T. L. TALTY.

TUBE FORMING DIE.

APPLICATION FILED JULY 20, 1920.

1,403,460. Patented Jan. 10, 1922.

Fig. 1.

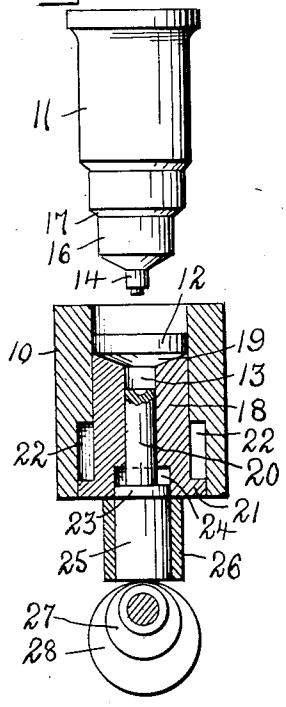


Fig. 2.

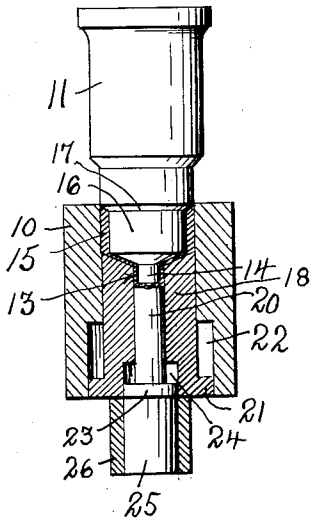


Fig. 3.

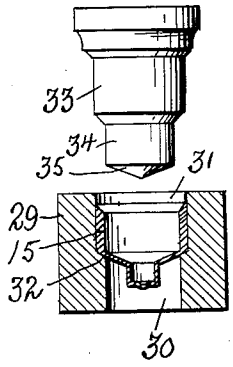


Fig. 4.

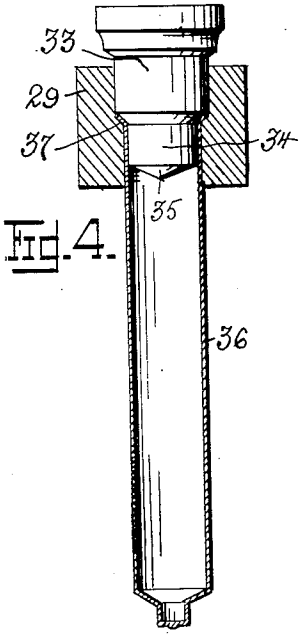


Fig. 5.

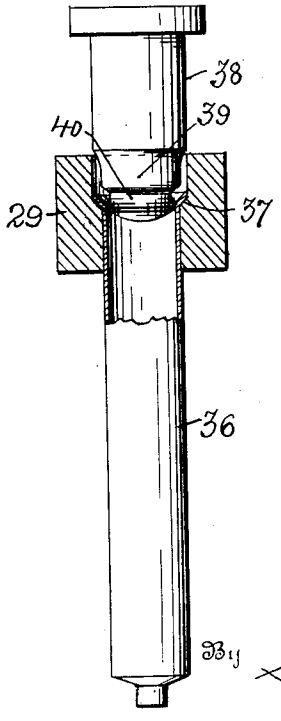
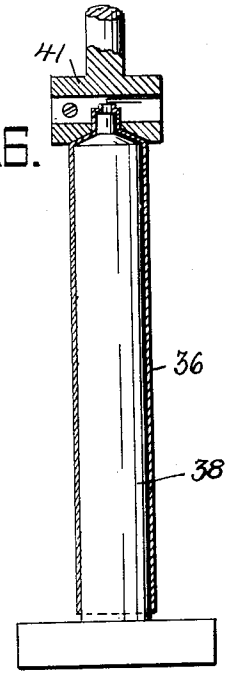


Fig. 6.



Inventor

THOMAS L. TALTY.

By Geo. P. Kimmel.

Attorney

UNITED STATES PATENT OFFICE.

THOMAS L. TALTY, OF BOSTON, MASSACHUSETTS.

TUBE-FORMING DIE.

1,403,460. Specification of Letters Patent. Patented Jan. 10, 1922.

