

April 25, 1939.

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2,156,237

CONTAINER CLOSURE CONSTRUCTION

Filed Dec. 27, 1937

2 Sheets-Sheet 1

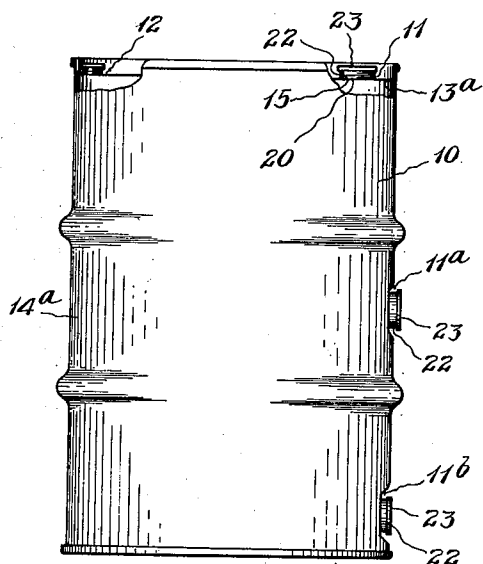


FIG. 1.

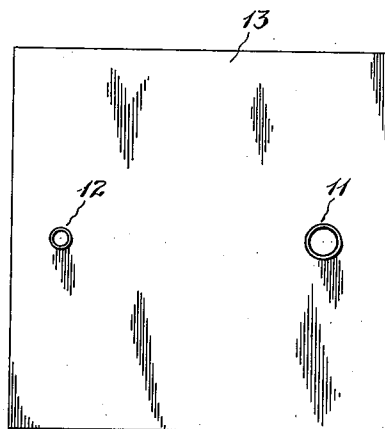


FIG. 2.

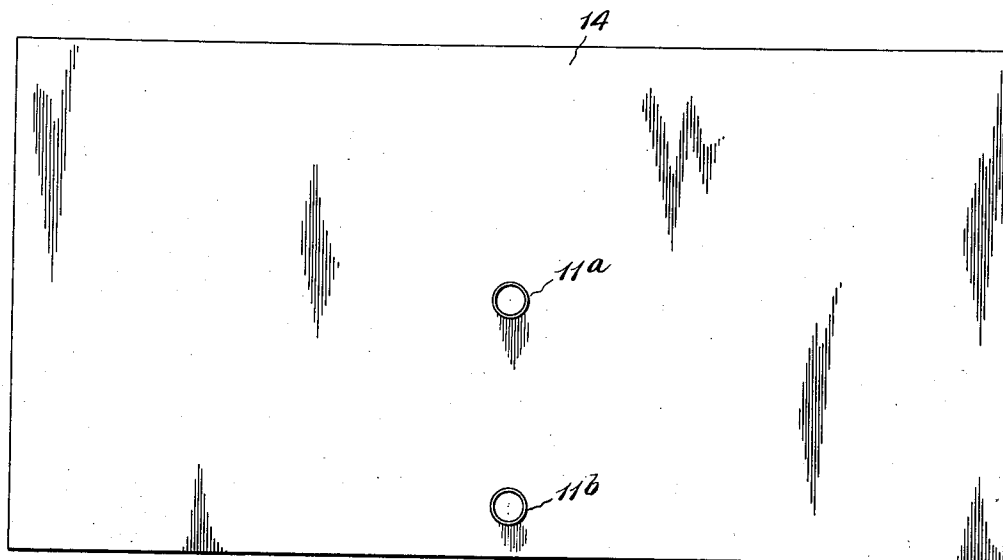


FIG. 3.

