Feb. 28, 1939. M. M. KISTNER 2,148,864

UNITARY BOTTLE CLOSURE

Filed May 25, 1935 2 Sheets-Sheet 1

Fig. 1.

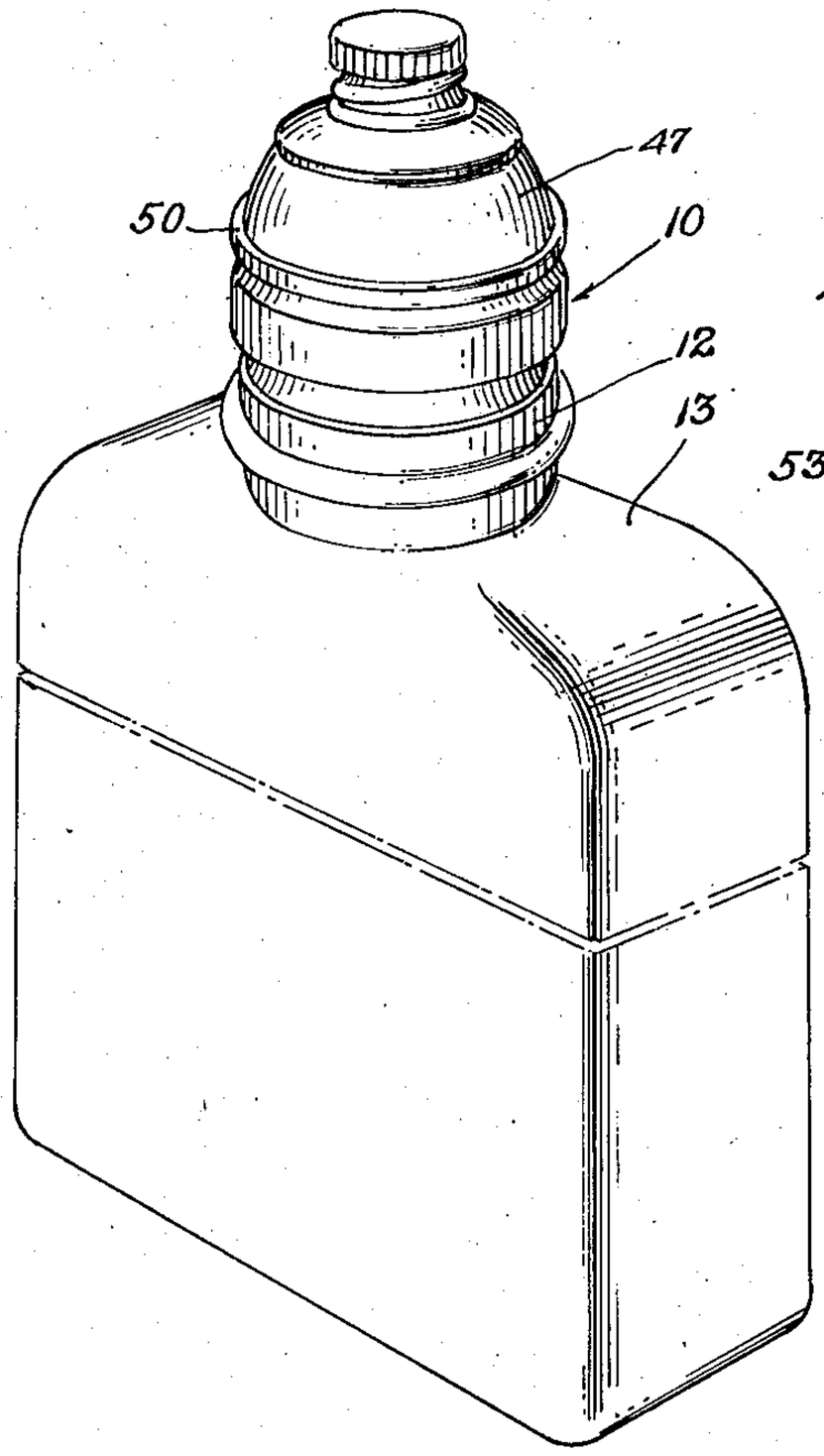


Fig. 2.

