

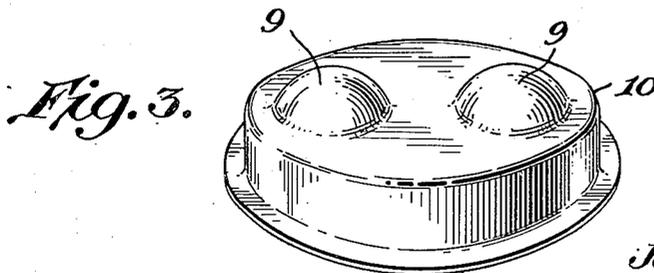
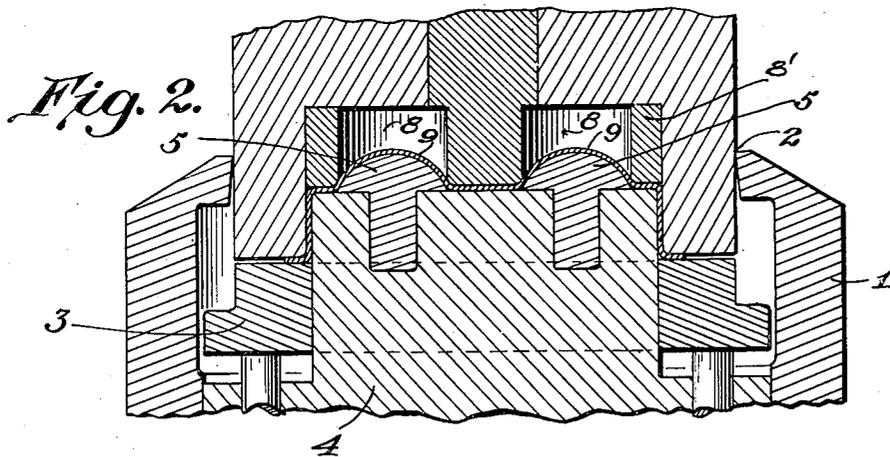
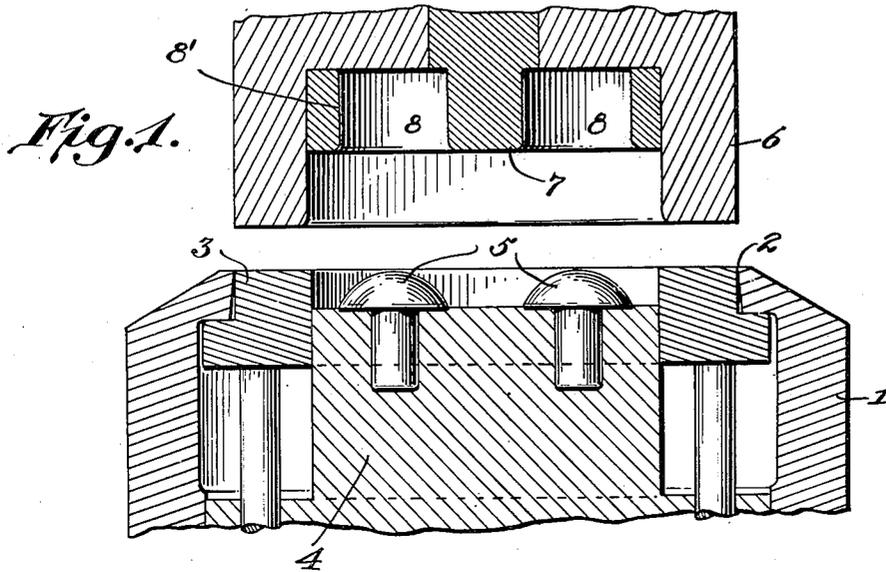
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J. J. NOLL ET AL  
METHOD OF FORMING CAPS

2,067,459

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2 Sheets-Sheet 1



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Fig. 4.

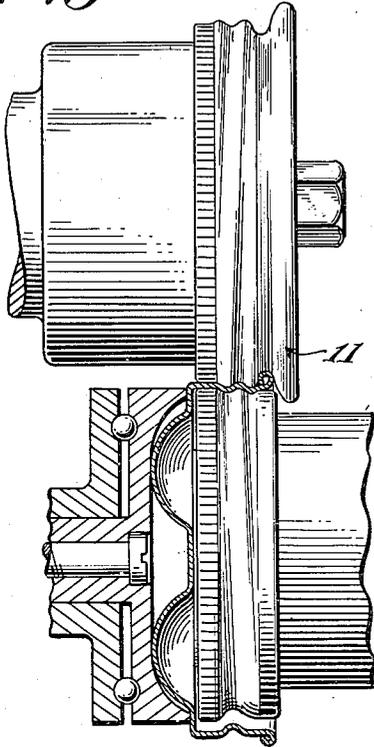


Fig. 5.

