Feb. 8, 1938. I. E. SEXTON 2,107,428

BAIL EAR FOR SHEET METAL VESSELS AND METHOD OF MAKING THE SAME

Filed Dec. 24, 1935

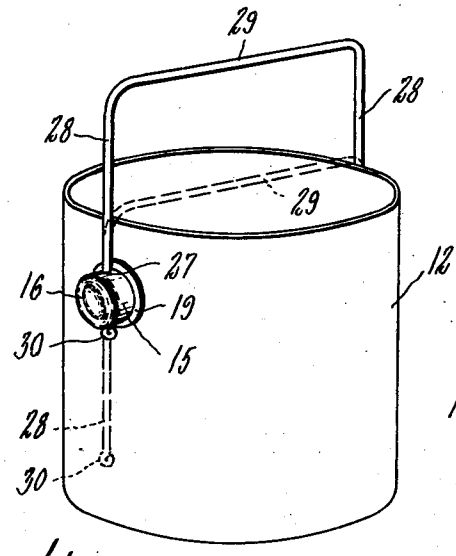


Fig. 1.

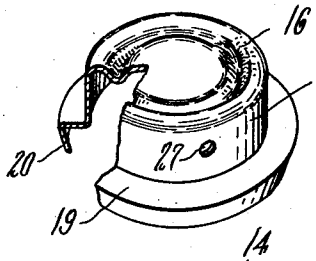


Fig. 2.

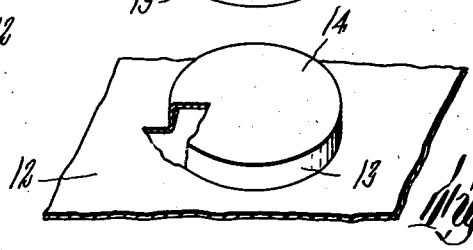


Fig. 3.

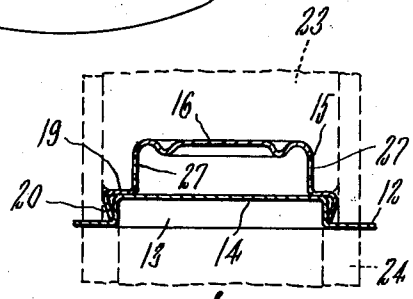


Fig. 4.

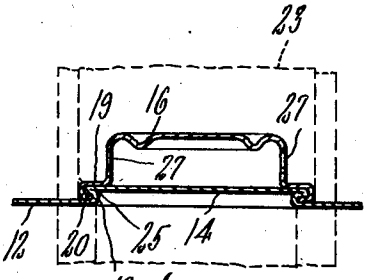


Fig. 5.

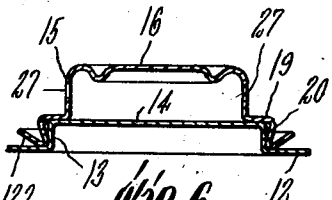


Fig. 6.

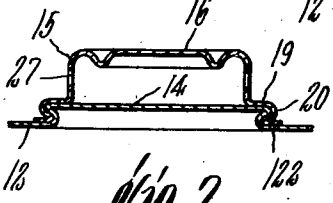


Fig. 7.

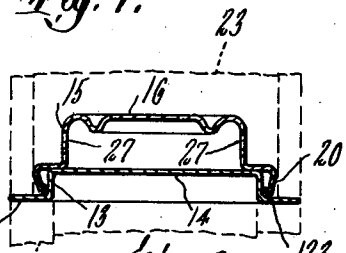


Fig. 8.

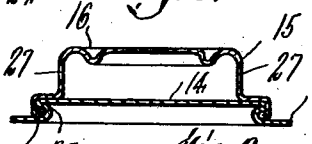


Fig. 9.

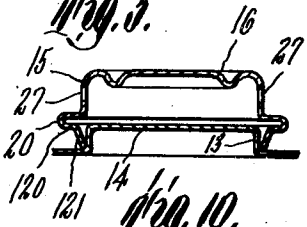


Fig. 10.

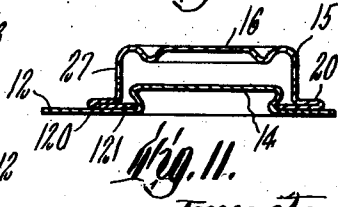


Fig. 11.

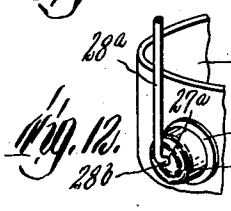


Fig. 12.



Fig. 13.

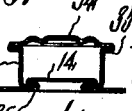


Fig. 14.