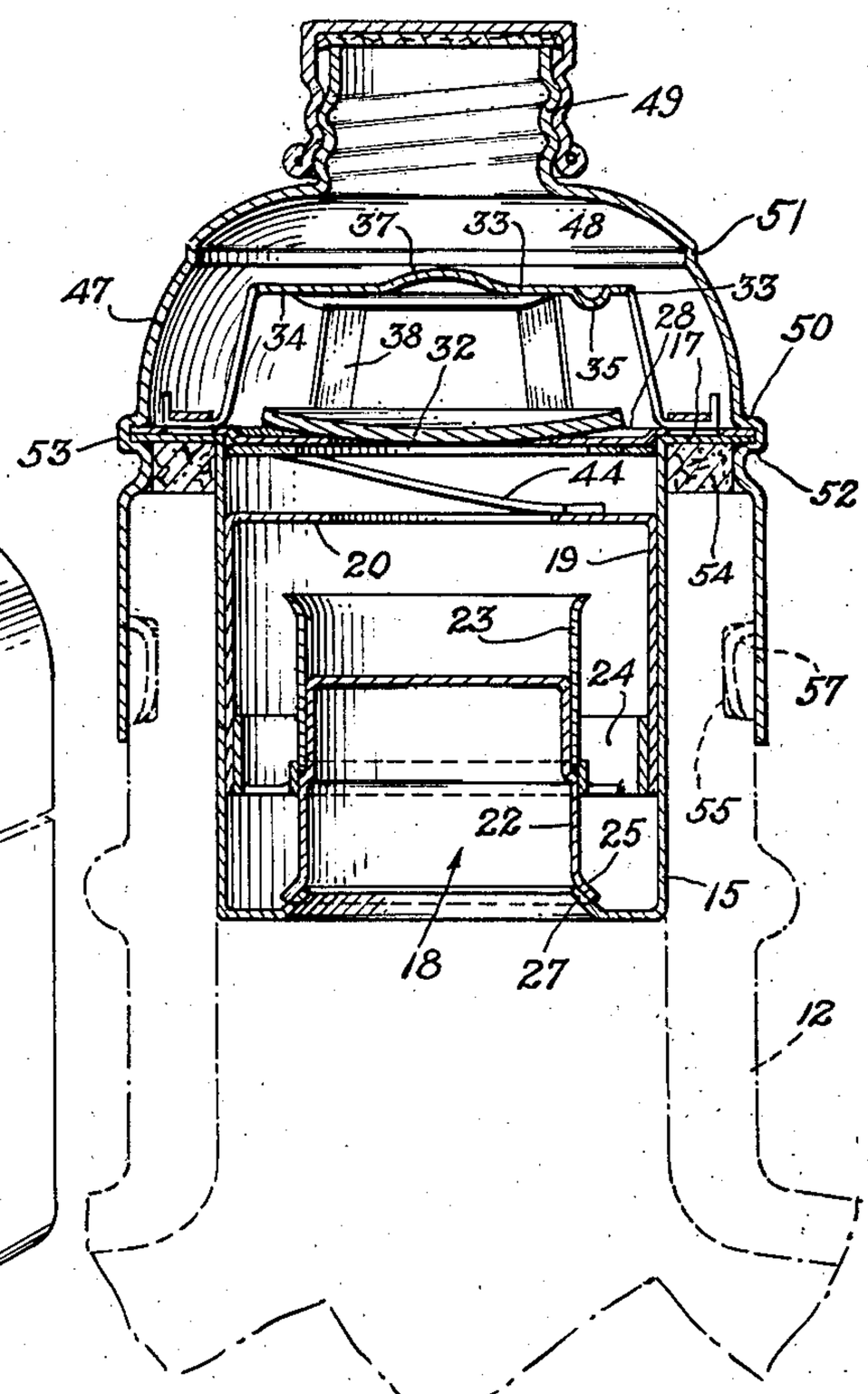
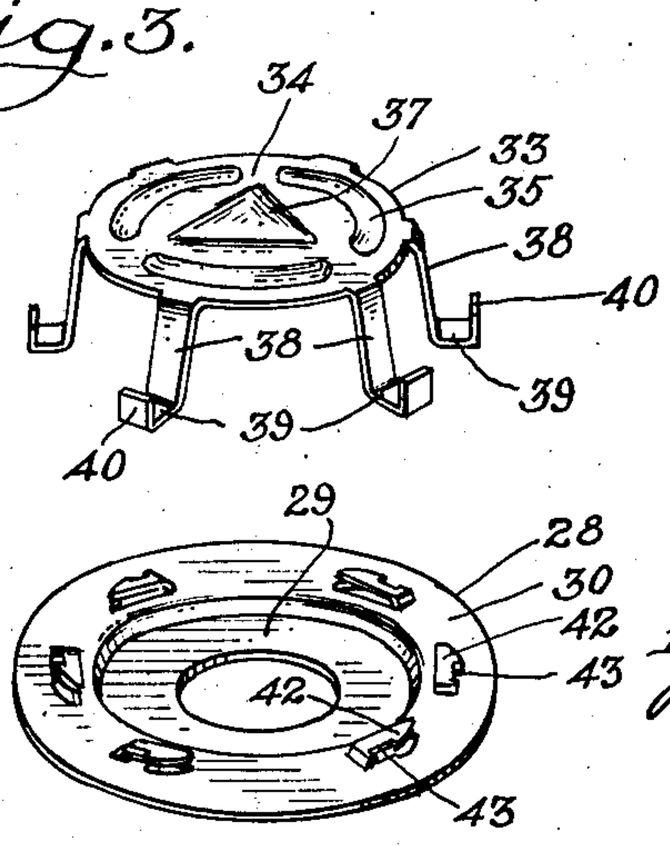


Fig. 3.



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UNITARY BOTTLE CLOSURE

Filed May 25, 1935 2 Sheets-Sheet 2

Fig. 4.

