Sept. 25, 1934. L. R. N. CARVALHO 1,974,981

METHOD OF MAKING CAPS FOR JARS OR OTHER CONTAINERS

Filed Jan. 26, 1933 2 Sheets-Sheet 1

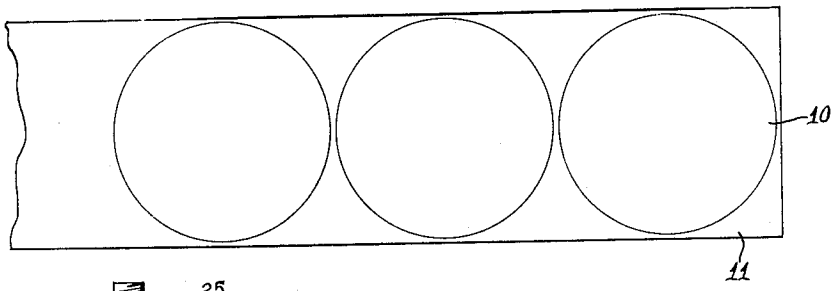


Fig-1-

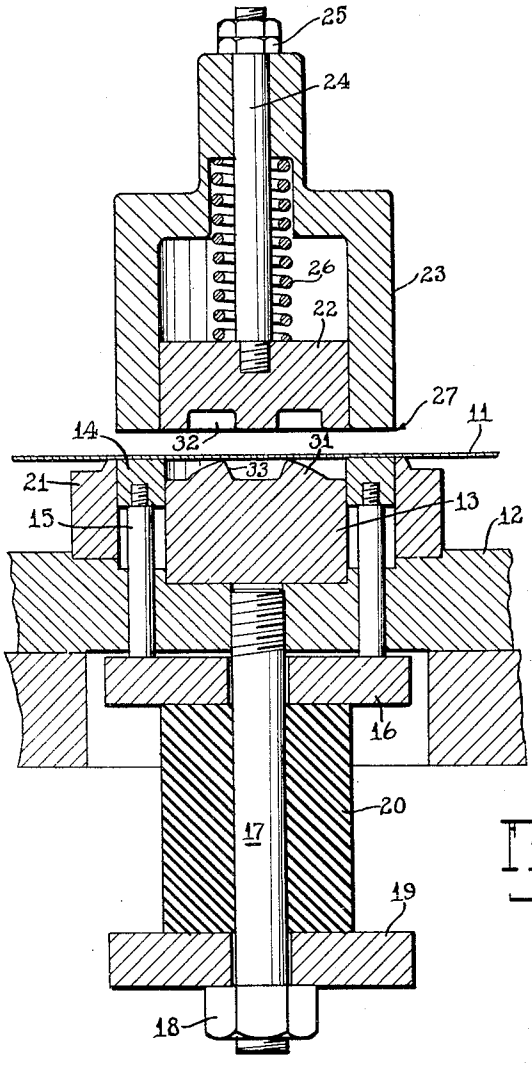


Fig-2-

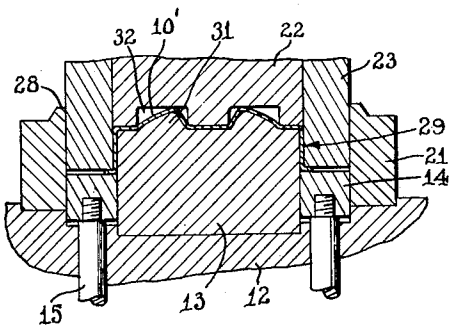


Fig-3-

Inventor

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Fig-4-

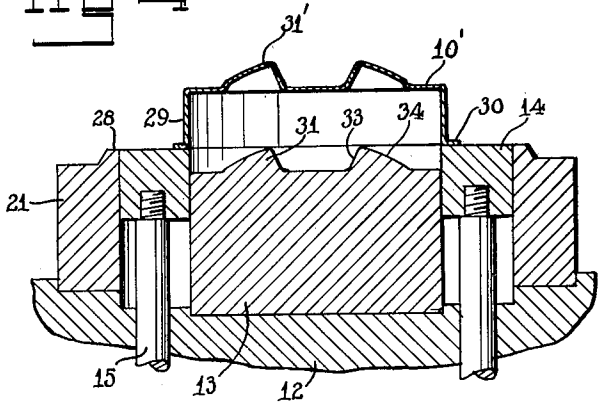
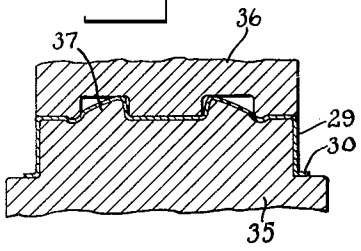


