July 9, 1929. J. S. REID 1,720,347

CLOSURE

Filed Sept. 16, 1926

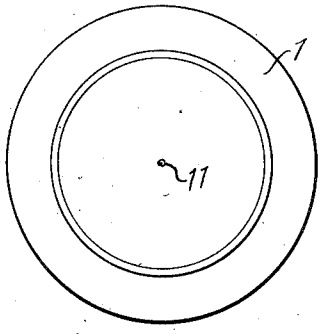


Fig.-1

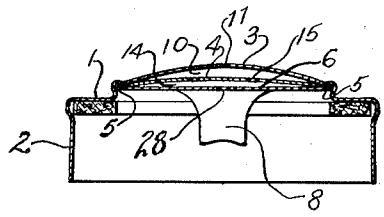


Fig.-2

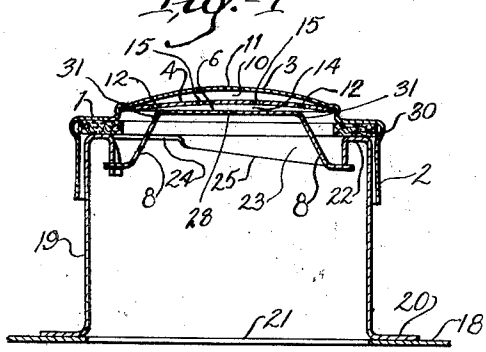


Fig.-6

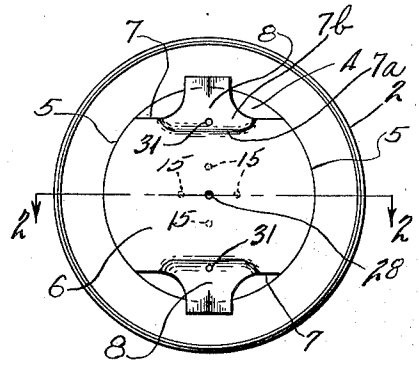


Fig.-3

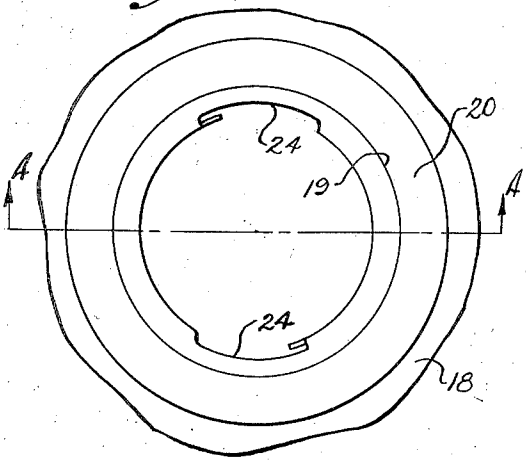


Fig.-5

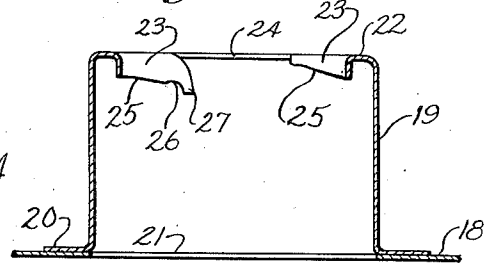


Fig.-4

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UNITED STATES PATENT OFFICE.

JAMES S. REID, OF CLEVELAND, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE EATON AXLE & SPRING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

CLOSURE.

Application filed September 16, 1926. Serial No. 135,815.

This invention relates to improvements in closures of the type provided with opposed locking fingers for co-operation with the opposed cam portions of the device to be closed.

The object of the invention is to provide an improved closure in which the locking plate or member is of relatively large diameter as compared with prior constructions and therefore has a greater frictional holding effect in the cap; in which said plate has its locking fingers attached to the base materially inwardly from its outer periphery to provide segmental recesses or openings in the plate, not only improving the vent system, as will appear later, but also enabling the locking fingers to be strengthened and to have greater flexibility without likelihood of damage; in which the outer shell of the cap may be of more or less ornamental shape and is not so nearly limited by the internal construction; in which the die shaping, forming and assembling operations are simplified; in which the cost for the several parts may be decreased; and which cap, nevertheless, may be adapted for use on standard receptacle necks or other parts to be closed, all within the limitations of the desirable and necessary constructions of such closures.

