July 25, 1944. M. O. KUHN 2,354,425

CONTAINER

Filed Oct. 4, 1940 4 Sheets-Sheet 1

Fig.1.

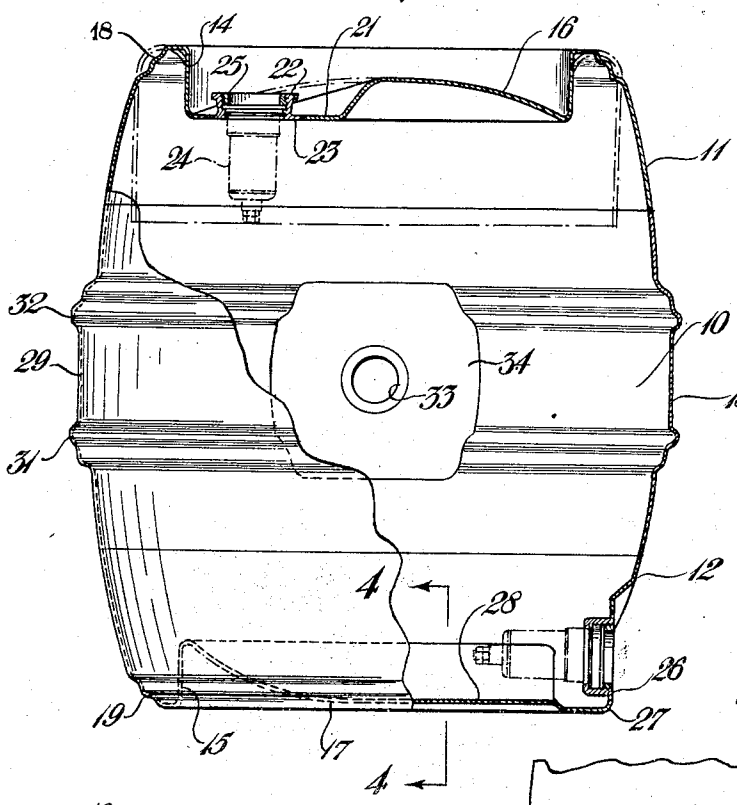


Fig.3.

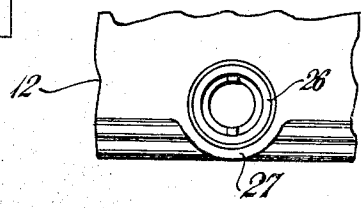


Fig.2.

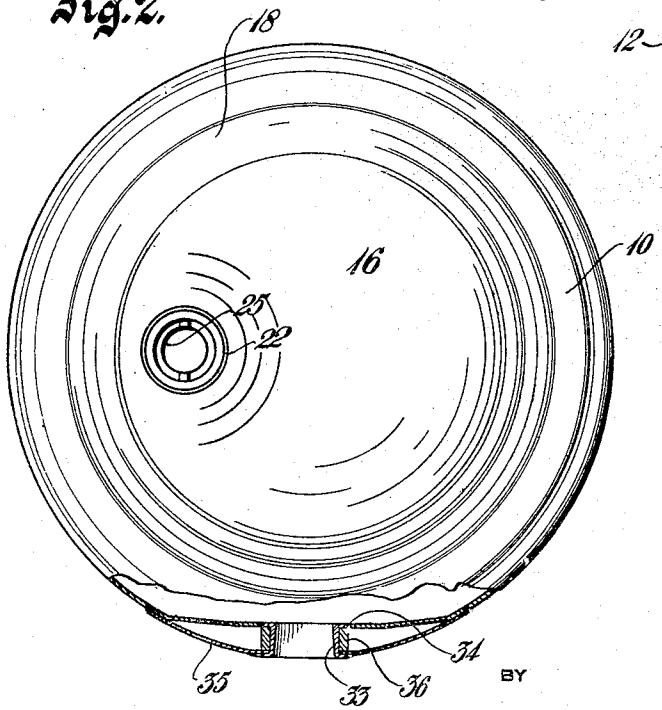
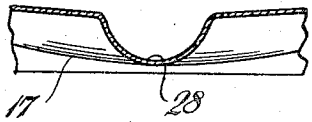


Fig.4.



