Dec. 19, 1944. H. W. DODSON 2,365,178

CLOSURE MEANS FOR CONTAINER OPENINGS

Filed Sept. 18, 1940 3 Sheets-Sheet 1

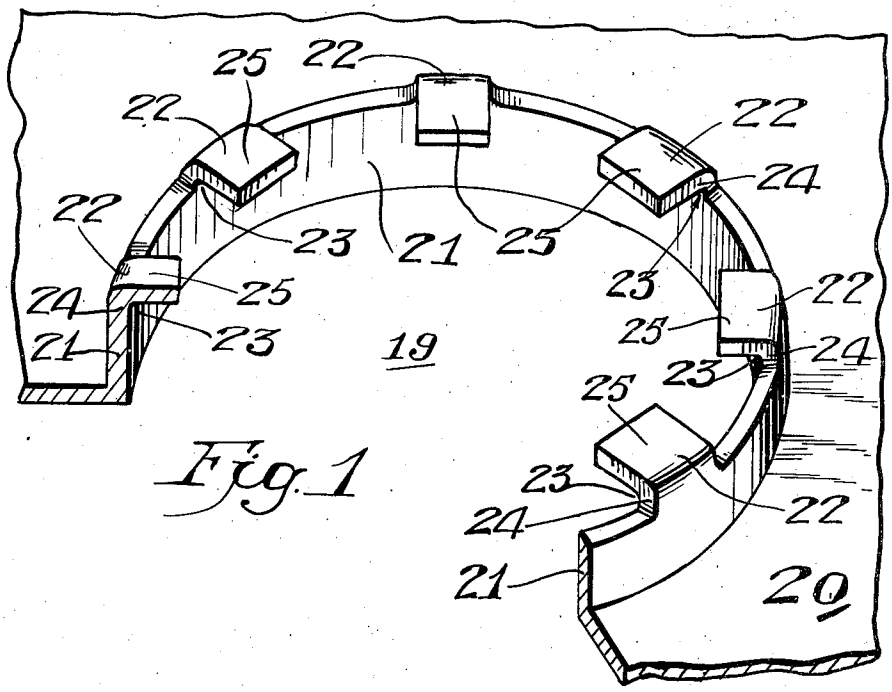

