

May 21, 1935.

J. H. GRUVER ET AL

2,002,143

NONREFILLABLE BOTTLE STOPPER

Filed Oct. 12, 1934

Fig. 1.

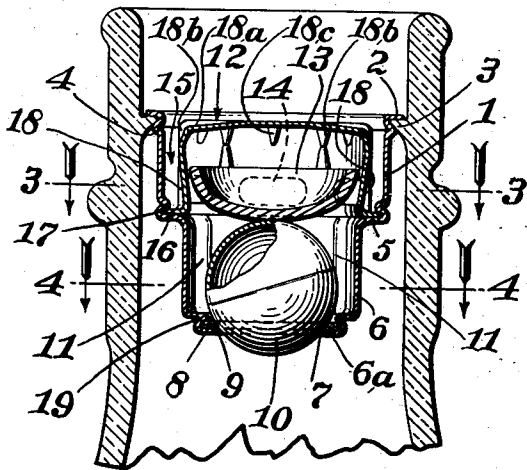


Fig. 2.

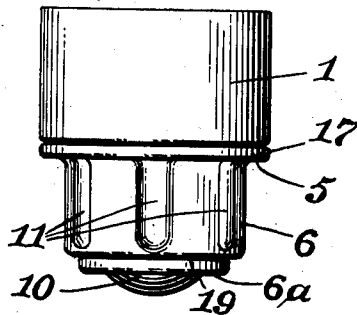


Fig. 5.

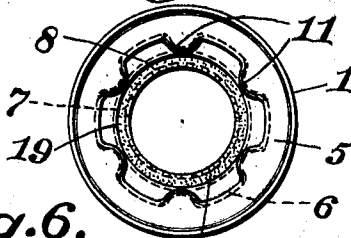


Fig. 3.

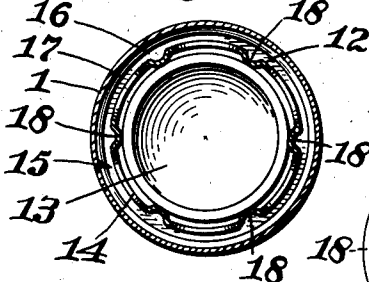


Fig. 6.

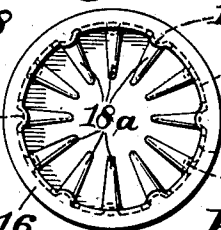


Fig. 7.

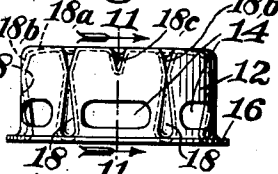


Fig. 4.

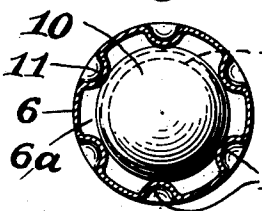


Fig. 10.

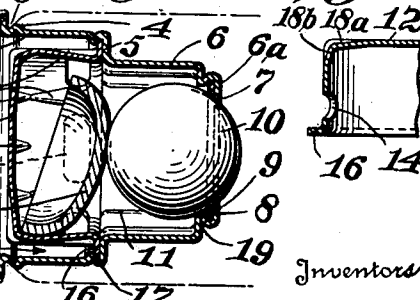


Fig. 11.

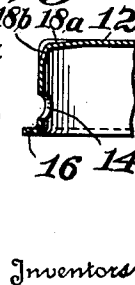


Fig. 8.

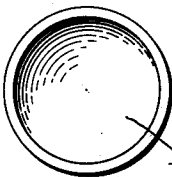
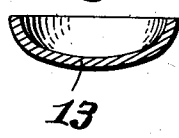


Fig. 9.



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UNITED STATES PATENT OFFICE

2,002,143

NONREFILLABLE BOTTLE STOPPER

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N. Y., a corporation of Maryland

Application October 12, 1934, Serial No. 748,142

16 Claims. (Cl. 215—22)

The invention concerns that type of non-refillable bottle stoppers having a float valve, and it consists of the features and combination and arrangement of parts hereinafter described and particularly pointed out in the claims.

In the drawing

Figure 1 is a sectional view through the bottle stopper, and through a portion of the bottle neck in which it is located.

