Sept. 22, 1942. J. J. WILLIAMS 2,296,550

METHOD OF MANUFACTURING CONTAINER CLOSURES

Filed Dec. 5, 1938

Fig. 4.

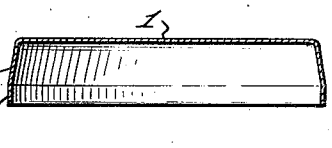


Fig. 5.

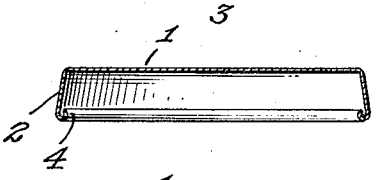


Fig. 6.

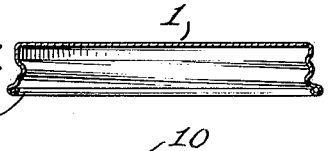


Fig. 1.

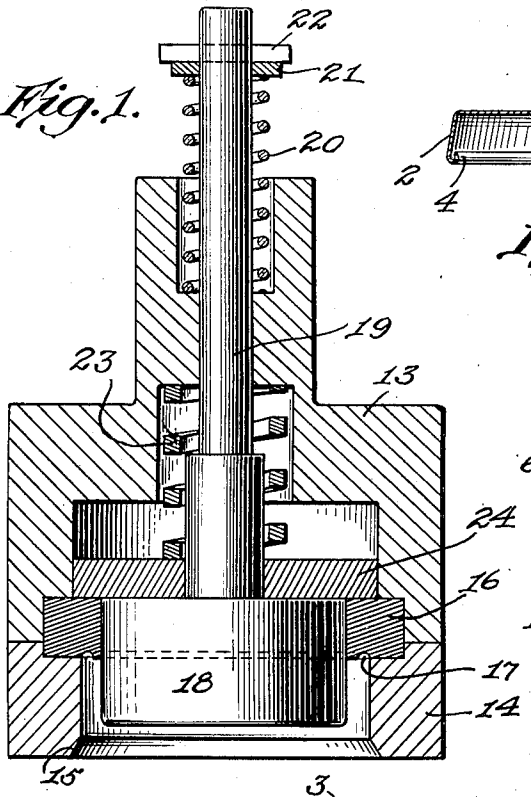


Fig. 3.

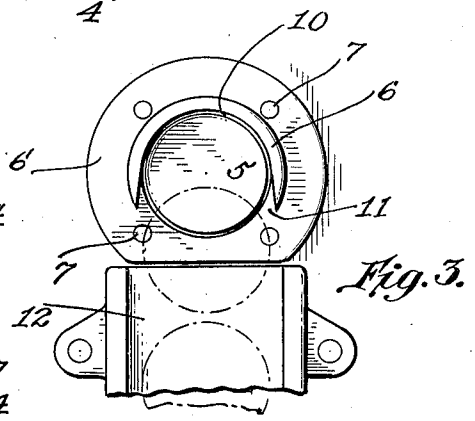
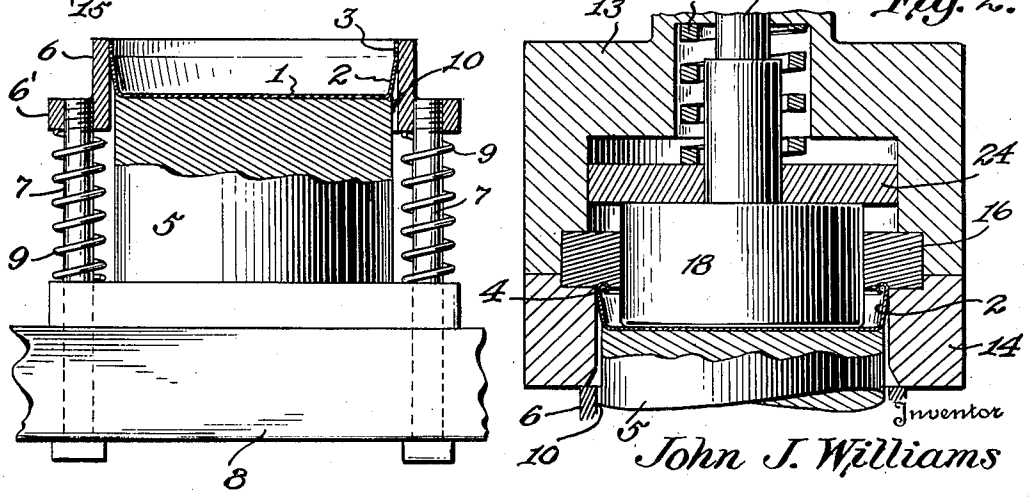


Fig. 2.



