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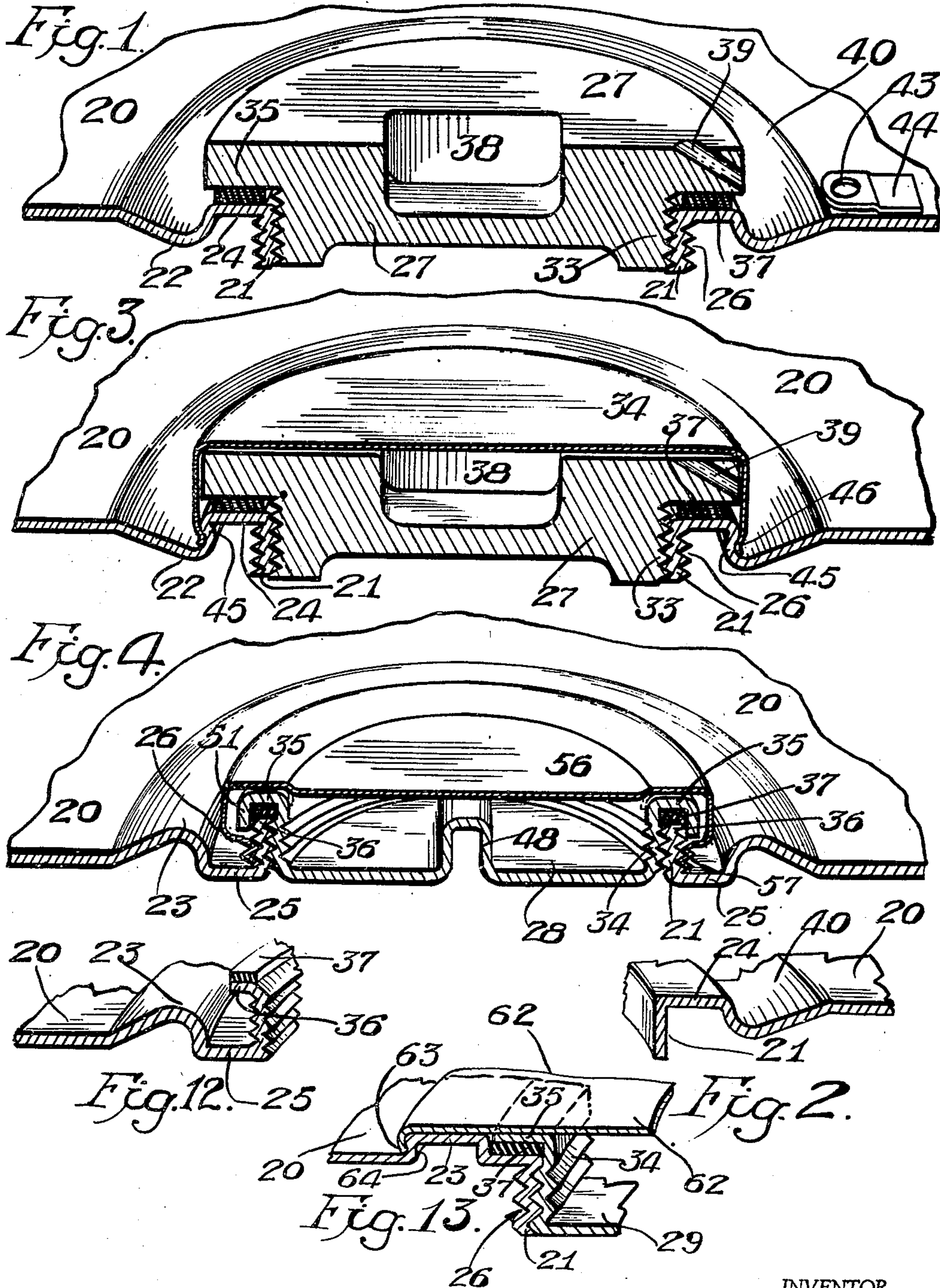
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CLOSURE FOR SHEET-METAL CONTAINER OPENINGS