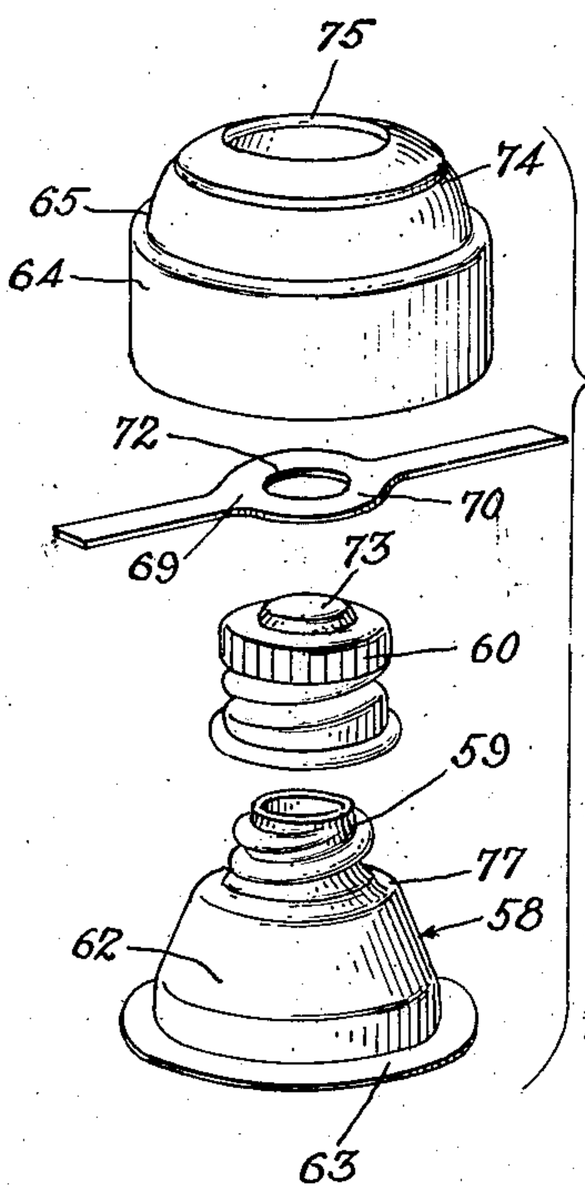


Fig. 5.

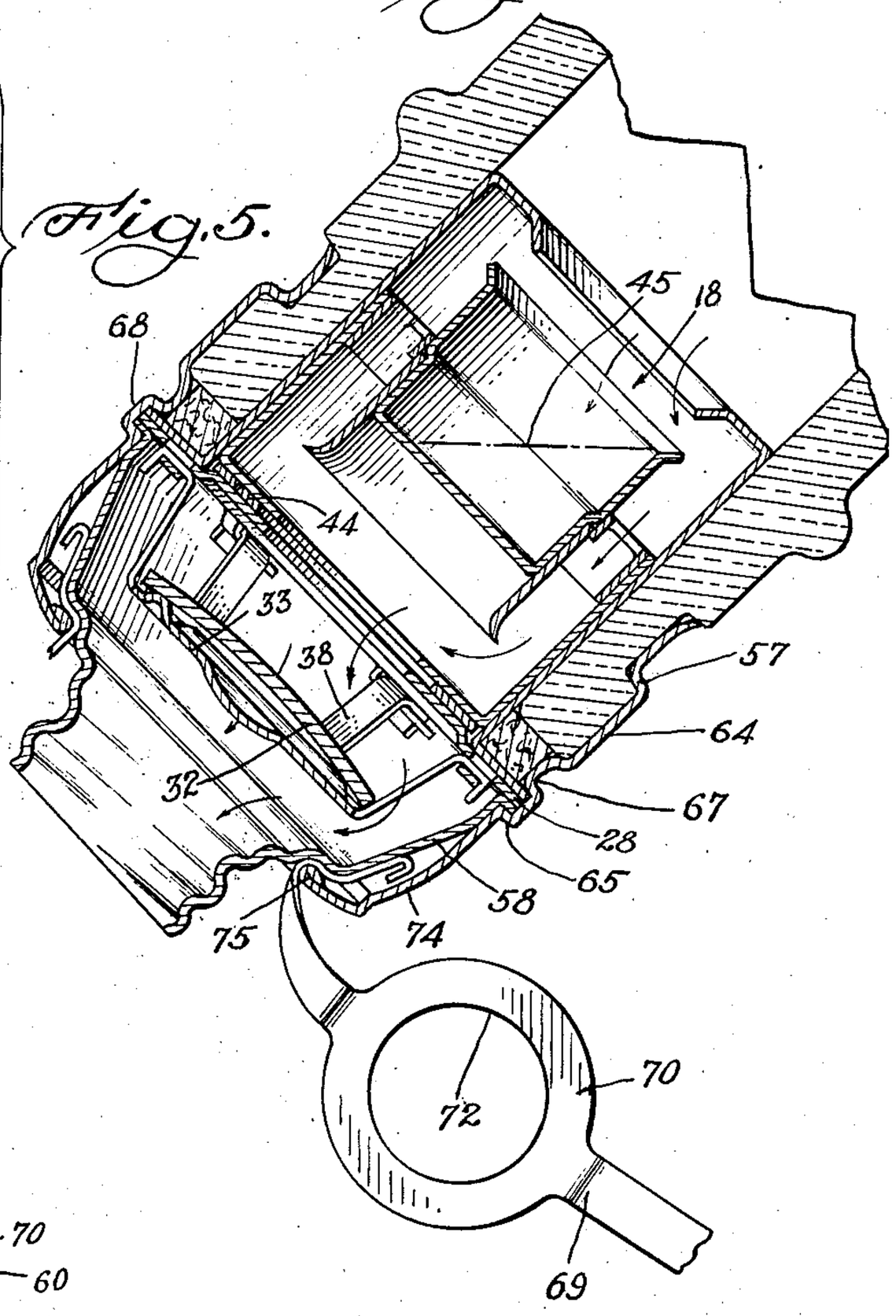
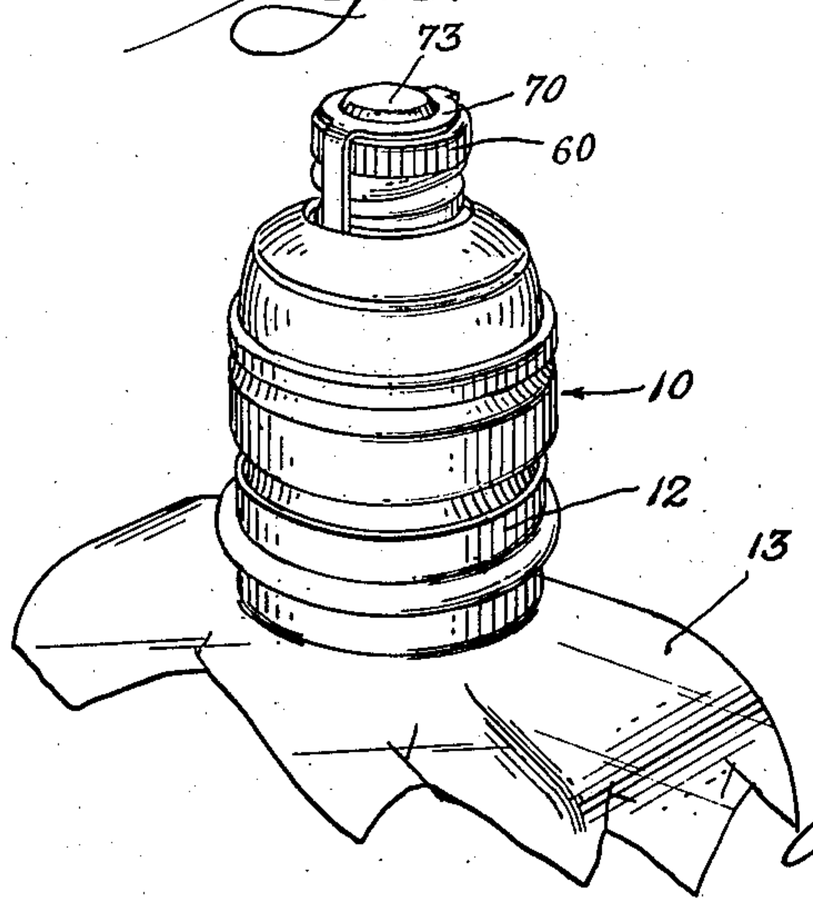


