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SQUEEZE BOTTLE

Fred R. Johnson, deceased, late of Kansas City, Mo., by Virginia R. Krogssdale, executrix, Raytown, Mo., assignor to Sta-Safe Corporation, Kansas City, Mo., a corporation of Missouri

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This invention relates to squeeze bottles for containing fluids to be dispensed in a mist or spray, and has for its principal object to provide a fluid seal for safely retaining the fluid and which functions to release the fluid upon squeezing of the bottle.

Other objects of the invention are to provide a bottle with a rupturable diaphragm which is held in place by an orifice plug that closes the neck of the bottle; to provide a seal for the orifice plug that connects the bottle, diaphragm material and orifice plug in a unit for preventing displacement and possibility of leakage; to provide a diaphragm capable of rupture under a predetermined squeezing pressure on the bottle; to provide an orifice plug having a cavity into which the diaphragm ruptures and in which the ruptured portion is retained to prevent interference with flow through the orifice of the plug; and to provide means to retain the orifice plug prior to sealing-in thereof and to supplement the unitary seal.

In accomplishing these and other objects of the invention as hereinafter pointed out, improved structure has been provided, the preferred form of which is illustrated in the accompanying drawing, wherein:

FIG. 1 is a perspective view of a squeeze bottle constructed in accordance with the present invention and showing the manner of use to dispense the contents in a forceful stream for a considerable distance.

FIG. 2 is a longitudinal sectional view through the bottle, showing rupture of the safety diaphragm under pressure applied to the walls of the bottle, and showing the contents of the bottle being ejected.

FIG. 3 is a perspective view of the body of the bottle, the diaphragm material, and the orifice plug, prior to assembly and shown in spaced apart relation.

FIG. 4 is a similar view, but showing the orifice plug and diaphragm material pressed into the neck of the bottle and prior to sealing of the orifice plug and diaphragm material to the neck of the bottle.

FIG. 5 is a vertical section through the completed bottle, and showing the protective cap removed therefrom.

FIG. 6 is an enlarged sectional view through one side of the neck of the bottle, to better illustrate the position and retention of the rupturable diaphragm.

Referring more in detail to the drawings:

1 designates a squeeze bottle constructed in accordance with the present invention and which may be used for containing various types of contents that may be ejected in a spray or mist form upon squeezing of the walls of the bottle. The body 2 of the bottle may be of any suitable shape, but the bottle illustrated has a shape that conveniently fits the palm of the hand, as shown in FIG. 1, whereby the invention is especially adapted as a personal bodyguard device for repelling thugs, robbers, and individuals tending to do harm to the user thereof.

The body 2 has an annular wall 3 of generally circular cross section and curving from a closed bottom 4 to a neck 5 at the upper end of the bottle. The neck 5 has a cylindrical bore 6 in connection with the interior of the bottle and through which the bottle is filled with a fluid 7. The exterior of the neck 5 has a thread 8 for attaching a closure cap 9. The closure cap 9 is of usual construction in that it has an annular wall 10 provided

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with internal threads 11 and a closed top 12 seating a gasket 13 within the cavity of the cap. In conformity with the present invention, the top annular face 14 of the neck 5 is preferably flat, as shown, and the inner cylindrical face 15 thereof may have an annular depression or groove 16 inset from the face 14, for purposes later described.

The bottle 1 and cap 9 thus described are of generally conventional design, and the bottle is constructed of a flexible and tough plastic material having a high tensile strength, such as polyethylene, that is capable of retaining its shape but which is yieldable under pressure applied to the walls of the bottle for forcibly displacing the contents therefrom. It is also desired that the material selected be capable of fusion to seal in an orifice plug 17 and a frangible filmlike diaphragm 18 that constitute important parts of the present invention, and which also are formed of plastic material corresponding to the material of the bottle, so that they may be fused together by heat.

The plug 17 has a flanged head 19 forming a projecting annular shoulder 20 with a generally cylindrical body portion 21. The body portion 21 has a diameter near the shoulder 20 slightly less than the diameter of the bore 6 in the neck of the bottle, to accommodate the thickness of the diaphragm material firmly therebetween. The body portion 21 tapers slightly inwardly and terminates in an annular bevel 22. The body portion 21 may also have a slight annular rib 23 near the upper end in a position to match with the groove 16 when the parts are in assembly. However, it is understood that the rib and groove may be omitted, since in most instances the fit of the plug 17 within the neck of the bottle may suffice to anchor the plug with the diaphragm therein.

The body portion 21 of the orifice plug 17 has a recess 24 opening through the lower end thereof to leave an annular wall 25. The recess 24 terminates at the head portion of the plug, to leave a wall thickness to adequately withstand the pressure of the fluid under squeezing pressure and to accommodate an orifice 26. The wall 25 of the orifice plug 17 has a thickness to be stiff enough to support the diaphragm 18, as later described, but to be sufficiently resilient to act in the manner of a stopper when the parts are assembled into the neck of the bottle.

