

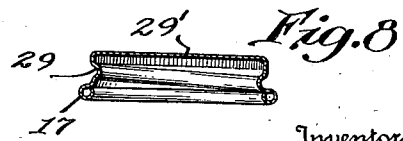
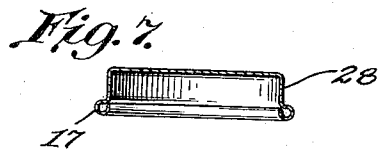
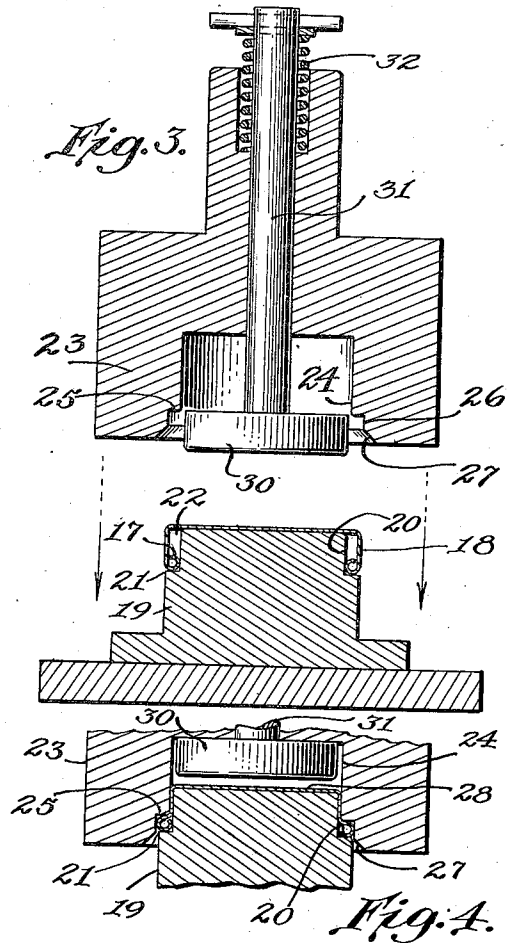
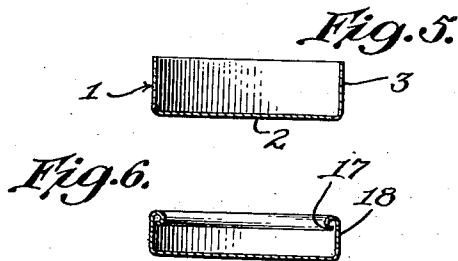
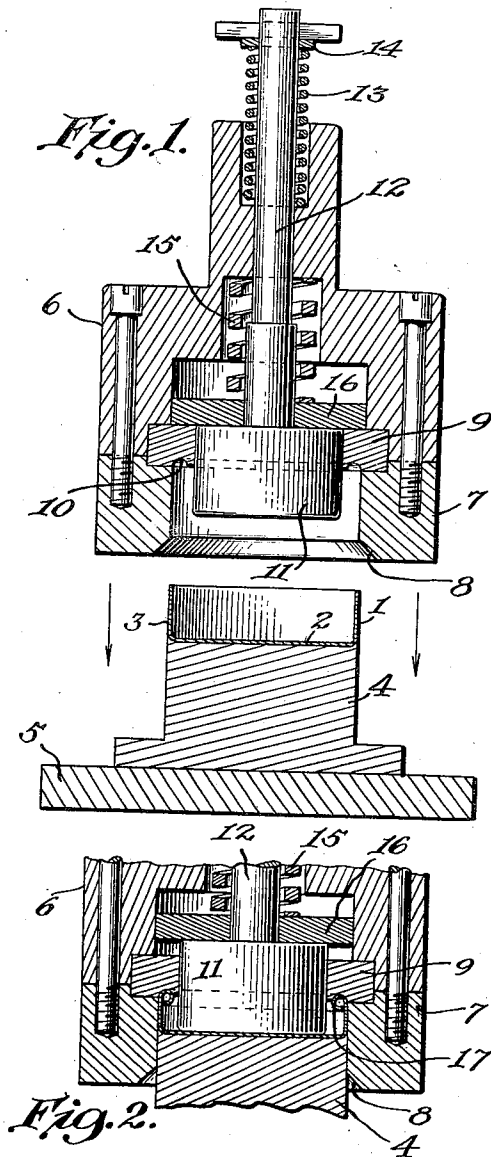
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METHOD OF MANUFACTURING CONTAINER CLOSURES

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METHOD OF MANUFACTURING CONTAINER CLOSURES

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The invention relates to an improved method of manufacturing metal screw caps of the continuous or the interrupted thread type, and particularly to that type of thread cap in which the bead or wire edge at the lower edge of the cap skirt, is incurled instead of being outcurled.