Fig. 6.



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UNITED STATES PATENT OFFICE

2,148,864

UNITARY BOTTLE CLOSURE

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Application May 25, 1935, Serial No. 23,440

21 Claims. (Cl. 215—25)

This invention relates to a unitary bottle closure and more particularly concerns a closure of this type embodying non-refillable valve mechanism and adapted to be permanently united with a filled liquid container.

An object of the invention is to provide a non-refillable bottle closure embodying a compact assembly in which all the parts are fitted together and permanently joined into a complete, inseparable unit.

Another object is to provide a bottle closure of this character including coacting interior parts and an exterior part arranged to engage the interior parts and secure the same into a permanent inseparable unit and having an integral part adapted to be affixed to a bottle for securing the unit thereto.

Another object is to provide an improved non-refillable bottle assembly in which a plurality of interior parts serve to form a valve arrangement permitting a flow of liquid from the interior of the bottle outwardly but preventing a return flow of liquid and including an exterior arrangement embodying a tamper-proof seal and a fastening member having a part in engagement with portions of said interior parts and with said seal to join the whole assembly permanently into a complete and inseparable unit.

Another object is to provide a non-refillable bottle closure embodying as one feature thereof an improved valve arrangement of a highly efficient tamper-proof nature and constructed of a minimum of interfitting and quickly assembled elements.

Another object resides in the provision of an improved bottle closure embodying a few snugly interfitting metal parts fashioned for simplicity and ease of assembly and forming a complete, compact, self-contained unit which may be manufactured and sold at low cost and which is adapted to be permanently united with a filled liquid container by a simple operation.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawings, in which:

Figure 1 is a perspective view of a closure unit embodying the principles of the present invention and showing the same united with a bottle.

Fig. 2 is a sectional elevation through the improved closure unit.

Fig. 3 is an exploded assembly view of the outer valve of the interior assembly of the unit.

Fig. 4 is a sectional elevational view of a modified form of closure showing the same in pouring position.

Fig. 5 is an exploded assembly view of a portion of the modified form of closure.

Fig. 6 is a perspective view of the modified form of closure.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

The features of the present invention are embodied in a simple, unitary structure fashioned to be assembled as a self-contained, inseparable commercial unit and which may be affixed permanently to a filled liquid container. All parts of the device may be manufactured according to standardized patterns and are cooperatively arranged in such manner that only a few parts which require but a limited number of assembly steps provide a complete, fool-proof unit.

Referring more particularly to the drawings, the invention is embodied in a preferred form in a closure unit 10 which is adapted to be affixed permanently to an annular neck 12 of simple design and forming part of a liquid container 13 of any desired shape.

Herein the closure unit 10 is shown as embodying a plurality of interior and exterior parts inseparably united as a complete unit. In the present instance the interior parts comprise a non-refillable valve assembly providing a discharge passage of undiminished effective flow area from the interior outwardly and arranged to effectively prevent a return flow of liquid, thereby permitting liquid to be discharged freely from the container to which the unit has been affixed but effectively preventing attempts to refill the container. The valve arrangement may be of the type more particularly described and claimed in my copending application, Serial No. 758,257, filed December 19, 1934, and includes a pair of cooperating inner and outer valves successively interposed in the path of liquid flow.