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2 Sheets-Sheet 2

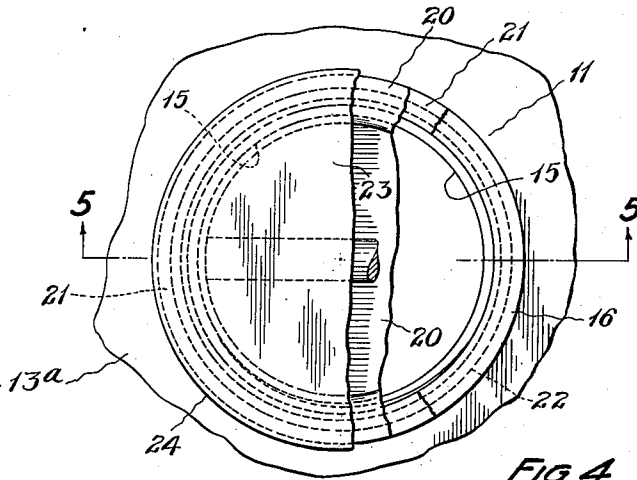


FIG. 4

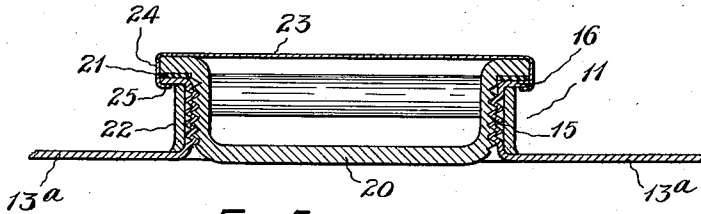


FIG. 5

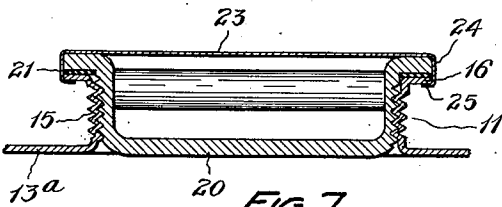


FIG. 7

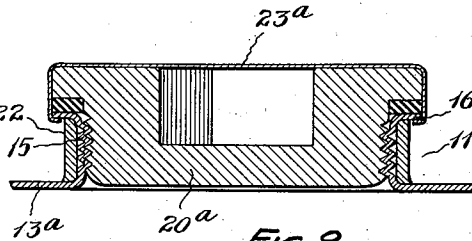


FIG. 8

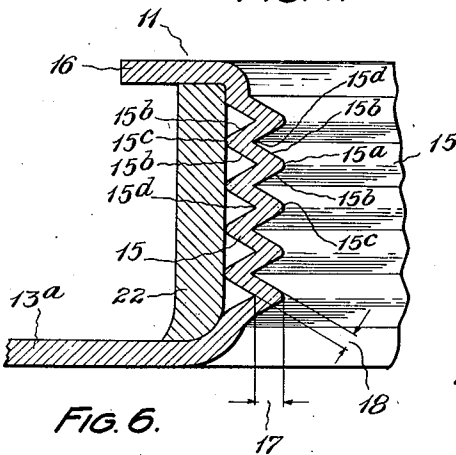


FIG. 6

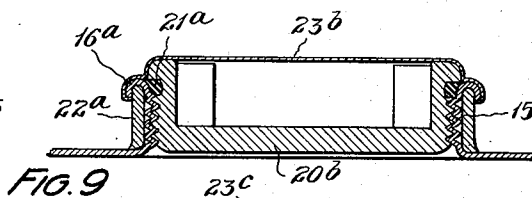


FIG. 9

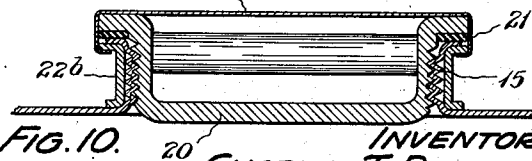


FIG. 10

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2,156,237

CONTAINER CLOSURE CONSTRUCTION

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Application December 27, 1937, Serial No. 181,875

6 Claims. (Cl. 220—39)

The invention relates to bung opening construction for metallic containers, barrels, drums, vessels, packages, and the like, utilized for shipping, storing and/or dispensing fluid, liquid, or semi-solid materials; and relates more particularly to a simplified threaded bung opening construction to which a threaded member may be readily connected.

Metallic containers are extensively used for transporting, storing and dispensing various kinds of lubricating oils, and such containers are usually provided with means for preventing undetectable tampering with the closure structure. Moreover, it is desirable that the bung opening and closure structure be such that complete or substantially complete drainage of the container may be effected through the bung opening.