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July 25, 1944. M. O. KUHN 2,354,425

CONTAINER

Filed Oct. 4, 1940 4 Sheets-Sheet 2

Fig. 5.

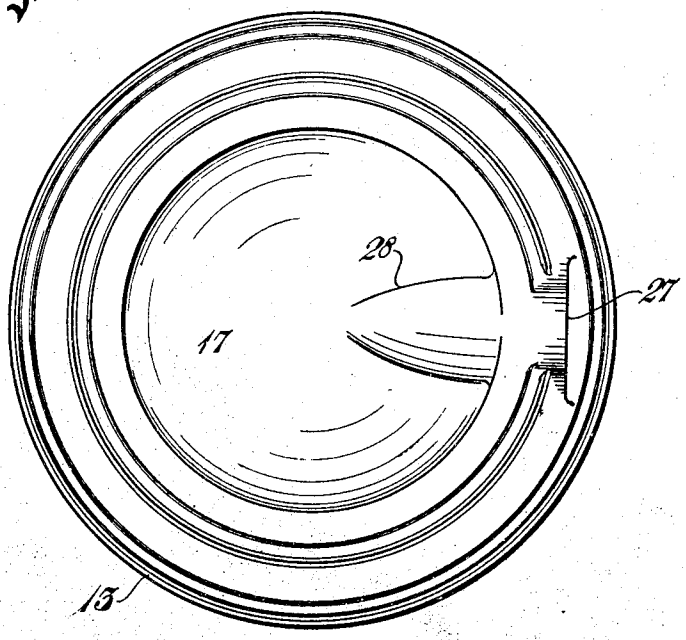


Fig. 6.

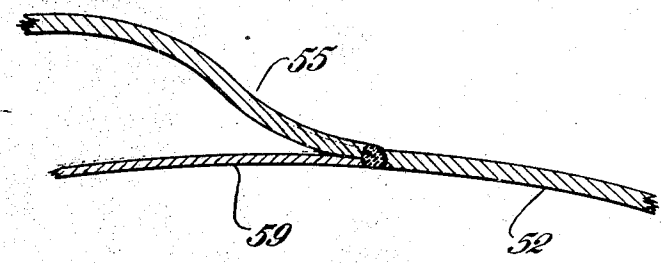
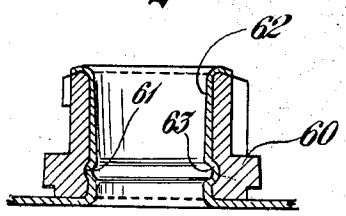


Fig. 13.



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CONTAINER

Filed Oct. 4, 1940 4 Sheets-Sheet 3

Fig. 7.

