Jan. 27, 1953 J. G. CAMPBELL 2,626,606

EYE BATH DEVICE

Filed Feb. 23, 1951

2 SHEETS—SHEET 1

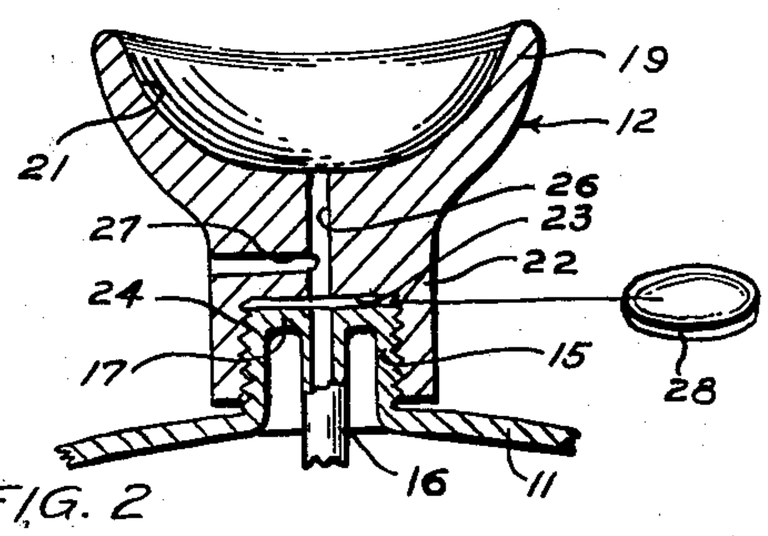


FIG. 2

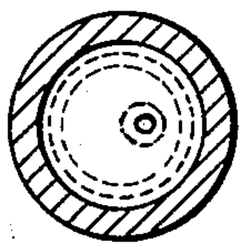


FIG. 3

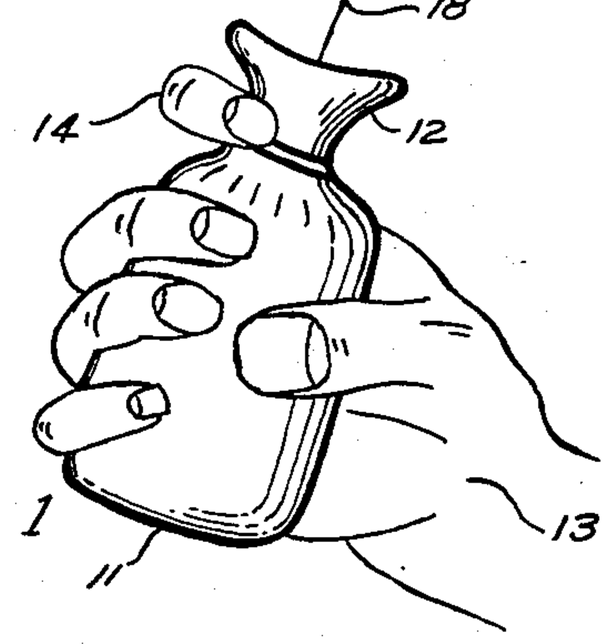


FIG. 1

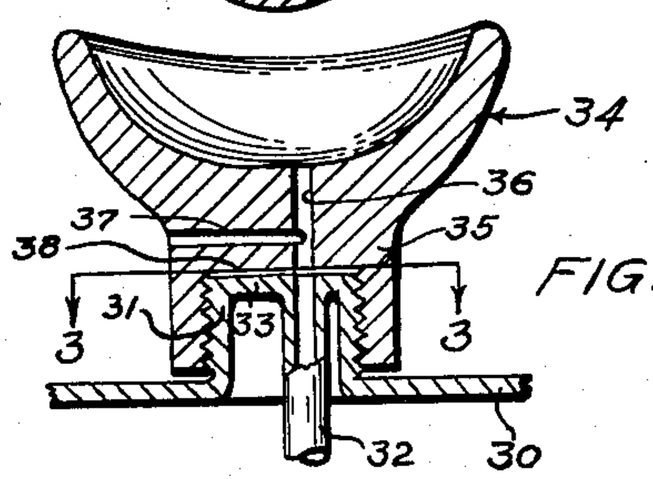


FIG. 4

