Jan. 26, 1932. H. SEBELL 1,842,571

METHOD OF APPLYING BAIL EARS TO CONTAINERS

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Fig.1.

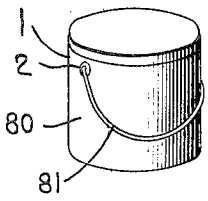


Fig.3.

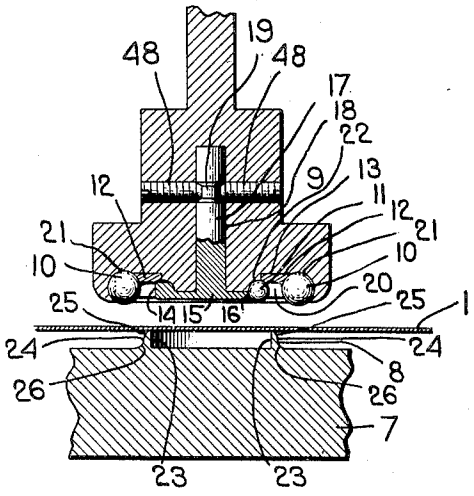


Fig.2.

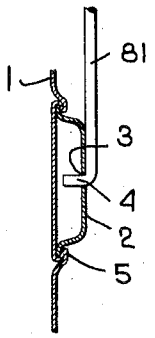


Fig.5.

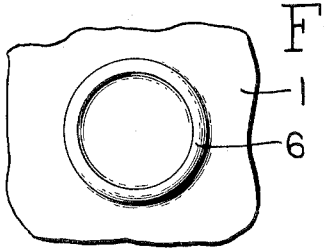


Fig.6.

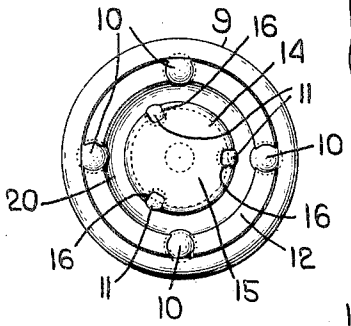
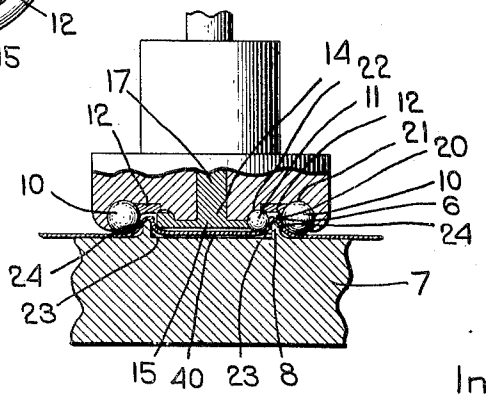


Fig.4.



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METHOD OF APPLYING BAIL EARS TO CONTAINERS

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Fig. 7.

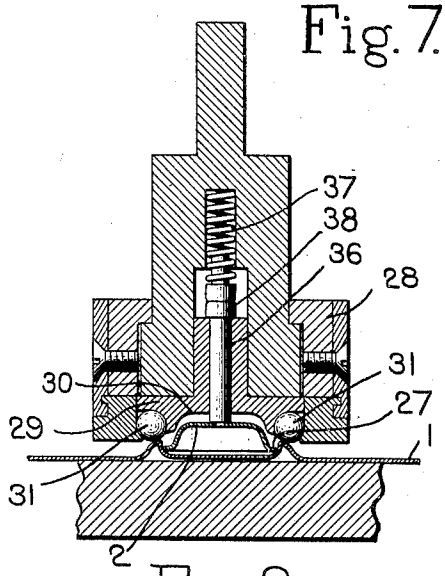


Fig. 8.

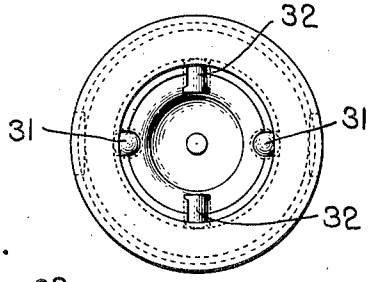


Fig. 9.