Filed July 20, 1939

2 Sheets-Sheet 1



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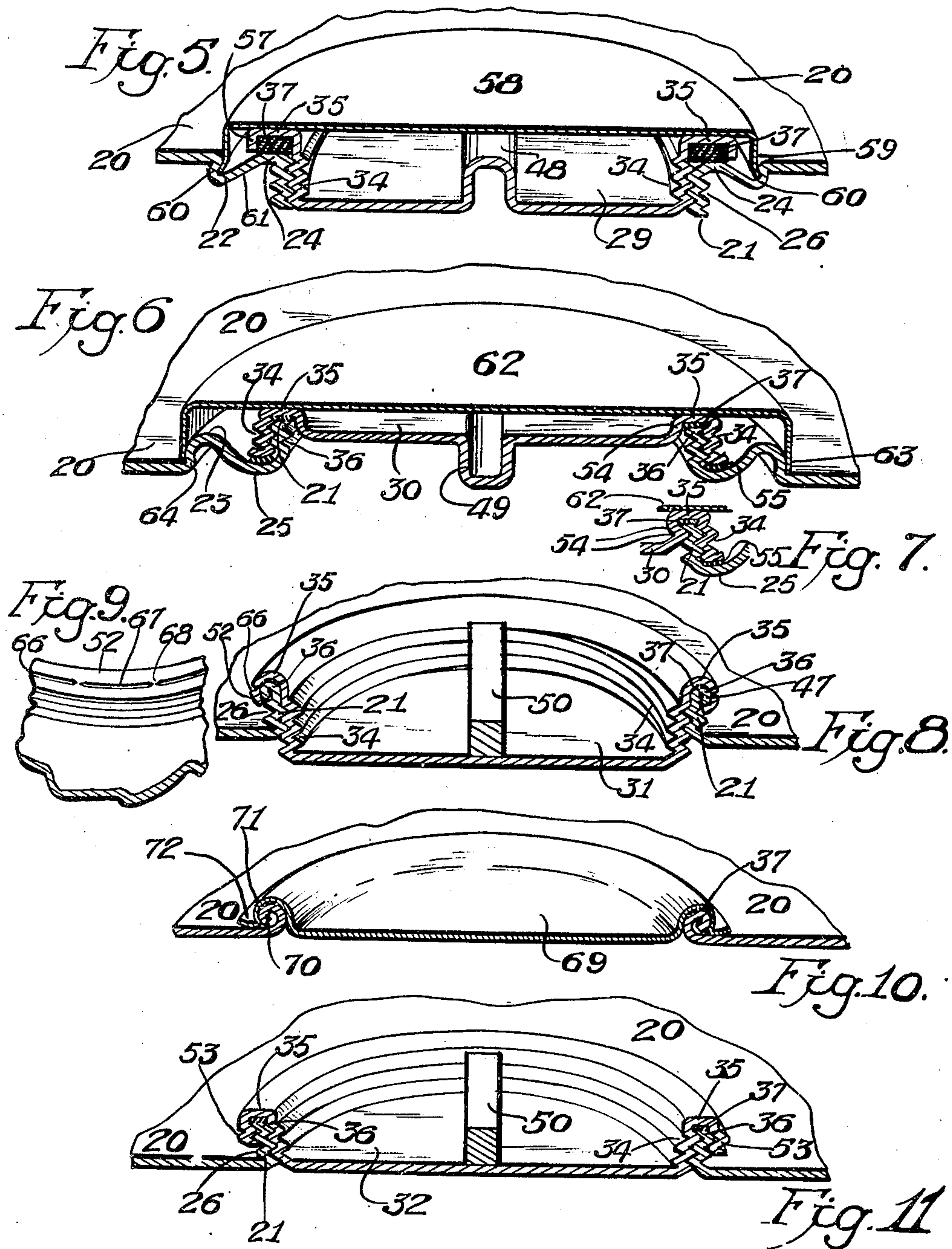
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2 Sheets-Sheet 2



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CLOSURE FOR SHEET-METAL CONTAINER OPENINGS

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1 Claim. (Cl. 220—39)

The present invention relates to certain new and useful closures for sheet-metal containers such as steel drums and the like, and it relates more particularly to certain constructions in the openings and the closures therefor whereby said steel or other sheet metal containers may be emptied and refilled.

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, in which like reference characters indicate like parts,

Figure 1 represents a cross-sectional perspective view of one form of construction embodying the present invention.