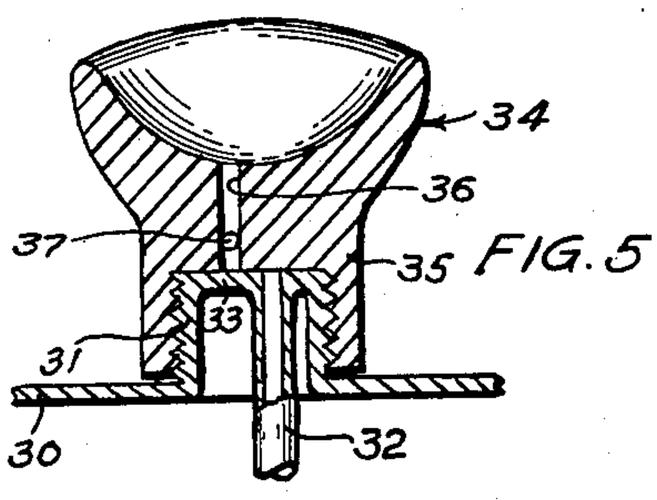


FIG. 5

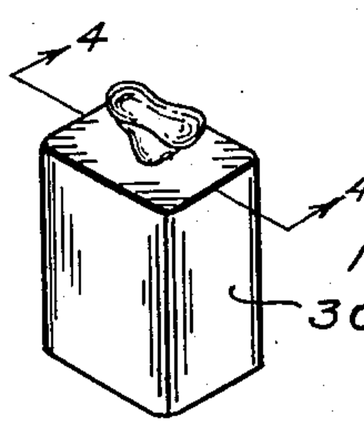


FIG. 6

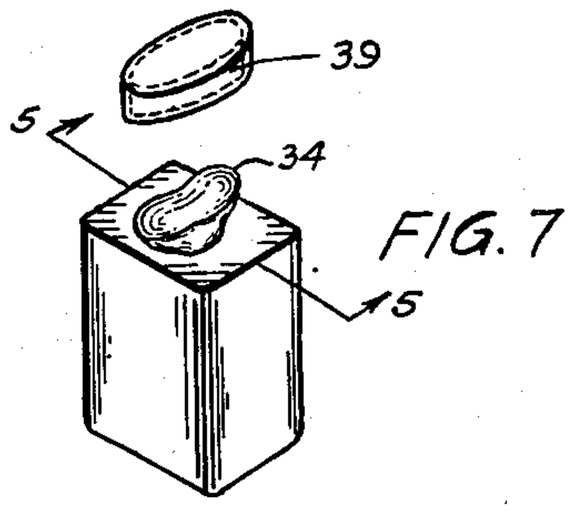


FIG. 7

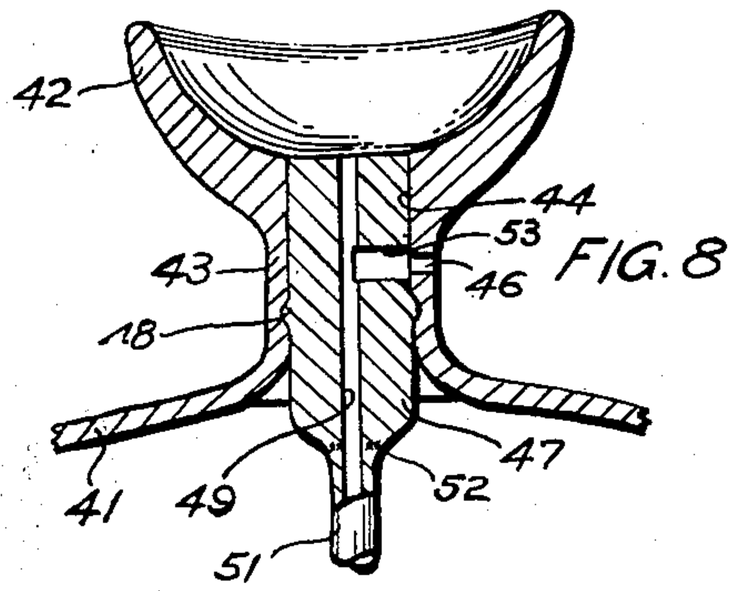


FIG. 8

FIG. 9

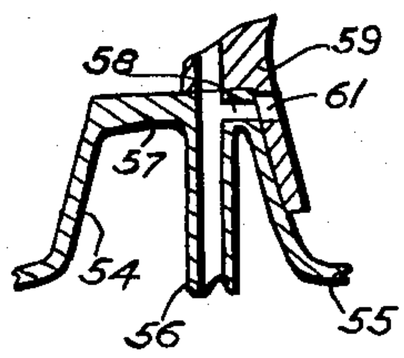
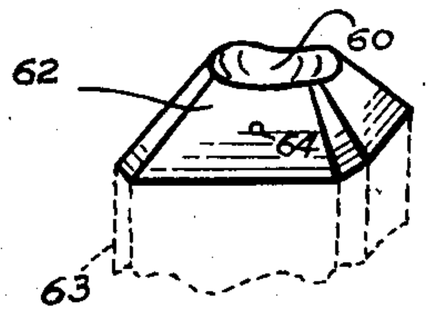