Accordingly, metallic containers heretofore have been provided almost universally with cast, forged, or specially pressed bung rings or bushings having internal threads; the bung rings being secured in a liquid-tight manner by seaming, welding or the like, to the container wall; the bung rings or plugs threaded therein to providing for the securement of the means for preventing undetectable access to the container; and the bung rings being arranged to project wholly outwardly of the container wall in case complete container drainage is desired.

In many cases special types of closure plugs are required for use with particular bung rings and tamper sealing means; and two or more gaskets are frequently required or used, interposed between the container wall, bung ring, plug, and tamper seal, in order to assure a liquid-tight closure.

The manufacture of such bung rings, the threading of the same, the securing of the bung rings to the container wall, the manufacture of the special closure plugs, the manufacture and securing of the tamper sealing means, and the provision of the gaskets are each relatively expensive operations. The composite expense of such parts or operations greatly increases the cost of manufacturing metallic containers. In fact, the cumulative expense of most or all of the enumerated parts or operations forms a relatively large portion of the total cost of manufacturing a sheet metal container provided with the same.

It is therefore a primary object of the present invention to appreciably reduce the cost of manufacturing metallic containers by greatly reducing the prior disproportionate cost of providing the bung opening and appurtenance; without,

however, sacrificing complete container drainage, a liquid-tight construction, or adaptability for the reception of tamper sealing means.

A further object of the present invention is to provide a container bung opening construction to which a threaded closure plug of any one of a variety of forms may be readily secured with the use of only one gasket, and without utilizing any separate, specially cast, forged or machined threaded bung ring or the like.

Threaded bung openings for such containers frequently range from $\frac{3}{4}$ inch to $2\frac{1}{2}$ inches in diameter, and are provided with from 3 to 6 threads. These threads are usually formed as standard pipe threads, because the bung openings must be adapted for the reception of standard pipe threaded fittings. Such threads depending upon the size of the opening range from 14 to $11\frac{1}{2}$ threads per inch. Moreover, metallic containers, to which the present invention pertains, are frequently made from sheet, strip or plate metal of from 24 to as heavy as 12 gauge material.

Containers have in the past been provided with bung openings formed by drawing a neck in a metal wall thereof, and by then threading the neck. Such constructions, however, have required very thick metal in the wall in which the bung opening was formed; and have required the threads to be cut therein.

Sheet metal cans or canisters, such as small paint and varnish cans, kerosene lamp reservoirs, or small hand oil cans have been made of very thin sheet metal such as tin plate or the like with a short, small central or concentric neck drawn in the top wall thereof. These necks have been formed by a rolling operation with rounded, corrugated-like threads having a pitch of 4 to 6 threads per inch. Such rounded threads are similar to the threads on glass bottles or fruit jars, and do not have the accuracy, pitch or V-sides which characterize standard pipe threads. Moreover, such rounded threads cannot be used in the bung opening of a large 55 gallon sheet metal container, and the like, because they will not receive a standard pipe threaded fitting.

For more than sixty years during which I have had experience in the art of making sheet metal containers of all sorts, sizes, kinds and shapes, I have never seen an integral neck in a sheet metal container provided with standard pipe threads in which the threads had not been formed by cutting; and I have likewise never seen an integral threaded neck eccentrically lo-

cated in a container wall in which said threads had not been formed by cutting.

Moreover, until the present invention, there has not to my knowledge, been available any machinery or method for forming threads in an integral eccentrically located neck in a container wall without cutting; or any machinery or method for forming standard pipe threads in an integral neck formed in a container wall without cutting.

Accordingly, it is a further object of the present invention to provide a sheet metal container wall with an integral bung opening neck having standard pipe threads formed therein without cutting the threads.

It is a further object of the present invention to provide a wall of a sheet metal container with an eccentrically located integral bung opening neck having threads formed therein without cutting the threads.

Moreover, it is an object of the present invention to provide a sheet metal container made of from 24 to 12 gauge rolled steel, with a $\frac{3}{4}$ inch to 2 inch threaded bung opening, having from 3 to 6 standard pipe threads with a pitch of 14 to 11½ threads per inch formed in the neck without cutting the threads.

A further object of the present invention is to provide a wall of a sheet metal container with an integral bung opening neck having V-sided threads formed therein without cutting the threads.