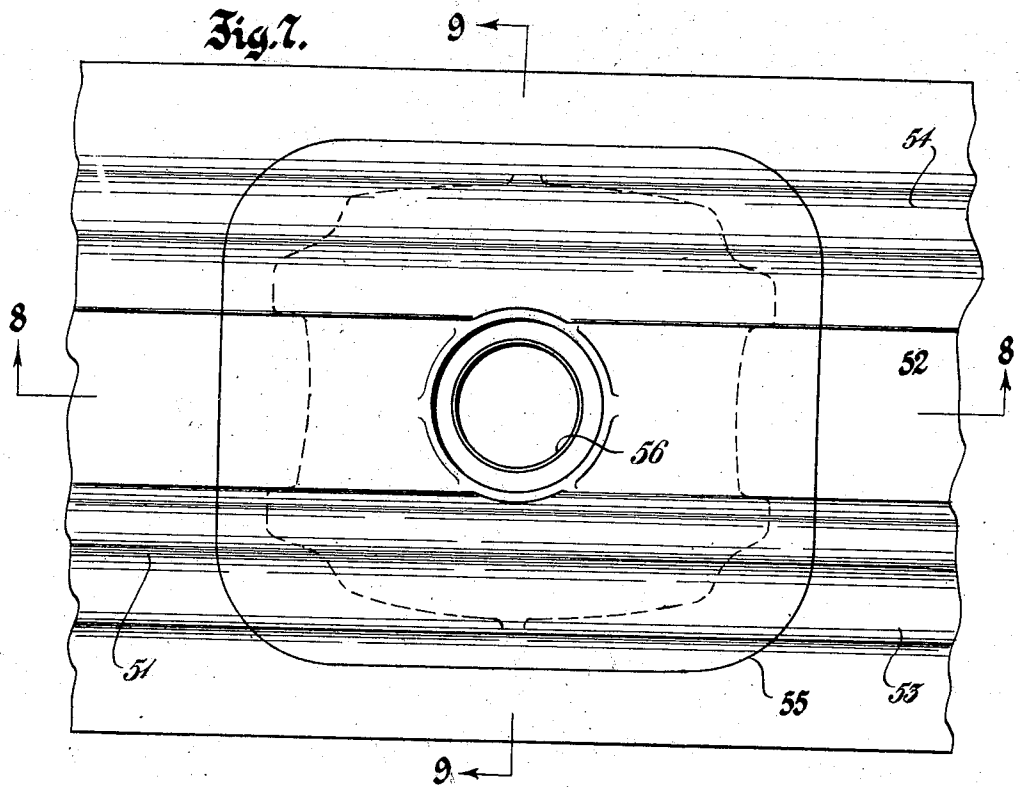


Fig. 8.

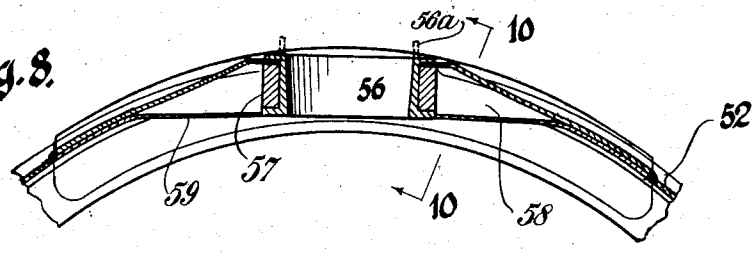


Fig. 9.

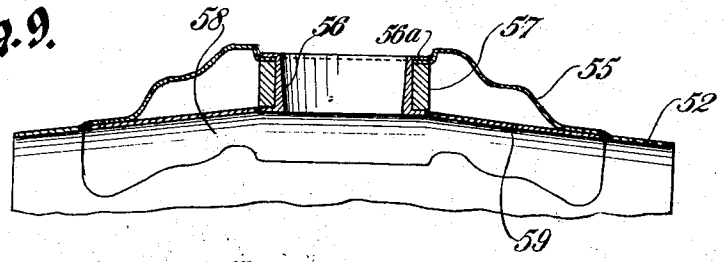
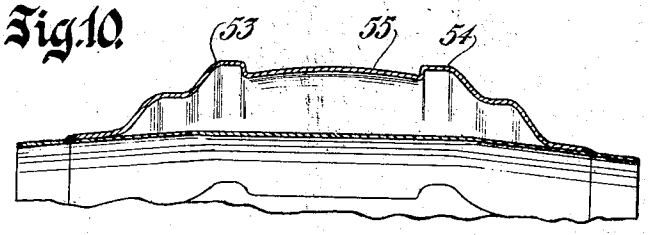


Fig. 10.



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July 25, 1944. M. O. KUHN 2,354,425

CONTAINER

Filed Oct. 4, 1940 4 Sheets-Sheet 4

Fig.11.