Further objects of the invention are in part obvious and in part will appear more in detail hereinafter.

In the drawings, Fig. 1 is a top plan view of my improved closure; Fig. 2 is a vertical sectional view thereof on the line 2—2, Fig. 3; Fig. 3 is a bottom plan view thereof; Fig. 4 is a vertical sectional view of a tubular filler member to which the closure is adapted to be applied, the view being taken on the line 4—4, Fig. 5; Fig. 5 is a plan view of said tubular member; and Fig. 6 is a vertical sectional view of the closure applied to the tubular member.

The closure illustrated in the drawings includes a metal top portion 1 and a depending marginal skirt portion 2 integral therewith. Said top portion is provided with a centrally disposed integral circular dome 3, to the inner surface of the marginal or edge portion of which are crimped or otherwise suitably secured to the entire edge portion of a circular metal disk 4 and the two curved opposed edge portions 5 of the flat body portion 6 of a locking member, said disk lying above said body portion, as clearly indicated in Figs. 2 and 6. In securing the three parts together, to wit, the locking member, disc 4 and dome 3, the metal of the dome may be crimped around the edge of the plate 6, while the disc 4 may be of smaller diameter than the disc 6, being not actually included in the crimped or folded joint, but clamped in its position intermediate the disc 6 and the dome by crimping them together, all as shown in Fig. 2. The body portion of said locking member is provided at each of its two opposed, straight edge portions 7, (provided by cutting away portions of the otherwise substantially circular body portion) with a locking spring finger 8 extending downwardly and outwardly from the body portion, as clearly indicated in Fig. 6. This arrangement locates the bases of the locking fingers materially inwardly from the periphery of the disc 6, as well as inwardly from the crimped joint, so that adjacent the base of each locking finger there is a fairly large segmental shaped recess or opening through the disc 6. The bend in the metal at the bases of the locking fingers is along the line 7^a located inwardly of the chord edge 7 of the recess, and a rounded fillet 7^b fills each corner at the bend, being shaped to avoid sharp angles or break lines, thus materially increasing the strength of the parts where the locking fingers are joined to the base and permitting greater flexibility or bending of the parts with less liability of crystallization and breakage than with prior structures. Said locking spring fingers are adapted for engagement with two opposed cam portions of the device to be closed, as will later appear.

The dome 3 and the disk 4 form the outer and inner walls respectively of an air chamber 10, which is vented to the atmosphere by an aperture 11 in the dome and is vented to the inside of the device to be closed, when the closure is applied thereto, through apertures 12 in the disk which may be located in its outer portions where they come opposite its recesses, although this is not essential. Preferably and as shown, said disk apertures 12 lie opposite the locking spring fingers 8, which baffle said apertures and the normal escape therethrough of liquid from the device to be closed.

If desired, and as shown, a space 14 may be provided between the central portion of the disk 4 and the central portion of the body

6 of the locking member, the central portion of the disk being pressed upwardly in the embodiment here shown. Communication between this space and the chamber within the device to be closed may be provided by having the straight edge portions 7 of the locking member body portion 6 spaced from the disk 4 or by having the base or upper end portions of the locking spring fingers 8 spaced from said disk, or by both arrangements, as here shown.

If desired, and as shown in Fig. 2, the body portion 6 of the locking member may be provided with an aperture 28 to provide communication between the air space 14 and the chamber within the device to be closed. Communication between the space 14 and the upper air chamber 10 is provided by apertures 15 in the central portion of the disk 4, which are, of course, baffled by the body portion 6 of the locking member.

In the present embodiment of the invention, the device to be closed is an automobile fuel tank 18 having the cam portions for co-operation with the spring fingers 8 of the closure carried by an upwardly extending tubular filler neck. Said neck includes a cylindrical body portion 19 which may be an integral part of the tank 18 or be separate therefrom and provided with a base flange 20 for attachment thereto around the edge of the opening 21 in said tank. At its upper end, said body portion 19 is provided with an inwardly extending, substantially horizontal flange 22 terminating in a depending flange 23. At two diametrically opposite points, portions of flanges 22 and 23 are cut away so as to provide two passageways 24, through which the locking fingers 8 of the closure are adapted to be passed, as will later appear. The cutting away of said flanges provides two depending flanges 23 of substantially semi-circular form, and the bottom edges of these flanges are inclined to provide cam portions 25 with which the locking fingers of the closure are adapted to co-operate in effecting detachable locking engagement of the closure with the neck portion of the tank 18. At the rear ends of the cam portions 25 are provided recessed dwell portions 26, in which the locking fingers of the closure are adapted to engage when the closure is in fully seated position on the neck portion. Just beyond said dwell portions, the depending flanges 23 are provided with depending lugs or projections 27 which form stops for the locking fingers of the closure when said fingers are travelling up the cam portions 25, as will be readily understood.