Moreover, it is an object of the present invention to provide a sheet metal container with an integral bung opening neck having V-sided internal threads with relatively sharp or pointed valleys and rounded crests formed therein without cutting the threads.

Moreover, it is an object of the present invention to provide a wall of a sheet metal container with an integral threaded bung opening neck located a less distance from a chime of the container than the diameter of the opening, without cutting the threads.

It is also an object of the present invention to provide a wall of a metal container with an integral bung opening neck having threaded inner and outer contours, the thickness of the metal in the thread apices being greater than the thickness of the metal in the neck perpendicular to the thread sides.

Likewise, it is an object of the present invention to provide a container with an integral bung opening neck, the metal in the neck being swaged and deformed to thicken the same at different regions, to provide standard V-sided pipe threads therein.

It is a further object of the present invention to provide a sheet metal container wall with an outwardly projecting integral bung opening neck terminating in an outturned flange and having an inner and outer standard pipe thread formation in the neck between the wall and flange.

Moreover, it is an object of the present invention to provide a sheet metal container with an integral flanged bung opening neck having standard pipe threads formed therein without cutting the threads.

It is also an object of the present invention to provide a sheet metal container with an integral reinforced bung opening neck having standard pipe threads formed therein without cutting the threads.

Additionally, it is an object of the present invention to provide a wall of a sheet metal con-

tainer with an eccentrically located integral bung opening neck, the metal in the neck being swaged and deformed to provide standard V-sided pipe threads therein.

Also, it is an object of the present invention to provide a sheet metal container made from thin gauge rolled steel, as distinguished from tin plate, with an integral bung opening neck drawn therefrom formed with V-sided pipe threads, as distinguished from rounded corrugated-like threads.

Moreover, it is an object of the present invention to provide a sheet metal container with an integral bung opening neck terminating in an outturned flange having threads formed therein so shaped and constructed as to lend a slight axial resilience to the neck to provide a nut lock action to a flanged threaded closure plug screwed into the neck and seated on the neck flange.

Moreover, it is an object of the present invention to provide a sheet metal container wall with an outwardly projecting integral bung opening neck terminating in a flange and having threads formed in the neck between the wall and flange without cutting the threads.

Also it is an object of the present invention to provide a sheet metal container wall with an outwardly projecting integral bung opening neck terminating in a flange and having threads formed in the neck between the wall and flange without cutting the threads, the threads being disposed from the neck oppositely from direction in which the flange extends, that is, inward in the case of an outturned flange, or outward in the case of an inturned flange.

Moreover, it is an object of the present invention to provide a container bung opening construction having characteristics described in one or more of the preceding objects and which is adapted to receive any one of a number of different types of closure plugs provided with standard pipe threads.

Also, it is an object of the present invention to provide a container bung opening construction having the characteristics defined in one or more of the above objects, to which a tamper-proof seal may be readily applied.

And finally, it is an object of the present invention to provide a container bung opening and closure construction, which accomplishes the aforesaid desiderata, which greatly simplifies present day bung opening constructions, and which provides a more efficient and inexpensive bung opening and closure.

These and other objects may be obtained by the elements, parts, combinations and constructions constituting the present invention, preferred embodiments of which are shown in the accompanying drawings and are hereinafter claimed and described in detail, which may be stated in general terms as including in metallic container construction, a wall provided with an integral tubular neck forming a bung opening for the container projecting or extending preferably outwardly of the container from the wall, the neck preferably but not necessarily terminating in an outturned annular flange or lip, the neck between the wall and flange being deformed and swaged to provide a standard V-sided pipe thread formation therein, an externally threaded member in threaded connection with the threaded neck to form a closure therefor, a single gasket for sealing the opening in a liquid-tight manner, and preferably a tamper-proof cap enclosure

ing the outer end of the threaded member and secured to the neck flange.