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2,107,428

BAIL EAR FOR SHEET METAL VESSELS AND METHOD OF MAKING THE SAME

Isaac E. Sexton, Winchester, Mass.

Application December 24, 1935, Serial No. 55,971

11 Claims. (Cl. 113—120)

The object of this invention is to provide a sheet metal vessel, such as a pail or bucket, with bail ears adapted to engage the ends of a bail, and each composed of two bosses one of which is imperforate and integral with the usual body, while the other is perforated to engage a bail end, said bosses including parts which are convertible by pressure into an annular seam uniting the bosses.

Of the accompanying drawing forming a part of this specification,—

Figure 1 is a perspective view of a sheet metal vessel having a bail ear made in accordance with the invention.

Figures 2 and 3 show in perspective the two bosses separated from each other, and partly broken away.

Figure 4 shows in section the two bosses assembled, and before they are united to each other.

Figure 5 shows in section the completed bail ear.

Figures 6 and 7 are views similar to Figures 4 and 5 showing a supplement to the flange extension hereinafter described.

Figures 8 and 9 are views similar to Figures 4 and 5 showing a beaded reinforcing edge on the flange extension.

Figures 10 and 11 are views similar to Figures 4 and 5, showing a modification.

Figure 12 is a fragmental perspective view showing a bail designed to swing.

Figures 13 and 14 show a differently constructed bail ear.

The size of the bail ear and the thickness of the sheet metal of which it is composed are considerably exaggerated in Figures 2 to 11.

The same reference characters indicate the same parts in all of the figures.

In the drawing 12 designates the body of a sheet metal vessel which is provided with bail ears as next described, each ear including two bosses.

One of said bosses, called the inner boss, is imperforate and integral with the body 12, and projects outwardly therefrom. Said boss has an originally cylindrical wall 13 and a circular head 14. It is formed by offsetting the sheet metal used for making receptacles of the kind referred to, by known methods of metal working, while the sheet is flat, in a manner such as to make the encircling wall substantially perpendicular to the metal sheet and the head of the boss substantially parallel to the sheet, at least as to its marginal portion.

The other or outer boss, which constitutes the ear proper is cut and pressed from sheet metal with a formation which provides a cylindrical lateral wall 15, preferably of smaller diameter than the previously described boss, and a head portion 16 which may be plane or convex, or embossed in any desired way. It is also formed with an outstanding annular flange 19, preferably disposed in a plane perpendicular to the cylindrical wall 15, and with an annular flange extension 20 of frusto-conical form depending and inclined inwardly from the margin of the flange 19. The outer circumference of the flange 19 is considerably larger than the diameter of the inner boss, and the edge of the flange extension forms the circumference of a circle nearly equal in diameter to the inner boss, but enough larger to permit of being easily slipped over such boss. The axial length of the flange extension is substantially equal to the height of the inner boss; wherefore when the outer boss is slipped over the inner boss, as shown in Fig. 4, the edge of the extension 20 occupies the angle between the metal sheet 12 and the side wall of the inner boss while the flange 19 bears on the margin of the head 14.

After the inner and outer bosses have been assembled as thus described, they are subjected to pressure applied axially against the flange 19 against a supporting or opposed pressure applied to the opposite side of the metal sheet over an area which may be continuous, and at least is suitably located to sustain the portion of the sheet adjacently surrounding the inner boss. The pressing means may consist of a die recessed at its end to bear directly on the flange 19 and to admit the head part of the outer boss without pressing upon it, and an opposing die or, equivalently, a table having a continuous, flat supporting surface, as indicated by broken lines at 23 and 24, respectively. The pressure thus exerted causes the edges of the conical flange extension 20 to be displaced inwardly toward the axis and thus to indent the cylindrical wall 13 of the inner boss, forming a channel therein; while the continuation of pressing action causes the inner boss to be collapsed, with folding inward of its sides, and its margin to be clamped down upon the inturned edge of the flange extension. Thus the bosses are interlocked and united by an annular seam designated as a whole by 25 in Fig. 5.

This method of uniting the members utilizes the flexibility of the metal in an effective manner. It provides a smooth action which is not harsh on the metal, i. e., does not risk overstraining or rupturing the metal. Each mem-

ber, while being pressed into position, is able to adjust its dimensions while being changed in shape by and conformably to the other. Each member is adequately flexible in the directions in which it is reformed by the pressing action. The inward bending of the sides of the inner boss tends to draw down the head of the boss and starts the folding action, which is then carried further by the direct endwise pressure of the dies with no stretching effect, but rather with a bending and possibly a compressive effect. The complemental members adjust and fit themselves together, and are maintained in close contact with one another throughout the entire operation, without injury to either.