FIG. 10



INVENTOR.
JOSEPH G. CAMPBELL
BY H. W. Brelsford
ATTORNEY

Jan. 27, 1953 J. G. CAMPBELL 2,626,606

EYE BATH DEVICE

Filed Feb. 23, 1951 2 SHEETS—SHEET 2

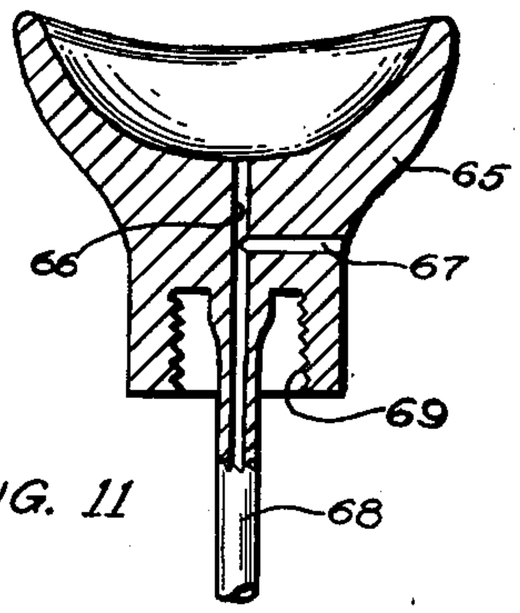


FIG. 11

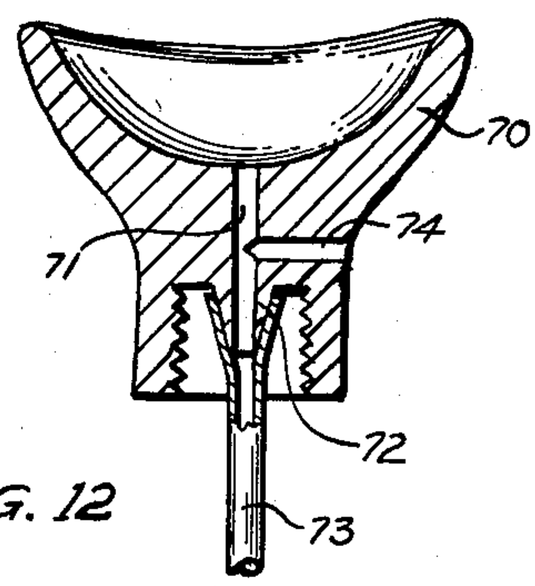


FIG. 12

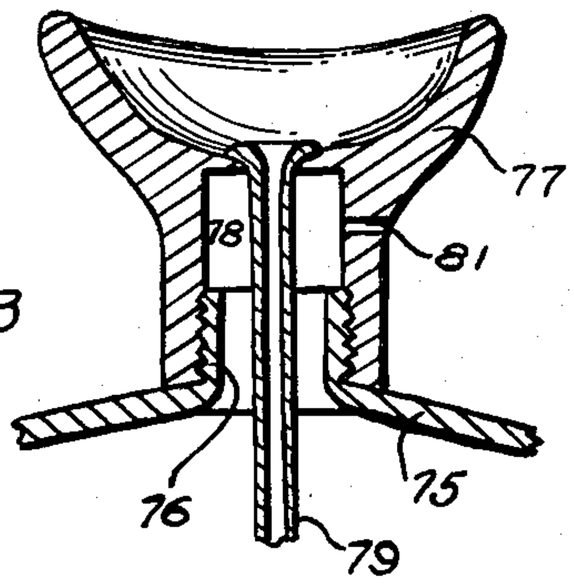


FIG. 13

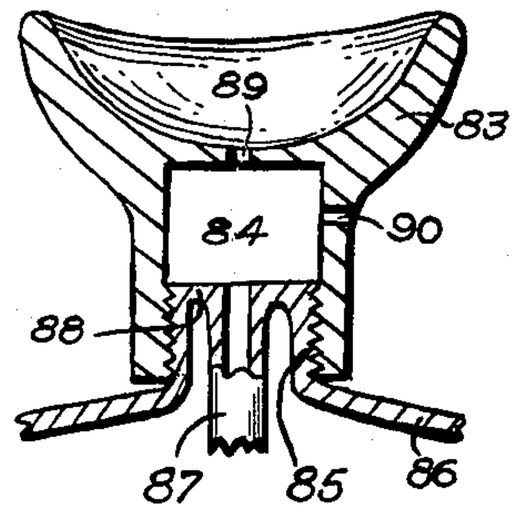


FIG. 14

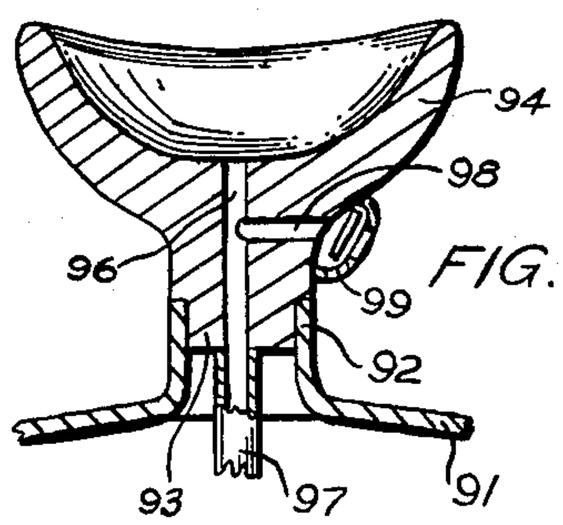


FIG. 15

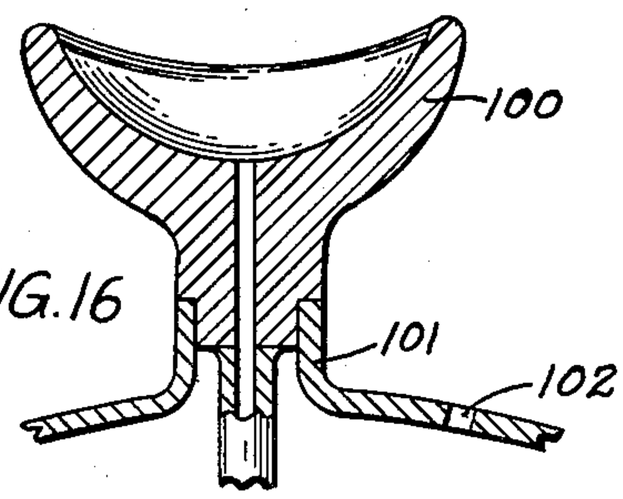


FIG. 16

INVENTOR.
JOSEPH G. CAMPBELL
BY H. W. Bradford
ATTORNEY

Patented Jan. 27, 1953

2,626,606

UNITED STATES PATENT OFFICE

2,626,606

EYE BATH DEVICE

Joseph G. Campbell, Santa Barbara, Calif.

Application February 23, 1951, Serial No. 212,465

19 Claims. (Cl. 128—249)

1

This invention relates to eyecups and has particular reference to an eyecup that may be placed on a flexible bottle and relates further to the combination of such eyecups with bottles constructed to receive them.

The bathing of eyes by the use of eyecups is often inconvenient due to the physical separation of the eyecup and the container for the bathing liquid. Eyecups have been combined in the past with containers providing a unitary structure that is more convenient to use than two separate items. For example, eyecups have been attached to rubber syringes so that squeezing the syringe results in forcing liquid from the syringe into the eyecup. These prior art devices have not proved to be satisfactory. Thus release of pressure on the container sucks dirty liquid back in the container to contaminate the bulk of the liquid. Additionally, such devices have been expensive to manufacture and thus have not been available to the purchasing public generally.

It is a principal object of the invention to provide an improved eyecup and container combination that is reliable and sanitary in operation, yet simple and inexpensive in construction.