Figure 2 represents a fragmentary cross-sectional perspective view of the form of construction shown in Figure 1, prior to the formation of the thread.

Figure 3 represents a cross-sectional perspective view of another form of construction embodying the present invention.

Figure 4 represents a cross-sectional perspective view of still another form of construction embodying the present invention.

Figure 5 represents a cross-sectional perspective view of still another form of construction embodying the present invention.

Figure 6 represents a cross-sectional perspective view showing another embodiment of the present invention.

Figure 7 represents a fragmentary cross-sectional view of a form of construction similar to that shown in Figure 6 but still further modified.

Figure 8 represents a sectional perspective view showing another embodiment of the present invention.

Figure 9 represents a fragmentary external perspective view showing the outside of the turned-over sealing flange on the closure plug shown in Figure 8.

Figure 10 represents a sectional perspective view of still another embodiment of the present invention.

Figure 11 represents a sectional perspective view of a further embodiment of the present invention.

Figures 12 and 13 represent a fragmentary sectional perspective view of further embodiments of the present invention.

In the drawings, only a fragmentary portion of one of the sheet-metal walls of the sheet-metal container is shown; it being understood that this sheet-metal wall is generally an end wall of a more or less cylindrical container, although it may be a side wall also. The sheet-metal wall of the container is designated generally by the numeral 20 in all the figures.

In the embodiment of the invention shown in Figure 1, the sheet metal of the wall 20 is provided with a suitable hole, and the sheet metal is then flanged inwardly around the hole to provide a more or less cylindrical flange 21 formed integrally with the sheet metal of the wall 20. Intermediate the more or less cylindrical flange 21 and the main body portion 20, the sheet metal is also preferably provided with a generally annular rib-like depression 22 or elevation 23 (in the form of construction shown in Figure 1, it is in the form of a depression while in the form of construction shown in Figure 4, it is an elevation). The annular ribs 22 and 23 serve as a stiffening reinforcement around the opening defined by the generally cylindrical flange 21 and also around the generally flat annular gasket-seat 24 which surrounds the generally annular flange 21 or around the flange-base portions 25 in the forms of construction shown in Figures 3 and 5; all the above named portions, namely the flange 21, the gasket-seat 24 and the reinforcing ribs 22 or 23 and flange-base 25, being formed integrally with each other and drawn or pressed out of the same metal as that of which the body 20 is formed.

The flange 21 is then threaded by means of two or more coacting thread-forming rolls (of the form well known in the art) by means of which the metal of the flange 21, which is initially in the form shown in Figure 2, is de-formed in such a way that a thread 26 of the character shown in Figure 1 is produced. This thread 26 differs essentially from the rounded-cross-section thread commonly rolled onto the discharge spout of tin cans, in that the rolled thread on tin canned flanges is produced merely by bending the sheet metal, whereas the thread 26 hereinabove indicated is produced by an actual deformation or flowing of the comparatively heavy gauged sheet-steel under the pressure of the thread-forming rolls, to form a more or less sharp thread.

A plug 27 of cast metal or die-cast metal, or a plug, like plugs 28, 29, 30, 31 or 32, pressed out

of sheet metal is provided with a cast thread or with a cut thread 33 as in Figures 1 and 3 and with a rolled thread 34 as in Figures 4, 5, 6, 7, 8 and 11 (formed in the same manner as the thread 26), corresponding generally to the thread 26 of the flange 21, and having a laterally extending flange 35, in juxtaposition to the gasket seats 24 and 36 and adapted to engage the annular sealing gasket 37 between itself and the gasket-seats 24 and 36, respectively, so as to form a fluid-tight seal. The cavity 38 in the plug 27 may be of any suitable cross-section, as for instance, square, hexagonal, or triangular, for the reception of a wrench or other instrument by means of which the plug may be turned.

An inclined hole 39 across one corner of the outer periphery 40 of the flange 35 may be provided, as indicated in Figure 1, for the reception of a sealing wire 42, which is in turn extended through a hole 43 of an eyelet lug 44, which may be spot-welded to the sheet-metal body 20 of the container for insuring against undetected removal of the plug 27.