Figure 2 is a side elevation of the stopper.

Figure 3 is a transverse section of the stopper on line 3—3 of Fig. 1.

Figure 4 is a transverse section of the stopper on line 4—4 of Fig. 1.

Figure 5 is a plan view of the outer casing of the stopper with the ball valve and baffle omitted.

Figure 6 is a plan view of the baffle inverted.

Figure 7 is a side view of the baffle.

Figure 8 is a plan view of the overbalanced unit, or weight.

Figure 9 is a sectional view of the weight detached.

Figure 10 is a view of the stopper turned to substantially a horizontal position.

Figure 11 is a sectional view on line 11—11 of Fig. 7.

The stopper comprises a casing of thin sheet metal having an upper portion 1 of generally cylindrical form provided with a substantially horizontal lip or flange 2 to rest on the upper side of a shoulder or rib 3 projecting inwardly from the wall of the bottle neck. This lip or flange may be preformed, i. e., before the stopper is inserted into the neck or mouth of the bottle, or it may be formed by a spinning operation after the stopper has been placed in the bottle neck. Below this flange and spaced apart therefrom a part of the sheet metal casing is spun into the form of a bead 4 which lies under and against the lower side of the rib 3 integrally formed with the wall of the bottle neck. The shell of the casing extends down from the bead 4 in spaced apart relation to the wall of the bottle neck, and at its lower end it has a bottom provided by the inwardly extending flange 5, and an extension 6 of reduced diameter terminating in an annular inwardly extending flange 6a. This formation provides a bottom opening 7 and a shoulder 8 surrounding the same against which rests a ring shaped washer 9 of soft material, such as, for instance, blotting paper. This washer provides the seat for a hollow ball float valve 10 formed of thin sheet metal. This ball float valve is of a diameter to close the centrally disposed bottom opening of the stopper when it rests upon the seat afforded by the ring shaped washer.

The ball when seated protrudes slightly through the bottom opening of the stopper into the space below the stopper, and within the bottle or bottle neck. The ball is guided by ribs 11 projecting inwardly from the wall of the shell, these ribs being formed of sheet metal portions spaced apart around the interior of the stopper casing. The ball float valve contacts with these ribs and is thus guided to move axially of the stopper being spaced by said guide ribs away from the wall of casing, and providing outlet passages between them and at various points around the stopper for the outflow of fluid from the interior of the bottle past the ball valve, when this is raised from its seat. Within the casing of the stopper and above the ball valve there is an inverted cup-shaped member 12, the upper wall of which is spaced far enough above the ball to allow for free movement of the latter and for containing an overbalanced weight member 13. This inverted cup-shaped member provides a baffle and a shield to prevent direct access to the ball valve by a wire or other means in an attempt to mechanically displace the valve from its seat for refilling of the bottle.

This inverted cup-shaped shield or baffle has openings through its side walls for the outflow of fluid from the bottle. One of these side openings is indicated at 14. The baffle or shield is of generally cylindrical form and is of a diameter less than that of the interior diameter of the casing so as to provide an annular space 15 between the outer side of said baffle and the wall of the casing for the outflow of the fluid content of the bottle. The baffle or shield member is united to the casing of the stopper by its external flange 16 seated within a bead 17 formed in the sheet metal wall of the valve casing. This bead lies adjacent the level of the upper ends of the guides for the ball valve, or, in other words, at the upper end of the chamber containing these guide ribs and containing the ball valve when seated. The diameter of the bead is such that the stopper can be inserted through the opening or bore within the rib in the bottle neck.

An overbalanced weight member cooperates with the ball to exert pressure thereon for seating it. This weight may be of generally disc form, but having its face, which contacts with the ball of convexed curved form somewhat similar, for instance, to a portion of a sphere. It rests upon the ball at that portion thereof which is disposed substantially at the axis of the stopper. Preferably the weight is of concavo-convex form. The edge of the disc weight rests upon guides

18 which are in the form of ribs on the interior of the wall of the inverted cup-shaped baffle or shield member.

These ribs or guides are spaced apart for the outflow of the fluid, and they incline outwardly from the axis of the stopper in a direction towards the outer end of the stopper, or, in other words, they may be said to flare upwardly and outwardly relative to the axis of the stopper, when the bottle is in upright position.