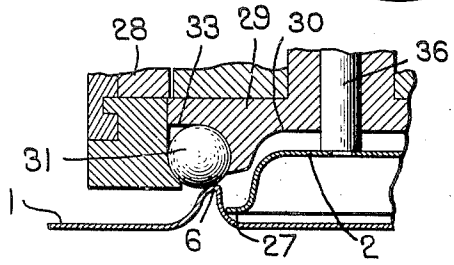


Fig. 10.

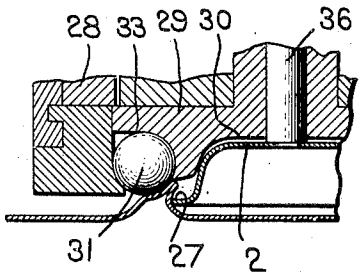
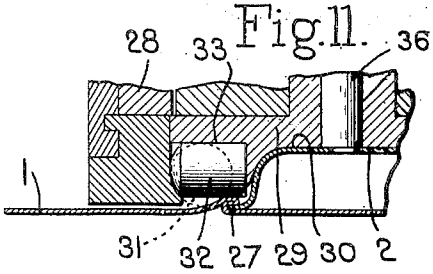


Fig. 11.



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1,842,571

UNITED STATES PATENT OFFICE

HARRY SEBELL, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO ARTHUR H. PARKER, OF LEXINGTON, MASSACHUSETTS

METHOD OF APPLYING BAIL EARS TO CONTAINERS

Application filed December 26, 1929. Serial No. 416,521.

This invention relates to the securing to the side of a pail or other container an ear to which the bail is pivoted. It has heretofore been proposed to form the ear on a pail or other container by forming a circular rib in the side of the pail and then placing a cup-shaped circular ear member within said rib, the material of the rib being then folded over the periphery of the ear thereby to secure it in place.

While by this method the ear may be firmly secured to the bail, yet as heretofore carried out it not infrequently happened that the material of the can would be cracked slightly either during the forming of the rib or the folding of the rib over the periphery of the ear. While such cracking or breaking of the material of the can might not affect the security with which the ear is retained in place yet it often did affect the hermetic seal of the can or container.

Where this ear is used on a container that is to be hermetically sealed after it is filled it is, of course, important that there should be no crack in the metal around the ear through which air might seep because the presence of such a crack would destroy the hermetic seal.

One of the principal objects of my invention is to provide a novel method by which an ear of this type may be attached to the can without danger of producing any crack or break in the side wall of the container which will destroy the hermetic seal in case the container is to be hermetically sealed.

In carrying out my process I form the annular rib on the side wall of the can by a metal-spinning process, which involves applying a rolling pressure through balls to one face of the sheet metal in two concentric zones simultaneously and at the same time supporting the opposite face of the sheet metal between said two concentric zones, whereby the rolling pressure in the two zones together with said support results in the formation of the annular rib in the sheet metal. By this operation the annular rib can be formed without danger of cracking or breaking the metal.

My improved method further contemplates a novel manner of folding the annular rib over the periphery of the ear thereby to lock the ear in place, this part of the method also being carried out in such a way that there will be no breaking or cracking of the metal.

In order to give an understanding of the invention I have illustrated in the drawings a selected embodiment thereof which will now be described after which the novel features will be pointed out in the appended claims.

Fig. 1 is a perspective view of a container in the form of a pail having my improved ear applied thereto;

Fig. 2 is an enlarged fragmentary sectional view through the ear;

Fig. 3 illustrates the tool which may be used in forming the annular rib by which the ear is secured to the container;

Fig. 4 shows the operation of forming the annular rib;

Fig. 5 is a view of a portion of the side of the pail with the rib formed thereon;

Fig. 6 is an under side view of the tool illustrated in Figs. 3 and 4;

Fig. 7 illustrates the first state of the operation of spinning the rib over the periphery of the ear;

Fig. 8 is a bottom plan view of the tool used for this purpose;

Figs. 9, 10 and 11 are fragmentary sectional views illustrating the operation of spinning the rib over the periphery of the ear, Fig. 9 illustrating the beginning of the operation, Fig. 10 illustrating an intermediate stage and Fig. 11 illustrating the final stage.

