Nov. 27, 1934. J. W. SHERA 1,982,145

CLOSURE DEVICE FOR METALLIC CONTAINERS

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Fig. 1.

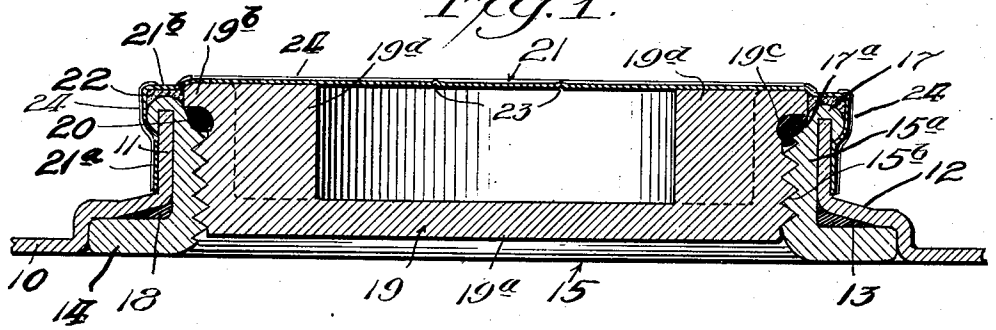

Fig. 2.

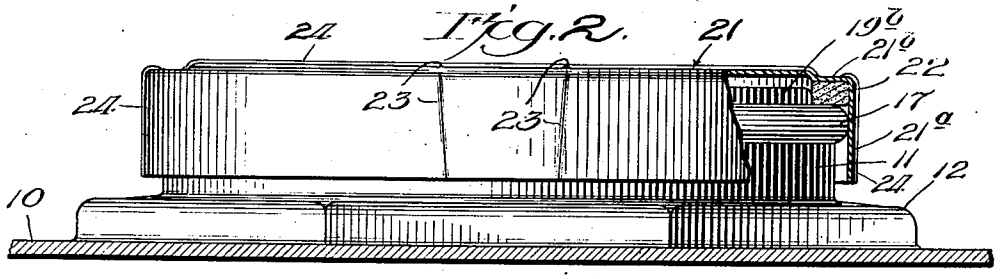

Fig. 3.

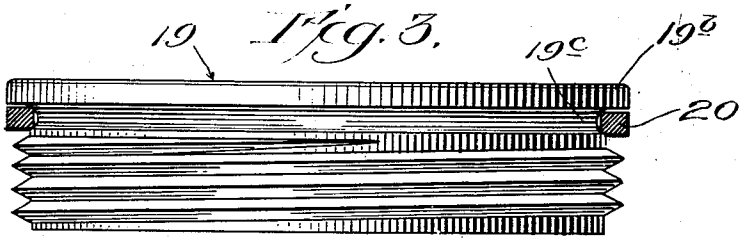

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Fig. 4.

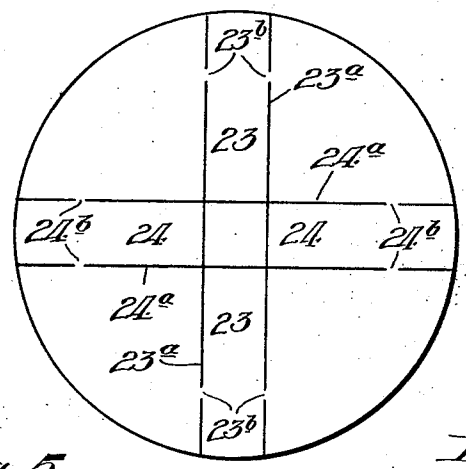


Fig. 5.

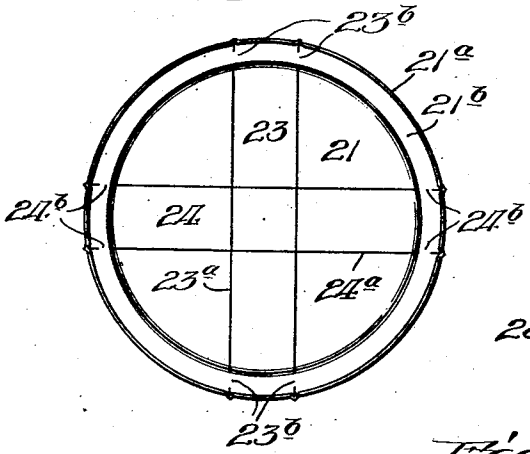


Fig. 7.