This valve structure comprises in one part a uniformly dimensioned cup-like cylinder 15 adapted to fit snugly within the neck 12 and having a laterally extending flange 17 disposed to overlie the outer end of the neck 12 after the unit

has been placed in position thereon. Within the shell or container provided by the cylinder 15 is a piston-like valve, herein the inner valve indicated generally by the numeral 18; and including a cup-like sleeve 19 dimensioned to fit snugly in slidable relation within the cylinder 15 and having an axially apertured base 20.

Concentrically supported partly within the sleeve 19 is a pair of oppositely facing cup-like members 22 and 23 rigidly secured to the sleeve through the medium of a spider 24. As best seen in Fig. 2, the outwardly facing member 23 is formed as a band fitting around the base of the inwardly facing member 22 so that both cup-like members have a common base. A lip 25 is formed about the edge of the member 22 and adapted to fit snugly over a lip 27 defining a valve seat aperture in the base of the cylinder 15. Through this arrangement a predetermined quantity of liquid will be caught by the cup-like member 22 when the bottle is moved to pouring position to force the valve positively to open position. Conversely, liquid returning through the valve structure will be trapped in the cup-like member 23 and force the valve positively back upon its seat.

The present invention contemplates an improved outer valve construction. While the operation of this valve is not essentially different from that disclosed in my aforementioned copending application, the embodiment herein provides a simplified arrangement. To this end an axially apertured thin disk 28 is provided with a depressed valve seat portion 29 adapted to fit closely within the mouth of the sleeve 15 and has a marginal portion 30 abutting the flange 17. A freely seating, gravity acting valve 32 which has a gently arcuate seating face is seated in the apertured depressed portion 29, the weight distribution of this valve being eccentrically disposed so that it will be unseated only after the outer end of the unit has been tilted below a predetermined point.

Unseating movement of the valve 32 is limited by a spider-leg cage 33 having an imperforate disk 34 overlying the valve in fixed spaced relation. Adhesion between the valve 32 and the disk 34 that might be induced by liquid or vacuum is prevented in the present instance by a series of inwardly extending arcuate beads 35 herein three in number formed in the disk in spaced relation to its periphery and adapted to be contacted by the edge of the valve. The end spacing between the beads insures that air may always enter between the contacting parts when the valve is intended to be returned to its seat. An outwardly projecting protuberance 37 of arcuate outer surface is formed medially of the disk 34 and serves together with the beads 35 to rigidify the disk. Moreover, this protuberance will prevent seating of a drill point when an attempt is made to drill through the disk. As may be seen in Fig. 3, the protuberance 37 is of an outline substantially triangular providing a plurality of points directed toward the spaces between the beads, that is, the marginal unreinforced areas of the top of the disk 34.

The fixed spaced relation of the disk 34 is maintained by a plurality of spaced, slightly diverging peripheral spider legs 38 having hook-shaped base flanges 39 joined on a radius with the legs and having angular ends 40. To receive the flanges 39, the marginal portion 30 of the valve seat disk has a series of lugs 42 struck outwardly therefrom and disposed to engage the base flanges 39 upon a slight turning movement of the housing relative to the seat disk. Each lug 42 is preferably fashioned to provide a notch 43, and the relationship of parts is such that when the spider legs are positioned, the ends 40 thereof will snap into the notches and permanently maintain a fixed position of the housing. If pressure is exerted against the protective disk 34, the spider legs will be caused to spread outwardly between the lugs 42 and the adjacent body of the seat disk margin, thereby binding the valve 34 against any movement whatever. Should the spider legs 38 for any reason fail to spread, then the disk 34 may itself give way between the beads 35 and collapse into a distorted mass.

Preferably the inner valve is suitably loaded as by a spring 44 in order to insure a normally seated sealing position thereof. As shown herein, this spring may be disposed between the sleeve base 20 and the inner face of the valve seat 29, and is adapted to urge the inner valve normally toward its seat. The tension of the spring is such that regardless of the position of the closure unit, the valve will remain seated except when a predetermined quantity of liquid has been trapped in the inner valve cup 22. This condition is shown in Fig. 4 wherein the closure is shown in pouring position with a predetermined quantity of liquid 45 supplying the necessary weight to overcome the spring tension.

A salient feature of the invention resides in an improved arrangement whereby all parts of the closure device are united into a compact, self-contained inseparable unit prior to the time the closure is affixed to the liquid container. In this manner the closure device may be assembled wherever or whenever desired and will constitute a complete entity ready to be secured to the liquid container by a simple operation. Improper assembly by inexperienced workers will thus be practically eliminated and the capping operation will be greatly simplified. Herein this purpose is accomplished by providing an exterior dome-like enclosing member 47 providing a substantial chamber 48 surrounding the outer valve cage or housing 33 and affording an unrestricted flow passage toward a capped spout 49 formed on its outer end. Intermediate its ends, the enclosing member 47 is provided with an offset shoulder 50 adapted to fit against the margin 30 of the seat disk member 28 in order to define a fixed position thereof within the member. A rib 51 may be formed in the enclosing member between the spout 49 and the shoulder 50 and serves to rigidify the member.