Fig-5-



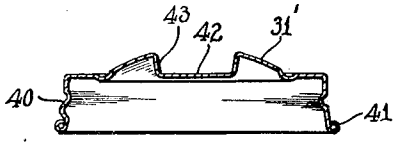


Fig-6-

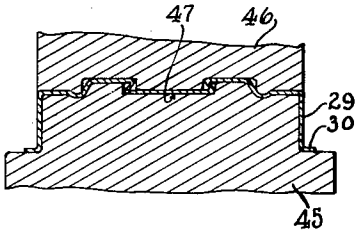


Fig-7-

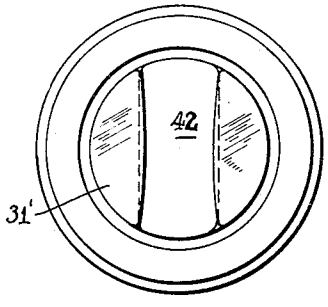


Fig-9-

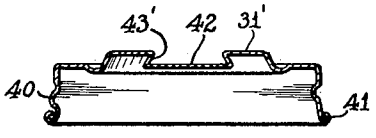


Fig-8-

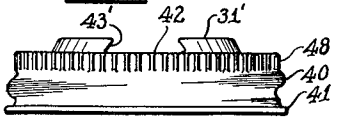


Fig-10-

Inventor

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Patented Sept. 25, 1934 1,974,981

UNITED STATES PATENT OFFICE

1,974,981

METHOD OF MAKING CAPS FOR JARS OR OTHER CONTAINERS

Leslie R. N. Carvalho, Toledo, Ohio, assignor to The Closure Service Company, Toledo, Ohio, a corporation of Ohio

Application January 26, 1933, Serial No. 653,613

2 Claims. (Cl. 113—51)

My invention relates to methods for making sheet metal caps or closures for bottles, jars or other containers. The invention is particularly designed for making caps of the type indicated in which the top cover portion of the cap is formed with integral raised bosses having their inner walls spaced and arranged to provide a channel to receive a knife or other implement used in tightening the cap on the container or removing it therefrom. A cap of this character is disclosed and claimed in my Patent Number 1,912,969, dated June 6, 1933.

An object of the present invention is to provide a novel and practical method of shaping the top cover portion of the cap.

In the formation of a cap of the character indicated, that portion of the metal which is shaped to form the raised portions or bosses on the cover portion of the cap must be drawn or stretched out to a considerable extent. A feature of the present invention consists in effecting this shaping or drawing of the metal by a plurality of successive drawing operations by which excessive strain on the metal and consequent breaking or disruption is prevented. The invention, moreover, provides a practical method of giving the bosses a shape which it would be impractical or impossible to give them by a single drawing or stamping operation.

Other objects of the invention will appear hereinafter.

In the accompanying drawings:

Figure 1 is a diagrammatic view of a sheet or strip of sheet metal from which the blanks are cut for forming the caps.

Fig. 2 is a sectional elevation of the stamping machine for cutting and giving an initial formation to the blanks.

Fig. 3 is a fragmentary sectional view showing the dies brought together and the partially formed blank therebetween.

Fig. 4 is a fragmentary view showing the lower dies and the blank supported thereon after the upper die has been withdrawn.

Fig. 5 is a fragmentary sectional view of a second pair of dies for further shaping the blank.

Fig. 6 is a sectional elevation of the completed cap.

Fig. 7 shows a pair of dies for further shaping the blank after it leaves the dies shown in Fig. 5, in the formation of a modified form of cap.

Fig. 8 is a sectional elevation of the completed cap made from the blank shown in Fig. 7.

Fig. 9 is a top plan view and Fig. 10 a side elevation of the cap shown in Fig. 8.

In accordance with my invention, the caps are preferably formed from circular blanks 10 which are stamped from a sheet metal strip 11 by the stamping machine shown in Fig. 2. The sheet may be coated with lacquer or the like and may also be lithographed before the blanks are cut and shaped. This machine comprises a bed plate 12 on which is removably supported a lower die 13 surrounded by a ring 14. The ring is carried on supporting rods 15 which extend downward through the plate 12 and are attached to a block or disk 16 beneath said plate. The disk 16 is slidable up and down on a central shaft 17 secured to and depending from the bed plate 12. A nut 18 is threaded onto the lower end of the shaft and forms a stop for a lower disk 19 mounted on the shaft. Mounted on the shaft 17 between the disks 16 and 19 is a cylindrical block 20 made of rubber or other elastic, compressible material.

Surrounding the ring 14 is a stationary annular cutter member 21. The upper die 22 is yieldingly mounted in a cylindrical head 23, the die being attached to the lower end of a rod 24 movable up and down in said head. A nut 25 on the rod 24 adjustably limits its downward movement within the head 23. A coil spring 26 mounted on the rod 24 normally holds the die 22 in its lowered position, in which its lower face is flush with the lower face of the head 23.

In operation, the sheet metal strip 11 is fed forward step by step in the usual manner. While said sheet is at rest the head 23 is lowered and cooperates with the cutter ring 21 to stamp out or cut a circular disk and by the same operation draw the disk to the general shape of the finished cap and also form bosses on the top or cover portion of the cap.

