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CLOSURE DEVICE FOR METALLIC CONTAINER OPENING

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Fig. 1.

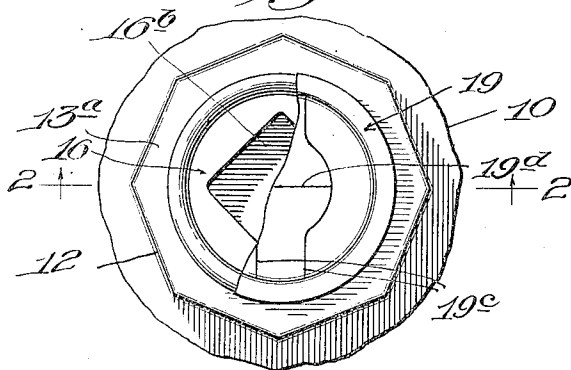


Fig. 2.

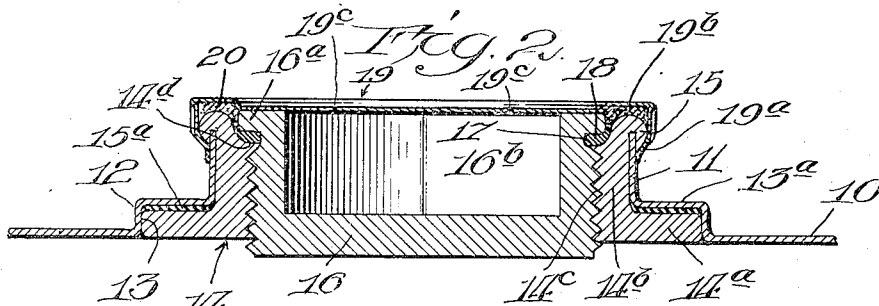


Fig. 3.



Fig. 4.

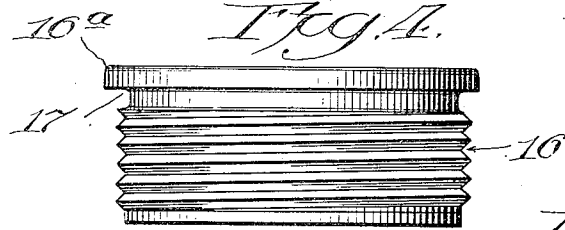


Fig. 5.

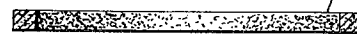
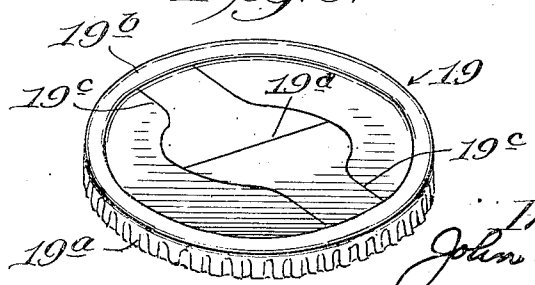


Fig. 6.



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UNITED STATES PATENT OFFICE

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CLOSURE DEVICE FOR METALLIC
CONTAINER OPENING

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4 Claims. (Cl. 220—39)

My invention relates generally to metallic containers such as drums, barrels and the like, and it has to do particularly with sealed closures for the filling and discharge openings thereof. My invention is particularly (although not exclusively) adapted for use in connection with containers suited for transportation and storage of oil, gasoline, and the like.

The principal object of my invention is to provide an improved closure device for containers of the foregoing character, which closure is adapted to positively seal the container fill or discharge opening against leakage and to maintain it sealed notwithstanding temperature conditions and strains and stresses imposed in transporting and handling the container.

Another object is to provide a novel plug closure means of a character practically eliminating the possibility of the same loosening during transportation and handling, and which may be employed to effectively close the container opening after the sealed container has been opened. More particularly, my invention contemplates the use of a novel form of closure plug adapted to be concealed and rendered inaccessible by a seal cap, which plug detachably supports compressible gasket means cooperating with the plug and the wall of the container opening to effect a fluid-tight and air-tight closure. The gasket is so supported by the plug that it yieldingly opposes the final closing movement of the plug and, together with the seal cap, holds the plug against loosening.

