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2,220,893

CLOSURE DEVICE FOR CONTAINER OPENING

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Fig. 1.

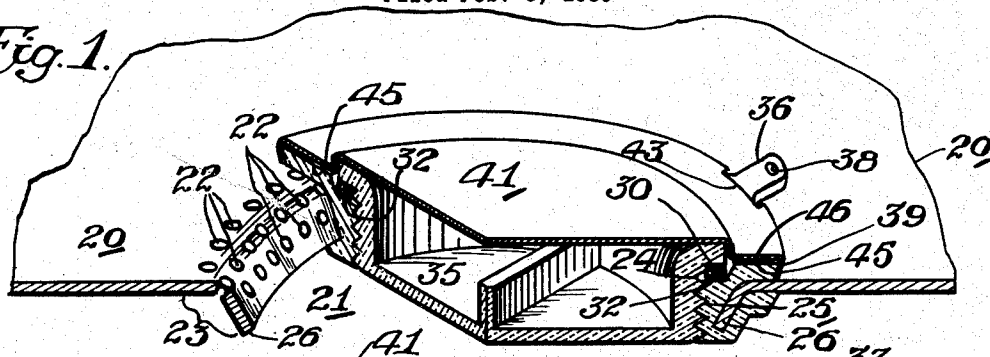


Fig. 2.

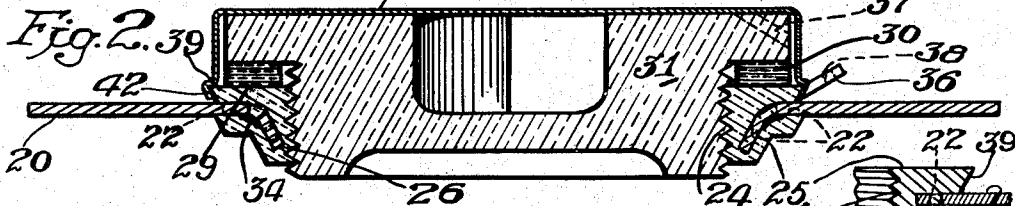


Fig. 4.

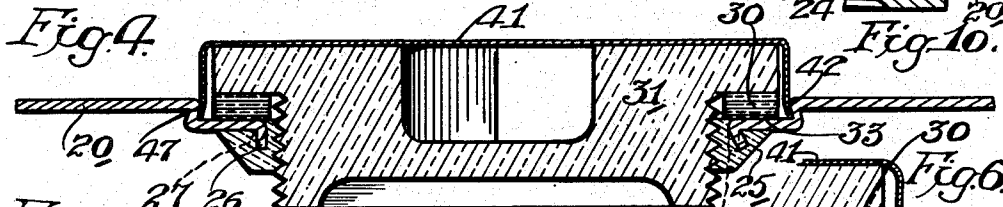


Fig. 12.

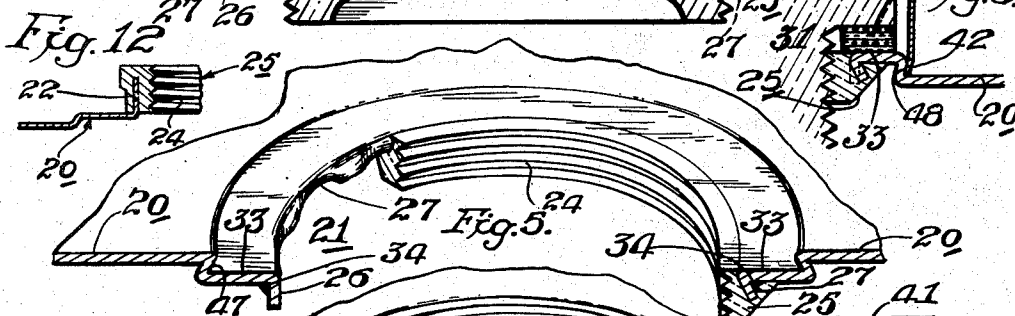


Fig. 7.