Another object is to provide an improved self filling eyecup for use with flexible containers.

Still another object is to provide a combined eyecup and container self filling combination that may be simply locked against leakage so that the combination may be portable, for example by carrying in ladies' purses.

Still another object is to provide a vented filler passage for eyecups so that opening of the vent prevents fluid from returning to the container.

Other objects and advantages of the invention will be apparent in the following description and claims considered together with the accompanying drawing forming an integral part of this specification and in which:

Fig. 1 is a view of a combined container and eyecup embodying the invention and being operated by a manual grasp to force liquid into the eyecup;

Fig. 2 is a view in full section through the neck of the container of Fig. 1 and through the eyecup of Fig. 1;

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 4;

Fig. 4 is a view in full section of a modified form of the invention;

Fig. 5 is a sectional view of the same container top and eyecup of Fig. 4 wherein the eyecup is rotated 90°;

2

Fig. 6 is a perspective view of the container supporting the eyecup of Fig. 4;

Fig. 7 is a perspective view of the container supporting the eyecup of Fig. 5 and showing it rotated 90° thereon;

Fig. 8 is a sectional view through a container top and eyecup of still another modification of the invention;

Fig. 9 is a sectional view through the neck of a container with a fragmentary showing of an eyecup member of still another modification;

Fig. 10 is a perspective view of still another type of eyecup embodying the invention.

Figs. 11, 12, and 13 are views in full section of three different types of eyecups that can be used on any type of container.