After all of the interior parts defining the inner and outer valves have been assembled and placed in position within the enclosing member, the parts are permanently united by forming a crimp 52 in any desired manner as by a spinning operation to clamp the flange 17 and the seat disk margin 30 against the shoulder 50. It will thus be observed that the flange 17 and seat disk 28 will be maintained in a fixed, permanent relation within a laterally projecting channel 53, one wall of which is formed by the shoulder 50 and the opposite wall by the crimped portion 52. In this manner the entire structure is joined into a compact inseparable unit which can be disassembled only by destroying the enclosing member 47.

When it is desired to unite the completed unit 10 with the container 13, the unit is placed upon the neck 12 with the cylinder 15 within the discharge opening thereof and the parallel encircling end of the enclosing member 47 surrounding

the head of the neck. Preferably a suitable gasket 54 is interposed between the end of the neck and the adjacent face of the flange 17 to provide a liquid tight joint, this gasket being of such thickness as to maintain a separated relationship between the flange and neck at least equal to the width of the crimp 52. A permanent union between the neck and unit is then effected by pressing the end of the enclosing member as by a spinning operation, into an annular groove 55 in the neck, thereby forming an anchoring shoulder 57. As an incident to the latter operation the edge of the enclosing member will be forced well within the curvilinear plane of the neck and it will be extremely difficult if not impossible to insert an instrument thereunder in an attempt to pry the same free.

In the modified form of the invention shown in Figs. 4, 5, and 6, the closure device embodies not only the non-refillable valve arrangement hereinbefore described, but also includes a temper-proof seal arrangement forming a unitary part of the completed closure unit and preventing removal of the discharge spout cap without visibly affecting the assembly. This end is attained in the present instance without materially affecting the interior arrangement of the device, but incorporates a slightly different exterior arrangement for the closure. For this purpose, the enclosing means for the assembly instead of being in one piece, comprises a plurality of parts, one of which is fashioned as a tapered pouring spout 58 terminating at its outer end in a discharge neck 59 of reduced diameter and adapted to receive a cap 60. The pouring spout has a body portion 62 surrounding the outer valve cage 33 in substantially spaced relation so as to provide a liquid flow chamber thereabout, and has a lateral flange 63 at its inner end adapted to overlie the outer face of the marginal portion 30 of the valve seat disk 28. An enclosing member 64 has a shoulder 65 engaging the flange 63 and defining the assembled position of the interior parts of the assembly. Beyond the shoulder the member is crimped as at 67 to provide a channel 68 within which the flange 17 and the flange 63 with the seat disk margin 30 therebetween are permanently maintained in fixed assembled relationship.

In the present instance means is provided which will prevent removal of the cap 60 without leaving a visible indication of such removal. To this end a thin, flexible sealing strip 69 is provided having an enlarged medial portion 70. This medial portion has an aperture 72 and is adapted to fit over the crown of the cap, the latter having a protuberance 73 adapted to fit within the aperture. The opposite ends of the strip are bent into engagement with the opposite sides of the body portion 62. In order to clamp the ends of the strip permanently in place, the enclosing member 64 is provided with a collar portion 74 having its edge turned inwardly toward the base of the discharge neck 59. This edge is turned over to form a stiffening bead 75 engageable with a shoulder 77 near the base of the discharge neck, and so arranged that when the shoulder 65 is brought into position relative to the flange 63, the bead will engage and firmly hold the ends of the sealing strip in position. Through this arrangement when the cap 60 is unscrewed from the discharge neck the ends of the sealing strip will either be withdrawn from their secured position, or the strip will break at its weakest point, thereby visibly indicating that the cap has been moved. Similarly as described in connection with the first described form of unitary closure device, the modified form is secured into a compact, inseparable unit with all parts properly adjusted and the device as a whole ready to be affixed to the liquid container.

From the foregoing, it will be apparent that the invention provides a small, neat closure device of few and simple parts, efficiently and compactly arranged for economical manufacture and assembly, and formed as a complete, inseparable unit which may be quickly and permanently secured to a liquid container without further adjustment. Reference is made to my copending applications Serial No. 758,257 filed December 19, 1934, and Serial No. 22,754 filed May 22, 1935, in which cases claims appear that are generic to the subject matter of the present application.

I claim as my invention:

1. In a non-refillable container closure unit including valve mechanism defining a liquid passage of unrestricted flow area in one direction and preventing a flow of liquid in the reverse direction, said mechanism including a cylindrical container dimensioned to fit within the neck of a liquid container and having laterally projecting engageable means arranged to overlie the rim of the neck, means defining a discharge opening of restricted proportions, means for closing said discharge opening against escape of liquid, sealing means disposed over said closing means and arranged to be visibly affected upon moving said closing means to unsealing position, and means engaging said engageable means and said sealing means for securing all parts of the assembly into a compact inseparable unit ready to be affixed to a liquid container.

2. In combination in a non-refillable container closure, means defining an inner valve adapted to fit within the discharge opening of a container; a laterally extending part on said means adapted to overlie the end of the container; means defining an outer valve including a freely seating, gravity valve member, a substantially flat centrally apertured member providing a valve seat for said valve member and a movement limiting cage over said valve member having a plurality of spider legs connected to said apertured member; the margin of said apertured member adjoining said laterally extending part; and means defining a chambered closure for said outer valve and having a part fixedly clamping together said adjoining laterally extending part and said apertured member and having an integral part for affixing the closure to the container.