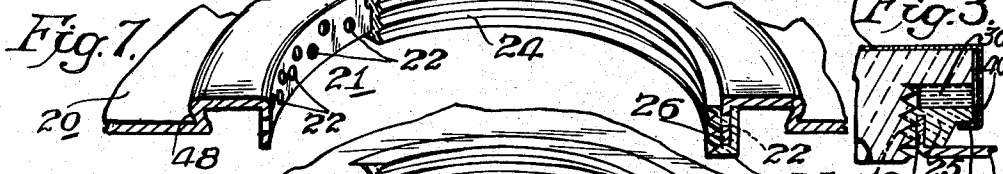


Fig. 8.

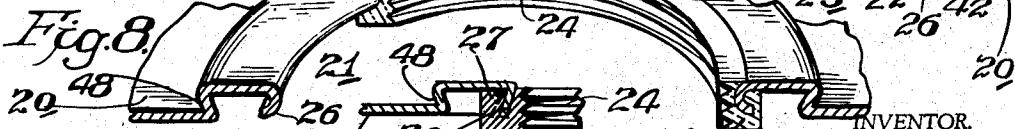


Fig. 9.

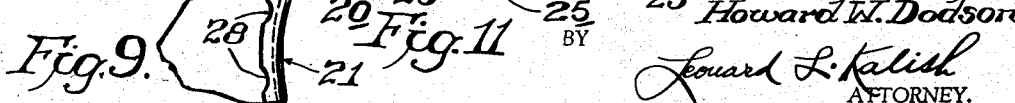
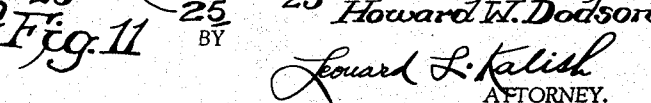


Fig. 11.



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## UNITED STATES PATENT OFFICE

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CLOSURE DEVICE FOR CONTAINER OPEN-  
ING

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Application February 8, 1939, Serial No. 255,201

3 Claims. (Cl. 285—49)

The present invention relates to closure devices for the openings of metallic containers, such as drums, barrels, cans, tanks, or the like, and particularly for the openings through which such containers, drums, barrels, tanks, etc., may be filled and emptied.

The present invention relates more particularly to openings and closure devices therefor which are to be repeatedly opened or closed, or in which the closure device is to be secured by screw-threads or similar means.

In sheet metal containers, such as steel drums, barrels, tanks, sheet-metal cans, many means have been devised in the past for outlining the opening through the thin sheet-metal with a grommet-like thread-bearing member sometimes referred to as a "flange" or as a "bushing", as shown for instance in the following patents: Nos. 473,495; 643,743; 689,896; 817,100; 1,486,374; 1,513,637; 1,633,555; 1,644,154; 1,820,192; 1,887,435; 1,901,196; 1,915,300; 1,982,144; 1,982,145; and 2,021,960.

As the cost of production is frequently a vital factor bearing upon the practicability of the device, particularly where the container, such as the sheet-metal drum, barrel, tank, or the like is likely to be used only once for the transportation or storage of the original contents, it is important to provide not only effective closure means, but also one which can be produced at low cost and which can be made produced at low cost and which can be made uniform by manufacturing operations not subject to failure.

Thus, as such closures for containers must be made in large quantities, it is important that the construction shall be one which will be dependable in mass production.

One of the objects of the present invention is to provide a so-called flange end closure for sheet-metal containers, such as drums, barrels, tanks, etc., which will be both dependable and will bear a low production cost, and in which the possibilities of failure either in the manufacture or in use of the device will be minimized.

With the above and other objects in view which will appear more fully from the following detailed description, the present invention contemplates a screw-threaded flange for the openings of sheet-metal containers, such as steel drums, barrels, etc., separate and distinct from the body metal of the container, and indeed of a metal different from the body metal and which is formed in a molten state directly upon the body metal of the container and surrounding its opening.

More particularly, the present invention contemplates casting a flange, in situ, directly to the opening in the body metal which is to serve as the filling or emptying opening of the container, and so interlocking the cast flange with the peripheral zone of the body metal as to form a firm union therebetween.