Fig. 14 is a view in full section through an eyecup and container providing a vent chamber.

Fig. 15 is a view in full section of an eyecup sealed to a container to provide a non-refillable combination.

Fig. 16 is a view in full section of an eyecup and container wherein the vent passage is in the container.

Referring to Fig. 1 there is illustrated a container or bottle 11 to which is secured an eyecup 12. The container 11 is preferably of flexible pliant material, for example, of organic plastic material such as rubber, rubber compounds, vinyl compounds, or polyethylene, or any other suitable material. Such containers are widely used commercially and include a tube sealed across the neck of the container and extending to the bottom thereof so that squeezing of the bottle will cause an increase in hydrostatic or pneumatic pressure to project liquid or other contents from the container.

The invention may employ such commercially available containers if desired and there is provided an eyecup for use on such a container particularly in accordance with the invention.

Referring to Fig. 2 there is illustrated the container 11 having a neck portion 15 which may be externally threaded if desired and which may have a tube 16 sealed across the neck 15 by means of a web 17. Thus the tube 16 may form the only outlet for the entire container 11. The eyecup 12 may be provided in accordance with the invention and may include a body portion 19 defining an eyecup shape 21. A shank 22 may be secured to the body member 19 and may be internally recessed as at 23 and the inner edges of the recess may be threaded as at 24.

A fluid flow passage 26 is provided in the eyecup 12 which is adapted to communicate directly

with the tube 16. Accordingly, pressure on the flexible bottle or container 11 will cause liquid to be projected through the tube 16 into the passage 26 to fill the cup 21.

While pressure on the flexible container 11 will force fluid into the cup, release of the pressure on the bottle normally allows it to return to its free state causing a suction which would return the liquid of the cup into the container. It is discovered, however, that the surface tension of most eyewash liquids is sufficiently high so that liquid will not flow downwardly through the passage 26 if the tube 16, or the container is properly vented to atmosphere. Accordingly therefore, there is provided a vent passage 27 which may be selectively opened or closed by placement of the finger of the user over this passage.

Operation

The operation of the combined container and eyecup of Figs. 1 and 2 is as follows: the user may grasp the bottle 11 with his hand 13 and may apply pressure thereto. This creates an increase in hydrostatic pressure if the container is completely full of liquid or if partly full, provides an increase in pneumatic head. This causes liquid to flow through the tube 16, which may extend to the bottom of the container 11. The liquid may flow upwardly through the tube 16 and through the registered passage 26 into the bowl 21 of the eyecup 12.

To prevent liquid from running out of the vent 27 the user may place an index finger 14 over the outer end of the vent passage 27 and thus cause all flow to shoot upwardly through the passage 26. This flow accordingly may form a gentle stream or fountain 18 which will fall back into the bowl 21 to create a pool of liquid. When the bowl is sufficiently full the user may cease applying pressure to the container 11 and may thereupon lift the index finger 14 off of the vent passage 27 allowing atmospheric air to flow into the vent passage. Thereafter, elastic or hydrostatic return of the container 11 to its normal shape will cause a suction of air through the vent passage 27 into the lower portion of the flow passage 26 through the tube 16 to bubble up through the liquid to occupy the upper part of the container 11. Thereafter the eyecup may be used in a normal manner.

The surface tension of most eyewash liquids is so great that there will be no flow of liquid back down the passage 26 if it is properly vented to atmosphere. It is discovered, for example, that the passage 26 may be as large as 1/64 of an inch in diameter without any return flow and may even be slightly larger. Thus the liquid which has been contaminated by use will not flow back into the container when the combination is properly used and a sterile supply will be kept at all times within the container 11.

As a variation in the use or operation the user may apply the eyecup directly over the eye before applying pressure. Squeezing of the bottle 11 will then cause the stream 18 to impinge upon the eyeball itself to assist in any washing of the eye. It is discovered that even unusual pressure will not cause a stream through a passage of 1/64 of an inch that will give rise to any discomfort or injury to the eye. When sufficient liquid has been accumulated in this manner the eyecup may then be used in the usual customary fashion by inverting the entire container and eyecup combination while holding it in contact with the eye region, assuming, of course, that the head is tilted backwardly.

When the combined container and eyecup of Figs. 1 and 2 is to be shipped, or if it is to be carried on the person, a sealing disc 28 may be placed between the neck 15 and the bottom of the recess 23 and the eyecup 12 screwed tightly thereon to prevent escape of liquid. When the device is to be used the disc 28 may be either punctured or removed. Alternatively, the openings of the vent 27 and the passage 26 may be taped to prevent escape of liquid.