3. In combination in a non-refillable device, means defining an inner valve adapted to fit within the discharge opening of a container; a laterally extending part on said means adapted to overlie the end of the container; means defining an outer valve including a freely seating, gravity valve member, a substantially flat centrally apertured member providing a valve seat and having lugs struck up therefrom adjacent its periphery and a movement limiting cage over said valve member having a plurality of spider legs connected to said apertured member by engagement with said lugs; the margin of said member adjoining said laterally extending part; and means defining a chambered closure for said outer valve and having a part fixedly clamping said laterally extending part to said apertured member.

4. In a non-refillable, tamper-proof closure device including a discharge opening and a cap closing said opening, means providing an inner

valve, means preventing access to said valve through said opening, each of said means including a part having a lateral flange with said flanges in adjoining relationship, a thin flexible sealing member over said cap and having ends extending from the crown of said cap toward said flanges, and enclosing means around both of said means with a part in engagement with and gripping the ends of said sealing member and having a part defining a channel engaging said flanges for permanently securing the entire assembly into a complete inseparable unit.

5. In a non-refillable valve attachment for preserving the purity and originality of the contents of a container, a cup-shaped valve-carrying member adapted to fit within the discharge opening of the container and with the mouth of said member opening outwardly, a metallic disk of greater diameter than said member resting against the margin of said member defining said mouth, said disk having an apertured depressed portion of a diameter to fit within said mouth and serving as an aid in assembly of the parts by defining the coacting relation of the disk to the container, a valve supported by and adapted to control the flow of material through said apertured depressed portion, and means permanently uniting the parts into an inseparable unit after assembly and prior to union with the container.

6. In combination in a device for preventing adulteration of the contents of a container, means for securing the device over the discharge opening of the container, means providing a discharge port from the device, an element providing a passage for material from the container to said discharge port, means within the device between said discharge port and said element for preventing access through said discharge port and said passage to the interior of the device but adapted to permit free passage of material outwardly through said passage and including an imperforate disk having a plurality of thin spider legs extending in one direction away from said discharge port and angularly relative to the disk, and means within the device for receiving the ends of said legs to maintain said disk in fixed operative position but permitting said legs to move laterally relative to the edge of the disk upon application of pressure through said discharge port to the outer face of said disk, whereby upon such movement of said legs said disk will be moved into obstructing relation to said passage.

7. In combination in a non-refillable valve device for attachment over the discharge opening of a container and having a discharge port, means providing a valve seat, a disk-shaped valve coacting with said seat and having a broad outer surface, a spider-leg cage enclosing said valve and confining the same to a limited range of movement from said seat, said cage including an imperforate abutment portion having a broad inner surface for receiving said valve when unseated and providing a shield between said valve said said discharge port, a discontinuous bead projecting inwardly from said inner surface of said abutment portion for maintaining a spaced relation between said outer surface of said valve and said inner surface to prevent liquid adhesion therebetween, and a protuberance of arcuate outer surface projecting outwardly from said abutment portion and serving to prevent seating of a drill or the like in an attempt to penetrate said abutment portion.

8. A device adapted to coact with the outlet of a container to permit discharge of fluid therefrom but interposing practical difficulty to a refilling operation comprising, in combination, a cup-shaped container adapted to fit within said outlet and having a lateral flange arranged to overlie the wall of the container defining said outlet, reciprocal valve means within said container, an apertured abutment member coacting with the mouth of said container to receive said valve means in the outermost limit of its reciprocal movement and including a part in engagement with said flange, a baffle member including a disk having a plurality of thin marginal legs extending transversely therefrom toward said abutment member to maintain the disk in spaced relation thereto and permitting liquid flow past said disk, a freely rotatable member confined within the area between said baffle member and said abutment member, and a shell enclosing said baffle member and having a portion intermediate its ends deformed after assembly of the parts and before application of the device to the container to bind the assembly into a permanent inseparable unit.

9. In combination in a closure device of the character described, a housing having therein valve means permitting flow in one direction only, a discharge spout opening from said housing, means for connecting the device to a container, a baffle structure between said spout and said valve means including a disk presenting an imperforate face to said spout and having a plurality of discontinuous marginal beads serving to reinforce the disk, unreinforced areas between the ends of said beads, and an arcuate-face protuberance on said face located to prevent seating of a drill through said spout and having a plurality of points extending laterally thereof toward said unreinforced areas.

10. In combination in a non-refillable bottle valve unit adapted to fit within a bottle neck of restricted proportions, cooperative valve means adapted to permit free discharge of liquid from the bottle but sealing said bottle against return of liquid, including a gravity valve, a support for said gravity valve, means including a plurality of thin spider legs forming a cage over said valve to permit movement thereof away from said support and having laterally extending ends, and means for securing the ends of said legs against said support laterally spaced from said valve.

11. In combination in a non-refillable bottle valve mechanism, an assembly including a thin metallic outer casing adapted for attachment to a bottle neck and defining a substantial chamber having a pouring spout, a pair of connected metallic elements having an annular portion in engagement with said casing and being maintained thereby in fixed position relative to said pouring spout, one of said elements having a central aperture and the other element having a thin centrally imperforate part substantially spaced from said one part and serving as a shield between said pouring spout and said aperture, spider legs extending from the edge of said imperforate part toward said one element to maintain a fixed spacing therebetween, and a gravity actuated valve adapted to seat over said aperture to prevent inflow of liquid through the mechanism and being movable from said aperture into engagement with said other element as an incident to tilting the mechanism below a horizontal position whereby to permit a discharge flow of liquid therethrough.