The present invention further consists of other novel features, principles and details of construction all of which will appear more fully from the following detailed description.

For the purpose of illustrating the invention, there is shown in the accompanying drawing 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 drawing in which like reference characters indicate like parts,

Figure 1 represents a fragmentary perspective cross-sectional view of the drum head and flange enclosure, representing one embodiment of the present invention.

Figure 2 represents a cross-sectional view of a drum head and flange enclosure representing a somewhat modified form of the present invention.

Figure 3 represents a fragmentary cross-sectional view of a modified form of construction similar to that shown in Figures 1 and 2.

Figure 4 represents a sectional view of a drum head and flange enclosure of still another embodiment of the present invention.

Figure 5 represents a fragmentary perspective cross-sectional view of the drum head and flange illustrated in Figure 4, showing another embodiment of the present invention.

Figure 6 represents a fragmentary cross-section of a drum head and flange enclosure similar to that shown in Figures 4 and 5, but of a further modified embodiment of the present invention.

Figure 7 represents a fragmentary perspective cross-sectional view of a drum head and flange, showing another embodiment of the present invention.

Figure 8 represents a fragmentary perspective cross-sectional view of a drum head and flange, showing another embodiment of the present invention.

Figure 9 represents a fragmentary bottom plan

view of the inturned peripheral portion of the body metal in the embodiment shown in Figure 8, to show the notching thereof.

Figure 10 represents a fragmentary cross-sectional view of another embodiment of the present invention.

Figure 11 represents a fragmentary cross-sectional view of another embodiment of the present invention.

Figure 12 represents a fragmentary cross-sectional view of another embodiment of the present invention.

The present invention contemplates forming a hole in the sheet metal of the head or body of the container. In the particular illustration shown the body sheet-metal or body metal 20 is indicated as being that of the head or generally flat end of the sheet-metal container, such as the drum, barrel, tank, can, etc., although it is to be understood that the present invention is equally applicable to openings in the more or less cylindrical sides of such containers.

The opening indicated generally by the numeral 21 is first preferably prepared so as to present some interruptions in the continuity of the metal in the zone of the periphery of the opening 21. Thus, for instance, the zone around the periphery of the opening may be perforated with a series of more or less staggered openings 22, or by more or less similar indentations or corrugations pressed into the body metal 20 in the peripheral zone 23 thereof. The width of such peripheral zone may be varied. Thus, it may be considerably narrower than that shown in Figure 1, as for instance, that shown in Figures 3, 4, 5, 6 and 9.

I then apply to the opening 21 in the body metal 20 a mold having a concavity or metal-receiving space of the cross-section and size of any of the flange, as for instance, those indicated in Figures 1 to 8, inclusive.

A relatively low melting-point alloy, consisting principally of zinc with variable amounts of aluminum, copper and magnesium and, optionally, with some per centages of tin and antimony, is then poured or forced into the mold under pressure in a molten stage and at a sufficient temperature, so that it will flow freely and fill the mold completely and so that the screw threads 24 of the flange, designated generally by the numeral 25 will be sharply and clearly defined and so that the metal will enter the interlocking interruptions, as for instance the holes 22 in the peripheral zone 23 of the body metal 20.

The construction of the molds and the manner of their application to the openings 21 in the body metal 20 is not here shown because this specification is intended to be addressed solely to the resultant product and the method of making the same (and not to the apparatus for making the same and not to the apparatus for the practice of the method).

A low-melting point alloy composition for the flanges 25 may be represented by a composition of 90 to 95% zinc and about 2 to 5% aluminum, 1 to 4% copper and about .01 to .05% of magnesium. These proportions may be varied according to the degree of hardness and other qualities desired.