Before describing my improved method I will refer to the finished article which is produced by the method. This is shown in Figs. 1 and 2 wherein 1 indicates the side wall of a pail or other container 80 and 2 the circular ear which is secured thereto. This ear is cup-shaped as shown and is provided with the central aperture 3 to receive the end 4 of the bail 81.

The ear is circular in shape and is retained in position by an annular fold 5 which is formed in the side wall of the can and which overlies the periphery of the ear 2.

The present invention has relation to a novel way of making the annular rib in the pail from which the fold 5 is produced and

also a novel method of spinning the rib over the edge of the ear to produce the fold 5.

In attaching the ear to the container an annular rib 6 is first formed in the wall of the container. The ear is then placed within the rib and the latter is spun over the peripheral edge of the ear to form the fold 5.

In producing the annular rib 6 the side wall of the can or container is backed by a backing element 7 which is provided with an annular form-giving rib 8 over which the annular rib or bead 6 is formed. The actual forming of the rib or bead 6 is accomplished by applying a rolling pressure through the medium of balls to the face of the wall 1 opposite that which is backed by the form-giving rib 8, said pressure being applied in two concentric zones, one immediately circumjacent to said backing rib 8 and the other immediately inside of said rib. The application of rolling pressure in this way produces a metal-spinning action by which the rib 6 can be formed without any danger of cracking or breaking the metal.

As illustrating a tool which is suitable for accomplishing this spinning action I have shown a tool 9 which carries on its operative face two sets of balls 10 and 11, the balls 10 being adapted to roll over the face of the metal 1 in a zone immediately outside of the rib 8 and the balls 11 rolling over the metal in a zone immediately inside of said rib. The balls 10 are larger than the balls 11 and are retained in a ball carrier or cage 12 which is loosely fitted within a recess 13 formed in the tool 9.

The balls 11 are shown as retained in a ball carrier 14 which is loosely retained in the body of the tool 9. This carrier 14 is shown as provided with a head portion 15 which has the recesses 16 for the balls 11 and the stem portion 17 which fits into a recess 18 with which the body of the tool 9 is formed, said member 14 being retained in position by means of retaining screws 48, the inner ends of which operate in a groove 19 in the stem 17.

The cage 12 is so formed as to present an annular groove or space 20 between the balls 12 and the head 15 to receive the rib 6 as it is formed. The head 15 is of sufficient size so that its periphery overlies the inner edge of the cage 12 thus retaining the cage in place.

The larger balls 10 rotate in and are backed by a race or way 21 formed in the tool 9 while the smaller balls 11 rotate in and are backed by a race or way 22. The tool is so made that the horizontal diameters of the balls 10 and 11 are in the same plane. Because of this fact the working faces of the balls 10 are on a slightly lower plane than the working faces of the balls 11. It will be understood that both sets of balls project slightly beyond the cages 12 and 14.

In forming the rib 6 the sheet metal 1 to which the ear is to be attached, whether it be in the form of the side of a pail or container or in the form of a blank from which a pail or container is to be made, is placed on the form-giving rib 8 as shown in Fig. 3, and the tool 9 is then brought into engagement with the sheet metal and at the same time rapidly rotated.

The balls 10 roll over the face of the sheet metal in a zone circumjacent the rib 8 while the balls 11 roll over the sheet metal in a zone immediately within said rib. As the tool is brought into engagement with the work the balls 10 first operate on the sheet metal because the working faces of these balls are in a plane below that in which the working faces of the balls 11 are located.

The action of the balls 10 on the exterior zone and those of the balls 11 on the interior zone results in spinning the metal over the form-giving rib 8 thereby to produce an annular rib 6 in the sheet metal 1. Because this rib is made by a spinning process it can be easily formed without any danger of breaking or cracking the metal such as is present where the rib is formed by means of dies.