While thread caps having an incurled wire edge or bead are old, yet heretofore they have been difficult to manufacture. One of the objects of the present invention is to provide a method by which the rate of production of thread caps having an incurled bead, can be greatly increased.

Another object of the invention is to provide a method of manufacturing caps of this type, by which the caps will be formed with great accuracy, thereby very considerably reducing the loss of caps due to rejection after completion.

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 apparatus for incurling the bead; the die being shown in elevated position.

Figure 2 is a fragmentary vertical sectional view of the same apparatus, but showing the die in lowered position.

Figure 3 is a vertical sectional view of the apparatus for reshaping the blank after the formation of the bead, but prior to the threading operation; the die being shown in elevated position.

Figure 4 is a fragmentary vertical sectional view of the same apparatus, but showing the die in lowered position.

Figure 5 is a vertical sectional view of the original blank.

Figure 6 is a vertical sectional view of the blank after the incurled bead has been formed.

Figure 7 is a vertical sectional view of the blank after it has been reshaped, prior to rolling the threads; and

Figure 8 is a vertical sectional view of the completed cap.

Referring to the drawing in more detail, numeral 1 indicates a blank having a top 2 and a skirt 3. This blank is placed upon a plug 4 by any desired means. A resiliently mounted centering plate (not shown) may be associated with the plug. This plug 4 is mounted on a die block 5, which is secured to the bolster plate of an ordinary punch press (not shown), or to any other desired machine.

Numeral 6 indicates a die holder, which is secured to the ram of an ordinary punch press (not shown), or to any other desired mechanism providing a reciprocating movement. Numeral 7 refers to a guide or centering ring which is attached to the die holder, and which has a snug fit with the cap blank 1; the lower end of the centering ring being preferably flared, as indicated by numeral 8.

The curling ring or die is referred to by numeral 9. It is mounted in the die holder, and is provided with a continuous annular groove 10, which in the form illustrated is substantially semi-circular in cross section. Numeral 11 refers to a clamping and ejector pad, having an upwardly extending stem 12. Arranged about the upper end of the stem is a coil spring 13; the lower end of the spring being seated in the upper end of the die holder 6, and the upper end of the spring bearing against a washer 14. Within the holder there is arranged about the stem 12 a heavy coil spring 15; the upper end of the spring bearing against the holder, and the lower end thereof bearing against a washer 16.

As the ram of the press descends, the guide or centering ring 7 snugly fits around the cylindrical cap blank 1, to center the blank with respect to the descending die or curling ring 9. This guide or centering ring also supports the skirt of the blank to prevent any outward bulging of the skirt when the die acts on the edge of the blank. The clamping pad now engages the base of the blank and firmly holds it in position. The pad now remains stationary but the curling ring or die continues to descend against the pressure of spring 15. The continued descent of the die holder brings the annular groove 10 of the die 9 into contact with the upstanding edge of the blank, and as the die descends farther the metal of the skirt is curled inwardly to form the incurled bead 17 on the blank, as shown in Figures 2 and 6.

The die holder now moves upwardly, and during the first part of the upward movement the pad is held stationary against the cap, by reason of the spring 15. The cap is thus removed from the die, but it remains in the centering ring 7 because of the snug fit. As the upward movement of the holder continues the die ring 9 and washer 16 come together, whereupon the pad 50 rises with the holder. During the continued upward movement the stem 12 of the pad strikes a stop (not shown) on the press. This causes the upward movement of the pad to be stopped while the holder and its associated parts, including

the centering ring, continue to rise, the spring 13 being compressed. The blank with the incurled bead is thus ejected from the centering ring. While I have described in detail the specific apparatus disclosed here, it is to be understood that the invention is not limited to any specific apparatus, or to any apparatus for ejecting the blank after the curling of the bead. So far as the step of incurling the bead is concerned, the only apparatus required is the plug to receive the blank, a die having a continuous annular groove, and means for reciprocating the die.

The original blank has now been provided with a continuous incurled bead 17, the cap in its present incomplete form being referred to by numeral 18. The reshaping of the cap or blank 18, preparatory to the threading operation, will now be described; reference being had particularly to Figures 3, 4 and 7.