When the bottle is held about horizontal, these ribs provide a seat for the lower edge of the overbalanced disc weight, which seat inclines downwardly and outwardly, the result of which is that the lower edge of the weight will slide downwardly along the downwardly inclined guide upon which it happens to rest, it being noted that as the said guides are disposed at various points about the interior of the baffle member, there will always be a rib, or ribs, upon which the lower edge of the overbalanced weighted disc will rest, no matter what portion of the bottle is lowermost when turned into substantially horizontal position. When the lower edge of the disc weight slides forwardly down the inclined rib, said disc will tip over because of the preponderance of metal on its convex side, and thus this convex side will contact with the periphery of the hollow ball float and force the same upon its seat to prevent access of liquid into the bottle, if an attempt is made to refill the bottle by holding it in a substantially horizontal position.

The top wall of the baffle member is provided with indented ribs 18a radially disposed, and these ribs are continued at 18b part way down the side of the baffle member. The ribs 18 taper from about $\frac{1}{2}$ of an inch at the rim of the baffle to about zero as they approach the center. The side ribs 18 are inclined from about $\frac{1}{2}$ of an inch in height at the lower edge of the baffle to zero before quite reaching the top of the baffle, and they meet the side extensions 18b of the indented ribs of the top of the baffle, which incline in the opposite direction relative to the ribs 18 viz. from the upper rim of the baffle outwardly and downwardly to the point where they meet the zero end of the ribs 18. There are also ribs 18c similar to ribs 18b interposed between them and opposite the spaces between the ribs 18. These ribs at the top portion of the baffle serve to slightly space the edge of the weight 13 away from the wall of the baffle and thus prevent the edge of the weight from adhering to the said wall when the parts are wet.

The parts are so proportioned that the discharge of the liquid once started through the valve seat will continue freely and progressively through the stopper casing and baffle, and there will be no tendency for a non-flowing body of liquid to build up within the stopper and cause the float valve to flutter in its action towards and from its seat, with consequent interruption of the prescribed free flow.

If it is attempted to refill the bottle when in upright position, the weight of the disc member, will cause the ball valve to close upon its seat and prevent entrance of the liquid into the bottle.

If attempt is made to refill the bottle while inverted, the hollow ball will float upwardly to its seat and close the opening therein.

The soft washer of blotting paper upon which the hollow ball valve seats will soften under the action of the liquid and the fibers of the washer will adapt themselves to the shape of the ball

and make a closure sufficiently tight to prevent passage of the liquid, but not so tight as will prevent the equalization of air pressure on opposite sides so that no air lock will occur such as will hold the valve on its seat.

If pressure is applied, as in attempted refilling with a vacuum or pressure pump, the soft paper yields thereto conforming more closely to the shape of the valve, and thus forming a closure which is absolutely tight.

The use of the buoyant ball valve, together with an overbalanced weight, and more especially one having a rounded or convex surface to contact with the ball, results in an easy rolling action of the ball in its guides when the weight presses upon the ball, there being little frictional contact between the convex side of the weight and the convex periphery of the ball, said contact being a one point engagement. This contributes to a quick and efficient closure of the ball upon its seat.

In order to retain the washer or valve seat ring in place, the wall of the casing can be crimped at 19 just above the point where the washer is located to hold said washer in place.

It will be understood that the invention, in all its aspects, is not limited to the details shown and described. For instance, the baffle member may be held in place by a press fit, instead of by a flange engaging a bead on the main casing.

The ribs at the inner side of the top of the baffle prevent the disc weight from sticking to the top of the baffle, particularly when wet.

We claim:

1. A non-refillable bottle stopper comprising a float valve, a weight member engaging the float, said weight member being adapted to pivot on its edge, and guide means flaring outwardly towards the mouth of the bottle and upon which the edge of the weight member bears, said outwardly flaring guide means insuring that the portion of the edge of said weight upon which it pivots shall tend to move further away from the float which is engaged by the weight than any other portion of the weight, when the bottle is in substantially horizontal position, thereby keeping the force of the weight against the float.

2. A non-refillable bottle according to claim 1 in which the float valve is of spherical form and the weight has a rounded convex face contacting directly with the spherical surface of said spherical valve.