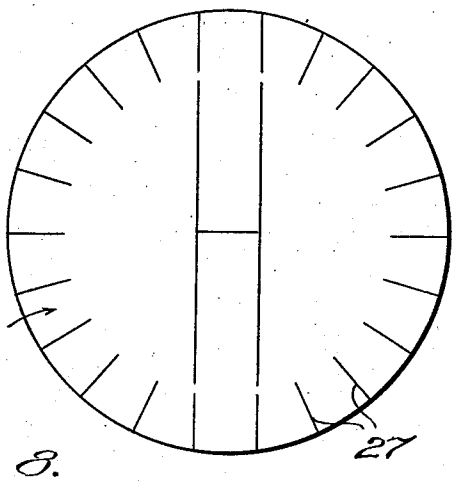


Fig. 8.

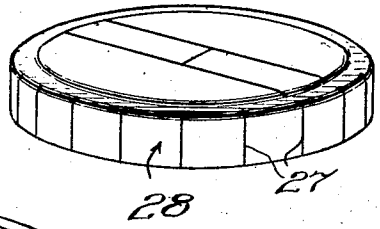
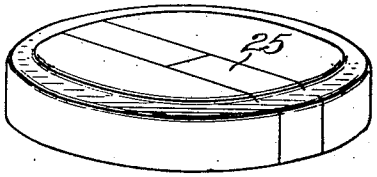


Fig. 6.



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Patented Nov. 27, 1934

1,982,145

UNITED STATES PATENT OFFICE

1,982,145

CLOSURE DEVICE FOR METALLIC CONTAINERS

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Application May 4, 1932, Serial No. 609,093

14 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 closure means for the filling and/or discharge openings thereof. My invention is well adapted for use in connection with containers fitted for the transportation and storage of oil, gasoline and the like.

The principal object of my invention is to provide an improved, simple and inexpensive closure assembly for openings in containers of the foregoing character, which closure assembly is adapted to positively seal the container opening against leakage and is of a character which insures against undetectable tampering.

Another object is to provide a closure embodying a threaded bushing member defining the container opening and adapted to be closed by a gasket-carrying plug, the bushing member being provided with an angularly-disposed seat surface above its threaded part adapted to be engaged by the head of the plug for limiting the depth of insertion of the plug and predetermining the sealing position of the plug and its gasket.

A further object is to provide an improved and novel seal cap adapted to be securely mounted over the closure plug to conceal and render the latter inaccessible, the cap being so constructed and being so associated with its mounting that it cannot be removed without so distorting and fracturing the same that its further usefulness is destroyed.

An additional, and more specific, object is to provide a seal cap for a closure opening defined by annular wall structure projecting outwardly from the container wall, which cap has a smooth skirt portion of sufficient length to extend, when secured in place, into close proximity to the container wall thereby preventing detachment or loosening of the same by insertion of an object under the free edge of its skirt, such cap being cross-scored through its top and skirt to permit of removal of the same by fracturing and tearing away the scored portion.

Other objects and advantages will become apparent as this description progresses and by reference to the drawings wherein,—

Figure 1 is a vertical sectional view of one form of closure assembly embodying my invention;

Fig. 2 is an elevational view, partially in section, of the closure, illustrating the position of the seal cap thereon prior to its securement;

Fig. 3 is a separated plan view of the plug and gasket assembly shown in Fig. 2;

Fig. 4 is a plan view of one form of blank for forming the seal cap;

Fig. 5 is a bottom plan view of a seal cap formed from the blank of Fig. 4;

Fig. 6 is a perspective view of a modified form of cap embodying my invention;

Fig. 7 is a plan view of another modified form of a cap blank embodying my invention; and

Fig. 8 is a perspective view of a cap formed from the blank of Fig. 7.