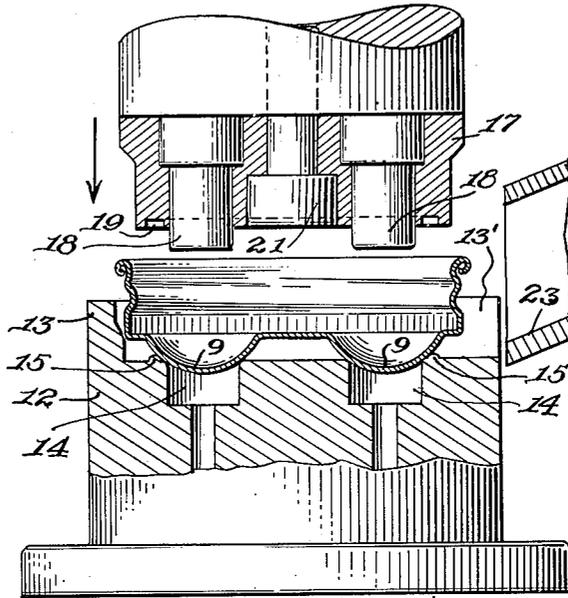


Fig. 6.

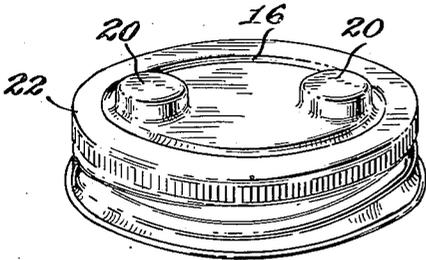
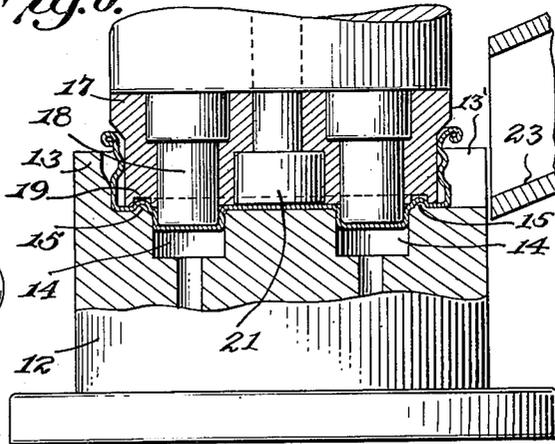


Fig. 7.

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# UNITED STATES PATENT OFFICE

2,067,459

## METHOD OF FORMING CAPS

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3 Claims. (Cl. 113—121)

The invention relates to a metal working method, and more particularly it relates to a method of manufacturing metal closures.

The closure may be of the continuous thread type or the lug type, and its top is provided with two upwardly extending members between which an implement may be inserted to aid in unscrewing the cap. It is not new to provide a closure with upwardly extending members for that purpose. But heretofore either no means was provided for preventing the implement from slipping out of place, or such means consisted of overhanging portions formed on the upwardly extending members. One of the objects of the present invention is to provide a closure of such construction that the implement will not slip out of place, and which avoids the necessity of forming, in the manufacture of the closure, the above-mentioned overhanging portions.

Another object of the invention is to provide a method of forming a closure of such construction that in removing the closure from the receptacle the implement itself will form nicks or dents in the upwardly extending members, thereby preventing the implement from accidentally slipping out of place.

Another object of the invention is to provide a new method of manufacturing a cap of this nature, involving a minimum number of steps.

A further object of the invention is to provide a method by which the steps in the formation of the closure are performed in a new and improved order, thereby increasing the rate of production and decreasing the cost of production.

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 drawings, in which,

Figure 1 is a fragmentary vertical sectional view of the cut and draw die in open position.

Figure 2 is a similar view showing the die in closed position.

Figure 3 is a perspective view of the blank after the first shaping operation.

Figure 4 is a fragmentary view of a conventional thread rolling machine, for threading, knurling and curling the blank shown in Figure 3.

Figure 5 is a fragmentary view, partly in section, of a second die, and showing the threaded closure in inverted position for the final shaping operation.

Figure 6 is a similar view showing the die in closed position; and

Figure 7 is a perspective view of the completed cap.

Referring to the drawings in more detail, and particularly to Figures 1, 2 and 3, numeral 1 indicates a fixed cutting ring, having a cutting edge 2. A movable blanking ring is indicated by numeral 3, and numeral 4 refers to a fixed drawing member. Fitted in this drawing member are two dome-shaped drawing knobs, referred to by numeral 5. These drawing knobs are circular throughout in horizontal cross-section.