Modification

Referring to Figs. 4, 5, 6, and 7 there is illustrated a modified form of the invention wherein sealing of the container is effected by rotation of the cup on the container. There is illustrated a flexible container 30 which may be of rectangular cross section if desired as compared to the circular cross section of the container of Fig. 1. The container 30 may have a neck 31 which may be externally threaded if desired and a fluid tube 32 may be sealed across the neck 31 by a web 33, but the outlet of the tube 32 may be off center with respect to the neck. An eyecup 34 may have a shank portion 35 which may have a recess 38 which may be internally threaded to fit on the neck 31. A passage 36 may connect the inside of the bowl of the cup 34 with the interior of the shank recess and as illustrated in Fig. 3 may be aligned with the tube 32. A vent passage 37 may pass outwardly through the shank 35 to communicate the fluid passage 36 to atmosphere.

The flow passage 36 is also placed off center with respect to the recess 38 which may be circular in cross section. Therefore, if the eyecup 34 is rotated any substantial amount the tube 32 and the flow passage 36 will become misaligned and when the eyecup is screwed tightly to seal on the web 33, flow from the tube 32 will be positively shut off. Thus the eyecup itself may form its own rotary valve with respect to the container 30. This rotation of the eyecup is illustrated in perspective in Figs. 6 and 7 wherein the section lines are indicated. Also illustrated in Fig. 7 is a dust cap 39 which may be placed over the eyecup 34 to keep it in a clean condition when it is not in use. This dust cap may be made of any suitable material such as the same pliable plastic from which the container is made.

The eyecups of Fig. 2 or 4 may be formed of any desired material. If they are formed of pliable plastic they will form a watertight joint with the neck even though the threads are not accurately formed. If the eyecup is formed of a hard material such as a thermosetting plastic they may be of such size as to compress the threads of the neck of the resilient container and thus effect positive sealing in this manner. Also the cups could be made of metal or any other acceptable material.

Illustrated in Fig. 8 is a modified form of the invention wherein a container 41 and an eyecup 42 may be formed as a single unitary structure with a communicating neck or shank portion 43 being formed with a relatively large opening 44 to facilitate manufacture of the combination. Thus the entire container and eyecup may be formed of suitable material such as polyethylene, vinyl, etc. The neck or shank 43 may be apertured as at 46 to provide a vent. A tubular plug 47 may be inserted in the opening 44 and this plug may have projections 48 thereon to grasp the interior of that opening to more se-

curely lock it in position. The plug 47 may have its passage 49 aligned with a tube 51 which may be integral with the plug 47 or which may be thermally welded to the plug as at 52. The plug may have a transverse cut 53 intercepting the passage 49 and this cut may be of large area so that the registration of the plug with the vent aperture 46 will not be critical in assembly.

The device of Fig. 8 functions in the same manner as the prior devices and the top of the plug 47 also acts as part of the bottom of the eyecup 42. The use of the unitary container and eyecup simplifies manufacturing and the plug type of tubular insertion permits the filling of the bottle before final assembly. The device of Fig. 8 may be sealed for shipment by inserting a long plug into the passage 49 or openings 46 and 49 may be taped.

Illustrated in Fig. 9 is a modification of the device of Figs. 4 through 7 wherein a neck portion 54 of a container 55 may be angular in cross section instead of circular. Thus the neck 54 may have a triangular, square, hexagonal, or other symmetrical shape which will permit the placing of an eyecup thereon at different angular positions. Thus a tube 56 may be sealed across the neck by a web 57 and this web may be sufficiently thick to permit the forming of a vent passage 58 therethrough. A removable eyecup member 59 shown in fragmentary illustration may have a vent passage 61 therein to register with the web vent passage 58 when the eyecup is positioned as illustrated. To seal flow from the passage to the eyecup the eyecup may be manually lifted off of the neck 54, which may be tapered, to facilitate sealing action. The new positions may then be used at which point the passages of the tube 56 and of the eyecup 59 will be misaligned and the web vent passage 58 will be sealed off.

Illustrated in Fig. 10 is still another modified form of the invention illustrating its capabilities with respect to design freedom. Accordingly, an eyebowl 60 may be formed in a pyramidal structure 62 which may be fitted on a container 63 shown in broken outline. A vent passage 64 may serve its usual function.

Illustrated in Figs. 11, 12 and 13 are eyecups embodying the invention which may be used on containers of any type. They may also be used repeatedly on different containers or on the same container and permit refilling of a container. These eyecups, therefore, may be referred to as universal types.

Referring to Fig. 11 an eyecup 65 may have a central passage 66 intercepted by a vent passage 67 and a tube 68 may be secured to the bottom of the passage 66 to extend to the bottom of a container. Suitable means for fastening to a container may be provided as for example, threads 69.