Referring particularly to the structure shown in Figs. 1 to 5, inclusive, the container wall 10 is provided with a circular opening defined by an outwardly-projecting, annular flange 11 struck, preferably, from the metal of the container wall. The wall surface at the base of the flange 11 is struck outwardly providing an annular boss 12 forming a pocket 13 adapted to receive the horizontal flange 14 of an internally threaded bushing 15, the body 15^a of which is adapted to fit snugly within the flange 11. The pocket 13 and bushing flange 14 are, preferably (but not necessarily), of octagonal shape in outline for preventing rotation of the bushing 15 within the flange 11. To securely fix the bushing 15 to the flange 11 against axial displacement, the upper edge of the bushing above its threads 15^b is gradually thinned and is extended upwardly and rolled over the outer edge of the flange 11 forming a bead 17 thereat. Any suitable sealing member or compound 18 may be inserted between the top wall of the pocket 13 and the bushing flange 14 and, with the parts secured as just described, a leak-proof joint is provided as between the bushing 14, the container wall and the flange 11. The bead 17 provides at the outer edge of the container opening a rounded, angular seat above the bushing thread which is utilized in a manner which will be described more fully hereinafter.

The bushing opening is adapted to be closed by a metallic plug 19 which may be formed of any suitable material and in any desired manner to the shape best shown in Figs. 1 and 3. Specifically, this plug is provided with a cup-shaped body 19^a (Fig. 3) having its lower portion threaded for engagement with the bushing threads 15^b, and it is further provided with a head 19^b of slightly larger diameter than the diameter of its threaded body portion. The surface 19^c between the plug head 19^b and the threaded plug body serves to support a gasket 20 formed from any suitable material, such as rubber, fiber, etc., with an outside diameter approximately the same as the diameter of the plug head 19^b. This gasket, as will be seen hereinafter, seals the threaded connection between the bushing 15 and plug 19. The bottom portion of the surface 19^c adjacent the plug

threads is approximately the same depth as the plug threads but the upper portion of the same is rounded and is slightly deeper than the plug threads providing a well defined groove in which the gasket is retained and compressed when the plug is screwed into closure position. Insertion and removal of the plug is facilitated by a pair of opposed lugs 19^d projecting inwardly from the inner wall of the plug body (Fig. 1).

I have found that, in closure devices of the foregoing character, unless guarded against, the plug may (due to lack of proper care and skill) be screwed into the bushing beyond its desired sealing position with the result that the gasket is forced into the bushing and plug thread thereby cutting and distorting the same in such a way that the desired sealing effect is destroyed. If such a condition should exist, the usefulness of the gasket is destroyed and a new gasket must be substituted, otherwise the proper seal cannot be effected. To guard against the foregoing, and to insure (in a fool-proof manner) that the plug will always be moved to a proper and predetermined sealing position, I relate the plug head 19^b, bead seat surface 17^a, gasket groove 19^c, and the threaded connection between the plug 19 and bushing 15 in such a way that the extent to which the plug may be screwed into the bushing is limited to that predetermined position wherein the gasket effects the desired positive seal against the threaded connection between the bushing 15 and plug 19. Specifically, the width of the plug head 19^b is such that its bottom edge strikes the inner rounded bead seat surface 17^a (Fig. 1) slightly below the top of the bead, and the plug groove 19^c and gasket 20 are of such relative size that as the plug head reaches the foregoing position the gasket is fully compressed and sealed upon the bushing and plug threads forming a tight seal. Furthermore, due to the head engaging the inner rounded (downwardly and inwardly inclined) seat surface of the bead, the engagement thus effected provides a wedging-like action which further insures the tightness of the seal and aids in prevention of loosening of the plug due to vibration, shock and other causes.

