

Dec. 10, 1957

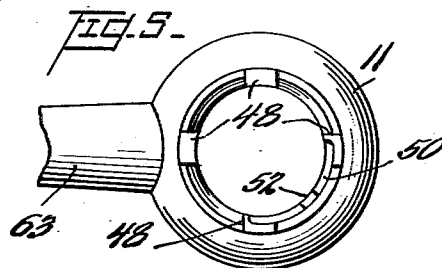
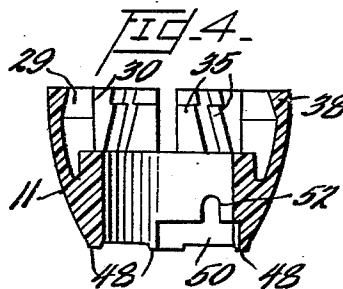
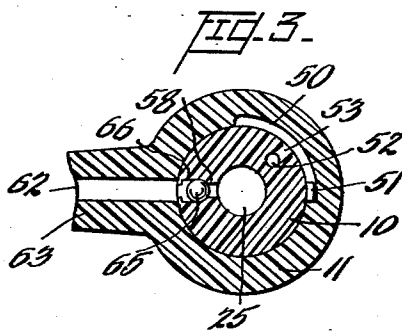
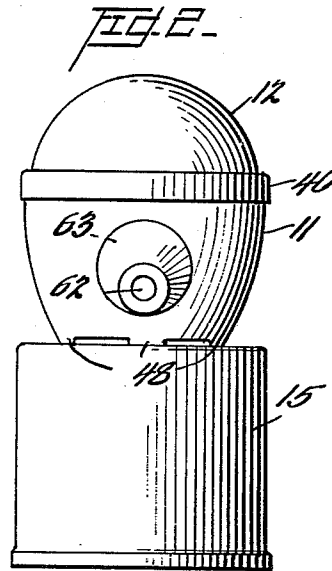
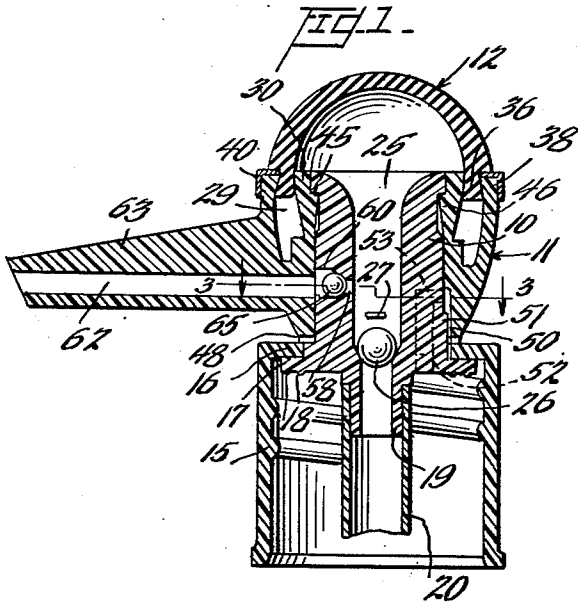
R. C. COOPRIDER ET AL

2,815,890

DISPENSER FOR LIQUIDS

Filed March 5, 1956

2 Sheets-Sheet 1



INVENTORS

BY *Rex C. Coopridier*
James U. Stewart,
Watson, Cole, Grindle & Watson
ATTORNEYS