The frangible diaphragm 18 may be formed from a strip of film 27 having the desired thickness and tensile strength to rupture under a predetermined pressure. A portion of the strip is pressed into the neck of the bottle by insertion of the orifice plug 17, so that a part 28 thereof is stretched across the open end of the recess 24 of the orifice plug to constitute a rupturable portion anchored by the part 29 of the film strip that is gripped between the outer surface of the body portion of the orifice plug and the inner face 15 of the bottle neck, as shown in FIGS. 2, 5 and 6. On insertion of the plug, the annular rib 23 thereon presses the film strip into the annular groove 16 at the time the shoulder on the orifice plug seats a part 30 of the film firmly against the annular end face 14 of the neck, to hold the film therebetween under pressure. The film is now in the condition illustrated in FIG. 4, with margins of the strip extending loosely from the neck of the bottle.

In order to further anchor the orifice plug and to heat seal the shoulder of the orifice plug to the portion 30 of the film, and the film to the face 14 of the neck of the shoulder, and also fuse away the projecting portions of the film, the neck of the bottle is brought into contact with a heater element 31, shown diagrammatically in FIG. 6, to supply the necessary heat for bonding the portions together by causing the materials to melt suffi-

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ciently to intermingle and fuse together, in order to obtain a strong bond.

In using the bottle, for example, by the distributor of the bodyguard device, the bottle is filled with the fluid 7 substantially up to the neck 5 of the bottle. A film strip 27 is brought across the neck of the bottle and pushed into the bore 6 by the orifice plug 17 until the shoulder 20 of the orifice plug seats the part of the film 30 against the end face 14, as shown in FIG. 4. When in this position, the rib 23 pushes the film into the groove 16, as best shown in FIG. 6. The orifice plug is then heat sealed by fusing the shoulder 20, part 30 of the film, and the face 14 of the neck of the bottle together.

After removal of the heat and cooling of the fused portions, a closure cap 9 may be applied to the threaded neck of the bottle. However, the orifice 26 is closed by the diaphragm 18 of the film that is stretched across the mouth of the recess 24, so that as long as the diaphragm is intact none of the fluid can escape from the bottle.

In using the device, the closure cap 9 is removed and the bottle 1 is held in the palm of the hand to apply a squeezing pressure on the wall 3 of the bottle, as indicated by the arrows 32 in FIG. 2, so that the pressure on the fluid causes the stretched portion 28 of the diaphragm to bulge within the recess and to burst or fracture sufficiently for the fluid to discharge through the orifice 26 as long as the squeezing pressure is maintained and the fluid is emptied from the bottle. The fluid is discharged in a mist or spray 33 under force to carry a substantial distance. Such fluids are usually of a type to cause temporary impairment of vision in an assailant, and to leave a stain or dye on the skin or clothing by which the assailant is readily identified.

While the invention is especially adapted for a personal bodyguard device, it is obvious that the bottle may be used for containing any type of fluid which is to be dispensed in a mist or spray form, without departing from the spirit of the invention.

From the foregoing, it is obvious that a squeeze bottle has been provided with a safety diaphragm automatically rupturable to discharge a spray upon application of a certain squeezing pressure to the wall of the bottle, and in the absence of such squeezing pressure the frangible diaphragm safely retains and prevents escape of the fluid through the orifice even when the bottle is carried without the cap 9. It is also obvious that the recess is of ample size for the diaphragm to bulge therein to the

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bursting or rupture point without interference with flow through the orifice 26.

What is claimed and desired to be secured by Letters Patent is:

1. A plastic squeeze spray bottle having a neck provided with a top annular face encircling a cylindrical bore in said neck through which the bottle is filled with a fluid, a plastic plug having a head portion provided with a spray orifice and having a projecting annular shoulder overlying said annular face of the neck, said plug also having a body portion extending from said head into the bore of said neck and provided with a recess of substantially larger size than the spray orifice and opening through the inner end of the body portion of the plug, a diaphragm of plastic film material stretched across said inner end of said body portion of the plug to provide a closure to said orifice and which is frangible under squeezing pressure on the bottle, said diaphragm having a portion extending between the body portion of the plug and the neck and terminating in a portion pressed between the annular face of the neck and the annular shoulder of the head, and a seal securing the head and neck of the bottle to said pressed portion of the diaphragm for retaining the diaphragm in stretched condition across the recess and securing the plug from displacement after the bottle has been filled with fluid, said recess in the plug providing space for the stretched portion of the diaphragm to bulge inwardly of said recess and to rupture under said squeezing pressure without interference to flow of the fluid through said orifice.

2. A squeeze spray bottle as described in claim 1, wherein the neck has an inner circumferential groove and the plug has a circumferential rib pressing said diaphragm into said groove.

3. A squeeze spray bottle as described in claim 1, in which said seal constitutes fusion of the diaphragm with said head of the plug and the neck of the bottle.

References Cited in the file of this patent

UNITED STATES PATENTS

54,201	Pike	Apr. 24, 1866
1,409,544	Hallock	Mar. 14, 1922
2,783,091	Haldy	Feb. 26, 1957
2,957,501	Holmes	Oct. 25, 1960
3,029,987	Gronemeyer	Apr. 17, 1962
3,071,294	Galbierz	Jan. 1, 1963