The form of construction shown in Figure 3 is similar to that shown in Figure 1 but, in addition, the annular wall portion 45 of the annular reinforcing rib 22 (that is, the portion of the sheet-metal wall directly adjacent to the gasket-seat 24) is turned or formed or spun inwardly slightly so as to form a shoulder against which the flange 46 of a thin sheet-metal tamper-proofing cap 34 may be crimped inwardly, so as to prevent the removal of the plug 27 without detection.

In the embodiment of the invention shown in Figure 4, the annular reinforcing bead or rib 23 is raised upwardly intermediate the main body portion 20 of the sheet-metal wall of the container and the annular portion 25 which forms a base for the upwardly extended bung-flange 21 in the form of construction shown in Figure 4 (and also for the form of construction shown in Figure 6).

The bung-flange 21, in the form of construction shown in Figures 4 and 6, is extended upwardly from the basal portion 25, and can either be terminated merely in a more or less sharp or flattened edge 36 constituting a gasket-seat as in Figures 4, 6, 7 and 11, or it can be turned over or beaded as at 47 in the form of construction shown in Figure 8, either to form a generally flat or slightly inwardly or outwardly inclined gasket-seat or to form a somewhat rounded gasket-seat, as shown in Figure 8.

It should be understood that the screw-thread on the bung-flange 21, in each of the modifications shown in Figures 1, 3, 4, 5, 6, 7, 8 and 11, is formed in the same manner as hereinabove indicated with respect to Figures 1 and 2, namely, by deformation or swaging the metal into the screw-thread formation.

The pressed or stamped sheet-metal plugs 28, 29, 30, 31 and 32 are formed in generally cup shape; the plugs 28, 29, 31 and 32 being "cupped" generally downwardly while the plug 30 is cupped generally upwardly. A transverse rib 48 may be pressed out of the central or more or less flat portion of the cup-shaped plugs 28, 29, 30, 31 and 32, either extending entirely across the diameter thereof, or extending only across a part of the diameter thereof, whereby the plug may be engaged by a suitable tool such as a wrench, pliers or the like, or as in the case of the rib 49 in Figure 8, it may be engaged by any flat object such as a wide screw driver or any flat

piece of metal. If desired, a solid metallic rib 50 may be extended across the flat part of the plug and spot-welded thereto or otherwise secured thereto, for the same purpose.

The plugs 28, 29, 30, 31 and 32 may also be provided with gasket-confining flanges, as for instance, the annular flanges 51 shown in Figures 4 and 5, or by the scored or weakened inwardly crimped flange 52 shown in Figure 8, or by the inwardly crimped flange 53 shown in Figure 11, or, as in the case of the type of plug 30 shown in Figures 6 and 7, the central part of the plug may be depressed to form the inner gasket-confining flange 54. By this means, the gasket 37 is not only confined in a generally axial direction, but is also confined in a generally radial direction so as to prevent its spreading unduly and thereby loosening the "seal."

The relationship of the gasket-confining flanges 51, 52 and 53 might be either that indicated in Figures 4, 8 and 11, where the flange extends below the gasket-seat 24 or 36, or it may be that illustrated in Figure 5 where it extends only down to the depth of the gasket 37. The gasket-confining flanges may also be provided on the cast plugs, such as the cast plugs 27 indicated in Figures 1 and 3, by merely extending the cast metal portions downwardly, that is, by extending a downward gasket-confining flange from the lateral flange 35 at a diametral point just sufficient to clear the outer diameter of the gasket 37.

In the forms of construction shown in Figures 6 and 7, the axial distance or axial extent of bung-flange 21 and of the threaded portion of the plug may be so related or proportioned as to be substantially equal, thereby permitting the interposition of a second sealing gasket 55 between the lower periphery of the threaded portion 34 of the plug and the flange-base portion 25, as indicated in Figures 6 and 7. In the form of construction shown in Figure 7, the inner flange portion 54 of the plug 30 may also be provided with one or more screw threads to engage the inner surface of the screw-threaded flange 21, as indicated in Figure 7.

The tamper-resistant cap 56, shown in Figure 4, may be crimped inwardly against the outer surface of the threaded flange 21 as at 57. In Figures 5 and 6, two further alternative forms of tamper-resistant cap arrangement is shown. In Figure 5, the tamper-resistant cap 58 is an outwardly flared skirt portion 59 which is adapted to be snapped into or to be spread out into the annular inwardly enlarged portion 60 formed intermediate the inclined portion 61 and the main body portion 20 of the sheet metal of the container. The tamper-resistant cup 62 shown in Figure 6 (likewise formed of thin sheet metal) is on the other hand provided with the inwardly crimped skirt 63 which is crimped around the downwardly contracting shoulder 64 formed intermediate the raised rib 23 and the main body portion 20 of the sheet metal container.