12. In combination in a non-refillable bottle valve mechanism, a compact assembly adapted to

be secured permanently to a bottle neck to permit discharge liquid flow but to prevent a return flow, comprising a valve seat member extending transversely across the flow passage through the mechanism and having a central aperture, a valve member coacting with said seat member to close said aperture against a return flow of liquid and having a flattened body of substantial diameter including a circumferential contact edge, said valve member being in slidable contact with said seat member and being adapted to shift transversely thereof as an incident to tilting movement of the mechanism, and a cage member for confining unseating movement of said valve member to a definite range and having spaced thin legs extending toward positions radially spaced from said contact edge when the valve member is in normally seated position during the non-pouring position of the mechanism and having parts so disposed with relation to said contact edge as to be engaged by the latter upon transverse shifting movement of the valve member to permit only limited movement and to prevent unseating of the valve member relative to said seat member during a defined interval in said tilting movement of the mechanism from non-pouring to pouring position, said cage member being adapted to receive said valve member fully when the mechanism has been tilted completely to pouring position or the weight of liquid forces the valve member away from its seat.

13. In a device for insuring the genuine character of the contents of a container, the combination of means providing a discharge opening, a member located substantially inwardly from said discharge opening and having an axial aperture for the passage of material from the interior of the container toward said discharge opening, and an element including a disk marginally spaced from the surrounding portion of the device interposed between said discharge opening and said aperture and thin legs extending radially and inwardly from the margin of said disk fixedly into position radially of said aperture and permitting free passage of material from said aperture around said disk to said discharge opening.

14. In a device for insuring the genuine character of the contents of a container, the combination of means providing a discharge opening, a member located substantially inwardly from said discharge opening and having an axial aperture for the passage of material from the interior of the container toward said discharge opening, an element including an annular plate interposed between said discharge opening and said aperture in marginally spaced relation to the surrounding portion of the device, thin supporting legs extending radially and inwardly from said plate fixedly into position radially of said aperture and permitting free passage of material from said aperture around said plate to said discharge opening, and means between said aperture and said plate of greater diameter than said aperture and movable relative to said plate to provide a barrier against entrance into the container through said aperture but permitting liquid flow thereby of the contents of the container.

15. A device adapted for permanent association with the discharge outlet of a container and including, in combination, a thin metallic member having thin legs extending radially therefrom and generally inwardly relative to the container, and flange means projecting laterally from the ends of said legs adapted for engagement in the assembly of the device to secure the member in a given position relative to said discharge outlet.

16. In a device of the character described, the combination of enclosing means providing a discharge opening and having an apertured transverse partition spaced inwardly from said opening, a relatively movable element between said partition and said opening permitting discharge through said partition toward said opening but providing a barrier to the passage of a drill or other tampering instrumentality through said partition, a cage for confining said movable element including legs extending inwardly and having laterally flanged ends abutting the margin of said partition, and means for securing said flanged ends to said partition.

17. In a mechanism for permanent association with the outlet of a container to preserve the genuineness of the contents thereof, the combination of a casing providing a chamber having a discharge port and being attachable in closing relation to said outlet, a disk element within said casing between said port and the interior of the container and having peripheral thin legs extending inwardly therefrom generally toward the container and adapted to straddle said outlet, engageable means projecting laterally from said peripheral legs, means engaging said engageable means for maintaining said disk element in a given operative position relative to said casing, and means for securing the whole assembly to the container.

18. In a device of the character described adapted for permanent connection to the outlet of a container, a casing having a discharge opening and having means for connection to the container, means enclosed by said casing including a valve permitting free discharge of material from the container but arranged to prevent reentry of material thereinto, a member engageable by said valve in one relative position of the parts and having a portion in the assembly of the device with the container overlying the margin of the container defining the outlet therefrom, a plate interposed between said valve and said discharge opening and having supporting means extending therefrom in a direction away from said opening, and means carried by said supporting means and projecting laterally from the latter for engagement with said overlying portion to secure the plate in a given position with respect to said outlet and with the inner part of said supporting means near the juncture of said casing with the container.

19. In a device for permanent association with a container, a metallic plate having a plurality of circumferentially spaced narrow peripheral legs extending toward one side of the plate, and laterally extending engageable means on the ends of the legs for connecting the legs to supporting means, said plate and legs together defining a cage capable of receiving a relatively movable part of a closure assembly.

20. In a device of the character described, means interposed in the flow path of fluid through the device including a fluid aperture, a thin metallic cage adjacent one side of said means including a plate having spaced, thin legs extending toward said means and anchored to maintain the plate fixedly disposed in spaced relation to said means, and a broad surface valve element within said cage coacting with said means to permit flow through said aperture in one

direction only, said valve element being movable in the unseating and seating movements thereof broadside to said plate and being engageable edgewise with said legs to restrict radial movement thereof relative to said aperture.

21. A device adapted to coact with the outlet of a container permitting discharge of fluid from the container and interposing practical difficulty to refilling the container comprising, in combination, means including a one-way-flow reciprocal valve, means providing an enclosure for said valve and having an axial discharge opening, means presenting an abutment between said valve and said discharge opening for limiting outward movement of the valve, a thin metallic baffle member between said abutment and said discharge opening, and a freely rotatable disk between said abutment and said baffle disposed to be engaged by drilling means or the like that may be passed through said baffle member.

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