Mounted for vertical reciprocation is a punch 6, and fitted in this punch is a pad 7. This pad has two holes 8 bored therein, the diameter of the holes being substantially that of the greatest diameter of the dome-shaped drawing knobs 5.

The metal from which the closures are to be formed is fed across the die, and as the ram of the press descends the punch 6, cooperating with the cutting edge 2 of the ring 3, cuts out the blank. The further descent of the punch, in cooperation with the fixed drawing member 4 and the movable blanking ring 3, draws the metal into a hat-shaped blank as clearly shown in Figure 2. And while this shaping operation is being performed the circular walls 8' of the holes 8, in cooperation with the dome-shaped drawing knobs 5, draw dome-shaped knobs 9 in the top of the hat-shaped shell 10, as clearly shown in Figures 2 and 3. And it is to be noted that as the drawing knobs 5 are circular throughout in horizontal cross-section, the metal is evenly drawn in all directions.

The first step of the process having been completed and the shell 10 having been produced thereby, the threading operation is next in order, followed by a second die operation which completes the cap. By performing the threading operation between the two die operations in this process, instead of after the two die operations, it is possible to deliver the shells automatically into the threaders, and also it gets rid of the raw sharp edge on the shell which would render it difficult and dangerous to handle in the second die operation.

Accordingly the shells 10 are delivered automatically to the threader 11, which is of conventional form, and which is illustrated fragmentarily in Figure 4. The threading machine threads, knurls, and curls the raw edge of the shell or blank, in the well known manner which needs no description. It should be mentioned here however that the invention is not limited to a continuous thread metal cap, but includes any

type of metal cap which is secured in sealing position by rotation on a container.

The closure having been threaded, knurled, and curled, if a closure of this particular type is being manufactured, it is then delivered for a second die operation, which will now be described, reference being had particularly to Figures 5 and 6.

Numeral 12 refers to a fixed plug which is hollowed out at its upper end to form a basin to receive the shells. The upwardly extending rim 13 constitutes means for guiding and centering the shells delivered to the plug. The plug is provided with two circular holes 14, and it will be noted, by reference to Figure 5, that when the shells are delivered to the basin of the plug 12 they are so centered by the rim 13 that the dome-shaped knobs 9 are directly over and centered with respect to, the holes 14. It will also be noted that the rim 13 is cut away at one side, as indicated by numeral 13', for a purpose to be described hereafter. The plug 12 is also provided with a circular raised portion or bead 15, which aids in forming the groove or paragon 16 in the completed closure, shown in Figure 7. It will be understood, however, that the groove or paragon 16 may not be desired in some forms of closures.

Mounted for vertical reciprocation above the plug 12 is a punch 17, into which punch are fitted two small cylindrical shaping plugs 18, in vertical, centered alignment with the holes 14 and the dome-shaped knobs 9. The lower face of the punch 17 is provided with a circular groove 19 to cooperate with the circular raised portion 15 on the plug 12, to form the above-mentioned bead or paragon 16.

The punch is shown descending in Figure 5, and in Figure 6 the punch is shown all the way down, completing the cap. As the punch descends the cylindrical shaping plugs 18 engage centrally the concave side of the dome-shaped knobs 9, and thereby draw the metal into the circular holes 14, thereby transforming the dome-shaped knobs into cylindrical shaped knobs 20, of smaller diameter, shown in Figures 6 and 7. And it is to be noted that as the dome-shaped knobs 9 are circular throughout in horizontal cross-section, and as the shaping plugs 18 and the final knobs 20 are all circular in cross-section, that in transforming the dome-shaped knobs to the cylindrical-shaped knobs, the metal is drawn evenly in all directions.

While the knobs 20 are being formed as above-described, the circular raised portion 15 is cooperating with the circular groove 19, to form the bead or paragon 16. And it may also be mentioned that when the punch descends it preferably fits rather snugly within the skirt of the cap, and thereby prevents any deformation of the cap skirt during this second and final die operation.

The punch now rises, carrying the completed cap with it, and this cap is preferably ejected by a knockout member 21 carried by the punch, and which is automatically moved downward relatively to the punch, after the punch has risen to a certain point. It is unnecessary to illustrate the means for operating the knockout member 21, and of course it will be understood that any desired means may be employed for ejecting the completed cap. The completed cap 22 is shown in Figure 7.