To complete the closure assembly, I employ a seal cap 21 (Figs. 1 and 2) which seats over the plug 19 with its skirt portion 21^a contracted around and behind the bead 17 and extending down along the flange 11 thereby concealing the plug 19 and rendering the same inaccessible. It is highly desirable that this seal be so constructed and applied that, once applied, it cannot be removed and/or reapplied without detection. To this end, I provide a cap which cannot be removed without fracture which destroys its further usefulness. The cap can only be removed by tearing away scored sections and the cap skirt is so related to its supporting structure that it cannot be pried or forced outwardly from the closure structure by the insertion of an object under the free edge of its skirt. Specifically, the top of cap 21 is slightly raised so as to seat upon the plug 19, and its outer peripheral edge portion is slightly depressed as at 21^b defining a surface which supports a gasket 22 of any suitable material. This gasket has, normally, an inside diameter approximating the outside diameter of the plug head 19^b so that it will fit freely around the edge of the plug head and upon the top of the bead 17. The cap skirt 21^a is of such length that when the cap is secured in place, its free edge extends into such close proximity to the surface of the boss 12 that it would be practically impossible for a person to project an object beneath such edge capable of prying loose the cap 21. Protection in this respect is further given by forming the cap skirt with a smooth surface, so that when it is secured in place it fits snugly around the flange 11 and there are no projecting parts or surfaces which may be engaged by an object for the purpose above mentioned.

The cap 21, before being secured to the closure, may take the form best shown in Figs. 2 and 5. It will be noted in Fig. 2 that the cap when assembled upon the closure before securement is in a somewhat raised position due mainly to the thickness of the gasket 22 which is compressed during the cap-securing operation. The cap is, preferably, secured by means of a tool of the character disclosed in the copending application of Fleck W. Sample, Serial No. 573,695. In the application of the cap by the tool just stated, the cap skirt is first moved radially inward against the outer rounded bead surface which translates the cap skirt movement into axial movement so that the cap skirt is contracted uniformly behind the bead 17 and into snug-fit engagement with the flange 11 throughout its circumference, as best shown in Fig. 1. During this cap-securing operation, the gasket 22 is compressed upon the top of the bead, the top of the cap is seated upon the plug 19 and a leak-proof joint is provided as between the cap and the bead 17.

By securing the cap in the foregoing manner it is so firmly fixed in place that special provision must be made for detachment of the same by the user. To that end, I may provide the top of the cap and its skirt with scored sections 23 and 24 (Figs. 4 and 5). The cap is formed from a flat blank (Fig. 4) which is provided with score lines 23^a and 24^a which are continuous to the edge of the blank except for skip portions 23^b and 24^b, the purpose of which will be explained hereinafter. When the cap is fully formed (Fig. 5), the skip portions 23^b and 24^b lie in the depressed peripheral portion 21^b of the cap top and immediately above the gasket 22. These skip portions insure a uniform depression of the gasket 22^b when the cap is applied, thereby effecting a uniform seal around the top of the bead. To remove this particular form of cap in an authorized manner, it is only necessary to break through the scored center of the cap and tear away some or all of the scored sections, the tear being continuous down through the free edge of the skirt, the relatively small skip portions 23^b and 24^b not interfering with this. I have found that a cap formed in the foregoing manner may be made from relatively heavy gauge sheet metal which further aids in the sureness of the seal and reduces the possibility of tampering with the closure.

The scoring of the cap top may be varied. For example, it may take the form shown in Fig. 6 wherein only one scored section 25 is employed, which section is identical to the section 23 or 24 of Fig. 5. I may also employ a cap scored similarly to that of Fig. 6 except that it is further provided with a plurality of radial score lines 27 in its skirt portion 28. Such a cap and its blank are shown in Figs. 7 and 8. The purpose of these skirt scores is to further guard against undetectable tampering with the cap seal by the insertion of some object under the free edge of its skirt portion. If, in some manner, an object should be inserted under the free edge of the cap and sufficient force is applied in an attempt to detach the cap, the cap skirt would tear

along the scored lines 27 without detaching the cap and it would clearly show tampering. Furthermore, if the cap should be tampered with in this manner, and the skirt portion torn, the further usefulness of the cap is destroyed.

From the foregoing, the objects and advantages of my invention hereinabove first stated will be obvious. A fool-proof, properly sealed closure is insured. Undetectable tampering is guarded against. It will be understood that while I have shown and described only two forms of my invention, other 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.