The closure is applied to the next or tubular filler portion 19 in the usual manner of bayonet joint connections, the locking spring fingers 8 of the closure being passed down through the passageways 24 of said neck portion. The closure is then turned in a clockwise direction, which causes the locking fingers thereof to ride up the cam portions 25 with yielding effect, the rotary movement of the closure being continued until said fingers strike the stop portions 27 which denotes full seating position of the closure. To remove the closure, it is only necessary to turn it in the reverse direction, whereupon the spring fingers thereof will leave the dwell portions 26 and ride down the cam portions. The closure can then be removed from the neck portion, the locking fingers of the closure passing through the passageways 24, as before.

The closure is provided with a yielding gasket 30 which is adapted to lie between the horizontal flange 22 of the neck portion and the marginal or outer portion of the closure top when the closure is applied to said neck portion. If desired, the metal of the skirt portion 2 of the closure may be bent in under the outer, lower edge of said gasket so as to maintain it at all times against said closure top portion, although the locking spring fingers 8 of the closure would normally prevent the gasket from becoming detached from the closure when said closure is removed from the neck portion 19 of the tank.

Preferably, the spring fingers 8 of the closure are each provided with one or more apertures 31 to give said fingers increased resiliency so that there will be no liability of subjecting the gasket 30 to undue compression.

The arrangement described has several important advantages. Assuming that the closure described is built of the proper size to fit upon a standard closure neck and therefore comparing it with prior structures of proper size to fit upon the same standard closure neck, it enables the diameter of the locking finger plate to be materially increased so that the frictional grip between its edge and the crimped joint is at a greater distance from the center, with increased leverage tending to resist rotation of the locking plate in the cap by cap operation. It avoids the necessity for specially forming or shaving the dome of the cap to receive the locking plate and prevent its rotation and enables the dome to be made shallow and the outer shell to be more or less ornamented and its appearance improved. It strengthens the locking fingers at their bases and enables them to be made more flexible but with less liability of breakage. It simplifies the die shaping operations, the shape and cost of the several cap parts, and the cost and difficulty of assembly. It also secures a tortuous vent channel or passage and insures that the vent will be open at all times, and avoids closing of the vent by an assembling operation or by collection of dirt or foreign matter. It also provides a stronger locking plate which is, generally

speaking, of disc form, but with its opposite sides folded back to provide segmental openings useful for venting purposes and to simplify the construction.

What I claim is:

1. A closure of the character described, provided with a cross wall having its center portion raised to form a recess bounded by an annular shoulder, and a locking member of disc form adapted to have its edge assembled with said cross wall at said shoulder and at intervals around its periphery being bent along a chord to leave a segmental opening within said shoulder, each bent edge portion extending downwardly from a point within the arc of said shoulder and being shaped to form a locking arm.

2. A closure of the kind specified in claim 1, provided with a plate located between said locking member and said cross wall and confined by the assembly thereof and having portions baffling said segmental openings.

3. A closure of the kind specified in claim 1, provided with a plate baffling said segmental openings and itself provided with vent means.

4. A closure of the kind specified in claim 1, provided with a plate located above said locking disc and baffling said segmental openings and itself provided with vent means baffled by said locking arms.

5. A closure of the character described, provided with a cross wall having its center portion raised to form a recess bounded by an annular shoulder, and a locking member of disc form adapted to have its edge assembled with said cross wall at said shoulder and at intervals around its periphery being bent out of its plane to form locking arms and leaving at each arm a segmental opening bounded internally by chord edges, the bend between each arm and the body of the disc being located inwardly of said chord edges.

6. A closure of the kind specified in claim 5, in which a curved metal fillet is provided in the angle between the side edge of each locking arm and the adjacent chord edge of said opening.

In testimony whereof I hereby affix my signature.

JAMES S. REID.