Illustrated in Fig. 12 is an eyecup 70 having its shank centrally relieved or recessed. A central aperture 71 may extend from the bottom of the cup bowl into the recess and may terminate in a tubular projection 72. A tube 73 for example of flexible material may be stretched over the projection or nipple 72. A vent passage 74 may connect the flow passage 71 to atmosphere.

Illustrated in Fig. 13 is a container portion 75 having an externally threaded neck 76 upon which may be threaded an eyecup 77 having a large central recess 78. A tube 79 may be sealed to the bowl of the eyecup to communicate the

bottom of the bowl to the bottom of the container 75. A vent passage 81 vents the recess 78 to atmosphere. The arrangement of Fig. 13 provides direct communication from the interior of the container 75 to atmosphere. The chamber 78 will normally be filled with air and thus ready flow to the interior of the container will be maintained. The container, of course, is preferably flexible and the vent 81 may be selectively closed by the finger of the user.

Illustrated in Fig. 14 is an eyecup wherein the length of the flow passage into the cup bowl is very short to prevent capillary action. Accordingly, an eyecup 83 may have an internally threaded recess 84 by means of which the eyecup may be secured to a projecting neck 85 on a container 86. A tube 87 may be sealed to the neck by a web 88. A flow aperture 89 may be provided in the bottom of the bowl of the eyecup to communicate the bowl with the recess 84. A vent passage 90 may communicate the recess to atmosphere.

In operation, squeezing the container 86 of Fig. 14 forces fluid through the tube 87 into the recess 84 and hence through the passage 89 into the bowl of the eyecup 83 when the vent passage 90 is closed. After the bowl is filled opening the vent passage 90 permits air to enter and the fluid will recede down the tube 87 allowing air to fill the recess 84. Inasmuch as the wall thickness between the bottom of the bowl and the top of the recess 84 may be small, for example of the same order as the diameter of the hole 89, there will be very little capillary action and little tendency of fluid in the bowl to creep down the flow passage 89.

Illustrated in Fig. 15 is a container 91 having a neck 92 into which may be inserted a shank portion 93 of an eyecup 94. A flow passage 96 may communicate the bottom of the bowl to a tube 97 extending toward the bottom of the container 91. A transverse passage 98 may be provided to communicate the flow passage 96 to atmosphere and if desired, a check valve 99 may be provided at the outer end of the vent 98 for automatic action.

The eyecup of Fig. 15 may be sealed to the neck 92 by heat welding, adhesive, or other means and accordingly once the contents of the container 91 are consumed, refilling is difficult, if not impossible. This prevents re-use of the container which is important in prescription use, preserving trademarked quality, etc. The user needs merely to squeeze the container 91 which causes the valve 99 to close forcing fluid into the bowl of the eyecup 94. Release of squeezing pressure permits air to unseat the check valve 99 permitting flow through the passage 98 to relieve all pressure within the tube 79 and the flow passage 96.

Fig. 16 illustrates an eyecup 100 sealed to a flexible bottle 101 having a vent 102 on an upper wall of the bottle.

Various modifications will be apparent to those skilled in the art. For example, the dust cap 39 of Fig. 7 may be kept in place while the bottle is squeezed and the dust cap will deflect the jet downwardly into the eyecup. Thus the eyecup may be quickly filled in this fashion and the dust cap 39 removed when the eyecup is to be used. The vent, of course, will be closed during the squeezing action. As mentioned previously, various materials may be used including soft plastics, hard plastics, metal and other structural materials. Various modifications in structure may also be employed. The vent hole is preferably

larger than the flow passage and if the flow passage is 1/64 of an inch in diameter, the vent passage may be 1/32 of an inch. For these reasons the application is not ilimited to the specific embodiments illustrated nor limited in any other way, but includes all modifications and variations as fall within the true spirit and scope of the invention.

I claim:

1. An eye bath device comprising: a flexible container; an eyecup connected to the container; a tube extending into the container adjacent to the bottom and communicating the exterior to the interior thereof; a flow passage connecting the exterior end of the tube to the interior of the cup, said tube and passage forming a fluid flow conduit; and a vent passage connecting said conduit to atmosphere.

2. An eye bath device as defined in claim 1 wherein the vent passage connects with the flow passage.

3. An eye bath device as defined in claim 1 wherein the vent passage connects with the interior of the tube.

4. An eye bath device comprising: a flexible bottle having a projecting angular neck; a tube sealed across the neck but off center therefrom and projecting into the bottle adjacent to the bottom; an eyecup having an angular shank recessed at its outer end and a passage extending off center from said shank recess to the interior of the cup; and a vent in said shank communicating the passage to atmosphere, said cup being moveable to different angular positions on said neck to align and misalign the passage and tube to communicate and seal off flow respectively.