The form-giving rib 8 is shown as having a substantially vertical inner wall 23 and a sort of ogee outer wall 24, the portion 25 of said wall adjacent the peak being convexly curved and the lower portion 26 being concavely curved. As the balls 10 and 11 act on the metal it is drawn over the rib 8 so that the peak of the rib 6 which is formed will conform to the peak of the form-giving rib 8 while the shape of the inner and outer walls of the rib 6 at the base will be that given by the balls 10 and 11.

After the rib 6 has thus been formed by the spinning process the ear 2 is then deposited within said rib and the latter is folded over the peripheral edge of the ear. This is accomplished by a two-stage operation, the first stage consisting in acting on the outer wall of the rib 6 by a spinning tool which forces said wall inwardly and thereby reduces the diameter of the rib thus partially bending it over the edge 27 of the ear 2, and the second stage consisting in flattening the rib down against the periphery 27.

A tool by which this two-stage operation may be performed is indicated at 28 and this comprises a tool body in which is mounted a race or ball holder 29 that is provided with a concave inner face 30 adapted to fit the convex shape of the ear 2. This ball holder or cage 30 carries a series of balls 31 which act on the exterior wall of the rib and force the latter inwardly thereby reducing the diameter of the rib and partially bending it over the periphery 27 of the ear 2 and a series of rolls 32 arranged to engage the bent-over rib and flatten the same down against the periphery 27 of the ear.

The balls 31 are mounted so that the oper-

ating face thereof projects slightly below that of the rolls 32 and hence as the tool is brought against the work the balls 31 first act on the exterior wall of the rib 6 thereby reducing its diameter or contracting it in size, said balls, of course, operating on the outer wall of the rib 6 progressively from the peak toward the base. The contracting of the rib 6 by the balls 31 is immediately followed by the flattening action of the rolls 32, these rolls engaging the peak of the rib and flattening it down against the periphery of the ear. During this rib-folding operation both the balls 31 and the rolls 32 are backed by the wall 33 of the tool.

The different stages in the folding of the rib 6 are perhaps best illustrated in Figs. 9, 10 and 11. Fig. 9 shows the tool as it begins to operate on the rib 6. When the tool is brought into operative position the rolls 31 engage the outer wall of the rib adjacent the peak and as the tool is rotated and pressed against the rib the balls have the effect of forcing the outer wall of the rib inwardly thereby reducing the diameter of the peak of the rib, this operation tending to force the peak of the rib inwardly over the edge 27 of the ear 2 as shown in Fig. 10.

The rolls 32 are of slightly smaller diameter than the balls and as they are backed by the same surface 33 of the tool the time of their engagement with the rib will be subsequent to that of the balls 31. The parts are so arranged that at about the time the balls have acted on the rib and have reduced its diameter and partially folded the peak over the periphery 27 of the ear as shown in Fig. 10, the rolls 32 will then engage the peak of the rib and as the ball continues to work down the outer face of the rib the rolls will flatten down the peak of the rib as shown in Fig. 11 thereby clamping the folded over rib against the peripheral edge 27 of the ear 2 and firmly locking the ear in place.

The folding of the ear thus comprises two stages, first, the reducing of the diameter of the rib and partially bending the peak of the rib over the periphery of the ear and second, the flattening of the peak of the rib down against the periphery of the ear.

These two stages are thus performed by the same tool and both stages are carried out progressively but so far as any point in the rib 6 is concerned the two operations constitute two separate stages. The rib can be spun over the periphery of the ear as above described without any danger of cracking or breaking the metal.

Means are provided for holding the ear firmly in place while the rib is thus being folded over its periphery. For accomplishing this I have provided a hold-down member 36 which is yieldingly mounted in the tool and which is backed by a suitable spring 37. Normally the hold-down member 36 projects slightly beyond the face 30 by reason of the action of the spring 37, the spring-impelled movement of said hold-down member being limited by the collar 38 on the hold-down.

When the tool is brought into use the hold-down member will engage the ear 2 at the time that the balls begin to act on the rib 6 and as the tool is moved forwardly during the rib-spinning operation the hold-down member 36 will retreat into the tool but will at all times be applying a pressure to the ear 2 by which it will be held firmly in position.