Fig. 1

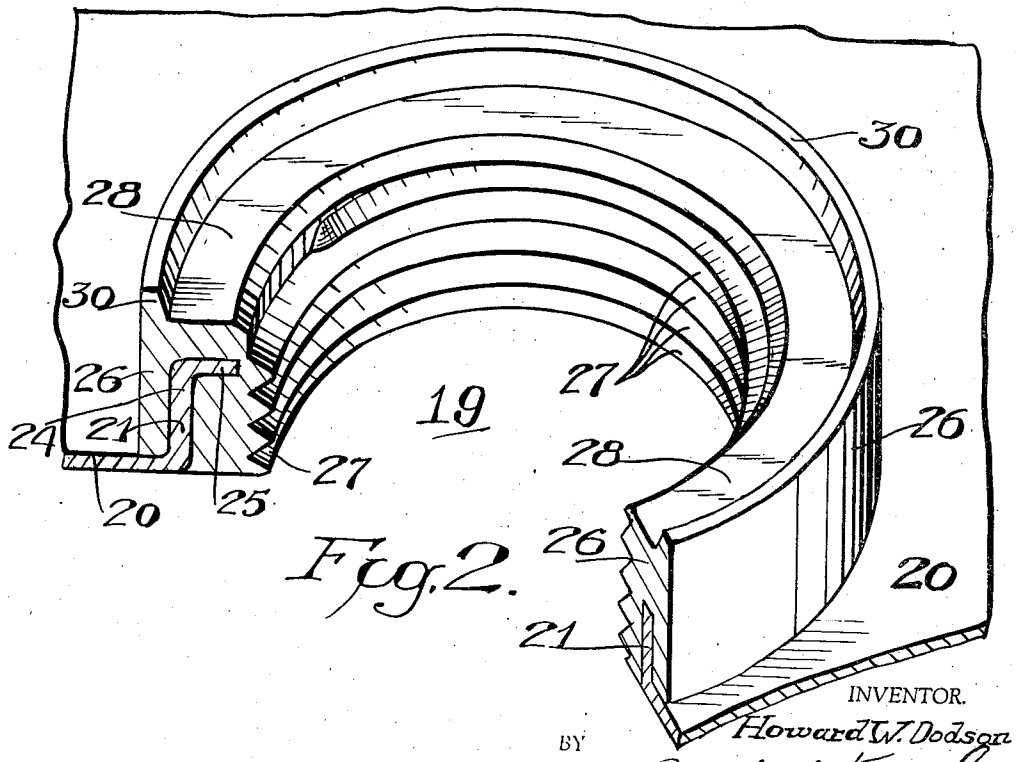

Fig. 2.

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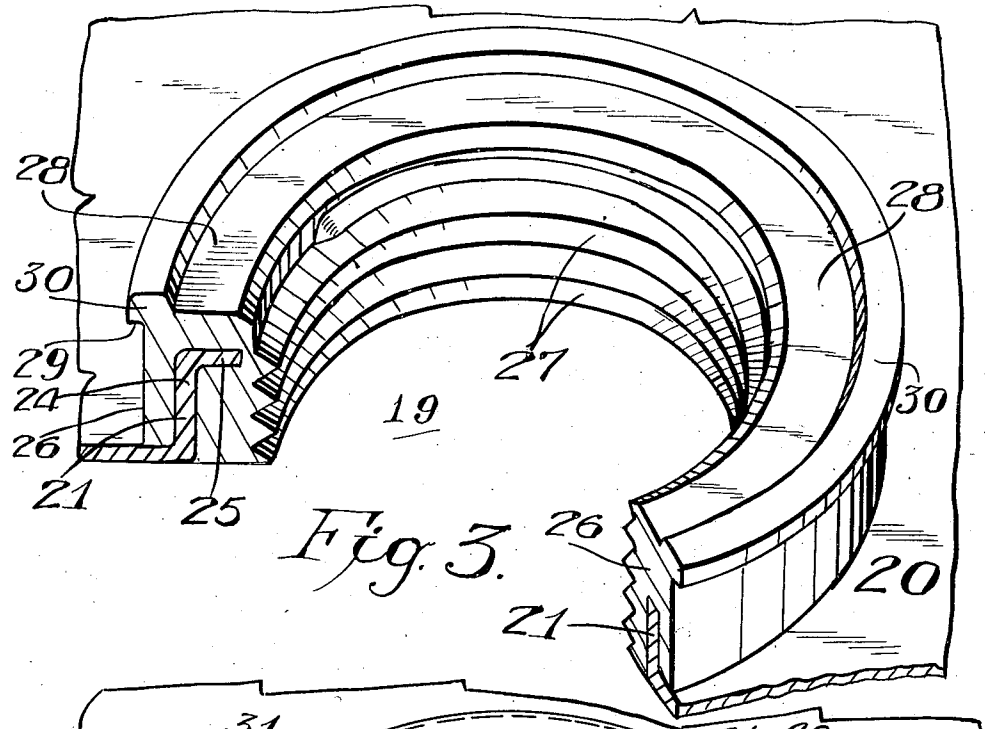

Fig. 3.