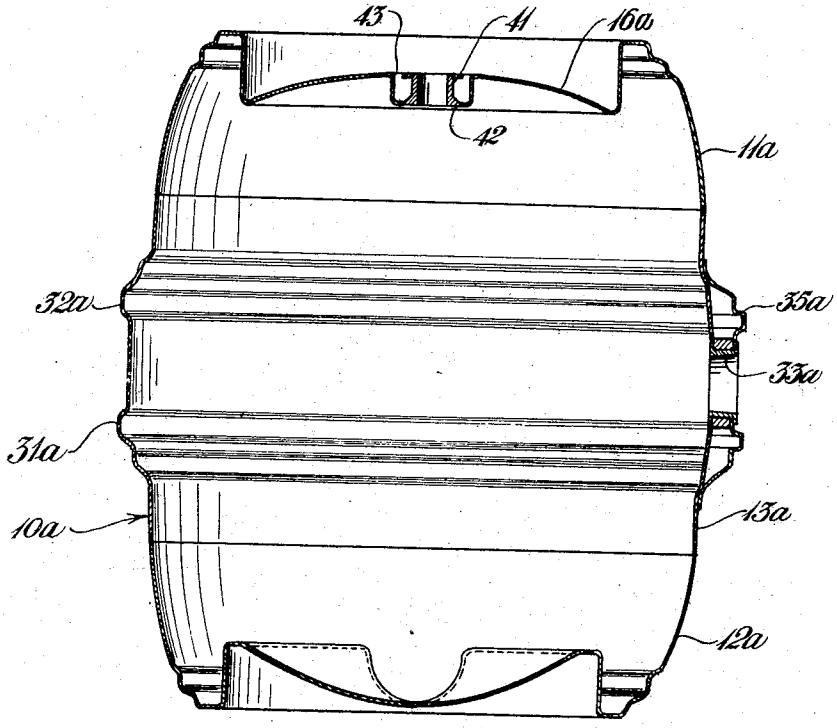
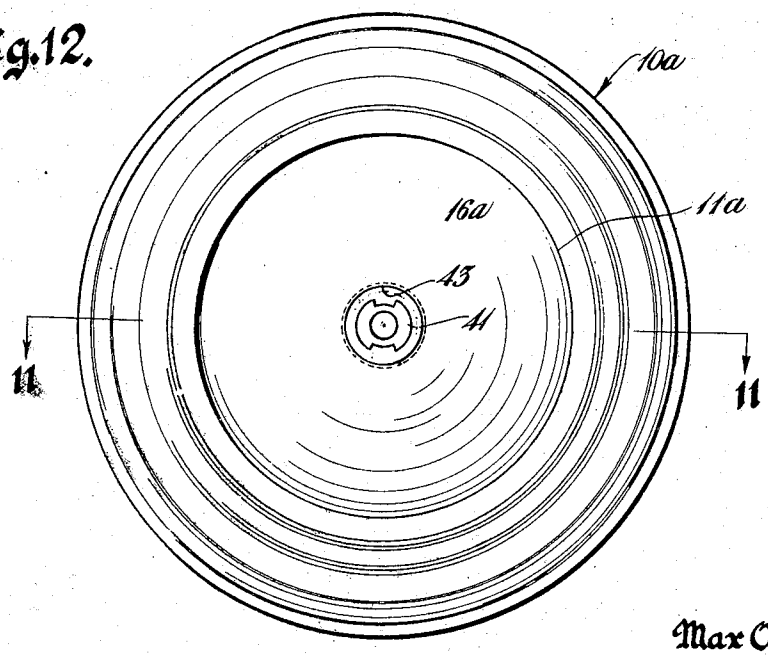


Fig.12.



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Max O. Kuhn

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Patented July 25, 1944

2,354,425

UNITED STATES PATENT OFFICE

2,354,425

CONTAINER

Max O. Kuhn, Cuyahoga Falls, Ohio, assignor to The Firestone Tire & Rubber Company, Akron, Ohio, a corporation of Ohio

Application October 4, 1940, Serial No. 359,673

1 Claim. (Cl. 220—71)

This application relates to containers, and more especially to single walled metallic containers and to methods of manufacturing same.