The peripheral zone 23 of the body metal 20 or some part thereof is also preferably turned or pressed at an angle to the main part of the body metal in the manner indicated in Figures 1 to 9 inclusive, so that an annular web designated generally by the numeral 26 is formed at an angle

to the main part of the body metal 20 and extending more or less parallel to the imaginary cylinder which would be defined by the pitch line of the screw thread before. Thus, instead of merely having the body metal terminate in a plane opening as in Figure 10, the innermost portion of the peripheral zone of the body metal around the hole or opening 21 is either turned inwardly or outwardly. In the forms of construction shown in Figures 1, 2, 3, 4, 5, 6, 7, 8 and 9, this peripheral portion is turned inwardly, while in the form of construction shown in Figure 5, the web 26 is turned outwardly. It is to be understood that each of the various forms of webs shown in the several views such as that shown in Figures 1 and 2 and that shown in Figures 4, 5 and 6 and that shown in Figures 8 and 9, can be turned outwardly instead of inwardly, as shown in these respective figures;—the difference being that the die-cast metal of the flange 25 will extend to engage such web.

In the forms of construction indicated in Figures 4, 5, 6 and 11, the web 26 is more or less crimped or corrugated with successive space portions 27 bent outwardly or inwardly and out of line with the rest of the web 26 in the manner shown in Figure 5 and indicated by the dotted lines in Figures 4, 6 and 11, so that the metal of the flange 25 which is cast in situ will follow these interruptions in the otherwise smooth periphery of the web so as to form an interlock therewith which will tend to prevent relative rotation between flange 25 and body 20.

Alternative to this crimping, holes 22 may be provided in the web 26, in the general manner indicated in Figures 1, 2, 3 and 7, through which the die-cast metal of the flange 25 extends.

As a further alternative, the web 26 may be notched as at 28 by cutting out small portions preferably at the same time the opening in the body metal is punched.

The flange 25 may be provided with a gasket-seating surface, as for instance, the surface 29 against which the sealing gasket 30 may be pressed by the screw plug 31 in the manner indicated in Figure 2.

The gasket-seating surface may be recessed or lowered as at 32 in Figure 1 for reducing the distance to which the plug and final seal must project beyond the outer surface of the body metal 20.

Alternative to the seating of the gasket 30 upon the flange, the flange may be formed below the adjoining or contiguous outer surface 33 of the body metal as indicated in Figures 4, 5, 6, 7 and 8, so that the gasket 30 may be pressed directly against the body metal, as shown particularly in Figures 4 and 5. By so providing a gasket seat on the body metal, the fluid-tight seal will not be affected by any possible cracking or fracture of the die-cast flange 25. Thus, for instance, in the forms of construction shown in Figures 4, 5, 6, 7 and 8, the flange may become fractured anywhere throughout its periphery and may be broken completely through at one or more points without affecting the seal of the gasket 30 because the seal is made directly against a continuous and uninterrupted body metal surface 33. Thus, a fracture or breakage of the annular die-cast flange 25 at one or more points of its circumference will not release the plug 31 because the successive sections of the flange produced by such fracture will still be maintained by the web 26 as well as by the plug 31. Thus, in addition to the interlocking between the die-cast metal of

the flange 25 and the web 26, the plug 31 also tends to pull the flange 25 into tight contact with the body metal rather than to separate it therefrom.

5 If desired, as for instance, in the forms of construction shown in Figures 1, 2 and 3, as well as in the other form of construction, a non-metallic or part-metallic sealing gasket 34 may be placed against the body metal and pressed  
10 against it and embedded partly in the die-cast metal so as further to insure a continuous fluid-tight or gas-tight sealing between body metal and die-cast flange-metal. This gasket 34 may be of a fibrous material suitably impregnated and com-  
15 pressed. If desired, also, a narrow ring of fluid or plastic sealing compounds may be substituted in place of or added to augment the sealing gasket 34 and permitted to set or harden suffi-  
20 ciently prior to the application of the molten metal of the flange 25 so that the sealing compound will remain in place during the applica-  
tion of the molten metal and will seal against both the body metal as well as the die-cast metal.

Before the application of the molten metal to  
25 form the flange 25, the body metal (at least in the zone of the application of the flange metal) is preferably cleaned of all scale. In this manner a substantial adhesion or union or metal-to-  
30 molten flange metal and the body metal. This union or bonding may be further augmented or increased by initially turning or cadmium or zinc-coating or plating the body metal in the zone where the flange is to be applied thereto.  
35 By increasing the union or the metal-to-metal bonding between body metal and flange metal, the web interruptions indicated by the apertures 22 and notches 27 and 28 may be reduced in number or extent or may be omitted.

