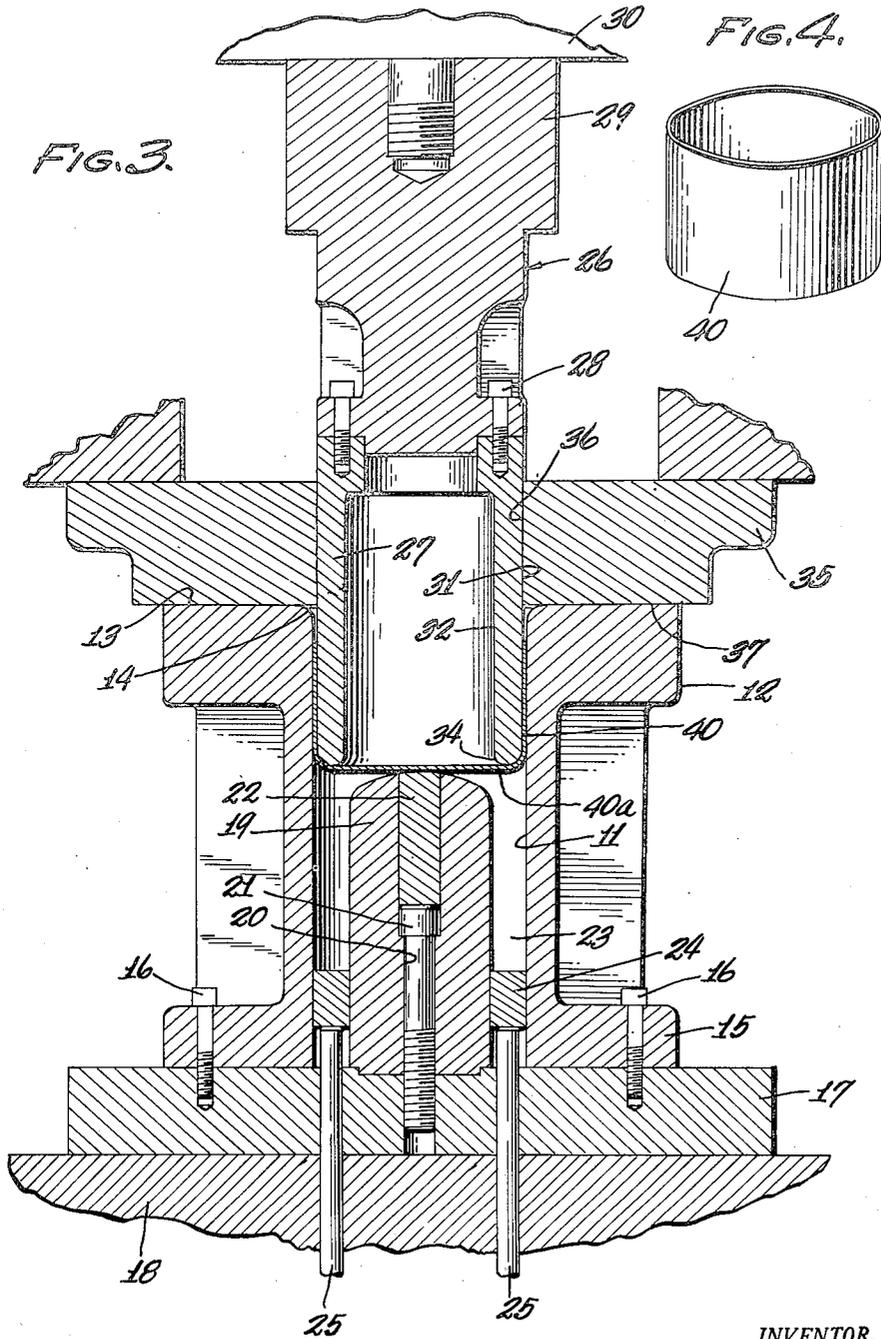
July 8, 1952

M. S. SCHNELL
MEANS FOR DRAWING MATERIAL

2,602,411

Filed Aug. 2, 1949

3 Sheets-Sheet 2



INVENTOR.
MICHAEL S. SCHNELL
BY *Michael Williams*
ATTORNEY

July 8, 1952

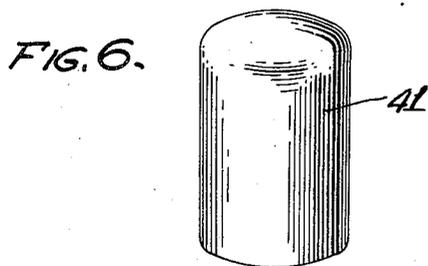
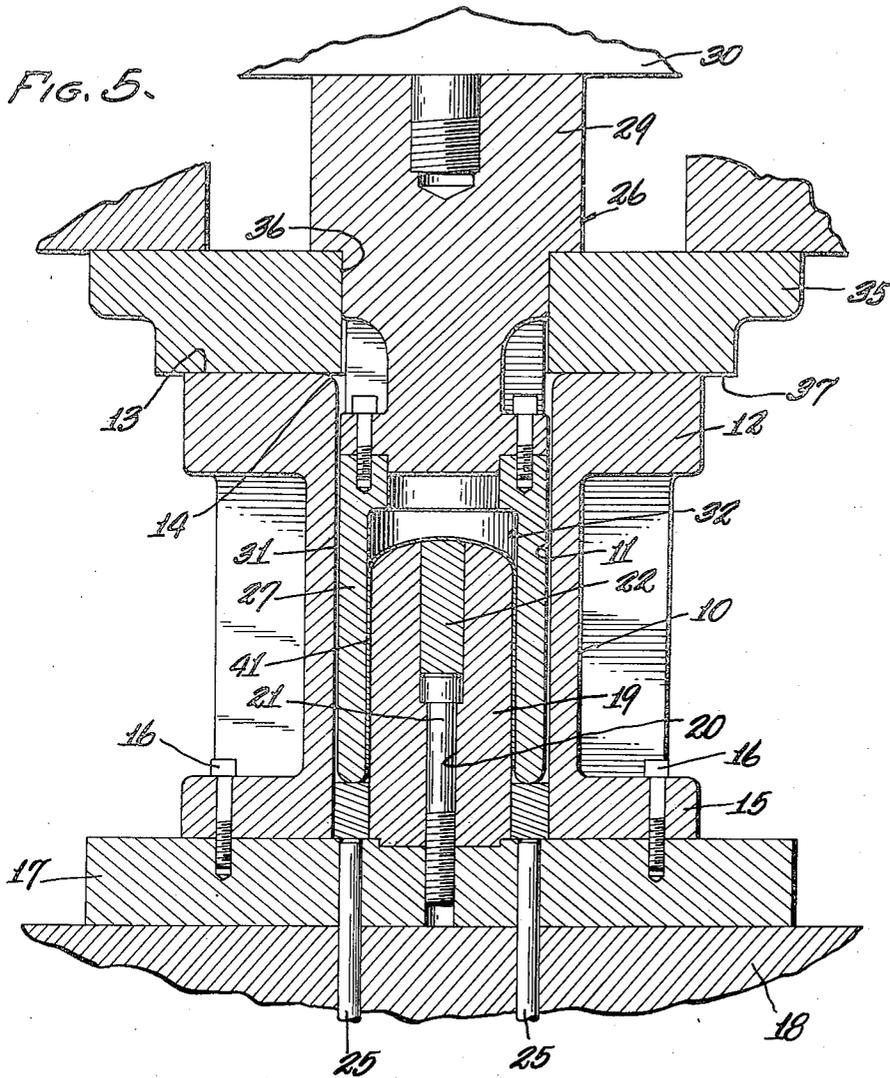
M. S. SCHNELL

2,602,411

MEANS FOR DRAWING MATERIAL

Filed Aug. 2, 1949

3 Sheets-Sheet 3



INVENTOR.
MICHAEL S. SCHNELL
BY *Michael Williams*
ATTORNEY

UNITED STATES PATENT OFFICE

2,602,411

MEANS FOR DRAWING MATERIAL

Michael S. Schnell, Salem, Ohio

Application August 2, 1949, Serial No. 108,097

2 Claims. (Cl. 113-46)

1

My invention relates to means for drawing material such, for example, as sheet metal, and the principal object of my invention is to provide new and improved means of this character.

Heretofore, in order to effect a substantial reduction in the diameter of an article, it was necessary to subject the article to more than one drawing operation to prevent cracks, tears, scratches, wrinkles, and other defects or injury to the article. Each operation involved handling, and after each operation it was usually necessary to anneal the article before a successive drawing operation.