Many types of containers have heretofore been made with a majority of the containers being of the double wall type. One principal reason for making containers double walled is that it is difficult to produce single walled containers that retain their shape when subjected to the rough use which containers normally receive. Another reason is that most single walled containers enlarge when containing a fluid under pressure. These disadvantages of single wall containers are difficult to overcome and have forced most manufacturers to produce double walled containers, whereas obviously double walled containers weigh and cost more than single walled containers.

The general object of the present invention is to provide a novel and improved type of container.

A further object of the invention is to provide a sturdy, constant volume, light weight container which can be readily and easily assembled.

Another object of the invention is to provide a single wall container having desirable physical properties.

Further objects of the invention will be manifest from the following specification which is described with particular reference to the accompanying drawings, in which:

Figure 1 is an elevation, partly in section, of one embodiment of the invention produced in accordance with the method of the invention;

Figure 2 is a top plan, partly in section, of the container of Figure 1;

Figure 3 is a fragmentary elevation of the lower tapping means of Figure 1;

Figure 4 is a fragmentary section on line 4—4 of Figure 1;

Figure 5 is a bottom plan of the container of Figure 1;

Figure 6 is an enlarged vertical sectional elevation of a joint formed in a modified form of bung construction;

Figure 7 is a plan of a modified bung construction partially disclosed in Figure 6;

Figures 8, 9, and 10 are sectional elevations on lines 8—8, 9—9 of Figure 7 and 10—10 of Figure 8, respectively;

Figure 11 is a section on line 11—11 of Figure 12;

Figure 12 is a plan of another embodiment of the invention; and

Figure 13 is a section of a modified tap construction.

Referring specifically to the drawings, a substantially constant volume single walled metallic container 10 is shown. This container is made from two cup shaped container sections 11 and 12 which are secured to opposite edges of a container ring 13. The container sections 11 and 12 have double walled chimes 14 and 15 respectively, formed at one end thereof, with the inner walls of the chimes 14 and 15 being connected to indented spheroidally contoured heads 16 and 17, respectively, of the container sections 11 and 12. The heads of the container sections are reinforced against localized axial outward movement by their curved contour. Outward movement of the heads as a unit appears to be fulcrumed about the outer corners of the double walled chimes. Such movement of the container heads is prevented by sharply reducing the end diameter of the sections by a series of steps or corrugations 18 and 19 formed in the outer walls of the chimes 14 and 15, respectively, so that the fulcrum arms for movement of the heads of the container sections about the outer edges of the double walled chimes are made as short as is feasible. This avoids excessive axial movement of the heads even when the section has an appreciable outwardly directed force thereon. The container section 11 is further reinforced by the continuous ring formed at the base of the inner wall of the chime 14. Furthermore, the steps 18 and 19 extend completely around the ends of the container and reinforce the container against axial impacts.

The container shown is provided with "Golden Gate" type of tapping means. To secure the tapping means in position, a flat portion 21 is formed in the head 16 with a tap bushing 22 having an outwardly extending flange 23 formed at its inner end being welded to the container head 16 by a butt joint. A standard tap 24 is received in the tap bushing 22 and extends into the container 10 while a locking ring 25 engages with the tap bushing to secure the tap 24 in position. A tap bushing 26 is welded in a similar manner to the container section 12 in a flat portion formed in the outer wall of the chime 15. Note that an integral embossed arcuate section 27 is formed in the chime 15 to engage with the bushing 26 so that the tap can be placed as close to the bottom of the container as possible.