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UNITED STATES PATENT OFFICE

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METHOD OF MANUFACTURING CONTAINER CLOSURES

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Application December 5, 1938, Serial No. 244,128

1 Claim. (Cl. 113—121)

The invention relates to a method of manufacturing metallic closures for containers, and particularly to closures in which the lower edge of the closure skirt has an incurled bead disposed below the threads or other container engaging means.

One of the objects of the invention is to provide a method by which closures of this type can be manufactured at a higher rate of production than has been possible heretofore.

Another object of the invention resides in the provision of a method which reduces the cost of manufacturing closures of this type.

A further object of the invention is to provide a method of manufacturing closures of this type which will avoid any danger of rupturing the metal or unduly straining it.

Various other objects and advantages of the invention will be apparent to those skilled in the art, from the following detailed description, when taken in connection with the accompanying drawing, in which,

Figure 1 is a vertical sectional view of the curling die and plug; the die being in raised position.

Figure 2 is a similar view, with parts broken away, but showing the die in lowered position.

Figure 3 is a plan view of the plug and the associated chute for delivering blanks thereto.

Figure 4 is a vertical, sectional view of the blank as shaped by a cut and draw die.

Figure 5 is a vertical, sectional view of the blank after the incurled bead has been formed; and

Figure 6 is a vertical, sectional view of the completed closure.

Referring to the drawing in more detail, Figure 4 illustrates the shape of the blank as it is just formed from the sheet metal, in the present method. This blank is cut from sheet metal and drawn, in a single step, by a cut and draw die which per se forms no part of the present invention. The blank has a top 1, which may be flat, dome-shape, or of any other desired shape. The skirt 2 is flared, and the flared portion preferably terminates in a cylindrical portion 3 at the free edge of the blank skirt. The flaring of the closure skirt is of very material importance, as it provides the necessary space for the incurling of the bead, without the necessity of forming a shoulder in the blank, as illustrated in Figure 5 of my Patent No. 2,119,662, granted June 7, 1938.

After the flared blank of Figure 4 has been formed, the next step is to shape the cylindrical portion 3 of the skirt, into an incurled bead 4. The preferred apparatus for performing this step of the method, will now be described.

Numeral 5 refers to a supporting plug which receives the flared blanks. Surrounding the plug is a locating ring 6, having a flange 6' at its lower edge. The ring is carried by four rods 7 slidably mounted in the base plate 8. The locating ring is normally held in elevated position by springs 9, but when the die descends to form the incurled bead, the locating ring is pushed downwardly, as shown in Figure 2.

It will be noted that the locating ring 6 is spaced from the plug 5, as indicated by numeral 10, which permits a flared blank on the plug to have its upper cylindrical portion in contact with the ring, so that the blank is accurately centered. It will also be noted, by reference to Figure 3, that the locating ring is cut away at one side as indicated by numeral 11. If the ring 6 were continuous it would be necessary to drop the blanks substantially vertically from above, but by cutting the ring away it is possible to slide the blanks into position in substantially a horizontal plane. Thus the blanks may be delivered directly to the plug from a chute 12, or the like.

Numeral 13 refers to a die holder, which is clamped to the ram of an ordinary punch press (not shown), or to any other mechanism providing a reciprocating movement. The die holder carries a guide or centering ring 14, which has a snug fit with the cylindrical portion 3 of the closure blank. The lower end of the ring is preferably flared, as indicated by numeral 15.