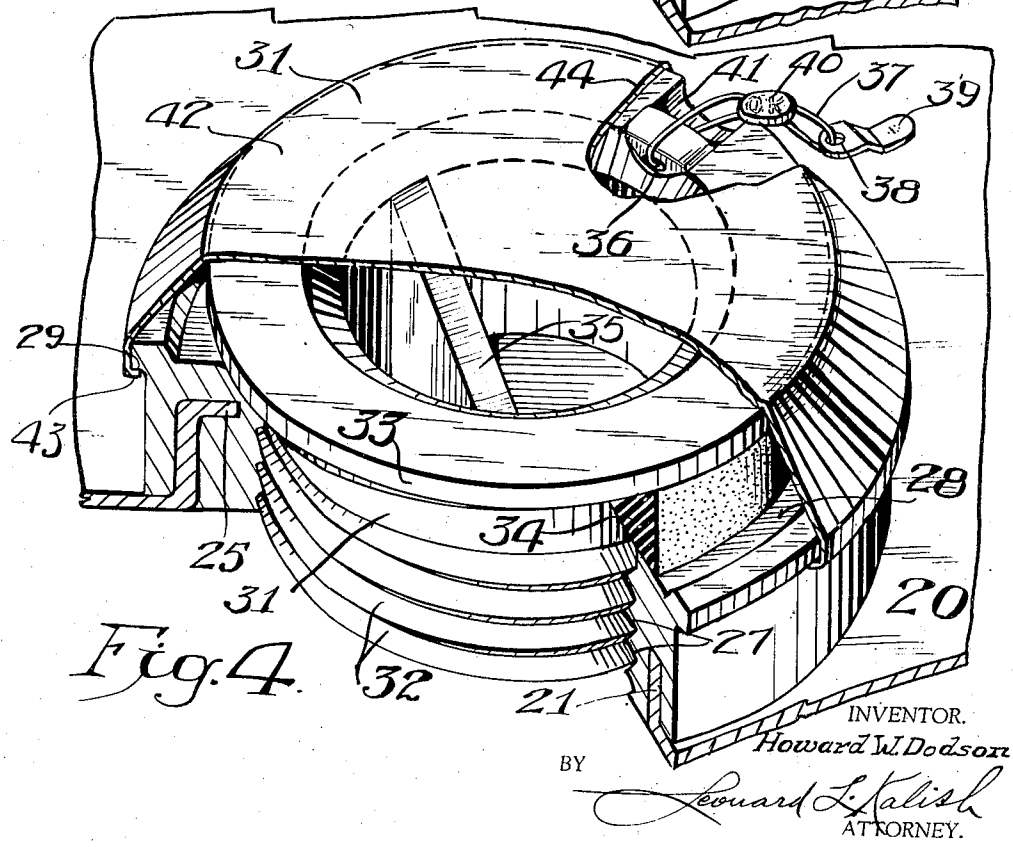

Fig. 4.

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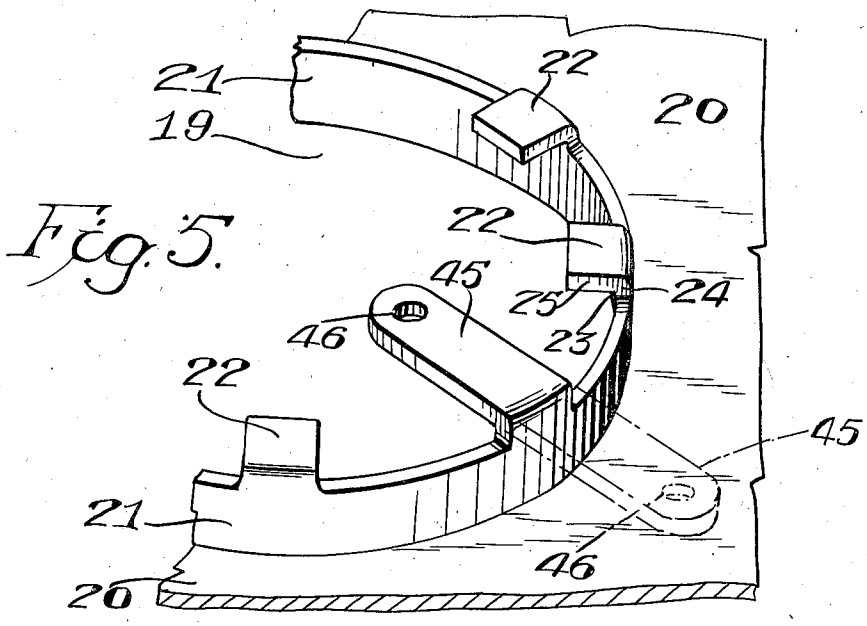

Fig. 5.