An additional object is to provide a novel form of seal-closure including a seal cap which is adapted to be secured in place in an air-tight leak-proof manner and which is so applied and secured that it cannot be removed without such distortion and fracture thereof as to render it unfit for further use thereby preventing access to the container contents without detection. Further, according to my invention, the seal cap is provided with a tear-strip section which may be broken through by a suitable tool and removed to facilitate detachment of the cap as a whole.

Other objects and advantages will appear as this description progresses and by reference to the drawing in which,—

Figure 1 is a fragmentary top plan view of the head of a metallic container employing one form of closure embodying my invention, certain of the parts being broken away to facilitate illustration;

Fig. 2 is an enlarged section taken substantially on line 2—2 of Fig. 1;

Fig. 3 is a sectional view in separated relation of

the gasket shown in Fig. 2 as supported by the closure plug;

Fig. 4 is a separated elevational view of the closure plug;

Fig. 5 is a sectional view in separated relation of the gasket shown in Fig. 2 as disposed directly beneath the seal cap; and

Fig. 6 is a perspective view of the seal cap and illustrating a tear strip section therein.

Referring particularly to the form of my invention shown in the drawing, the flat container head 10 is provided with a circular opening defined by an upstanding circular flange 11 struck, preferably, from the metal of the container head. The metal of the head 10 around the flange 11 is pressed upwardly to provide an annular boss 12 forming an internal pocket 13, the top of which serves as an annular seat 13^a extending around the base of the opening formed by the flange 11. The seat portion 13^a takes, preferably, (but not necessarily) an octagonal shape in plan outline and it receives the similarly-shaped flange 14^a of an internally-threaded bushing 14, the cylindrical, upwardly-projecting portion 14^b of which fits snugly within the annular flange 11. The outline shape of the bushing flange 14^a and the seat 13^a, obviously, prevents rotation of the bushing when it is inserted in the container opening. Also, the thickness of the bushing flange 14^a is equal to the depth of the pocket 13 so that its exposed surface lies flush with the inner flat wall surface of the head; whereby the opening defined by the bushing is unobstructed and the entire contents of the container may be drained. To firmly secure the bushing in place, its upper edge is gradually reduced in thickness and is extended upwardly and rolled over the upper edge of the flange 11 forming a bead 15 thereat. When the bushing is secured as just described, a leak-proof joint is provided as between the bushing 14, the drum head and the flange 11; but, if desired, to further insure against leakage, a suitable gasket structure 15^a (or a suitable leak-proof material) may be interposed between the bushing flange 14^a and the seat 13^a (Fig. 2).

The opening in the bushing 14 may be closed by a metallic threaded plug 16 which, preferably, takes the form best shown in Figs. 2 and 4. Specifically, the plug 16, which may be formed of any suitable material, has an externally threaded body adapted for engagement with the bushing threads 14^c and it is provided at its top with a flange or head portion 16^a. The central portion of the plug is provided with an exteriorly-

accessible opening 16^b of irregular outline shape adapted to receive a suitable tool for screwing it into and out of the bushing 14. This plug is also provided with an annular groove 17 between its head 16^a and threaded body, which groove is adapted to receive and retain a gasket 18 which may be formed of any suitable, compressible material such as fibre, rubber, etc. The bushing 14, immediately above its threaded portion 14^c, and adjacent the bead 15, is shaped to provide a laterally-extending seat 14^d with which the plug groove 17 aligns when the plug 16 is in its closing position, and upon which the gasket 18 is seated and compressed.

With the foregoing arrangement, as the plug 16 is screwed into the bushing 14, a leak-proof, air-tight closure is provided. The latter part of the movement of the plug 16 into its closing position is yieldably opposed by the gasket 18 and I, preferably, arrange the closure parts so that practically the entire final turn of the plug toward closing position is so opposed by the gasket; whereby the gasket tends to grip and hold the plug in closing position and substantially a complete turn of the plug is required in order to loosen it to an extent where it may turn freely in the bushing. This feature greatly reduces the possibility of loosening of the plug to the point of leakage by vibration, et cetera during transportation and handling.