Dec. 10, 1957

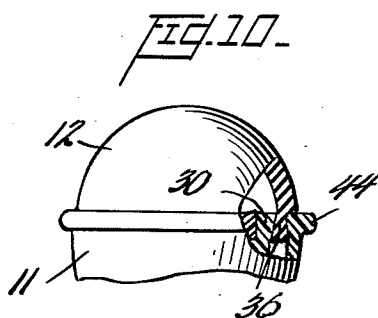
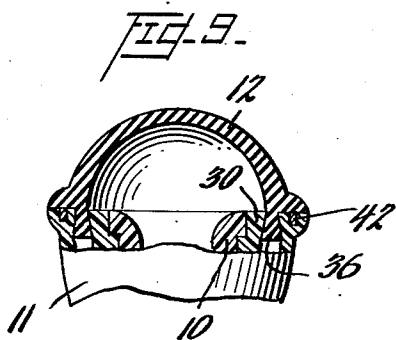
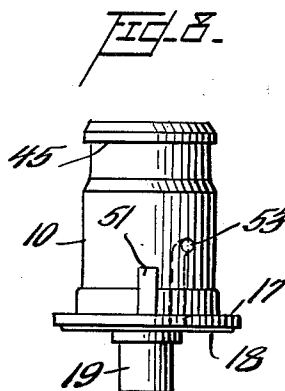
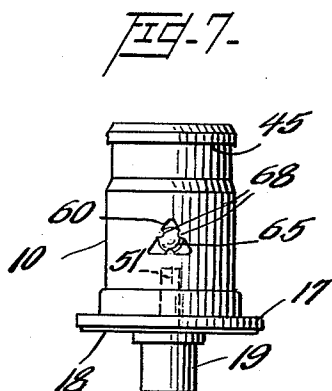
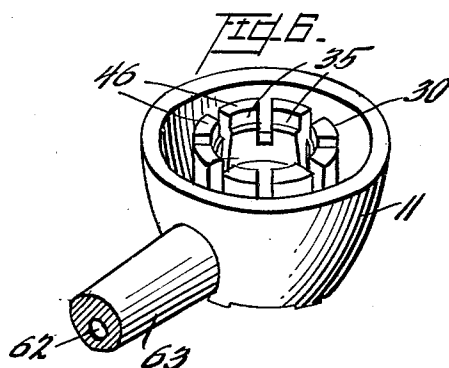
R. C. COOPRIDER ET AL

2,815,890

DISPENSER FOR LIQUIDS

Filed March 5, 1956

2 Sheets-Sheet 2



INVENTORS

Rex C. Coopridier
James U. Stewart,

BY *Watson, Cole, Grindle & Watson*

ATTORNEYS

1

2,815,890

DISPENSER FOR LIQUIDS

Rex C. Coopridger, Downey, and James U. Stewart, Whittier, Calif., assignors to The Drackett Company, Cincinnati, Ohio, a corporation of Ohio

Application March 5, 1956, Serial No. 569,459

11 Claims. (Cl. 222—207)

This invention relates to improvements in devices for dispensing liquids from containers and has for an object the provision of a dispenser of the character indicated which is economical to produce, consists of a minimum number of parts, is readily assembled, and characterized by ruggedness and unusual resistance to failure. It is a feature of the invention that the device embodies a minimum of moving parts, and to this end the preferred embodiment of the invention is a dispenser of the type employing a flexible diaphragm or the like, manually operable to supply the pressure required for discharge of the liquid contents of the container.

The invention finds its principal use in the dispensing or spraying of liquids from relatively small containers, adapted to be held in one hand and manipulated by a finger or thumb, for example in the spraying of glass cleaning fluid, deodorants, condiments or the like, it being appreciated that when it is desired to dispense the fluid in the form of a fine spray, conventional means may be employed to break up and/or vaporize the liquid particles.

More specifically, it is an object of the invention to provide a dispenser for liquids of the type in which pressure is supplied by flexure of a bulbous diaphragm, the diaphragm being secured in position and sealed to the associated members by mechanical gripping of the peripheral portion thereof, whereby the failure often experienced when sealing is effected through the agency of adhesives or the like is avoided.

In the preferred embodiment of the invention, the device comprises a body portion consisting of an outer member having therein an annular recess to receive the peripheral portion of the flexible diaphragm and an inner member so dimensioned that when inserted in the outer member, pressure is applied to the latter adjacent the annular recess to narrow the recess and thus to grip the diaphragm firmly therein. It is a feature of this construction that the assembled members are locked in position by the cooperative action of abutments or shoulders thereon, so as to prevent the retraction of the inner member after assembly thereof within the outer member.

A further object of the invention is the provision of means whereby the dispenser may readily be manipulated to close the vent and discharge openings thereof, so as to seal the container for storage and to prevent evaporation and leakage or spilling of the contents when the device is not being used. To this end, the outer member is arranged to be rotatable on the inner member so that discharge and vent openings in the two members, which openings are in registry during use of the dispenser, may be shifted to non-registering position to block the openings and seal the container with which the dispenser is associated.