Application filed July 20, 1920. Serial No. 397,766.

To all whom it may concern:

Be it known that I, THOMAS L. TALTY, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in a Tube-Forming Die, of which the following is a specification.

This invention relates to the construction of collapsible tubes, and has for one of its objects to simplify and improve the method of construction and increase the efficiency and utility of such methods.

The improved method requires the employment of a means for producing a cup shaped blank, a suitable die to receive the cup shaped member, and a punch or plunger to enter the die to cause the material of the cup shaped member to be spread out into a thin collapsible tube extending far beyond the lower or discharging end of the die.

The formation of the die produces an annular outstanding flange on the open end of the tube.

The last mentioned plunger or punch is then withdrawn and a plunger of novel shape inserted in the die and operating to sever the flange from the tube and thus trims the flange from the body of the tube. The tube is not withdrawn, it drops on conveyor orifice.

After the tube has been supplied with its contents, the open end is closed in the usual manner.

In the drawings illustrating the improved tube forming method:

Figure 1 represents the cup forming die and plunger with the cup forming plunger elevated and the die in section, the blank from which the cup is to be produced being shown within the die.

Fig. 2 is a view similar to Fig. 1, with the cup forming plunger at the end of its stroke and the cup shaped member completed.

Fig. 3 represents the tube forming die with the cup shaped member therein and the tube forming plunger elevated.

Fig. 4 is a view similar to Fig. 3 with the tube forming die at the end of its stroke and the walls of the tube completed.

Fig. 5 represents the means for severing the flange from the open end of the partly completed tube.

Fig. 6 represents the tube being completed by cutting the flanged end and threading and otherwise "finishing" the nipple end.

The die and plunger for producing the cup shaped member are indicated respectively at 10 and 11, and the blank from which the cup shaped member is to be produced is represented at 12 and disposed within the die.

The bottom of the die socket is flatly conical and the bottom formed centrally with a relatively small socket 13, and the lower part of the plunger 11 is formed with a projection 14 to force a portion of the cup shaped member therein to form the nipple portion of the tube when completed, the completed cup shaped member being represented as a whole at 15.

The punch or plunger is formed with a reduced portion 16 corresponding to the interior of the body part of the member 15, with an inclined shoulder 17 between the reduced part 16 and the body of the plunger, to form an inwardly inclined terminal to the member 16. The lower face of the reduced part 16 of the plunger 11 is flatly conical to correspond to the conical bottom of the socket part of the die 10.

With a device thus constructed when the blank 12 is inserted in the die 10 as shown in Fig. 1, and the plunger 11 forced home to its place in the die, the blank will be expanded into the cup shaped form as illustrated in Figs. 2 and 3.

The die device 10 is formed with a two part core consisting of an annular portion 18 corresponding in outer diameter to the interior of the blank receiving portion and with a flat conical top 19 corresponding to the conical terminal of the plunger portion 16, and a piston like portion 20 operating through the member 18. The member 20 is shorter than the member 18, the difference in length producing the cavity or recess 13 into which the material of the blank 12 is forced to produce the "nipple" portion of the tube.

The annular core member 18 is formed with an enlargement or flange 21 at its lower end operating in a guide seat 22 in the body 10 of the die, while the core member 20 is formed with a similar enlargement, or flange 23 operating in a guide seat 24 in the core member 18.

Bearing against the flanged portion 23 is a push bolt 25, and bearing around the core member 18 is a tubular bolt 26 bearing against the adjacent terminal of the core member 18 and externally of the bolt 25.

The tubular bolt 26 is designed to be actuated to force the core member 18 against the body of the cup shaped blank to force it from the die, while the bolt 20 is designed to be forced against the nipple portion of the blank to remove the completed cup from the die.

For the purpose of illustration cams 27 and 28 are shown as means for actuating the core member 18 and the bolt 20, the larger cam travelling at greater surface speed than the smaller, will move the tubular core member out of the way of the bolt 25, as will be obvious. The larger cam 28 is arranged to operate only on the tubular member 26, while the smaller cam 27 operates only on the bolt 25.

The cap member 15 is then deposited in an extrusion die, represented as a whole at 29.