For best results, the gasket 18 should be of a size to fit snugly in the plug groove. In the event of use of a fibre gasket of this character which does not afford, in its normal condition, sufficient resiliency to permit the same to be readily passed over the head of the plug, I propose to soften the preformed gasket by soaking the same in any suitable liquid. This treatment, as will be readily understood, will permit of sufficient expansion of the gasket in its softened form to pass it over the plug head and, as the gasket assumes its original, normal unsoftened condition, it will shrink into close fit relation to the plug groove.

While the closure structure just described may serve as efficient means for closing the container opening during transportation and storage, it is highly desirable that additional seal means be employed which not only protects the plug 16 against unauthorized removal or loosening, but which is also of a character readily and quickly informing one of unauthorized tampering with the container closure. To this end, I employ a relatively thin metallic seal cap 19, the side wall of which in its pre-securement form passes freely down over the beaded rim 15 of the bushing 14. Before the cap 19 is secured in place, a gasket 20 of any suitable compressible material is applied thereto, preferably, in the position shown in Fig. 2 so as to seat upon the upper rounded edge of the bead 15. It will be noted that the central portion of the top of the cap is slightly depressed forming an annular gasket-receiving pocket 19^b in which the gasket 20 is received and held against lateral displacement when the gasket is compressed upon the top of the bead by depression of the cap.

The plug 16 may be so related to the other closure parts that, when it is screwed fully inward, its head 16^a is either flush with the top of the bead, above the head or below it. However, in either case, the seal cap 19 is, preferably, so shaped and related to the plug that its top seats upon the top of the plug (as shown in Fig. 2)

thereby serving as additional means for positively preventing loosening of the plug.

In the securement of the cap, it is depressed, as a whole, upon the bead 15 to compress the gasket 20, and this securement should be effected without the exertion of such pressure on the flange 11, bushing 14 and container wall 10 in axial direction as would tend to permanently distort the container wall which permanent distortion, if it should occur, would tend to destroy the usefulness of the container. To avoid such an objectionable condition, the cap is, preferably, secured in place by contracting its skirt or side wall 19^a around and behind the bead 15 with a suitable tool acting in conjunction with the outer rounded side edge of the bead. To facilitate uniform contraction of the cap side wall, it may be corrugated or scalloped as clearly shown in Fig. 6; but, if desired, the cap side wall may be plain without hindering its attachment. One form of tool which has been disclosed to me, and which I may employ, embodies radially movable elements adapted to grippingly engage the cap skirt forcing the same inwardly against and along the outer rounded surface of the bead 15, the radial movement of the tool elements being converted into axial movement by the curved surface of the bead. For best results the cap may be depressed to an extent sufficient to compress the gasket to one-half, or less, of its original thickness.

In the finally-secured position of the cap, the free edge portion of its skirt is firmly and uniformly seated upon the flange 11 behind the bead 15. In this manner, the cap is so securely fastened in place that its removal is exceedingly difficult. In fact, it cannot be removed without so distorting and fracturing the same that its further usefulness is wholly destroyed. This feature positively guards against undetected and unauthorized breaking of the seal. To facilitate removal of the cap, I score the top of the same along spaced lines 19^c providing a tear-strip section with an enlarged central portion located directly above the opening 16^b in the plug 16. The enlarged portion of this tear-section is cross-scored as at 19^d, and this score line may readily be broken through with a screw driver or other suitably-pointed tool. The ends of the broken away part may readily be grasped with a suitable tool to strip the tear-section outwardly along the score lines 19^c and through the cap skirt or side wall, thereby loosening the cap so that it may be readily lifted from the closure structure.

The advantages to be derived from my invention are obvious from the foregoing. It provides a doubly-effective seal positively insuring against leakage and waste of the container contents under the most rigid transportation and storage conditions. In fact, demonstration has shown that the seal afforded by the cap alone is sufficiently strong and effective to meet ordinary transportation, storage and pressure conditions. Wherefore, if desired, the plug 16 may be eliminated in certain instances; and, in other instances, the plug may be formed of wood, cork, or other light weight material. Furthermore, the use of a closure plug formed of a lighter weight material, as provided by my invention, is an important factor from cost and tonnage standpoint, and particularly in marine shipping where tonnage limitations may be imposed; the closure plug-gasket assembly may well serve as a positive closure-seal means in the ordinary use of the container after the outer seal has been broken.

ken; by mounting the gasket upon the closure plug, the gasket is always at hand for proper closure; and the closure-seal is of an inexpensive character which may be readily and quickly applied.