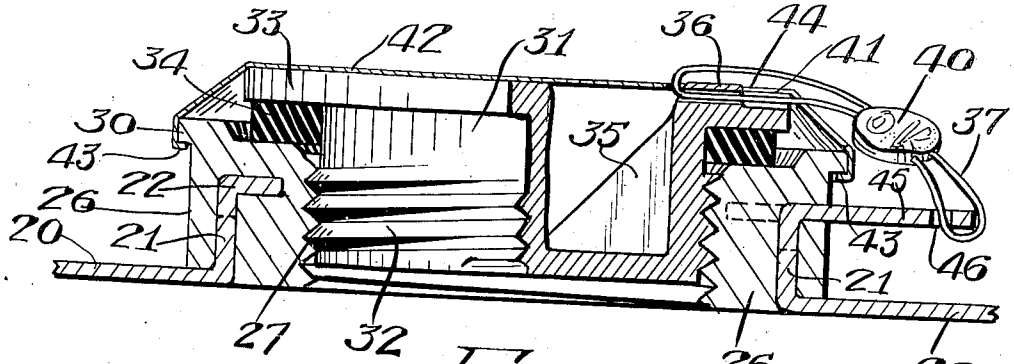

Fig. 6.

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2,365,178

UNITED STATES PATENT OFFICE

2,365,178

CLOSURE MEANS FOR CONTAINER OPENINGS

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Application September 18, 1940, Serial No. 357,206

8 Claims. (Cl. 285—49)

The present invention relates to certain new and useful closure means for the openings of metallic containers, such as steel drums, barrels, tanks or the like.

For the purpose of illustrating the invention, there is shown in the accompanying drawings forms thereof which are at present preferred, since the same have been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which the invention consists can be variously arranged and organized and that the invention is not limited to the precise arrangement and organization of the instrumentalities as herein shown and described.

In the accompanying drawings wherein like reference characters indicate like parts,

Figure 1 represents an enlarged fragmentary sectional perspective view showing the flanged body metal portion of one illustrative embodiment of the present invention surrounding a container opening, shown prior to the casting of a bushing therearound.

Figure 2 represents a view showing the flanged body metal portion enveloped by a bushing which has been cast in situ therearound.

Figure 3 represents a view similar to that shown in Figure 2, but showing the bushing with its upper outer corner portion flanged radially outwardly to provide a securement shoulder for retaining a seal cap.

Figure 4 represents an enlarged fragmentary sectional perspective view showing the assembled closure means, with the plug portion being both wire-sealed and cap-sealed for tamper indicating purposes.

Figure 5 represents an enlarged fragmentary perspective view of a modified body metal construction around a container opening.

Figure 6 represents an enlarged view, partly in section and partly in elevation, showing assembled closure means in which has been incorporated the modification illustrated in Figure 5.

In the accompanying drawings, the panel indicated by the numeral **20** represents the wall of a sheet metal container in the vicinity of a container opening **19**, through which the container may be filled or emptied. This container opening **19** may be formed in any desired portion of the container, as for example on an end wall of the container, or on a flat or curved side wall thereof, or the like.

In the particular embodiments of the present invention illustrated in the accompanying drawings, the body metal of container wall **20** in the vicinity of the opening **19** is outwardly flanged to provide a generally cylindrical outwardly extending flange portion **21**, integral with the wall metal, surrounding the container opening **19**. A series of anti-rotational, preferably well-defined, projections or lugs **22**, integral with the flange **21**, may be provided at suitable intervals along the outermost edge of the flange **21**, for the purpose of providing keying or gripping surfaces which will prevent rotation or loosening of die-cast bushing **26**, which is subsequently cast in situ around the body metal flange **21**. These keying projections **22** may each be transversely bent, either at their basal portions or at some intermediate point therealong, into a plane intersecting the axis of the opening, as for example radially inwardly as illustrated in Figure 1, thereby further to prevent axial movement of the subsequently cast in situ bushing **26** relative to the body metal flange **21**. As illustrated in Figure 1, where these projections **22** are transversely bent at some intermediate point **23**, their basal portions **24** may extend generally in the same plane as the flange metal **21**, and their end portions **25** may extend radially inwardly, and may be coplanar if desired.