40 I may, however, combine both the metal-to-metal bonding features hereinabove described with the web interruptions indicated by the apertures 22 or the notches 27 or 28. Such metal-to metal bonding also tends to effect a fluid-tight  
45 or gas-tight seal between body metal and flange metal.

After the plug 31 or the plug 35 is applied to the flange 25 and tightened in place, it may be desirable to apply some tamper-proof or tamper-  
50 indicating lock or sealing means, and as a further modification of the present invention, I contemplate casting a perforated lug 36 integrally with the flange 25, as for instance, shown in Figure 2 and provide a hole 37 through one corner  
55 of the plug, through which a sealing wire may be extended which is then threaded through the hole 38 in the lug 36. A lead or other metallic seal may then be applied to the wire so as to prevent the unscrewing of the plug 31 without detec-  
60 tion.

By forming the flange 25 with an outer inclined or horizontal shoulder 39 or 40 (Figure 2 and Figure 3) a crimped sheet metal sealing cap 41 may also be superimposed upon the plug, with its  
65 peripheral edge portion 42 crimped under the shoulder 39 or 40 by any suitable crimping tube, so as completely to prevent access to the plug 31 or 35 during transportation or storage. If the flange 25 is provided with a lug 36 as indicated in Figures 1 and 2, then the periphery of  
70 the cap 41 is cut out as at 43 sufficiently to clear the lug 36.

In removing the crimped cap 41, the crimped

flange thereof is so opened up as to make its application impossible without detection.

If desired, a second gasket seat 45 may be provided for receiving a second gasket 46 between the flange 25 and the cap 41 in the manner indicated generally in Figure 1.

If it is desired to apply a sealing cap similar to the sealing cap 41 shown in Figures 1, 2 and 3, to the form of construction in which the main gasket seating surface 33 is on the body metal  
10 as shown in Figures 4, 5, 6, 7, 8 and 11, then the body metal may be pressed to form an annular inclined or undercut shoulder, either of the internal form 47 as in Figures 4 and 5, or of the external form 48 in Figures 6, 7, 8 and 11. The  
15 cap 41 of the general form shown in Figure 2 is then applied in the manner shown in Figure 6 with its crimped periphery 42 crimped directly against the under-cut shoulder 48 on the body metal. With the internal form of shoulder 47 the  
20 cap 41 is of the outwardly expanding type shown in Figure 4 with the peripheral portion 42 thereof spread outwardly either by initial tension or by spreading pressure applied vertically from above to an initially flared peripheral edge 42.

25 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  
30 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  
35 by Letters Patent is:

1. In a sheet-metal container having a relatively small opening formed in a wall thereof, a metallic thread-carrying bushing of a lower melting point metal pressure-cast, in situ, out-  
40 lining said opening and enveloping a peripheral zone of the sheet-metal side wall of said container adjacent said opening.

2. In a sheet-metal container having a relatively small opening formed in a wall thereof, a metallic thread-carrying bushing of a lower melting point metal pressure-cast, in situ, out-  
45 lining said opening and enveloping a peripheral zone of the sheet-metal side wall of said container adjacent said opening, and keying irregularities  
50 in the annular enveloped portion of the sheet-metal constituting anti-rotational inter-locking keying means between sheet metal and pressure-cast metal bushing.

3. In a sheet-steel container having a relatively  
55 small opening formed in a wall thereof, an annular stiffening deformation around said opening formed out of sheet steel of said wall in the zone immediately surrounding said opening and dis-  
60 posed, at least in part, in a plane different from that of the wall in which the opening is formed, so as to stiffen the peripheral zone of said opening, an annular metallic thread-carrying bushing of a lower melting point metal, pressure-cast, in  
65 situ, outlining said opening and enveloping a peripheral zone of the sheet metal directly adjacent the periphery of said opening and confined to the aforesaid stiffening zone, and keying recesses in the enveloped portion of said  
70 sheet-steel.

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