It will be noted that in the second or final die operation the shell is inverted, so that it is in mouth-up position. The inverting of the shells,

prior to the second die operation, facilitates the delivering of the shells to the plug 12, the centering of the shells with respect to the die, and the ejection of the completed caps. If the shells were not inverted it would be necessary to move them forward over a plug and then drop them vertically onto a plug. By inverting the shells it is possible to merely deliver them by means of a chute, such as indicated by numeral 23, in connection with any desired timer; and as each shell is delivered it merely rides through the above-mentioned opening 13' of the rim 13, and is accurately guided to centered position by the rim. Also, as mentioned hereinbefore, when the cap is inverted for the second die operation the completed cap is lifted with the punch, thereby facilitating removal of the completed cap.

The method of making the cap having been fully described, brief reference is now made to the completed article 22, shown in Figure 7. The purpose of the knobs 20 is, of course, to facilitate removal of the cap from its container. It will be noted that while the cylindrical knobs are of a fairly large diameter, to give sufficient strength, yet they are also widely spaced, so that any desired implement, such as a letter opener, case knife, kitchen knife, etc., can be inserted between them, and a very good leverage will be obtained for unscrewing or turning the closure, for removal.

It will also be noted that the upstanding walls of the knobs are substantially vertical, and thus the actual shape of the knobs is not such as to prevent the opening implement from accidentally slipping out of place. In other words, the knobs are not provided with any overhanging portions for preventing accidental displacement of the opening implement. But as will now be pointed out the closure of the present invention does prevent the opening implement from accidentally slipping out of place, and it accomplishes this without the overhang, thereby avoiding in the method disclosed herein the additional step of forming overhanging portions.

It will be noted that the knobs 20 are circular in cross-section, and hence when the opening implement is inserted between the knobs it comes into contact with only a small area of the knobs; and these knobs are of sufficiently thin metal that the pressure of the opening implement, in contact with only a small area of the thin metal, forms a dent or nick in the knobs, thereby preventing accidental displacement of the implement. In other words, the implement itself forms the means for preventing displacement. And, of course, the greater the pressure required in turning off the cap, the greater will be the dents formed in the walls of the knobs. While the cylindrical knobs are much preferred for giving the reduced area of contact with the implement yet other shapes, such for example as triangular shaped knobs or oval shaped knobs could be so positioned as to present only small areas to the opening implement, which small area in combination with this thin metal, permits the opening implement to form its own means for preventing accidental displacement.

From the foregoing description it will be apparent that we have devised a very simple method of manufacturing a cap of this type requiring only two die operations, that in both die operations the metal for forming the knobs is drawn evenly in all directions, that by performing the threading operation between the two die operations the trouble and danger of handling

the blanks with raw sharp edges is eliminated in the second die operation, that by inverting the shells for the second die operation the feeding and centering of the shells and the ejection of the completed cap are facilitated, that by means of the two die operations a cap is produced which though not having overhanging portions yet does prevent accidental displacement of the opening implement, that the knobs of the cap produced by this method are of considerable diameter to give sufficient strength but are widely spaced to permit the use of almost any kind of opening implement, that the knobs are of such thin metal and of such shape that only small areas of the knobs come into contact with the opening implement, whereby the implement forms its own anti-displacement means by pressing dents or nicks in the walls of the knobs, and that the greater the pressure required to turn the cap the greater the opening implement will dig into the knobs.

No claim is made herein to the cap, as such subject-matter is claimed in our divisional application Ser. No. 75,445, filed April 20, 1936.

Having fully described the invention, what we claim is:

1. The method of forming metal screw caps, which includes drawing metal evenly from all directions to form two spaced dome-shaped knobs in the blank, then threading and curling the blank, then inverting the blank to mouth-up position, and then drawing metal evenly from all

directions to transform the dome-shaped knobs into cylindrical-shaped knobs of smaller diameter.

2. The method of forming metal screw caps, which includes simultaneously drawing two spaced circular dome-shaped knobs in the blank, then threading and curling the blank, then inverting the blank to mouth-up position and centering the two downwardly projecting dome-shaped knobs over two circular holes, and then causing two cylindrical shaping plugs to centrally engage the inverted domes and draw the metal thereof into the circular holes, to transform the dome-shaped knobs into cylindrical-shaped knobs of smaller diameter.

3. The steps in a method of forming metal caps which are mounted on containers by rotation, which include simultaneously drawing two spaced circular dome-shaped knobs into the blank, then inverting the blank to mouth-up position, then centering the blank in a basin with the two downwardly projecting dome-shaped knobs centered over two circular holes, then causing two cylindrical shaping plugs to centrally engage the inverted domes and draw the metal thereof into the circular holes, to transform the dome-shaped knobs into cylindrical-shaped knobs of smaller diameter, then lifting the cap from the centering basin with the shaping plugs, and then ejecting the cap.

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