The curling ring or die, referred to by numeral 16, is mounted in the die holder, and is provided with a continuous annular curling groove 17, which is substantially semi-circular in cross-section. When the die descends the curling groove engages the raw edge of the blank skirt and forms the incurled bead

Numeral 18 refers to a clamping and ejector pad, provided with an upwardly extending stem 19. Arranged about the upper end of the stem is a coil spring 20; the lower end of the spring being seated in the upper end of the holder, and the upper end of the spring resting against a washer 21 secured in place by a cotter pin 22. Within the holder there is arranged about the stem 19 a heavy coil spring 23; the upper end of the spring resting against the holder, and the lower end thereof resting against a washer 24.

In manufacturing closures of this type, i. e., screw closures with an incurled bead at the lower edge of the skirt, the blanks are first cut and drawn to the shape shown in Figure 4. This

blank has a flared skirt, and the flared portion portion preferably terminates in a cylindrical portion. The cylindrical portion is rolled into an incurled bead, and the flared portion of the skirt offsets the bead to such an extent that there can be no interference between the bead and the threads which are formed in the flared skirt portion.

The flared blanks are delivered to the supporting plug **5** by any desired means, as by a chute **12**. As mentioned hereinbefore it is not necessary to drop the blanks substantially vertically onto the plug, for by cutting away a portion of the locating ring **10**, as indicated by numeral **11**, it is possible to push the blanks onto the plug in substantally a horizontal plane. Of course the blanks, as delivered to the plug, are automatically positioned by the ring **10**.

In Figure 2 a blank is shown positioned on the plug. The base of the blank fits the plug, and the cylindrical portion **3** of the blank is resting against the ring **10**, which is spaced from the plug because of the flared blank skirt.

The die holder now descends and the centering ring **14** engages and pushes downwardly the ring **10**. The centering ring has a neat fit with the cylindrical portion **3** of the blank skirt, and supports the skirt as the incurled bead is being formed.

As the die holder continues its downward movement the clamping and ejector pad engages the blank and holds it firmly in position. The further descent of the holder brings the continuous annular curling groove **17** of the curling ring **16**, into engagement with the raw edge of the cylindrical portion **3** of the blank skirt. The cylindrical portion of the skirt is thereupon curled inwardly to form the incurled bead **4**. The parts are now in the positions shown in Figure 2.

The die holder now moves upwardly, and at first the ejector pad is held stationary by the spring **23**. This relative movement between the holder and the pad forces the blank from engagement with the curling ring, but leaves the blank in the centering ring. Further upward movement of the holder brings the top of the curling ring into engagement with the washer **24** and thereafter the holder and pad move upwardly together. As the holder continues its upward movement the stem **19** of the pad strikes a stop (not shown). This prevents further upward movement of the pad, but the holder continues its upward movement, and this relative downward movement of the pad causes the blank with the incurled bead to be ejected from the centering ring. The ejected blanks fall by gravity, or may be blown by compressed air, into a suitably placed container.

The blank, as formed by the curling die, is shown in Figures 2 and 5, and comprises the flat top **1**, the flared skirt **2** and the incurled bead **4**. The only further step necessary to complete the cap, is to form threads in the flared skirt and change the flared portion to a substantially cylindrical threaded portion, for locking the closure on a container. This step is performed by any desired threader, and as the threader per se forms no part of the invention it has not been shown herein.

The completed closure is shown in Figure 6, and of course it may be provided with a liner, if desired. While I have shown a screw cap, yet it will be understood that lugs or other container engaging means may be formed in the skirt, if preferred. By comparing the completed cap of Figure 6, with the flared blank having the incurled bead, of Figure 5, it will be apparent how the flared skirt provides the necessary clearance for the incurled bead, so that the bead will not interfere with the proper functioning of the closure threads.

From the foregoing description it will be apparent that I have provided a method by which closures of this type can be manufactured at very high speed, and without any danger of rupturing or unduly straining the metal.

Having fully described the invention, what I claim is:

The method of manufacturing metallic closures which includes the steps of drawing a blank with a skirt portion outwardly inclined from its base and followed by a cylindrical skirt portion, curling the cylindrical skirt portion inwardly to form an incurled bead of an inner diameter greater than the maximum inner diameter of the container engaging threads subsequently to be formed, and changing the outwardly inclined skirt portion to a substantially cylindrical skirt portion without substantially changing the position of the incurled bead and simultaneously forming container engaging threads in this skirt portion.

JOHN J. WILLIAMS.