I claim:

1. In structure of the class described, means providing an opening in a wall of the container, the lower or inner part of which opening is threaded and the outer part of which opening is provided with an unthreaded seat tapering downwardly and inwardly from the outer edge of said opening to the top of its threaded part, a closure plug having a threaded body part adapted to engage said threaded opening and having a head of greater diameter than its threaded body part and of less diameter than the outer part of said opening and adapted to engage the tapered surface of said seat somewhat above the threaded part of said opening to limit the depth of insertion of the plug in said opening, and a readily compressible gasket carried by said plug between its head and threaded body part and adapted to be compressed against said seat below the point of engagement between said seat and plug head and above the threads of said opening.

2. In structure of the class described, means providing an opening in the wall of the container, the lower part of the wall of said opening being threaded and its upper part above said threads tapering uniformly outwardly from said threads, a plug having a threaded body adapted to engage said opening threads and a head of less diameter than the outer portion of said upper tapered part and adapted to seat against said tapered opening wall above said threaded part, said plug also having an annular groove between its threads and head of a depth equal at least to the depth of said threads, and a gasket normally of substantially the same diameter as said head mounted in said groove.

3. In structure of the class described, means including an annular flange projecting outwardly at substantially right angles from a wall of the container forming an opening therein, a bead formed at the outer end of said flange, a plug mounted in said opening, and a cap member mounted over said plug and opening-forming means with its skirt portion contracted uniformly around and over said bead and with its free edge portion extending inwardly from said bead along said flange in substantially parallel relation throughout to the latter, said skirt being of sufficient length to permit the same to be contracted over and behind said bead into snug fit engagement with said flange and to project its free edge vertically into close proximity to said container wall at the base of said flange to prevent access to said free edge for detachment of the cap, and a gasket carried by said cap and seated upon said bead and adapted to be compressed upon said bead as said cap is secured in place by contracting the skirt behind said bead.

4. In structure of the class described, means including an annular flange projecting outwardly at substantially right angles from a wall of the container to form an opening in the latter, a bead upon and surrounding the outer end of said flange, a plug in said opening and having a head, and a cap member mounted over said plug and opening-forming means with its skirt portion extending inwardly towards said container wall over said bead and along said flange in substantially parallel relation throughout to the latter, said skirt having a portion contracted uniformly and snugly over said bead, and said skirt being of sufficient length that after it has thus been contracted over said bead it extends behind said bead and is contracted into snug fit engagement with said flange with its free edge extended vertically into close proximity to said container wall at the base of said flange thereby preventing access to said free edge for detachment of the cap, and a gasket carried by said cap and surrounding said plug head and seated upon said bead, the same being adapted to be compressed upon said bead and to be confined in compressed relation between said cap skirt and said plug head as said cap is secured in place by contracting the skirt thereof over, upon and behind said bead.

5. In structure of the class described, means forming an opening in a wall of the container which includes an outwarly extending annular flange and a bushing surrounded by said flange and turned upon the latter to provide a bead at the outer end of said flange, a plug mounted in said opening and having a head adapted to project somewhat above said bead and surrounded by the latter, a cap adapted to be mounted over said plug and bead and having a smooth skirt wall normally of greater diameter than said bead and flange and of sufficient length when contracted over and upon said bead and said flange to extend its free edge to the wall of the container at the base of said flange, said cap having the outer periphery of its top depressed somewhat below the periphery of said plug head, and a gasket supported by the depressed portion of said cap top and adapted to be compressed upon said bead between said plug head and cap skirt wall as said cap is secured in place.

6. In structure of the class described, an annular flange extending from a wall of the container and providing an opening, means forming a bead at the outer end of said flange, a plug closing said opening, a cap adapted to be mounted over said flange, bead and plug with its skirt portion uniformly contracted behind said bead in snug fit engagement with said flange and with the free edge of its skirt portion extending substantially into engagement with the wall of the container, a ring gasket between said bead and the top of the cap, said cap having a scored section extending across its top and down through its skirt on opposite sides and adapted to be detached for removal of the cap, the scoring of said section being interrupted at the periphery of the cap top immediately above said gasket.