In the form of construction indicated in Figures 8 and 9, the lateral gasket-engaging flange 35 of the plug is itself extended downwardly into a tamper-resistant down-turned portion 52 which engages beneath the enlarged peripheral portion 47 of the bung-flange 21. This crimping or turning under of the flange portion 52 must necessarily be done after the plug has been thoroughly tightened against the gasket 37. In order that the relatively thick or stout sheet metal, of which the tamper-resistant portion 52 of the plug 31 is formed, may be readily pried loose so

as to permit the unplugging of the container, a weakened peripheral zone 66 may be extended around the entire periphery. The weakened zone 66 may be either formed by a substantial deep scoring of the metal or may be formed by providing a successive series of elongated slots 67 pressed or cut or otherwise formed through the metal with small or narrow intervening connecting portions 68 to connect the tamper-resistant downturned flange 52 with the lateral gasket-engaging flange 35. By inserting a screw-driver or other similar tool in one or more of the slots 67, the tamper-resistant portion 52 may be broken away by the rupture of the connecting portions 68 thereof. This leaves the tamper-resistant portion 52 as a separate ring around the bung-flange 21, from which it cannot be removed without substantial injury to the bung-flange, without special cutting of the ring 52, because the diameter of the ring 52 is less than the diameter of the beaded or laterally extended upper periphery 47 of the bung-flange 21. This further serves as a tell-tale means to indicate that the container had once been opened, even though it may thereafter be re-plugged.

In the form of construction shown in Figure 11, the downturned flange 53 of the plug is also threaded to engage one or more turns of the thread 26 of the bung-flange 21.

In the form of construction shown in Figure 10, a relatively thinner sheet metal cap or closure 69 is provided for storage or shipment of materials requiring less protection against injury in shipment, or for lighter containers having smaller capacity. In this form of construction, the bung-flange is formed by merely turning the rim of the opening outwardly into a curled bead 70. The cap 69 is provided with a similarly curved bead-engaging portion 71 having a lateral and slightly upwardly inclined peripheral flange 72. The cap 69 is crimped into place by suitable crimping tools, with the laterally extending and slightly upwardly inclined flange 72 extending outwardly from the crimped portion, and serving as means whereby the cap may be pried loose by the insertion of a screw-driver or other thin tool beneath the slightly upwardly turned flange 72.

Because of the substantial contact between the bead 70 and the bead-engaging portion 71 of the cap, substantial seal may be obtained with

a comparatively thin sealing gasket or even by fluid sealing cement which sets in situ.

It will be understood that the various features illustrated in the several figures of drawings may be interchanged with the corresponding features shown in modifications illustrated in other figures of the drawings.

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 claim rather than to the foregoing description to indicate the scope of the invention.

The sheet metal 20 of which the flange 21 is drawn may be a gauge 12 to 26 gauge sheet-steel.

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

A sheet-metal container including a generally cylindrical bung-flange drawn outwardly and integrally from the container and defining an opening in a wall thereof, said bung-flange being helically corrugated to provide an external screw-thread and an internal screw-thread thereon, a gasket-seat formed at the outer end of said bung-flange, an annular gasket disposed upon said gasket-seat, a second gasket seat formed peripherally adjacent the base of said bung-flange, an annular gasket disposed upon said second gasket-seat, an annular stiffening rib pressed out of the wall of said container peripherally of said second gasket-seat, a sheet-metal bung having a pair of annular concentrically-adjacent screw-threads formed thereon, said bung being removably disposed within said bung-flange with the annular screw-threads of said bung engaging both the outer screw-thread and the inner screw-thread of said bung-flange, said bung having an annular shoulder formed thereon for compressing and confining the gasket upon said first-mentioned gasket-seat, the outer screw-thread of said bung being adapted to compress the gasket upon said second gasket-seat, and a tamper-resistant cap fitted over said bung and said bung-flange, said cap being locked against said stiffening rib whereby it cannot be removed without deformation.

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