A further object of the invention is to provide, in a dispenser of the general character indicated, a novel and simplified form of check valve means in association with the discharge opening, for the purpose of achieving economy in production and insuring efficient operation of the valve.

2

Further objects and features of the invention will be apparent from the following description, taken in connection with the accompanying drawings, illustrating a preferred embodiment of the invention, in which:

Figure 1 is a vertical section through a dispenser embodying various features of the invention;

Figure 2 is an elevation, viewed from one side, of the dispenser shown in Figure 1;

Figure 3 is a horizontal section on the line 3—3 of Figure 1;

Figure 4 is a vertical section of the outer member of the dispenser body;

Figure 5 is a bottom view of the outer member shown in Figure 4;

Figure 6 is a perspective view of the outer member of the dispenser body;

Figures 7 and 8 are elevations at opposite sides of the inner member of the dispenser body; and

Figures 9 and 10 are fragmentary views illustrating variant methods of reinforcing the outer member.

In order that the principles of the invention may be clearly understood, reference is made to the preferred embodiment shown in the drawings and specific language is used to describe the same. It will nevertheless be appreciated that the scope of the invention is not thereby intended to be limited, various alterations, modifications, and adaptations being contemplated such as would occur to one skilled in the art to which the invention relates.

Referring first to Figure 1 of the drawing, it will be perceived that the dispenser comprises essentially a body portion consisting of an inner member 10 and an outer member 11, a flexible bulbous diaphragm 12 of rubber or rubberlike synthetic resin or plastic, and inlet and discharge openings controlled by check valve means, whereby liquid may alternately be drawn into the body of the dispenser and discharged therefrom on manipulation of the flexible diaphragm. There is also provided a vent means whereby air may be admitted to the container to replace the withdrawn liquid.

The dispenser may be associated with the container in any convenient manner, for instance by mounting the dispenser body directly in an opening in an upper wall of the container. Ordinarily, however, the dispenser is associated with a bottle type of container having an externally threaded neck, adapted to receive an internally threaded cap 15, the cap having at its upper end an inwardly directed annular flange 16 defining a circular opening through which the lower end of the inner member 10 of the dispenser body extends. An outwardly directed flange 17 on the inner member 10 underlies the flange 16 on the cap 15, and is provided with a plurality of small annular ribs 18, so that when the cap 15 is screwed on the bottle neck, the flange 17 is pressed firmly against the upper edge of the bottle neck to effect a liquid tight seal therewith, necessitating the provision of separate vent passages to admit air to the interior of the fluid containing bottle, as hereinafter described.

Depending from the lower end of the inner member 10 of the dispenser body is a tubular boss 19 to which is secured an intake tube 20 extending downwardly into the container to a point below the level of liquid therein, preferably nearly to the bottom of the container. The boss 19 and intake tube 20 may be sealed together in any conventional manner, for instance by adhesive, or may be integrally formed. Flow of liquid upwardly in the intake tube 20 is controlled by a check valve to prevent the return of liquid withdrawn from the container. It will be appreciated that this check valve may be located at any point in the length of the intake tube 20, but it is preferred to associate the valve with the lower portion of the inner member 10, as shown in the drawing.

Thus the inner member 10, which is generally cylin-

3

drical in external contour, may be provided with a passage 25 extending therethrough, the lower end of the passage, which communicates with the boss 19, being narrowed to provide a seat for a check ball 26, the ball being shown in seated position in Figure 1, upward movement of the ball being limited by lugs or projections 27 extending inwardly from the wall of the passage and formed integrally with the inner member 10.

The outer member 11 of the dispenser body is generally annular shape and embraces the inner member 10, being rotatably mounted thereon for the purpose of sealing the container, as hereinafter described. The flexible diaphragm 12 is received in an annular recess 29 in the upper end of the outer member 11, being gripped therein by pressure applied to the inner wall 30 defining the recess.