7. In structure of the class described, means forming an opening in a wall of the container with an exterior bead therearound, a plug mounted in said opening, and a cap adapted to be mounted over said plug and bead with its skirt contracted behind said bead, a gasket between the peripheral part of said cap top and said bead, said cap having a scored section extending continuously across its top and down through the opposite sides of its skirt except for skip portions at the points where said section passes over said gasket.

8. In structure of the class described, an annular flange extending outwardly from the container wall and defining an opening, a bushing mounted within said flange, means securing said bushing against axial displacement, means securing said bushing against rotation, said bushing being provided with internal threads extending from its inner end and terminating short of its outer end with the outermost side of the outermost thread merging into the interior unthreaded wall of the bushing therebeyond to form a gasket seat which is uniformly flared outwardly, a plug having a head of less width than the outermost diameter of said gasket seat, said plug also having a threaded body part in engagement with said bushing threads and a gasket-receiving groove immediately beneath said head, and a gasket of resilient material supported in said groove, said gasket being of such dimensions that it does not project laterally beyond said head, and upon screwing said head fully into said bushing the gasket is seated upon the outer side of the outermost of said threads and is compressed against and confined between said outermost thread, said head, said groove and the inner wall of said bushing outwardly beyond said outermost thread, and said plug head is, at the same time, so related to said gasket seat that it is engaged with said seat inwardly of the outer end of the latter.

9. In structure of the class described, means forming an opening in the wall of a container which includes an outwardly extending annular flange, means at the outer end of said flange forming a bead there around, a plug mounted in said opening and having a head adapted to lie within the confines of said bead being surrounded by the latter, a cap adapted to be mounted over said plug and bead and having the smooth skirt wall normally of greater diameter than said bead and flange and of sufficient length when contracted over and upon said bead and flange to extend its free edge to the wall of the container at the base of the flange in substantially right angle relation with respect thereto, said cap having the outer periphery of its top offset somewhat with respect to said plug head, and a gasket supported by the offset portion of said cap top and adapted to be compressed upon said bead at a point between said plug head and cap skirt wall as said cap is secured in place.

10. A seal cap for structure of the class described which comprises a smooth top and a smooth skirt both of which are imperforate, and a plurality of equally and circumferentially spaced score lines in said skirt and extending throughout the length of the latter whereby pressure applied at any point to the free edge of said skirt and axially of the cap will tend to fracture only the skirt without freeing the cap for removal.

11. A seal cap for structure of the class described which comprises a top and a skirt portion both of which are imperforate, an offset portion around the periphery of said top portion defining a distinct and comparatively narrow gasket-supporting surface, a scored section in and extending across said top portion with its opposite ends terminating at said gasket-supporting surface, and scored sections in and extending from the free edge of said skirt portion adjacent the opposite ends of said top scored section, said skirt scored sections being aligned with said top scored section and terminating at said gasket-supporting surface.

12. A seal cap for structure of the class described which comprises a top and a skirt portion, both of which are imperforate, a comparatively narrow offset gasket-supporting surface around the periphery of said top portion, a plurality of scored sections in and extending across said top portion at an angle to and intersecting each other, and scored sections in and extending from the free edge of said skirt toward and in alignment with the ends of said top scored sections, said skirt scored sections terminating at said gasket-supporting surface whereby scored portions do not pass through said gasket-supporting surface.

13. A seal cap for structure of the class described which comprises a top and a skirt portion, both of which are imperforate, an offset gasket-supporting surface formed around the periphery of said top portion, a scored section in said top portion with its opposite ends terminating at said gasket-supporting surface, and a plurality of scored sections in said skirt portion all terminating at said gasket-supporting surface, and at least one of said skirt scored sections being aligned with said top scored section.

14. A seal cap for structure of the class described which comprises a smooth top and a smooth skirt, both of which are imperforate, said top having a definitely defined and compartively narrow gasket-receiving surface formed around its periphery, a scored section extending transversely across said top and terminating at but not passing through said gasket-receiving surface, a plurality of scored sections through the circumference of said skirt extending throughout the length of said skirt and terminating at said gasket-receiving surface, some of which latter sections are in alignment with said top scored section.

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