While I have illustrated herein some tools by which the method may be carried out yet I do not wish to be limited to the construction shown.

I claim:

1. The method of applying an ear cap to sheet metal to form an ear for the attachment of a bail which consists in placing one face of the sheet metal against an annular form-giving rib, applying a rolling pressure through balls to the other face of the sheet metal in two concentric zones simultaneously, one zone immediately circumjacent the rib and the other zone just inside the rib and at the same time supporting the metal on said other face within the inner zone thereby to raise an annular rib from the sheet metal by a spinning operation, placing an ear cap within the rib so formed and spinning the rib over the edge of the cap thereby locking it in place.

2. The method of attaching an ear cap to sheet metal to form an ear for the attachment of a bail, which consists in applying a rolling pressure through balls to one face of the sheet metal in two concentric zones simultaneously, one zone immediately outside of and the other immediately inside of an annular rib against which the other face of the sheet metal is resting and at the same time supporting the metal within the inner zone on the face against which the rolling pressure is applied thereby forming an annular rib entirely by a spinning operation, placing an ear cap within the rib so formed and spinning the rib over the edge of the ear cap.

3. The method of applying an ear cap to sheet metal for the purpose of forming an ear for the attachment of a bail which consists in subjecting two concentric zones of a sheet metal, one of which is immediately circumjacent to and the other of which is immediately within a forming rib by which the sheet metal is backed, simultaneously to a rolling pressure by balls with the balls acting on the outer zone of larger diameter than those on the inner zone, whereby the metal forming and lying between said zones is formed into an annular rib, placing an ear

within said rib and spinning the rib inwardly over the edge of the ear.

4. The method of applying an ear cap to sheet metal to form an ear for a bail which consists in forming an annular rib in said sheet metal, placing an ear cap within said rib, applying a rolling pressure to the rib first to the outside thereof to reduce its diameter and folding it over the edge of the cap and then to the peak of the rib to flatten the latter against said cap.

5. The method of applying an ear cap to sheet metal to form an ear for a bail which consists in forming an annular rib in said sheet metal, placing an ear cap within said rib, applying a rolling pressure to said rib in such a way as to first reduce the diameter of the rib and then flatten the rib of reduced diameter against the cap.

6. The method of applying an ear cap to sheet metal to form an ear for a bail which consists in forming an annular rib in the sheet metal, placing a circular ear within said rib, applying a rolling pressure to the exterior of the rib to reduce its diameter and fold it over the edge of the ear and then subsequently applying a flattening pressure to the peak of the rib.

7. The method of applying an ear cap to sheet metal to form an ear for a bail which consists in forming an annular rib in the sheet metal, placing a circular ear within said rib, applying a rolling pressure to the outer wall of the rib to reduce the diameter of said annular rib and close the walls thereof together and subsequently flattening the closed walls against the edge of the cap.

8. The method of applying an ear cap to sheet metal to form an ear for a bail which consists in applying a rolling pressure in two concentric zones simultaneously to one side of a sheet metal which is backed by an annular rib located between said zones thereby to form in said sheet metal an annular rib having a conical exterior wall and a substantially perpendicular interior wall, both of which meet the sheet metal in a rounded corner, placing a circular ear within said rib and spinning the rib over the edge of the ear.

9. The method of applying an ear cap to sheet metal to form an ear for a bail which consists in forming an annular rib in said sheet metal, placing an annular cap within said rib, applying pressure to the ear cap to hold it in position and simultaneously applying a rolling pressure to said rib in such a way as to first reduce the diameter of the rib and then flatten the rib of reduced diameter against the periphery of the cap.

10. The method of applying an ear cap to sheet metal to form an ear for a bail which consists in forming an annular rib in the sheet metal, placing a circular ear within said rib, applying pressure to the cap to hold it in position, and applying a rolling pressure to the exterior of the rib to reduce its diameter and fold it partially over the peripheral edge of the ear and subsequently applying a flattening pressure to the peak of the rib.

In testimony whereof, I have signed my name to this specification.

HARRY SEBELL.