It will now be seen that the completed bail ear is composed of an outer and an inner boss, the inner boss including a channeled rim 13 integral with the body 12, and a circular head 14 integral with, and overhanging the channeled wall, while the outer boss includes a circular head 16, an annular wall 15 provided with an outwardly projecting flange 19 and an originally frusto-conical extension 20 of said flange projecting into the channel of the wall 13, said extension and the channeled rim forming an annular seam uniting the two bosses.

As before stated, the diameter of the head 16 and the rim 15 is preferably less than that of the head 14 and wall 13 of the inner boss. If desired, however, the diameter of the head 16 and wall 15 may be greater than that of the head 14 and wall 13, as shown by Figures 10 and 11, the flange extension, designated by 120, being turned inwardly and provided with a supplemental extension 121 which in the completed ear bears on the body 12 and reinforces the latter. In this case, even though the inner boss is not collapsed by direct pressure on its head, nevertheless the inward displacement of the extension 121 causes the sides of the boss to be indented deeply enough to make a secure interlock.

Figures 6 and 7 show the extension 20 provided with a supplemental extension 122 which projects outward, and in the completed ear bears on and reinforces the body 12, as shown by Figure 7.

Figures 8 and 9 show the flange extension provided with a rolled or beaded margin 123 which is incorporated in the seam 25, and reinforces it, as shown by Figure 9.

The head 16 of the outer boss is spaced from the head 14 of the inner boss sufficiently to permit the formation of two diametrically opposite bail-receiving orifices 27, (Figure 5), in the rim 15 of the outer boss. Said orifices are adapted to receive the straight parallel end portions 28 of a bail and permit the sliding of said end portions, so that the bail may be raised as shown by full lines in Figure 1, or depressed as shown by dotted lines. The end portions 28 are provided with enlargements 30 adapted to limit the raising of the bail. The bail may include a straight handle portion 29 which rests on the cover of the vessel when the bail is depressed. The bail may therefore be stored on the periphery and cover of the vessel when not in use so that it will have only a limited projection therefrom.

It is obvious that the heads 16 of the outer bosses may be provided with orifices arranged to receive hooked bail ends in a well known manner. Figure 12 shows such an arrangement; the end portions 28^a being bent inwardly at 28^b and capable of turning in orifices 27^a in the heads 16.

In the bail ear shown by Figures 13 and 14 the outer boss is composed of an independently formed inner hollow section 32 having an originally frusto-conical inwardly projecting marginal zone 33 at its inner end forming, with the channeled rim of the inner boss when displaced inwardly and flattened by pressure in a manner similar to that previously described, an annular double seam 25 uniting the two bosses, and an independently formed circular head 34 joined by an annular outer seam 35 to the hollow section 32.

When pressure is exerted on the assembled parts the frusto-conical flange 33 is deformed and forced into the wall of the inner boss, thereby channeling said wall and forming the annular double seam 25.

The hollow section 32 spaces the heads of the bosses any desired distance apart, and farther apart than would be possible when the outer boss is constructed in one piece as first described.

It will be seen that no leakage from the completed vessel through the bail can occur, and that no packing means is required.

The formation of the bosses and mode of procedure herein described lends itself to the very rapid completion of bail ears, since the assemblage of the constituent parts and the formation of the seam which unites them may be effected by the single pressure movement of a die or plunger exerted toward a table on which the sheets of material provided with the integral bosses are supported. I have found it feasible to complete in this way as many as 300 assembled and interlocked bail ears per minute in regular commercial production. After the bail ears have thus been made and assembled with the flat sheet metal, or blanks cut to suitable dimensions for a pail, bucket, or can, the sheets or blanks are curved or bent to the prescribed form of, and made into, finished pails or the like, of any desired character in any suitable way.

The principles of the invention are not limited to the formation of bail ears on the sides of pails and the like but include similar constructions in all other useful relationships, such as, for example, on pieces designed for the covers or end walls of sheet metal cans, etc.

I claim:

1. A sheet metal vessel having a bail ear composed of an inner boss and an outer boss, the inner boss including an annular channeled wall projecting outwardly from and integral with the vessel, and a flat circular head integral with and overhanging the channeled wall, the outer boss including a circular head of smaller diameter than the head portion of the inner boss, an annular wall seated on the margin of the head of the inner boss and provided with an annular outwardly projecting flange seated on and projecting outwardly from the head of the inner boss, and an annular extension of said flange projecting into the channel of the inner boss, said extension and the channeled wall of the inner boss forming an annular seam uniting the two bosses.