The flange portion **21** and associated anti-rotational projections **22** may be formed from the body metal of the container wall in any suitable manner, as for example by being drawn, pressed or bent into their desired ultimate shape by multi-step die means or the like.

The cast bushing **26**, which is to envelop the outwardly extending body metal elements **21** and **22**, may then be die-cast in situ of molten metal preferably differing from the body of the container and preferably having a lower melting point than said body metal.

This may be done in any suitable manner, as by employing a sectional mold having a metal-receiving concavity corresponding to the desired shape and size of the bushing **26**. This sectional mold may be applied to the body metal bordering the opening **19**, with the body metal elements **21** and **22** extending into the metal-receiving space of the mold. The molten metal, at a temperature sufficiently high to insure proper fluidity, may then be poured or forced or injected into said space under high pressure, whereupon it will envelop the body metal elements **21** and **22** and completely fill all the unoccupied space in the mold. The molten metal is then caused or permitted to harden, and the sectional mold withdrawn, whereupon the cast bushing **26** is left outlining the container opening; said bushing being in continuous intimate contact with the body metal flange **21** and projections **22**, and securely fixed against movement relative thereto.

A suitable low melting point metal composition from which the bushing **26** may be cast, may comprise an alloy including approximately 90 to 95 percent of zinc, about 5 percent of aluminum, about 1 to 4 percent of copper and about .01 to .05 percent of magnesium. These

proportions, and the constituent elements of the alloy, may be varied or changed in accordance with the different degrees of hardness or other qualities desired.

Prior to the application of the mold to the body metal around the container opening, the body metal, at least in the zones thereof which the molten metal will subsequently contact, is preferably cleaned of all scale and dirt that may be present, to improve the union or bond or adhesion between the die-cast metal and the body metal. If desired, this union or bond or adhesion may be further augmented or increased by preliminarily coating or plating the body metal in the zones to which the molten metal is subsequently to be applied, with cadmium or zinc.

In the illustrated embodiments of the present invention the annular bushing **26** is cast with a generally flat annular gasket seating end surface **28**. If a tamper indicating seal cap **42** is to be superimposed over the assembled closure means, then the cast bushing **26** may bear a securement shoulder **29** over which the lower peripheral edge portion of said seal cap may be operatively crimped, thereby to secure said cap in position. This shoulder **29** may be formed in any suitable manner, as for example by casting the bushing **26** with an outwardly extending annular rib **30** disposed at its upper outer corner, as illustrated in Figure 2, and then turning or spinning this rib downwardly and outwardly to provide the securement shoulder **29** illustrated in Figure 3, or by originally casting the laterally extending rib **30** shown in Figure 3 directly into the bushing **26**.

The bushing **26** is preferably cast with a sharply defined internal screw thread **27** therein, for holding a threaded closure plug. If desired, however, the bushing may have its internal screw thread **27** cut therein after the bushing has been cast.

The lowermost or innermost end of the bushing **26** preferably does not extend inwardly into the container beyond the plane of the adjoining wall metal **20**, so as not to obstruct complete drainage of the container contents through the container opening when the container is inverted. If desired, this innermost end surface of the bushing **26** may be formed in direct continuation of and coplanar with the innermost surface of the wall metal **20**.

A screw threaded metal closure plug or bung **31**, having an external screw thread **32** engageable with the internal bushing thread **27**, may be screw threadedly engaged with the bushing **26** securely to close the opening outlined by the bushing. This closure plug **31** may be formed in any suitable manner, as for example by being die-cast, or pressed into shape. The closure plug thread **32** may be cast into the plug, or it may be cut into the wall thereof after the plug has been formed.