While I have shown and described only one form of structure embodying my invention, it will be understood that changes in details and arrangement of parts may be made without departing from the spirit and scope of my invention as defined by the claims which follow. For example, among other things, the bushing 14 may be dispensed with and the outer end of the flange 11 rolled upon itself in such a way as to provide a bead corresponding to the bead 15; or the bead may be provided in any other suitable manner. In that case, a closure plug may not be used; but, if one is used, it may be friction-fitted and held against loosening by the seal cap. The score lines in the top of the seal cap may, if desired, be extended on through to the free edge of the cap skirt. In certain cases, the cap seal gasket 20 may be dispensed with, and in that event the skirt of the cap 19 may be crimped behind the bead 15 in any desired manner. The plug 16 and cap 19 may be so relatively shaped that the top of the cap may seat upon the top of the plug, the cap thereby serving as additional means for preventing loosening of the plug.

I claim:

1. In structure of the class described, a container having an opening formed with an outwardly-extending cylindrical flange, a bushing fitting within said flange and having its outer end turned over the outer edge of said flange for securing the bushing within said flange, said turned over outer edge forming a rounded bead, and leak-proof and tamper-proof seal means including a metallic cap member having its cylindrical skirt encompassing said bead, said skirt being uniformly contracted throughout its circumference snugly around said bead with its lower edge portion extending along substantially parallel with and entirely contacting with the cylindrical flange below said bead, and gasket means confined and compressed between said bead and top of said cap member.

2. In a structure of the class described, a container having an opening formed with an outwardly extending cylindrical flange, a threaded bushing fitting within said flange, and having its outer end above the threads turned over the outer edge of said flange for securing the bushing within said flange, a gasket seat being formed at the top of said threads, a plug having a threaded body with the outer end of the plug slightly enlarged, the plug having an annular groove between said enlarged end and threaded part and

a gasket in said groove, said gasket being compressed between said enlarged end and said seat and being substantially confined below said enlarged end when said plug is screwed into closing position, and leak-proof and tamper-proof seal means including a metallic cap member having its cylindrical skirt encompassing said beaded end of the flange, said skirt portion being entirely contracted around and behind said bead, and gasket means confined and compressed between said bead and the top of said cap member and between said skirt portion and the enlarged end of said plug, the top of said cap member contacting with the top of said plug when the plug and cap member are in closing positions.

3. In a structure of the class described, a container having an opening formed with an outwardly extending rigid cylindrical flange, the flange being provided with a bead at its outer edge, internal threads, and a gasket seat at the top of the threads and within the upper end of the flange, a plug having a threaded body with the outer end of the plug slightly enlarged, a gasket carried by said plug under said enlarged end, said gasket being compressed between said enlarged end and said seat and being substantially confined below said enlarged end when said plug is screwed into closing position, and leak-proof and tamper-proof sealing means including a metallic cap having its cylindrical skirt contracted around said bead with its lower edge portion entirely engaging the flange in substantially parallel relation below said bead, and a gasket confined and compressed between said bead and the top of the cap vertically and between the skirt of the cap and the outer edge of the enlarged end of the plug horizontally.

4. In structure of the class described, a container having an opening formed with an outwardly-extending cylindrical flange, a bushing fitting within said flange and having its outer end turned over the outer edge of said flange for securing the bushing within said flange, said turned over outer edge forming a rounded bead, and leak-proof and tamper-proof seal means including a metallic cap member having its cylindrical skirt encompassing said bead, said skirt being uniformly contracted throughout its circumference snugly around said bead with its lower edge portion extending along substantially parallel with and entirely contacting with the cylindrical flange below said bead, and gasket means confined and compressed between said bead and top of said cap member, said metallic cap member being provided with spaced score lines providing a tear strip to facilitate the removal of the cap.

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