The head 17 of container section 12, which is the lower container section and must have a tapping orifice therein, is reinforced by forming a radially directed tapping trough 28 therein, which trough extends from the crown of the head 17 to the inner wall of the chime 15 in alignment with

the bushing 26. The trough 28 combines with the arcuate head 17 and the reduced diameter for the ends of the container sections to form a sturdy reinforcement for the container head and prevent expansion thereof. The head is strengthened, it appears, by the semi-cylindrical contour of the trough and by the substantially axially extending sections of the trough wall adjacent the inner wall of the chime 15.

A container reinforcing and strengthening band 29 is formed in the medial region of the container ring 13 and rolling rings 31 and 32 are formed at the edges of the band 29. A bung bushing 33 is secured to a flat spot 34 in the band 29 and extends outwardly therefrom with the outer edge of the bushing 33 being braced and a continuous rolling surface for the container being provided by a metal patch plate 35 which is secured to the bushing 33 and is arched over the flat spot 34. The patch plate 35 is secured at its edges to the ring 13 and makes the band 29, in effect, continuous. The bushing 33 is reinforced by a sput 36 positioned therearound.

In making the container sections 11 and 12, the articles are first drawn from flat sheets or discs into cylinders (see section shown in dotted lines in Figure 1) which are substantially the proper form only smaller than the ultimate size desired. The sections are trimmed roughly and expanded to the substantially conical contour or size desired. Finally the sections are drawn or pressed to the exact shape desired and finished by trimming the edges thereof. The ring 13 is formed by expanding a circular metal band to the desired contour. The container sections and ring are formed of a suitable metal such as stainless steel and are cold worked to shape to harden and strengthen the container parts which are butt welded together by the atomic hydrogen method wherein no extra metal is added and a stream of hydrogen is directed onto the surfaces being fused together by an electric arc. If necessary, a small amount of stainless steel rod can be melted in with the parts as they are being fused together. The tap bushings, the bung bushing, and patch plate, should be made of the same metal as the container sections, and be atomically welded in place to simplify construction of the barrel. The "Golden Gate" tap bushings are made by stamping them from a blank and cutting the threads therein whereas previous types of bushings have been made by forging them out roughly and then machining them to finished size, which is an appreciably more expensive operation.

A modified type of bung assembly for the container is shown in Figures 6 through 10. In this instance, a complete annular band 51 is formed in the medial member 52 of a container, which band has rolling rings 53 and 54 adjacent the edges thereof. After the band 51 is formed, preferably by cold rolling it into the member 52, a relatively thin reinforcing plate 59 having a bung liner 56 secured thereto is secured to a portion of the inner surface of the band 51 by spot welding. A reinforcing sput 57 is positioned around the bung liner 56 and a bung opening is formed in the band 51 before associating the reinforcing plate with the band 51. The outer end 56a of the bung liner extends through the bung aperture. Next a substantially rectangular, in projection, section 55 is cut from the band 51 adjacent the bung opening by a suitable punch and die. The plate 59 is trimmed to the exact size of the section 55 by this operation and the plate and section are then secured together with their edges in vertical alignment, by spot welding their edges together, which forms a bung unit 58. Note that the center portion of the plate 59 is flat while the ends and sides thereof are out of the plane of the center portion and are contoured so as to fit snugly against the section 55. The bung unit 58 is placed in the hole formed in the band 51 by cutting section 55 therefrom and the inner edge of the plate 59 is positioned flush with the inner edge of the band which obviously makes the outer edge of the section 55 protrude slightly beyond the surface of the container member 52. The abutted edges then are fused together by the atomic hydrogen process, by which all joints in the container are made. The fused joint positioning the bung unit 58 now is tested to determine if it is watertight and, if tight, the protruding end 56a of the bung liner is pressed down against the sput 57, while the liner is pressed out against the sput, and atomically welded in place. The dotted line in Figure 7 indicates the line of contact of the plate 59 with the section 55. In securing the bung unit to the container, the plate 59 is secured to the section 55 at the edge thereof while both the plate and section are secured to the container. If desired, the plate 59 may be made by a separate punching step and be secured to the section 55 after the section is cut from the band 51. After the bung unit is properly positioned, then a container section or sections can be secured to the member 52 to form a container therefrom.