The closure plug **31** is preferably provided with a laterally extending annular flange **33** having a lower surface in juxtaposition to the bushing gasket seat **28**. An annular sealing gasket or washer **34**, which may be formed of natural or synthetic rubber or of any other suitable gasket material, encircles the shank of the closure plug, and is adapted to be pressed down tightly against the gasket seat **28** by the plug flange **33** when closure plug **31** is screwed tightly into the bushing **26**, thus establishing and maintaining an effective fluid-tight seal.

It will be noted that the crests of the closure plug thread **32** extend radially outwardl beyond the innermost periphery of the sealing gasket **34**, thereby preventing the gasket from falling off the closure plug and becoming lost when the closure plug has been unscrewed.

Closure plug **31** may be recessed as illustrated, and inside its recess may be disposed a diametrically-extending web of metal **35**, preferably integral with the plug metal, to provide seizure means whereby the closure plug **31** may be forcibly tightened or loosened as desired. Thus, the end of any complementary-shaped implement or tool, or the end of a wrench or the jaws of a pair of pliers, may be operatively inserted into the plug recess and engaged with the transversely extending metal web **35**, and then turned in the desired direction to loosen or tighten the closure plug, as the case may be. The provision of a recess in the closure plug enables the seizure means **35** to be disposed inside the recess in the body of the plug thereby reducing the extent to which the closure plug must project beyond the bushing **26**.

If desired, other bungs or closure plugs may be employed in lieu of the illustrated plug **31**.

After the container has been filled and the closure plug engaged with the bushing, it may be desirable to apply tamper indicating sealing means which will prevent the closure means from being opened without detection. For this purpose, the closure plug **31** may be wire-sealed as illustrated in Figure 4, with the sealing wire **37** being looped through a hole **36** extending through the wall of the closure plug, and through an aperture **38** in a lug **39** spot welded or otherwise permanently secured to the container wall **20**. The end portions of the sealing wire **37** may be permanently gripped by a lead or other metallic seal **40**, thereby making it impossible to rotate the closure plug **31** without breaking the sealing wire **37**.

In order to facilitate the threading of sealing wire **37** through the closure plug hole **36**, the mouth of said hole may be enlarged as at **41**, with the wall of said mouth serving to guide the end of the sealing wire **37** into the hole **36**.

In the embodiment illustrated in Figures 5 and 6, the sealing wire **37** is looped through the apertured end **46** of a transversely extending lug **45** formed from the body metal of the container integrally with the flange portion **21**. Thus, in this particular embodiment of the present invention, the cylindrical flange portion **21** is formed not only with the projections **22** extending therefrom, but also with a relatively elongated anchorage lug portion **45** extending therefrom. This anchorage lug **45** may be initially bent radially inwardly coplanar with the lugs or projections **22** by the same die means which bend these latter projections inwardly, but before bushing **26** is cast in situ, this anchorage lug **45** is turned outwardly into the position indicated in dotted lines in Figure 5, and shown in full lines in Figure 6. When the bushing **26** is then cast in situ around the body metal bordering the container opening, the bushing metal will also envelop the basal portion of this anchorage lug **45**, whereby the latter serves as additional keying means preventing loosening or rotation of the bushing **26**. The apertured outer end **46** of this anchorage lug **45** extends transversely beyond the outer surface of the bushing **26**, and provides a fixed anchorage element for the sealing wire **37**, thus avoiding the

necessity of welding or otherwise securing a separate anchorage lug 39 to the container wall.

If desired, the closure plug 31 may be cap-sealed instead of being wire-sealed. Thus, a relatively thin sheet metal seal cap 42 may be superimposed over the closure plug 31, with the lower marginal portion 43 thereof being crimped over the bushing securement shoulder 29 (by any suitable crimping tool or implement). Once the seal cap 42 has been secured in position, it cannot thereafter be removed from the closure means without either destroying or visibly damaging the seal cap, thus providing effective tamper indicating means.