This inner wall 30 may be expansible solely by virtue of suitable choice of material of which the outer member 11 is formed, but it is preferred to use for the purpose a material which is only mildly flexible, such as a polyethylene resin or other plastic material exhibiting both toughness and flexibility, and further to reduce its resistance to flexure by slitting or otherwise forming the inner wall 30 to provide a plurality of upstanding segments or fingers 35, shown more particularly in Figure 4. It is most convenient to form these flexible elements or fingers by casting rather than by slitting a continuous wall, but it will be appreciated that this is optional. Whatever the structure of the outer member 11 or its mode of formation, the outer diameter of the inner member 10 adjacent its upper end is such that as it is moved upwardly into assembled relation within the outer member 11, the inner wall 30 of the outer member 11 is flexed or distended outwardly to apply gripping pressure to the peripheral portion 36 of the flexible diaphragm 12, so as to retain the diaphragm securely in position without dependence on adhesives.

The outward pressure thus exerted to close or narrow the annular recess 29 in the outer member 11 must, of course, be resisted by the outer wall 38 defining the recess, and this outer wall 38 is therefore preferably reinforced, either by fitting thereon a retainer ring 40 of metal or of other rigid material, for instance a synthetic plastic such as a vinyl polymer having relatively high tensile strength, or by imbedding such a reinforcing ring in a recess formed in the upper edge of the outer wall 38 of the outer member 11 as shown at 42 in Figure 9. Depending on the nature of the material of which the outer member 11 is formed, it may suffice merely to provide a reinforcing bead or rib 44 on the periphery of the outer wall 38, for instance as shown in Figure 10. Preferably the material of the outer member 11 is also polyethylene resin, but this is in no sense critical.

To avoid unintentional withdrawal of the member 10 after assembly thereof in the outer member 11, there are preferably provided cooperating abutments or shoulders 45 and 46 on the inner member 10 and the outer member 11, respectively, these shoulders interlocking when the inner member reaches its uppermost position within the outer member, as shown in Figure 1. It will be appreciated that the several parts have sufficient elasticity to effectuate the interlock, whereupon withdrawal of the inner member 10 is precluded and the diaphragm 12 is securely locked in position in the annular recess in the outer member 11. To guard against slippage of the peripheral portion of the diaphragm 12, this portion may be slightly enlarged downwardly, the inner surfaces of the walls defining the recess 29 being conformably shaped so that the recess is narrowed toward its upper end.

Preferably the lower end of the outer member 11 seats on the upper face of the intumed flange 16 of the cap 15, but it is advisable to provide at this point for the influx of air into the container. To this end, a plurality of abutments 48 are provided at spaced points on the

4

lower edge of the outer member 11, these abutments being pressed firmly against the flange 16 of the cap 15 when the inner and outer members are assembled, so that the cap is retained with a snug fit on the body of the dispenser. Air may enter between the abutments 48 and may flow upwardly through a recess 50 in the inner surface of the outer member 11, the recess 50 being extended upwardly at 52 to communicate, when the dispenser is being used, with an opening 53 in the inner member 10, and thus with the interior of the container through passage 52. Recess 50, 52 and opening 53 may be placed in nonregistering relation by rotation of the outer member 11 on the inner member 10 as hereinbefore generally described, rotation being limited by lug 51, which projects outwardly from inner member 10 into recess 50.

Similarly, inner member 10 is provided with a discharge opening 58 communicating with an enlarged recess 60 of generally triangular shape, the recess 60 extending inwardly from the outer surface of the member 10. Recess 60 communicates in turn with an opening or passage 62, which may be formed in a discharge spout 63 integral with the outer member 11. Thus when the outer member 11 is rotated to place the vent passages 50, 53 out of registry, discharge openings 60, 62 will also be out of registry, whereby the container is sealed and leakage or evaporation of its contents is precluded.

A check ball 65, of a diameter only slightly smaller than the diameter of a circle tangent to the walls of the triangular recess 60, is received in the recess and seats in the opening 58 to prevent return of liquid and air into the dispenser body, being closely guided by the walls of the recess into the seated position to insure prompt action. Liquid discharges freely past the ball owing to the triangular shape of the recess. Adjacent the outer end of the recess 60 there are provided a plurality of integral projections or lugs 68, serving to retain ball 65 in the recess. Insertion of the ball may be effected by pressing the same past the projections 68, the material of which the inner member 10 is formed, for instance polyethylene resin, being sufficiently resilient to permit passage of the ball when forcibly inserted.