Several embodiments of the present improvements are shown in the accompanying drawings, in which:

Figure 1 is a side elevation, parts being broken away and in section, illustrating a sheet metal container to which the improvements of the present invention are applied;

Fig. 2 is a plan view of the top head or wall of the container shown in Fig. 1 after two of the improved bung openings have been formed therein, but before the same has been blanked out, drawn or seamed to the container;

Fig. 3 is a view similar to Fig. 2, of the side wall of the container of Fig. 1, with two improved bung openings formed therein, before the wall has been formed to cylindrical shape;

Fig. 4 is a plan view with parts broken away, showing the improved container bung opening construction;

Fig. 5 is a vertical section taken on the line 5-5, Fig. 4;

Fig. 6 is an enlarged view showing the rolled, swaged or deformed V-thread formation of the integral bung opening connection illustrated in Fig. 5;

Fig. 7 is a view similar to Fig. 5, showing a modified form of construction without a reinforcing collar;

Fig. 8 is a view similar to Fig. 5, showing another modified form of construction;

Fig. 9 is a view similar to Fig. 5, showing a different type of closure plug screwed into the integral threaded bung opening neck; and

Fig. 10 is a view similar to Fig. 5, showing a still further modification.

Similar numerals refer to similar parts throughout the various figures in the drawings.

Referring first to Figs. 1, 2 and 3, a sheet metal container is indicated generally at 10 and is provided with an improved bung opening at four different places, generally indicated by the numerals 11, 11a, 11b and 12. The bung openings 11, 11a and 11b are shown as being bung openings formed with standard 2 inch pipe threads, while the bung opening 12 is a bung opening formed with standard $\frac{3}{4}$ inch pipe threads. Ordinarily only two bung openings are provided in a container, either both in the head, or one in the head and one in the side, at one of the locations indicated in Fig. 1. However, if desired, any number of bung openings can be provided in the container, as shown in Figs. 1, 2 and 3.

In Fig. 2, the integral threaded bung opening necks 11 and 12 are first formed in the sheet of metal 13 from which the head 13a is to be subsequently blanked; but the head 13a may be blanked and drawn first and the improved bung openings later formed therein if desired. The present invention, however, makes possible the provision of a bung opening in a container wall closer to a container chime than the diameter of the opening, as shown in Fig. 1; and if the bung openings are so located, they are formed in the wall before the wall is blanked or drawn, as indicated in Fig. 2.

Fig. 3 illustrates bung openings 11a and 11b formed in the blank 14 before the blank 14 is given a cylindrical shape to form the side wall or shell 14a of the container 10.

Referring more particularly to Figs. 4, 5 and 6, the improved bung opening 11 is shown therein on larger scales than in Figs. 1 and 2. The container head or top wall 13a may be formed from

24 to 12 gauge rolled sheet or strip steel, and the integral threaded tubular neck 15 projects outwardly of the container and terminates preferably in an outturned annular flange or lip 16 to form a bung opening for the container. The outturned flange 16 is formed from the parent metal 13a from which the flange is integrally drawn; and the threads of the integral neck 15 have a special shape, all of which characterize the present invention.

Referring more particularly to Fig. 6, the threaded neck 15 is provided with standard pipe threads; and the bung opening 11 being a 2 inch threaded opening, the pitch of the threads is $1\frac{1}{2}$ threads per inch. If the bung opening were a $\frac{3}{4}$ inch threaded opening, as indicated at 12 in Fig. 1, there would be 14 threads per inch. From 3 to 6 threads may be formed in the integral threaded neck 15, five complete threads being indicated in Fig. 6. The internal thread formation in the neck 15 is such that the threads 15a have V-sides 15b, rounded crests 15c, and relatively sharp or pointed valleys 15d.

Similarly, the outer thread formation is such that the threads have rounded crests 15c, V-sides 15b and relatively sharp valleys 15d; and, as more clearly shown in Fig. 6, both the internal and external thread valleys 15d are void.

Moreover, the parent metal in the neck 15 is deformed and swaged to provide the threads 15a. This deformed or swaged throughout the zone where the internal and external threaded surfaces are presented, without any cutting or shearing, thread formation is indicated by the thicker metal when measured radially between an outer valley 15d and an inner crest 15c, as shown at 17, which is thicker than the metal when measured perpendicularly between inner and outer V-sides 15b, as shown at 18.

Again referring to Fig. 6, the threads 15a project or are disposed inwardly of the neck indicated at 15; and it is obvious from an inspection of Fig. 5, that standard pipe threads, such as shown therein, could not be provided in metal of the gauge shown at 13a by cutting threads in the usual manner of tapping.