If the section 55 does not readily fit back into the opening produced by cutting it from the band 51, the edges of the section may be trimmed slightly to facilitate repositioning the section. Or, the band 51 may be heated, for example, by placing it on a hot welding jig whereby the hole in the band 51 is enlarged slightly and adapted to receive the section 55.

Figures 11 and 12 show a container 10a, embodying the present invention, provided with a tap opening adapted to receive a "Peerless" type fitting. In this case container sections 11a and 12a combine with a container ring 13a to form the container which has a bung bushing 33a and a cover patch 35a as in the embodiment of the invention shown in Figures 1 through 5. Note that rolling rings 31a and 32a have flat load carrying surfaces. Only one tapping opening is formed in the container. This opening is defined by a stainless steel tap liner 41 having a flange 42 at its base, which is secured to an inwardly extending stainless steel connecting ring 43 that in turn is secured to the crown of head 16a of the container section 11a. All of these joints are butt welded by the atomic hydrogen process. In some cases the indented connecting or anchoring ring may be formed integrally with the container head, or the liner 41 and ring 43 may be integral, if desired. These parts can be made by forming a small hole in the metal being processed and partially drawing out the metal, and then trimming the hole and drawing the metal to the exact shape desired, which method is covered in A. M. Brown Pat. No. 2,214,889.

A modified type of tap construction, including a sput, or fitting 60 having an annular recess 61 formed in the bore thereof, is shown in Figure 13. A tap liner 62 is expanded into the recess 61 in any suitable manner so that the liner follows the exact contour of the sput and a corresponding recess 63 is formed in the liner. The outer end of the liner is flared out and pressed down against

the sput, as previously explained. A feature of this type of tap construction is that the sput is positively secured to the tap liner and a liquid tight joint between the sput and liner is produced. Since the sput **60** does not contact the contents of the container, it can be made from any suitable material.

The containers of the invention are provided with bung bushings which connect to a flattened zone of the container in order that the inner and outer ends of the bushings can be anchored in place without forming a protuberance on the container. Also, this bung construction permits complete drainage of the container. No crevices or cracks are formed on the inner surface of the container, since it is primarily used as a beverage container and it is essential that the container can be kept clean easily. Preferably all of the component parts of the containers of the invention are made from stainless steel, except for the reinforcing sputs which may be made from any suitable material, such as carbon steel. A further feature of the container is that it does not expand appreciably when it is filled under internal pressure. Hence, no liquid is expelled when the filling pressure is removed after the container is filled, and the volumetric capacity of the container does not vary substantially under different degrees of internal pressure.

It will be seen that a sturdy easily constructed container has been provided by the invention and that the objects thereof have been realized.

While several embodiments of the invention have been illustrated and described herein, further modification of the invention may be made without departing from the scope of the invention as defined in the appended claim.

What is claimed is:

In a single wall metallic container, a centrally disposed generally cylindrical wall portion having a bung aperture formed therein, a pair of closed end portions, a bung liner, a bung liner reinforcing spud, an outer plate cut from said central portion and consisting of a segment of said wall portion about and including the bung aperture of said barrel, said outer plate having an inner reinforcing plate welded in fluid tight relation to its undersurface with the edges of said plates in alignment, said inner plate being composed of substantially thinner metal than that of the outer plate, said inner plate having a bung aperture therein, said inner plate having its central portion spaced radially apart from said outer plate, said bung liner with its reinforcing spud traversing the space between said apertures and joining said plates in fluid tight relation, said bung liner, spud and plates comprising a bung unit, said bung unit having the edge portion of said inner plate in abutting relation with the edges of the opening left by the removal of said outer plate and being welded in fluid tight relation thereto with the inner surface of said inner plate flush with the inner surface of said cylindrical wall portion.

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