2. A sheet metal vessel as specified by claim 1, said flange extension having an annular outwardly projecting reinforcing lip located on and reinforcing the outer surface of the vessel body.

3. A sheet metal vessel as specified by claim 1, said flange extension having a rolled annular bead on its outer margin forming a reinforcement of said seam.

4. A sheet metal vessel having bail ears each composed of an inner boss and an outer boss, the inner boss including an annular channeled wall projecting outwardly from and integral with the material of the vessel, and a circular head in-

tegral with and overhanging the channeled wall, the outer boss including a circular head provided with an annular outwardly projecting flange and an annular extension of said flange projecting into the channel of the inner boss, said extension and the channeled wall of the inner boss forming an annular double seam uniting the two bosses, the wall of the outer boss being provided with diametrically opposite orifices, the vessel having a bail including straight end portions slidable in said orifices and provided with stops limiting an upward sliding movement of the bail.

5. A sheet metal vessel having bail ears each composed of an inner and an outer boss, the inner boss being integral with the vessel, and including an annular channeled wall projecting outwardly from the side of the vessel, and a circular head integral with and overhanging said channeled wall, the outer boss being composed of an inner hollow section having an integral inwardly projecting marginal zone at its inner end forming with the channeled wall of the inner boss, an annular double seam uniting the two bosses, and a separately formed circular head joined by an outer seam to the outer end of the inner section of the outer boss.

6. That improvement in the method of providing a part of a sheet metal vessel with a bail ear, which consists in forming on the sheet metal of such part an outwardly projecting inner boss including an annular wall integral with and projecting outwardly from the sheet metal part, and a head integral with said wall, providing an outer boss including a head, an annular wall integral with the head, an annular flange projecting outwardly from said wall and an annular flange extension projecting inwardly from the flange, and of substantially frusto-conical form and inclined inwardly so that its margin is formed to surround the inner boss, placing the margin of the flange extension over the inner boss and against the adjacent surface of the sheet metal part, and exerting pressure on the assembled parts to force the margin of the flange extension inwardly, and thereby cause it to form an annular channel in the wall of the inner boss.

7. That improvement in the method of providing a sheet metal part with a bail ear, which consists in forming on the sheet metal part an outwardly projecting integral inner boss including an annular cylindrical wall and a circular head integral with said wall, providing a sectional outer boss including an independently formed hollow section having an inwardly projecting frusto-conical marginal zone at its inner end, and an independently formed circular head united by an annular outer seam to said hollow section, placing the margin of said frusto-conical zone against the sheet metal part around the inner boss, and exerting pressure on the assembled parts to deform said frusto-conical flange and force its margin into the wall of the inner boss thereby channeling said wall and forming an annular double seam uniting said bosses.

8. The method of securing to a piece of sheet metal an element of sheet metal which comprises forming an upstanding boss on said piece of sheet metal so that the side wall of said boss is substantially perpendicular to the portions of the piece immediately surrounding said boss, forming on said element a flange extending radially outward and an extension on said flange having a length approximately equal to the height of the boss and inclined inwardly to fit its terminal edge against the side wall of said boss, placing said element on said boss, and pressing on said flange to cause said terminal edge to indent a channel in the side wall of the boss and to flatten the boss so as to pinch the marginal portion of said extension in said indented channel.

9. The method of securing a sheet metal attachment to a piece of sheet metal which comprises forming an upstanding boss on said piece with integral side and head walls, of which the side walls are substantially perpendicular to the surface of the piece immediately surrounding said boss, forming said attachment with a substantially plane flange of which the inner diameter is less and the outer diameter greater than the diameter of said boss, and with an extension on said flange of a length substantially equal to the height of the boss and inclined inwardly to make the area surrounded by its terminal edge substantially equal to the area of the boss, and then pressing said flange and boss simultaneously toward the plane of the piece with force sufficient to deflect the edge part of the flange extension inwardly and to fold the margin of the boss over the edge of the extension.

10. A sheet metal article having an integral, outwardly projecting boss formed with a channeled annular wall and a head joined to said wall, combined with a sheet metal outer boss having a peripheral flange bearing on the marginal portion of said head, and an inwardly turned extension projecting from the outer rim of said flange into the channel of said annular wall.

11. A sheet metal article having an integral, outwardly projecting boss formed with a channeled annular wall and a head joined to said wall and of which the junction of its margin with the annular wall forms the outer boundary of the channel in such wall; combined with a sheet metal boss having a radially projecting peripheral flange and an annular extension from the outer rim of said flange, the flange overlapping the marginal portion of the head of the first-named boss and said annular extension being turned inwardly and confined within said channel.

ISAAC E. SEXTON.