Obviously, if it is desired that the flange 16 be inturned, rather than outturned as shown, the threads 15a would be disposed outwardly of the neck; and in case the flange 16 is not used, there is a threaded formation available on the inner and outer peripheries of the neck, either of which may be sized to a desired standard formation.

As shown in the drawings, the internal thread crests, ridges or apices 15c are opposite the external thread valleys 15d, and the external thread crests, ridges or apices 15c are opposite the internal thread valleys 15d, so that the internal and external threads are complementary.

Likewise, in Fig. 6, the internal threads 15a are standard pipe threads and these threads are disposed or displaced inward of the parent neck metal which is in the tubular locus of the remaining unthreaded part of the neck. Thus, the threads in the neck are displaced from the tubular locus of the unthreaded part of the neck toward the standard threaded side of the neck.

Moreover, the thread formations being standard pipe threads, can receive a usual closure plug 20 provided with standard pipe threads, or can receive a standard pipe threaded fitting, which may be attached to the container upon removal of the closure plug 20.

A standard pipe thread is one having V-sides

each inclined at an angle of thirty degrees (30°) from a plane normal to the axis of the thread, as indicated in page 663 of the first edition (1916) of "Marks' Mechanical Engineers' Handbook".

5 Additionally, the thread formation is stiff and strong, due to the hardening and toughening of the metal resulting from the swaged formation of the same. This feature distinguishes these threads from the rounded or corrugated-like
10 formation of round threads previously known in the art having a pitch of only from 4 to 6 threads per inch, which will not receive a standard pipe threaded closure plug or coupling.

The integral threaded necks 15, may be provided almost any place in the wall of a sheet metal container formed from rolled steel by first drawing a neck at the desired location in a sheet metal blank and by then forming the internal and external threads in the neck by a swaging
20 operation between roller dies, in apparatus shown in my copending patent application, Serial No. 181,874, filed of even date herewith, matured in Patent No. 2,145,587, dated January 31, 1939.

The swaging pressure to which the neck metal
25 is subjected in forming the threads between the roller dies, deforms or swages the metal of the threaded part of the neck wall throughout its entire thickness into a zig-zag thread-like shape or formation; and the swaging pressure deforms
30 the metal to form the thread apices 15c so that the internal and external thread apices may be said to be compressed thread apices as distinguished from the stretched thinned thread apices of threads formed by bending or distorting metal
35 under tension by a stretching operation.

Thus, the present invention provides an integral neck forming a bung opening in a thin sheet metal wall having standard pipe threads formed therein without cutting and also provides
40 for the location of an integral threaded neck eccentrically in a thin sheet metal blank.

Referring to Fig. 5, when the improved bung opening is closed by a closure plug 20, a liquid tight sealing gasket 21 is preferably interposed
45 between the lower side of the plug flange and the upper side of the neck flange 16. The neck may be reinforced by an annular ring 22 telescoped around the neck and clamped to the wall 13a by the flange 16 when the flange 16 is formed. This
50 reinforcing ring 22 forms an abutment between the flange 16 and wall 13a so as to prevent the thin metal neck from being damaged, under severe usage.

If desired, a tamper-proof sealing cap 23 may
55 be placed over the plug 20 and have its downwardly extending rim 24 turned inward at 26 by a suitable tool to engage under the neck flange 16 for sealing the closure against unauthorized opening.

60 The same threaded neck is shown in Fig. 7 as is shown in Fig. 5, excepting that the reinforcing ring has been omitted, since in some cases it is unnecessary to provide the same. Otherwise, the construction of Fig. 7 is identical with that of Fig. 5.

The structure of Fig. 8 again is identical with that of Fig. 5, excepting that a different type of plug 20a and cap 23a is used.

70 Referring to Fig. 9, another standard form of closure plug is shown at 20b utilizing a special liquid sealing gasket 21a, which seats within the upper neck opening against the top of the neck threads. Otherwise, the construction is the same
75 in Fig. 9 as that shown in Fig. 5, excepting for the

modified form of flange 16a, reinforcing ring 22a and tamper sealing cap indicated at 23b.

Fig. 10 shows a construction similar to Fig. 5, excepting for the modified form of reinforcing collar 22b and sealing cap 23c.