3. A non-refillable bottle stopper comprising a shell having a valve seat with spaced guides for a valve above said seat, a float valve, a baffle above said valve consisting of a sheet metal member of inverted cup shape having ports and provided with a horizontally extending flange at its lower edge, the wall of said sheet metal casing being crimped about said flange, and a weight member within said baffle member adapted to press upon the float valve, substantially as described.

4. A non-refillable bottle according to claim 3 in which the casing extends above the baffle member and is crimped at its upper end above and below a projection from the wall of the bottle neck extending into the bore of said neck.

5. A non-refillable bottle stopper comprising a casing member of sheet metal and a baffle member of sheet metal crimped into connection with each other at a point intermediate the height of said casing, said baffle member being of inverted cup shape, and having ports in its

sides, said casing member having a valve seat at its lower end and crimped guides in its wall, a ball valve in the casing engaging said guides and an overbalanced weight member to engage the ball valve, said baffle member having guide ribs projecting inwardly from its wall, said weight being within the baffle and adapted to pivot on its edge slidably engaging the guide ribs of said baffle.

contacting directly against the spherical surface of the ball, substantially as described.

12. A non-refillable bottle comprising a ball valve, a weight member of the general form of an overbalanced disc, a baffle member within which said weight member is located, the said baffle at its upper portion having means which space the edge of the weight away from the baffle wall to prevent adhesion thereto when the parts are wet.

13. A non-refillable bottle according to claim 12 in which the means at the upper part of the baffle consist of ribs, substantially as described.

14. A non-refillable bottle comprising a ball valve, an overbalanced weight of disc like form to bear on the ball to seat the same, a baffle member within which the weight member has sliding and tilting movement, ribs on the sides of the baffle inclining outwardly in respect to the axis of the baffle, and ribs at the top portion of the baffle inclining reversely to the ribs first mentioned, substantially as described.

15. A non-refillable bottle stopper comprising a tubular sheet metal casing, the upper portion of said tubular casing being of greater diameter than the lower portion thereof, a valve seat at the lower end of said casing, a sheet metal baffle member of inverted cup form received within the upper portion of said tubular casing and of less diameter than said upper casing portion to provide an annular space therebetween, said inverted cup-shaped baffle member being secured to said casing at the juncture between the upper casing portion and the reduced lower casing portion and forming substantially a continuation of the lower casing portion, said baffle member having holes only in its side wall leading to said annular space, a valve on said seat and a weight member within said baffle member and bearing on said valve.

16. A non-refillable bottle stopper according to claim 15 in which the baffle member has a terminal laterally extending flange and said sheet metal casing is crimped over to embrace said flange on both sides thereof, said sheet metal casing at its upper end being crimped over to embrace both sides of an annular bead within the bottle.

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6. A non-refillable bottle stopper comprising a casing having a valve seat, a ball float valve within the casing, a baffle member of inverted cup shape carried within the casing above the valve and an overbalanced weight in said baffle member to rest on the ball and adapted to pivot on the wall of said baffle.

7. A non-refillable bottle stopper according to claim 6 in which the baffle member has guide means inclining progressively outward from the axis of the stopper towards the mouth thereof, said overbalanced weight at its edge being adapted to have sliding and pivotal contact with said inclined guides, substantially as described.

8. A non-refillable bottle stopper comprising a sheet metal shell having a valve seat, a valve in said shell, a sheet metal baffle member of inverted cup shape within the shell and having a crimped connection with the shell, said shell having an extension above the baffle to be crimped into connection with the bottle, said baffle having ports, substantially as described.

9. In combination with a bottle having a projection extending from the wall of its neck into the bore of said neck, a non-refillable stopper comprising a sheet metal casing, upset at its upper part outwardly above and below said projection, said casing at its lower part being of a less diameter than the bore of the bottle neck to fall into the bottle if detached at its upper end, and a valve carried by the casing, substantially as described.

10. A bottle stopper according to claim 1 in which the float valve member is in the form of a ball and a valve seat comprising a ring of fibrous soft material, substantially as described.

11. A non-refillable bottle according to claim 1 in which the float valve member is in the form of a ball and the weight is overbalanced and of concavo-convex formation with its convex side

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