Fig. 3 shows the relative position of the parts when the head 23 has been lowered and also shows the partially formed cap 10'. The head 23 as it moves downward cuts out the disk 10 when its lower peripheral cutting edge 27 engages the metal sheet and shears past the cutting edge 28 of the ring 21. As the head 23 continues its downward movement between the ring 21 and the die 13, it forces the ring 14 downward, compressing the rubber block 20 and at the same time bending and drawing down an annular portion of the blank to form the vertical skirt or flange portion 29 of the cap. The parts are so proportioned that when the head 23 completes its downward stroke, a narrow marginal flange 30 at the lower edge of the skirt 29 is formed and held between the ring 14 and the head 23, said flange 30 being later rolled to complete the for-

mation of a bead at the lower margin of the finished cap.

The lower die 13 is formed on its upper surface with a pair of bosses or raised portions 31 for forming correspondingly shaped bosses 31' on the top or cover portion of the blank 10'. The upper die 22 is formed in its lower face with recesses 32 to receive the bosses 31. The inner faces 33 and the outer faces 34 of the bosses 31 as viewed in cross section are inclined at a considerable angle to the vertical, whereas the recesses 32 of the upper die as viewed in cross section have substantially vertical side walls.

When the head 23 is retracted from its lowered position (Fig. 3) to the Fig. 2 position, the ring 14 is lifted by the expansion of the rubber block 20 and thereby lifts the partially formed cap 10' off the lower die to the Fig. 4 position, permitting it to be easily removed.

The blank is next operated upon by a second pair of dies (Fig. 5) including a lower die 35 and an upper die 36. The blank is placed onto the lower die and the upper die is then lowered to further shape the top portion of the blank. The lower die 35 is formed with bosses or raised portions 37 which differ from the corresponding parts 31 of the die 13 mainly in that the inner side walls of said parts 37 are substantially vertical, also the width of the bosses at their base is somewhat reduced. The distance between said bosses at their base is thus increased as well as the distance between the periphery of the die and said bosses. The shape of the upper die 36 is correspondingly modified as compared with that of the die 22 by widening that portion thereof which enters between the bosses 37. By means of the dies 35 and 36, the inner walls of the bosses 31' on the cap are drawn to a substantially vertical position.

When the blank is removed from the second set of dies 35, 36, it may be further shaped by rolling screw threads 40 in the skirt portion thereof and by rolling the bottom flange 30 inward to form the bead 41, thus completing the formation of the cap as shown in Fig. 6. It will be noted that in the finished cap as thus formed there is provided a channel 42, the side walls 43 of which are substantially vertical.

Fig. 8 shows a modified form of cap in which the side walls of the channel are downwardly and inwardly inclined as shown at 43'. This results in a dovetailed shape channel with overhanging side walls, designed to securely hold a knife blade or other implement against accidental displacement when used for turning the cap on or off the container to which it is applied. This construction further permits the implement to be used for lifting and holding the cap as well as turning it.

The method of making the cap shown in Figs. 8 to 10 is identical with that above set forth in connection with the cap shown in Fig. 6, except that an additional drawing or shaping operation is imparted to the blank by means of a set of dies 45 and 46 (Fig. 7) after the blank is removed from the dies 35, 36 (Fig. 5). The dies 45 and 46 are shaped to flatten the upper surfaces of the bosses 31' and draw them down to a substantially horizontal plane, and also force the vertical walls 43 to an inclined position in which they overhang the bottom wall of the channel, giving said channel a dovetail shape, as shown. It will be noted that the channel portion 47 of the lower die 45 is made wider than the corresponding part of the die 35 and also wider than that part of the upper die 46 which enters said channel. This provides the required space between the dies to permit the channel walls of the blank to be shaped in the manner above described.

After the blank has been shaped between the dies 45 and 46, it may be finished by forming screw threads 40 and the bead 41 thereon. The cap may also have formed thereon, in the usual manner, an annular series of ribs or corrugations 48 (Fig. 10).

Modifications of the methods above described and the apparatus for carrying out such methods may be resorted to within the spirit and scope of my invention.

I claim:

1. The method of forming a sheet metal cap having a horizontally disposed top portion formed with raised bosses spaced apart to provide a channel, including the following successive steps, the first step comprising partially forming the bosses between a pair of dies shaped to draw the walls of said bosses which form inner walls of the channel to a position upwardly and outwardly inclined from the floor of the channel, a succeeding step comprising a further drawing operation between a set of dies shaped to draw the said walls to a substantially vertical position, and a further step comprising forcing or drawing the upper walls of the bosses in a downward and inward direction and thereby upsetting said channel walls and forcing them to a position in which they overhang the floor of said channel.

2. The method of forming a sheet metal cap including a horizontally disposed top portion formed with a pair of raised bosses spaced apart and shaped to provide a channel having walls overhanging the floor thereof which consists in partially forming the bosses between a pair of dies shaped to draw the walls of said bosses which form the side walls of the channel to a position upwardly and outwardly inclined from the floor of the channel, a second step comprising a further drawing operation between a pair of dies shaped to draw said walls to a substantially vertical position, and a succeeding step comprising substantially flattening the upper walls of the bosses and drawing them in a downward and inward direction and thereby upsetting the walls of the channel and forcing them to a position in which they overhang the floor of said channel.

LESLIE R. N. CARVALHO.