5. An eye bath device comprising: a flexible container and an eyecup formed as a single unitary structure with a passage communicating the interior of the cup and the interior of the container; a vent communicating the passage to atmosphere; and a tubular plug inserted in the passage and having a tubular portion extending into the container adjacent to the bottom thereof and having a cut out portion to register with the vent to communicate the interior of the passage to atmosphere.

6. An eye bath device comprising: a closed container and an eyecup formed as a unitary structure from pliable organic plastic and having a passage communicating the interior of the container with the interior of the eyecup; a vent through the wall of said passage to communicate it to atmosphere; a tubular plug press fitted in said passage and having projections to more effectively grip the passage and having a transverse aperture to register with the vent; and a tube connected to the plug and projecting in the container toward the bottom thereof.

7. An eye bath device comprising: a flexible bottle; an eyecup positioned on the top of the bottle; a conduit communicating the interior bottom of the bottle and the bottom of the eyecup; and a vent to atmosphere for the interior of said bottle.

8. A device as defined in claim 7 wherein the vent opens into the conduit.

9. A device as defined in claim 7 wherein the vent is in an upper wall of the bottle.

10. A device as defined in claim 1 wherein the container has a tube whose inside diameter is larger than the passage and the vent is in the eyecup.

11. A non refillable container and eyecup combination comprising: a flexible container having a neck; an eyecup sealed to the neck and having a bowl; a conduit extending from the bottom of the container through the neck to the bottom of the eyecup to communicate the interior of the bowl to the bottom of the container, and a vent to atmosphere for said conduit adjacent to said bowl.

12. The combination of: a flexible bottle having a circular projecting neck and an off center tube sealed to the neck as the only outlet for the bottle and extending to the bottom of the bottle; and an eyecup having a body member defining an eyecup bowl, a shank formed on the body and having a circular recess to fit over the circular neck, a passage extending from the interior of the recess but off center the same amount as the tube to the interior of the bowl, and a vent to the exterior of the shank for said passage, whereby said eyecup may be rotated to align the tube and passage for operation, and may be rotated to misalign the tube and passage to seal off flow.

13. The combination of: a flexible bottle having an annular projecting neck and an off center tube sealed in the neck as the only outlet for the bottle and extending to the bottom of the bottle; and an eyecup having a body member defining an eyecup bowl, a cylindrical shank formed on the body and having a passage extending from the outer end of the shank to the interior of the bowl but off center by the same amount as the tube in the neck, and a vent to the exterior of the shank for said passage, whereby said eyecup may be rotated to align the tube and passage for operation, and may be rotated to misalign the tube and passage to seal off flow.

14. The combination of: a flexible bottle having a non circular neck and an off center tube sealed to the neck as the only outlet for the bottle and extending to the bottom of the bottle; and an eyecup having a body member defining an eyecup bowl, a shank formed on the body and having a non circular outline that mates with the non circular neck at two different angular positions, an off center passage in the shank to the bottom of the bowl, and a transverse vent in the shank communicating the passage to atmosphere.

15. The combination of: a flexible bottle having a non circular neck, an off center tube sealed to the neck as the only outlet for the bottle and extending to the bottom of the bottle, and a transverse passage in the neck of the bottle venting said tube to atmosphere; and an eyecup having a body member defining an eyecup bowl, a shank formed on the body member and having a non circular recess in the end thereof that fits over the neck at two different angular positions on the neck, an off center passage in the shank extending from the recess to the bottom of the bowl, and a transverse hole in the shank that aligns with the neck vent at one angular position when the tube is aligned with the shank passage, whereby positioning the eyecup on the neck at the other angular position seals off flow from the tube and seals off the vent passage in the neck.

16. The combination of: a flexible container having an outlet with a tube sealed to the outlet that extends to the bottom of the container; and a non-capillary eyecup having a body member defining an eyecup bowl and having a thin bottom, an aperture through said bowl bottom having a diameter of the same order of size as the thickness of the thin bottom, means for securing the bowl to the outlet to communicate the tube and the aperture, and a vent for communicating

the apertured bottom of said bowl to atmosphere.

17. A device as defined in claim 7 wherein the vent opens to the interior of the bottle that is outside of the conduit.

18. A device as defined in claim 7 wherein the vent is located in the eyecup.

19. A device as defined in claim 1 wherein the tube is attached to the eyecup.

JOSEPH G. CAMPBELL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
158,224	Stephens	Dec. 29, 1874
747,525	Willis	Dec. 22, 1903
1,000,001	Holz	Aug. 8, 1911
1,944,901	Mock	Jan. 30, 1934
2,067,268	Hans	Jan. 12, 1937
2,080,268	Harris	May 11, 1937