This latter die is formed with an opening extending entirely therethrough with one portion 30 reduced to correspond to the exterior of the tube to be formed and the other portion 31 corresponding to the interior of the body portion of the member 15, so that when the latter is deposited in the die 29 it will rest upon the shoulder 32 between the portions 30 and 31 thereof.

The incline of the conical bottom of the socket of the die 10 is about 30 degrees from the horizontal, while the incline of the shoulder 32 is somewhat greater, or about 45 degrees from the horizontal, as shown in Fig. 3 to facilitate the operation.

The plunger or punch of the extrusion die is represented as a whole at 33 and includes a reduced portion 34 corresponding to the interior of the tube to be formed and with a flat conical terminal 35, corresponding to the interior of the flat conical bottom of the member 29, the body of the plunger 33 corresponding to and fitting closely in the larger upper part of the socket of the die 29. The flat conical terminal 35 corresponds to the conical bottom of the cup shaped member 15 and facilitates its action on the latter in forcing the material through the die.

Any suitable means may be employed for supporting the dies 10 and 29 and for operating the plungers or punches 11 and 33, but these parts are not illustrated as they form no part of the present invention.

By this construction, when the member 15 has been deposited in the die 29 and the plunger 33 operated, the material of the cup shaped member 15 will be expanded or spread out and passes from the die as a thin collapsible tube represented at 36 in Fig. 4 and with a flange 37 at the open end.

The plunger 33 is then withdrawn leaving the tube 36 suspended by its flange 37 in the die, and another plunger 38 of novel construction forced into the die, as shown in Fig. 5.

The latter plunger is formed with a reduced lower end 39 and rounded as shown, so that it quickly severs the flange which is caused to fold or curl over into the annular channel 40 around the operative end of the plunger and be removed with the plunger.

The partly completed tube 36, is then disposed over a mandrel or arbor 38 as shown in Fig. 6, and the nipple provided with its cap receiving threads, by a suitable device represented conventionally at 41, thus completing the tube ready to receive its contents through the open end from which the flange 37 has been severed. The tube is then closed in the usual manner.

The preferred embodiment of the invention is disclosed in the drawings and set forth in the specification, but it will be understood that any modifications within the scope of the claims may be made in the construction without departing from the principle of the invention or sacrificing any of its advantages.

What I claim is:

1. The method of constructing a metal tube consisting in disposing a cup shaped member having a projecting nipple in a die having an opening entirely therethrough and an intermediate shoulder to support the member, compressing the side walls of the member to cause the material thereof to flow from the opening of the die as a thin walled tube disposing the tube thus produced over a supporting arbor, threading the nipple portion of the tube and trimming the open end of the tube.

2. The method of producing a metal tube consisting in constructing a cup shaped member having a projecting nipple, disposing said member in a die having an opening entirely therethrough and an intermediate annular shoulder to support the member, and compressing the side walls of the member to cause the material thereof to flow from the opening of the die as a thin walled tube with the nipple portion at the outer end.

3. The method of producing a metal tube consisting in disposing a cup shaped member in a die having an opening entirely therethrough and an intermediate annular shoulder to support the cup shaped member, and compressing the end walls of the member to cause the material thereof to expand as a flange over the shoulder and to flow from the opening of the die as a thin walled tube.

4. A device of the class described comprising a die having an opening entirely therethrough with one portion of the opening reduced to form an annular intermediate stop shoulder, said stop shoulder being

inclined toward the discharge end of the die, and a plunger with a body portion corresponding to and closely fitting the larger portion of the die opening and a reduced portion of slightly less diameter than the reduced portion of the die opening, an annular shoulder being formed between the reduced portion of the plunger and the body thereof with the face of the shoulder inclined to a less degree than the shoulder of the die.

5. The method of producing a metal tube consisting in disposing a cup shaped member in a die having an opening entirely therethrough and an intermediate annular shoulder to support the cup shaped member, compressing the side walls of the member to cause the material thereof to expand as a flange over the shoulder and to flow from the opening of the die as a thin walled tube inserting a plunger having a reduced end to sever the flange of the tube by pressing the same over the shoulder.

In testimony whereof, I affix my signature hereto.

THOMAS L. TALTY.