Numeral 19 refers to the plug of a second die which, as in the case of the first-described die, may be secured to the bolster plate of an ordinary punch press or to any other desired machine. The upper portion of the plug, referred to by numeral 20, is of a diameter equal to the desired diameter of the finished cap, and the depth of this portion is equal to the depth of the blank 18. At the point where the upper reduced portion 20 of the plug merges with the lower portion, an abrupt shoulder 21 is formed.

The blank 18 is inverted and placed on the plug 19 by any desired means. When so positioned the incurled bead 17 rests on the shoulder 21, the top of the blank rests on the top of the plug, and the skirt of the blank is spaced from the reduced portion 20 of the plug, as indicated by numeral 22. The blank mounted on the plug, ready for the reshaping or reducing operation, is shown in Figure 3.

Numeral 23 refers generally to a die which, as in the case of the first-described die, may be secured to the ram of an ordinary punch press, or to any other desired mechanism providing a reciprocating movement. The interior 24 of this die is of a diameter only very slightly greater than that of the reduced portion 20 of the plug. Numeral 25 refers to a shoulder which is followed by an enlarged portion 26 of substantially the same diameter as that of the exterior diameter of the bead 17, and below the enlarged portion 26 there may be provided a flared portion 27.

As the die descends the shoulder 25 of the die engages the blank, and this shoulder together with the portion 24 of the die and the portion 20 of the plug draw and reshape the blank to conform to the diameter of the reduced portion 20 of the plug. The blank as reshaped is referred to by numeral 28, and is shown in Figs. 4 and 7.

It will thus be noted that the blank has been considerably reduced in diameter above the incurled bead 17; the bead remaining in substantially its original shape and position, as the downward movement of the die stops before the shoulder 25 of the die engages the bead. While the bead remains in substantially its original position, yet with respect to the skirt of the cap it has been relatively moved outward. That is, the reduction of the diameter of the skirt is the equivalent, relatively, to moving the bead outwardly. The blank is now in condition to be placed on an ordinary threader to form any desired container engaging means, such as the threads 29. The cap is thus completed, and is

shown in Figure 8, where the finished cap is referred to by numeral 29'.

The reduction in the diameter of the cap skirt from that shown in Figure 6 to that shown in Figure 7, makes it possible to thread the skirt, for it will be understood that if the skirt as shown in Figure 6 were threaded, the cap would not be practical for the incurled bead would interfere with the threads so the cap could not be screwed on a container. And it will be understood that this process assures a finished cap of the exact size desired, for the blank is drawn or shaped over the reduced portion 20 of the plug to the exact size of the plug.

If desired, the die 23 may be provided with an ejector pad 30. In the specific form illustrated the pad is carried by a stem 31 which is normally held in elevated position with respect to the die by a coil spring 32. The pad in its normally elevated position with respect to the die, is shown in Fig. 4, and in this particular construction the pad does not contact with the metal blank even when the downward movement of the die has been completed. When the die is lifted the ejector pad remains in elevated position relative to the die, until the continued upward movement brings the stem 31 into engagement with a stop (not shown). The pad then remains stationary while the upward movement of the die continues, thereby ejecting the blank. The die and pad in this position are shown in Figure 3.

While the preferred apparatus has been described in considerable detail, it will be understood that the method disclosed herein can be carried out by widely different apparatus. It will also be apparent that by the method disclosed screw caps having incurled beads can be efficiently and inexpensively manufactured at a very high rate, and that the caps manufactured by this method will be of the exact size desired.

Having fully described the invention, what I claim is:

1. The method of manufacturing metal closures from a blank having a cylindrical skirt, which comprises curling inwardly the free edge of the skirt to form an incurled bead inwardly of the skirt, changing the relative position of the bead and skirt so that the bead projects outwardly of the skirt, and forming container engaging means in the skirt.

2. The method of manufacturing metal closures from a blank having a cylindrical skirt, which comprises curling inwardly the free edge of the skirt to form an incurled bead, by a die shaping operation decreasing the diameter of the skirt only, and forming container engaging means in the skirt.

3. The method of manufacturing metal closures from a blank having a skirt, which comprises forming with a die an incurled bead inwardly of the skirt, and with a second die reducing the diameter of the skirt without changing the diameter of the bead, so that the bead projects outwardly of the skirt.

4. The method of manufacturing metal closures from a blank having a skirt, which comprises forming with a die an incurled bead inwardly of the skirt, with a second die changing the relative position of the skirt and bead so that the bead projects outwardly of the skirt, and then rolling threads in the skirt.

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