It will be appreciated that where spraying of the liquid is desired, appropriate modification of the discharge opening 62, for instance by the provision of a restricted orifice, may be effected without impairing the operation of the structure as hereinbefore described. Various other changes and alterations may readily be effected within the purview of the invention as defined in the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a device for dispensing liquid from a container, the combination with an inner member having a passage therethrough, an intake tube depending from said inner member and forming a continuation of said passage and adapted to extend into the liquid in the container, check valve means associated with said passage to prevent return of liquid to the container, a flexible bulbous diaphragm, an outer member embracing said inner member and securing said diaphragm in position above said inner member to provide a fluid chamber, said outer member having inner and outer annular portions defining therebetween an annular recess in which is received the peripheral portion of said diaphragm, the inner annular portion of said member comprising a plurality of separate elements free to flex at their upper ends, the outer diameter of said inner member being such as to flex said elements outwardly to grip the peripheral portion of said diaphragm between the inner and outer portions of said outer member when said members are assembled, said elements and the contiguous peripheral portion of said inner member having interlocking shoulders to prevent relative axial displacement of said inner and outer members upon assembly thereof, said inner member having a discharge open-

5

ing therein communicating with said passage, and check valve means associated with said discharge opening.

2. In a device for dispensing liquid from a container, the combination with an inner member having a passage therethrough, an intake tube depending from said inner member and forming a continuation of said passage and adapted to extend into the liquid in the container, check valve means associated with said passage to prevent return of liquid to the container, a flexible bulbous diaphragm, an outer member embracing said inner member and securing said diaphragm in position above said inner member to provide a fluid chamber, said outer member having inner and outer annular portions defining therebetween an annular recess in which is received the peripheral portion of said diaphragm, the inner annular portion of said member comprising a plurality of upstanding fingers free to flex at their upper ends, the outer diameter of said inner member being such as to press said fingers outwardly to grip the peripheral portion of said diaphragm between the inner and outer portions of said outer member when said members are assembled, said inner and outer members having registering discharge openings therein communicating with said passage, and check valve means associated with said discharge openings, said inner and outer members being provided with registering vent passages affording communication between the interior and the exterior of the container, said outer member being rotatable on said inner member to a position in which said discharge openings and said vent passages are out of registry to seal said container.

3. In a device for dispensing liquid from a container, the combination with an inner member having a passage therethrough, an intake tube depending from said inner member and forming a continuation of said passage and adapted to extend into the liquid in the container, check valve means associated with said passage to prevent return of liquid to the container, a flexible bulbous diaphragm, an outer member embracing said inner member and securing said diaphragm in position above said inner member to provide a fluid chamber, said outer member having inner and outer annular portions defining therebetween an annular recess in which is received the peripheral portion of said diaphragm, the inner annular portion of said member comprising a plurality of separate elements free to flex at their upper ends, the outer diameter of said inner member being such as to flex said elements outwardly to grip the peripheral portion of said diaphragm between the inner and outer portions of said outer member when said members are assembled, said inner member having a discharge opening therein communicating with said passage, and check valve means associated with said discharge opening.

4. In a device for dispensing liquid from a container, the combination with an inner member having a passage therethrough, an intake tube depending from said inner member and forming a continuation of said passage and adapted to extend into the liquid in the container, check valve means associated with said passage to prevent return of liquid to the container, a flexible bulbous diaphragm, an outer member embracing said inner member and securing said diaphragm in position above said inner member to provide a fluid chamber, said outer member being formed to provide an annular recess in which is received the peripheral portion of said diaphragm, the outer diameter of said inner member being such that when the inner and outer members are assembled, outward pressure is applied to the inner wall defining said recess to expand the inner wall, thereby to reduce the width of said recess and to grip said diaphragm therein.

5. In a device for dispensing liquid from a container, the combination with an inner member having a passage therethrough, an intake tube depending from said inner member and forming a continuation of said passage and adapted to extend into the liquid in the container, check valve means associated with said passage to prevent re-

6

turn of liquid to the container, a flexible bulbous diaphragm, an outer member embracing said inner member and securing said diaphragm in position above said inner member to provide a fluid chamber, said outer member being formed to provide an annular recess in which is received the peripheral portion of said diaphragm, the outer diameter of said inner member being such that when the inner and outer members are assembled, outward pressure is applied to the inner wall defining said recess to expand the inner wall, thereby to reduce the width of said recess and to grip said diaphragm therein, and annular means surrounding and reinforcing the outer wall defining said recess to prevent substantial expansion thereof.