My invention provides a substantial reduction in one operation and accordingly eliminates costly procedure heretofore found essential. Through use of my invention correlation of movement of independent parts is eliminated, thus doing away with the great skill and accuracy heretofore required in producing the prior art dies and in setting up the die and a press for a drawing operation. Many other advantages, not herein particularly pointed out, will appear or be obvious to those skilled in the art.

In the drawings accompanying this specification and forming a part of this application, there is shown, for purposes of illustration, an embodiment which my invention may assume, and in these drawings:

Figure 1 is a longitudinal sectional view through a draw die illustrating an embodiment of my invention,

Figure 2 is a plan view of a blank shown in section in Figure 1, but drawn to a slightly smaller scale,

Figure 3 is a sectional view similar to Figure 1, but with parts in different position,

Figure 4 is a perspective view of a partially formed article,

Figure 5 is a sectional view similar to Figures 1 and 2, but with parts in different position, and

Figure 6 is a perspective view of a shell resulting from one operation of the die herein disclosed.

Referring to the drawings, the embodiment herein shown to disclose the invention comprises a die body 10 which is here shown in the form of a tubular body providing a cylindrical die cavity 11. The die body 10 has a top flange 12 formed with a generally plane upper surface 13, the latter merging with the adjacent surface of the die cavity in a rounded drawing edge 14. The die body herein shown also has a bottom flange 15 secured, as by means of bolts 16, to a shoe or plate 17, and the latter is adapted to be

2

secured to the bolster plate 18 or similar surface of a suitable press (not shown).

Disposed within the die cavity 11 and extending upwardly from the shoe 17 is a punch 19 which is here shown as in the form of a cylindrical projection formed with a shouldered aperture 20 for the reception of a bolt 21 which is threaded into the shoe 17.

The upper surface of the punch 19, as herein disclosed, is positioned some distance below the opening into the die cavity 11, and such upper surface may be curved and a plug 22 is preferably fitted into the aperture in the punch and has an outer surface forming a continuation of the upper surface of the plug 19.

The diameter of the plug 19 is less than the diameter of the die cavity 11 to form an annular ring-like space 23 therebetween. A stripper ring 24 is slidable axially within the space 23, and pins 25 are resiliently pressed (by rubber cushion or pneumatic pressure) against the stripper ring 24 and urge it in a direction away from the shoe 17.

Sleeve means 26 is adapted for cooperation with the die cavity 11 and the punch 19, and in the embodiment herein disclosed, such means comprises a sleeve 27 secured, as by means of bolts 28, to a head 29 which is adapted to be secured to a movable portion of the press, such as to the ram 30.

The sleeve 27, as here shown, is in the form of a cylinder, having outer and inner wall surfaces 31 and 32 respectively. The free end of the sleeve 27, in the embodiment disclosed, lies in a plane normal to the axis of the sleeve, and has rounded outer and inner drawing edges 33 and 34 respectively.

A blank holder 35 is formed with an aperture 36 to permit the sleeve 27 to work therethrough, and as here shown, has a lower generally plane surface 37 cooperable with the surface 13 of the upper flange 12 to clamp a blank 38 therebetween. As is well known in the art, the blank holder 35 presses the peripheral portion of the blank 38 to the surface 13 through action of suitable means (not shown) so that proper drawing of the blank 38 may be effected.

As best seen in Figure 3, the outer wall surface of the sleeve 27 has proper operating clearance with the die cavity 11, and as best seen in Figure 5 the inner wall surface of the sleeve 27 has proper operating clearance with the punch 19.

In operation, and assuming that the sleeve 27 has been withdrawn from the die cavity 11 as shown in Figure 1, a blank 38 is positioned on

3

the upper surface 13 of the die body 10, suitable gauging means (not shown) being provided to properly position the blank.

The blank holder 35 may then be lowered to clamp the blank between it and the upper surface 13. The ram 30 may then be urged downwardly, to move the free end of the sleeve against the intermediate portion of the blank, so as to draw the blank over drawing edges 14 and 33 until all of the blank is removed from between clamping surfaces 13 and 37, and the blank is drawn to a cup-shaped article as best shown at 40 in Figures 3 and 4.

During this operation considerable heat is generated in the blank and therefore the metal is made more pliable than it is in cold condition. Further, during this drawing operation, the metal is caused to flow from flat shape to the drawn shape.