If desired, the closure plug 31 may be both wire-sealed and cap sealed as illustrated in Figures 4 and 6, in which case the seal cap may be provided with an aperture 44 through which the sealing wire 37 may extend.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiments be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

Having thus described the invention, what is hereby claimed as new and desired to be secured by Letters Patent is:

1. In a sheet metal container having a relatively small opening formed in a wall thereof, an outwardly extending generally cylindrical flange portion at said opening integral with the wall metal and bearing along its outermost edge a series of well-defined keying projections integral therewith, each of said keying projections being bent transversely at some intermediate portion thereof, and having their basal portions extending generally in continuation of the adjacent flange metal, and having generally coplanar radially-inwardly-extending outer end portions, and a bushing, pressure-cast in situ, enveloping said flange portion and said projections and outlining the container opening.

2. In a sheet metal container having a relatively small opening formed in a wall thereof, an outwardly extending generally cylindrical flange portion at said opening integral with the wall metal, a series of generally coplanar radially-inwardly-extending keying projections extending from the outermost edge of said cylindrical flange portion, and a bushing, pressure-cast in situ, enveloping said flange portion and said keying projections and outlining the container opening, said bushing bearing an internal screw thread adapted screw-threadedly to receive a closure plug.

3. In a sheet metal container having a relatively small opening formed in a wall thereof, an outwardly extending flange portion at said opening integral with the wall body metal, said flange portion bearing along its outermost edge a series of transversely bent projections, integral therewith, and a die-cast bushing, cast in situ, enveloping said outwardly extending flange portion and said bent projections and outlining said container opening, said bushing having at its outermost end a generally flat gasket-seating surface adapted to receive a sealing gasket.

4. In a sheet metal container having a relatively small opening formed in a wall thereof, an annular flange portion at said opening integral with the wall metal and bearing along an edge thereof a series of well-defined transversely bent projections integral therewith, said flange portion and said projections being formed from the container wall metal around said container opening.

5. In a sheet metal container having a relatively small opening formed in a wall thereof, an annular flange at said opening integral with the wall body metal, keying means associated with said flange, a bushing, pressure-cast in situ, enveloping said flange and said keying means and outlining said container opening, an anchorage element integral with the flange metal, extending from within said bushing to a point exteriorly thereof, the exposed portion of said anchorage element having a hole therethrough, a closure member removably associated with said bushing and closing the opening defined thereby, said closure member having an outer exposed annular shoulder and an opening extending generally radially through the shoulder, and a wire seal looped through the opening in said closure member and through the hole in the exposed portion of said anchorage element said wire being generally flush with the closure member.

6. In a sheet metal container having a relatively small opening formed in a wall thereof, an annular flange at said opening integral with the wall body metal, said flange having a series of transversely extending keying projections formed integrally therewith, a bushing, pressure-cast in situ, enveloping said flange and said keying means and outlining said container opening, an anchorage element integral with the flange metal, extending from within said bushing to a point exteriorly thereof, the exposed portion of said anchorage element having a hole therethrough, a closure member removably associated with said bushing and closing the opening defined thereby, said closure member having an outer exposed annular shoulder and an opening extending generally radially through the shoulder, and a wire seal looped through the opening in said closure member and through the hole in the exposed portion of said anchorage element said wire being generally flush with the closure member.

7. In a sheet metal container having a relatively small opening formed in a wall thereof, an annular flange at said opening integral with the wall body metal, keying means associated with said flange, a bushing, pressure-cast in situ, enveloping said flange and said keying means and outlining said container opening, and an anchorage element integral with the flange metal, extending from within said bushing to a point exteriorly thereof, the exposed portion of said anchorage element having a hole therethrough, said anchorage element being adapted to receive a wire seal connected to a closure member removably associated with said bushing.

8. In a sheet metal container having a relatively small opening formed in a wall thereof, an annular flange at said opening integral with the wall body metal, said flange having transversely extending keying projections formed integrally therewith, a bushing, pressure-cast in situ, enveloping said flange and said keying projections and outlining said container opening, and an anchorage element integral with the flange metal, said anchorage element extending from within said bushing to a point exteriorly thereof.

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