6. In a device for dispensing liquid from a container, the combination with an inner member having a passage therethrough, an intake tube depending from said inner member and forming a continuation of said passage and adapted to extend into the liquid in the container, check valve means associated with said passage to prevent return of liquid to the container, a flexible bulbous diaphragm, an outer member embracing said inner member and securing said diaphragm in position above said inner member to provide a fluid chamber, said outer member having an annular recess in which is received the peripheral portion of said diaphragm, the outer diameter of said inner member being such that when said inner member is inserted in said outer member, the width of said annular recess is reduced to grip the peripheral portion of the diaphragm therein, and a reinforcing annulus encircling said outer member adjacent said recess to resist expansion thereof on assembly of said members.

7. In a device for dispensing liquid from a container, the combination with an inner member having a passage therethrough, an intake tube depending from said inner member and forming a continuation of said passage and adapted to extend into the liquid in the container, check valve means associated with said passage to prevent return of liquid to the container, a flexible bulbous diaphragm overlying said inner member to provide therewith a fluid chamber, and an outer member embracing said inner member, said inner and outer member having registering discharge openings therein communicating with said passage, and check valve means associated with said discharge openings, said inner and outer members being provided with registering vent passages affording communication between the interior and the exterior of the container, said outer member being rotatable on said inner member to a position in which said discharge openings and vent passages are out of registry to seal said container.

8. In a device for dispensing liquid from a container, the combination with an inner member having a passage for liquid therethrough, an outer member embracing said inner member, a flexible bulbous diaphragm mounted on said outer member and communicating with said passage to provide a variable volume fluid chamber, said inner and outer members having registering discharge openings therein communicating with said passage, and check valve means associated with said discharge openings, said inner and outer members being provided with registering vent passages affording communication between the interior and the exterior of the container, said outer member being rotatable on said inner member to a position in which said discharge openings and vent passages are out of registry to seal said container.

9. In a device for dispensing liquid from a container, a member formed to provide a passage for liquid and a discharge opening communicating with said passage, said opening comprising a generally triangular recess extending inwardly from the outer surface of said member, a check ball received in said recess with a slight clearance, whereby said ball is centered in said recess by the sides of the recess, said opening being reduced in size inwardly of said recess to provide a seat for said ball,

7

and lugs formed integrally with said member and projecting inwardly from each side of said recess adjacent the outer end thereof said lugs being spaced from said seat to retain said ball in said recess, the material of which said member is formed being sufficiently elastic to permit pressing said ball into said recess past said lugs.

10 In a device for dispensing liquid from a container, the combination with an inner member having a passage therethrough, check valve means associated with said passage to prevent return of liquid to the container, a flexible bulbous diaphragm, an outer member embracing said inner member and securing said diaphragm in position above said inner member to provide a fluid chamber, said outer member having inner and outer annular portions defining therebetween an annular recess in which is received the peripheral portion of said diaphragm, the inner annular portion of said member comprising a plurality of separate elements free to flex at their upper ends, the outer diameter of said inner member being such as to flex said elements outwardly to grip the peripheral portion of said diaphragm between the inner and outer portions of said outer member when said members are assembled, said inner member having a discharge open-

8

ing therein communicating with said passage, and check valve means associated with said discharge opening.

11 In a device for dispensing liquid from a container, the combination with an inner member having a passage therethrough, check valve means associated with said passage to prevent return of liquid to the container, a flexible bulbous diaphragm, an outer member embracing said inner member and securing said diaphragm in position above said inner member to provide a fluid chamber, said outer member being formed to provide an annular recess in which is received the peripheral portion of said diaphragm, the outer diameter of said inner member being such that when the inner and outer members are assembled, outward pressure is applied to the inner wall defining said recess to expand the inner wall thereby to reduce the width of said recess and to grip said diaphragm therein.

References Cited in the file of this patent

UNITED STATES PATENTS:

1,303,708	Moffitt	May 13, 1919
1,520,502	Lundblad	Dec. 23, 1924
2,690,278	Bocheller	Sept. 28, 1954