The sleeve 27 continues its descent and carries the cup-shape article 40 with it, and shortly after the blank has been drawn to cup-shape, and before the metal has lost its heat from the drawing operation just described, and before the metal has taken a set, the sleeve 27 presses the cup-shaped article over the punch 19.

Figure 3 shows the position of the sleeve 27 just before the cup-shaped article is pressed over the punch 19. As the sleeve 27 continues its descent, the bottom 40a of the cup-shaped article is pressed against the upper surface of the punch 19, and the article commences to turn inside-out and is drawn over the drawing edge 34 and the upper surface of the punch, and finally assumes the shape of the shell shown at 41 in Figures 5 and 6.

Figure 5 shows the free end of the sleeve clear of the open end of the shell 41 and pressing the stripper ring 24 downwardly against the resilient upward force supplied by the pins 25. With the operation completed, the travel of the ram 30 is reversed to withdraw the sleeve 27 from the die cavity 11. As the sleeve 27 is withdrawn, the stripper ring 24 presses against the lower end of the shell tends to strip the shell from the punch 19. The stripper ring 24 may have sufficient travel to substantially completely remove the shell 41 from the punch 19, or it may dislodge the shell and other suitable ejector means (not shown) may be provided to completely remove the shell 41 from the punch 19 and position it so that it may be readily removed from the die cavity 11.

It is here pointed out that the invention herein disclosed may be used with equal utility to produce either large or small diameter articles of either thin or thick gauge. Articles of considerable size and material thickness have been formed from blank shape to desired shape in one stroke of the press at a very satisfactory production rate per hour.

As an example, on one particular job, a shell 4 1/4 inches inside diameter by 7 inches deep and .125 inch wall thickness has been formed from a blank 12 3/8 inches in diameter. This job showed a total draw reduction of about 62 to 63% with a reduction of metal thickness of substantially 8 to 9%. Since previous methods required more than one die because it was heretofore not practical to secure so great a draw reduction, it will be appreciated that considerable economy in production, handling and tool cost is effected, and annealing between intermediate operations is eliminated.

The foregoing example is by no means an in-

4

dication of the limitation of the invention, since shells of greater diameter, depth and wall thickness have been equally well produced in one operation on draw dies of my invention.

In view of the foregoing, it will be apparent to those skilled in the art that I have accomplished at least the principal object of my invention, and it also will be apparent to those skilled in the art that the embodiment herein described may be variously changed and modified, without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described; hence it will be appreciated that the herein disclosed embodiment is illustrative only, and that my invention is not limited thereto.

I claim:

1. A drawing die adapted for use with a standard press having stationary and movable parts, comprising a first unit including a die body and a die post, said body and post being held in axial alignment and against relative movement, and a second unit comprising a sleeve, said units being adapted for respective mounting on the base and ram members of said press so as to be movable toward and away from each other; said die body having a cavity for receiving said sleeve, said cavity and said sleeve having cooperable drawing surfaces so that a blank positioned therebetween is drawn into a cup-shaped shell by relative movement of said units to position said sleeve within said cavity, said sleeve having a recess for receiving said post, said sleeve and said post having cooperable interior and exterior drawing surfaces so that said shell is inverted and drawn into a reduced cup-shaped shell by relative movement of said units to position said post within said sleeve.

2. A drawing die for use with a standard press comprising a stationary die body having a cavity, a stationary post disposed co-axially within said cavity and held against relative movement with said die body, and a sleeve disposed co-axial with said cavity, said die body and said post being carried by the base of said press and said sleeve being carried by the movable platen of said press and movable into said die cavity to engage and deform a blank positioned therebetween into a cup-shaped shell having a closed end spanning the end of said sleeve and a skirt wall disposed around the exterior surface of said sleeve, said sleeve being movable over said post so that the closed end of said shell is pushed inwardly of said sleeve by the terminal end of said post, said sleeve and said post having cooperating interior and exterior drawing surfaces for turning said shell inside-out into a reduced cup-shaped shell having its closed end spanning said post terminal end and a skirt wall disposed between adjoining interior and exterior surfaces of said sleeve and said post.

MICHAEL S. SCHNELL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
483,008	Norton	Sept. 20, 1892
516,809	Hewitt et al.	Mar. 20, 1894
1,649,841	May	Nov. 22, 1927
1,879,510	Rode	Sept. 27, 1932
2,132,002	Hight	Oct. 4, 1938
2,331,490	Menkin	Oct. 12, 1943