Accordingly, the present improvements appreciably reduces the cost of providing bung openings for metallic containers and therefore appreciably reduces the cost of such metallic containers by the provision of an integral threaded
10 bung opening neck into which a closure plug having standard pipe threads may be screwed and the opening sealed in liquid tight manner with the use of only one sealing gasket. Moreover, the integral threaded neck, in being provided with standard pipe threads without cutting, permits
15 the use of any one of a variety of types of standard closure plugs and permits the integral neck to be formed from thin metal of the gauge ordinarily used in making metallic containers such
20 as oil drums and the like.

And finally, the integral threaded neck, in being provided with an integral flange, not only provides metal integral with the container wall for the seating of the liquid receiving gasket, but
25 also provides means for clamping a reinforcing collar if necessary, and provides means for the attachment of a tamper sealing cap if desired.

Moreover, the integral threaded bung opening neck in projecting outwardly of the container
30 wall enables complete container drainage to be obtained and the threads in being deformed and swaged to thicken the metal at places, provides a slight axial resilience to the threads, which may give a slight nut lock action to closure plugs
35 threaded therein.

Having now described the features of the invention, the construction and use of preferred forms of the same, and the advantages and results obtained by the improved construction; the
40 new and useful parts, elements, combinations, constructions and devices, their reasonable mechanical equivalents thereof obvious to those skilled in the art are set forth in the appended claims.

I claim:

1. A sheet metal wall provided with an integral tubular neck, complementary internal and external V-sided threads in the neck one of which
50 is a standard pipe thread, the metal of the threaded part of the neck wall being internally, externally and throughout its entire thickness roller swaged into zig-zag thread-like formations with compressed internal and external thread
55 apices, and the threads being displaced from the tubular locus of the unthreaded part of the neck toward the standard threaded side thereof.

2. A sheet metal wall provided with an integral tubular neck terminating in a flange, complementary internal and external V-sided threads
60 in the neck between the wall and flange one of which is a standard pipe thread, the metal of the threaded part of the neck wall being internally, externally and throughout its entire, thickness roller swaged into zig-zag thread-like formations
65 with compressed internal and external thread apices, and the threads being displaced from the tubular locus of the unthreaded part of the neck toward the standard threaded side thereof and in a direction opposite to that in which the flange
70 extends.

3. In metallic container construction, a 24 to 12 gauge sheet metal wall provided with an integral tubular neck forming a bung opening, complementary internal and external V-sided
75

threads in the neck one of which is a from $\frac{3}{4}$ inch to 2 inch standard pipe thread, there being from 3 to 6 threads having a pitch of from 14 to 11½ threads per inch, the metal of the threaded part of the neck wall being internally, externally and throughout its entire thickness roller swaged into zig-zag thread-like formations with compressed internal and external thread apices, and the threads being displaced from the tubular locus of the unthreaded part of the neck toward the standard threaded side thereof.

4. In metallic container construction, a sheet metal wall provided with an integral tubular neck, complementary internal and external V-sided threads in the neck one of which is a standard pipe thread, said threads having void valleys, the metal of the threaded part of the neck wall being internally, externally and throughout its entire thickness roller swaged into zig-zag thread-like formations with compressed internal and external thread apices, and the threads being displaced from the tubular locus of the unthreaded part of the neck toward the standard threaded side thereof.

5. In metallic container construction, a sheet metal wall provided with an integral tubular neck

located eccentrically of the wall, complementary internal and external V-sided threads in the neck one of which is a standard pipe thread, the metal of the threaded part of the neck wall being internally, externally and throughout its entire thickness roller swaged into zig-zag thread-like formations with compressed internal and external thread apices, and the threads being displaced from the tubular locus of the unthreaded part of the neck toward the standard threaded side thereof.

6. A sheet metal wall provided with an integral tubular neck, complementary internal and external V-sided threads in the neck having rounded apices and relatively sharp valleys, the metal of the threaded part of the neck wall being internally, externally and throughout its entire thickness roller swaged into zig-zag thread-like formations with compressed internal and external thread apices, one side wall of each internal thread being in common a side wall of an external thread, and the radial thickness of the metal in the thread apices being greater than the thickness of the metal in the common side walls.

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