(12) PATENT
(19) AUSTRALIAN PATENT OFFICE

(11) Application No. AU 199854583 B2
(10) Patent No. 728336

(54) Title

Single-use flexible container

(51)[6] International Patent Classification(s)
B65D 001/09 A61J 001/06

(21) Application No: 199854583

(22) Application Date: 1997.11.25

(87) WIPO No: WO98/25829

(30) Priority Data

(31) Number	(32) Date	(33) Country
60/032632	1996.12.09	US

(43) Publication Date : 1998.07.03
(43) Publication Journal Date : 1998.09.03
(44) Accepted Journal Date : 2001.01.04

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(56) Related Art

US 3993223
AU 32780/71
GB 832056

OPI DATE 03/07/98 APPLN. ID 54583/98
AOJP DATE 03/09/98 PCT NUMBER PCT/US97/21647
AU9854583

(51) International Patent Classification 6 : B65D 1/09, A61J 1/06 | A1

(11) International Publication Number: WO 98/25829

(43) International Publication Date: 18 June 1998 (18.06.98)

(21) International Application Number: PCT/US97/21647

(22) International Filing Date: 25 November 1997 (25.11.97)

(30) Priority Data:
60/032,632 9 December 1996 (09.12.96) US

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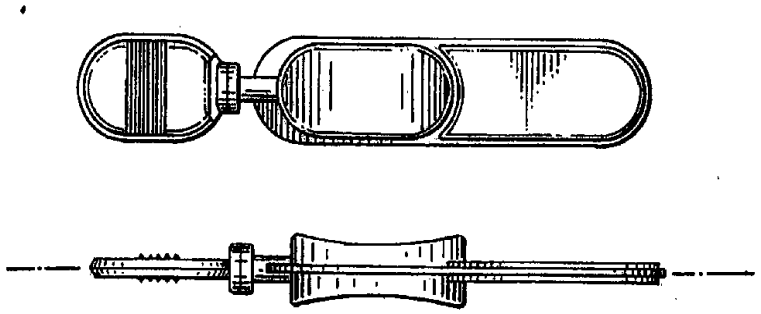
(81) Designated States: AL, AU, BB, BR, BY, CA, CU, EE, ES, FI, GB, HU, IL, JP, KE, KG, KP, KR, MD, MK, MN, MW, NO, NZ, PL, PT, RU, SE, SI, SK, TJ, TR, TT, UA, UZ, VN, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: SINGLE-USE FLEXIBLE CONTAINER



(57) Abstract

A single-use container (10) including: a vessel (12) for holding liquid wherein the vessel includes two opposing engagement surfaces (20, 20'), a removable seal top (16) for sealing the vessel, and a neck portion (14) interconnecting the vessel and the seal top, and wherein the improvement comprises the engagement surfaces of the vessel having a concave surface provided along the longitudinal axis of the container.

SINGLE-USE FLEXIBLE CONTAINER

FIELD OF THE INVENTION

The present invention is a single-use container useful for storage and dispension of small quantities of liquids. The subject container is particularly useful for dispensing sterile, preservative-free formulations, such as those used in single dose eye drop applications.

BACKGROUND

Single-use containers are commonly used for providing small quantities of sterile, preservative-free liquids, e.g. lubricating eye drops. Commercial examples of such containers are used in the following products: Dry Eye Therapy® Lubricating Eye Drops from Bausch & Lomb; Tears Naturale Free® and Bion® Tears Lubricating Eye Drops from Alcon; Celluvisc® and Refresh Plus™ Lubricating Eye Drops from Allergan; OcuCoat™PF Lubricating Eye Drops from Storz Opththalmics; and Hypo Tears® PF Lubricating Eye Drops from IOLAB.

Such containers are typically molded from low density polyethylene using form-fill seal or blow-fill seal technology. The containers include: a vessel portion for containing a small quantity of liquid, (e.g. typically from 0.1 to 3.0 ml), a twist-off seal top for sealing liquid within the vessel, and a neck portion interconnecting the seal top and vessel. To dispense liquid from the container, the seal top is bent, twisted or otherwise broken from the neck. The vessel is then squeezed between the finger tips to force liquid from the vessel and through the neck portion where droplets are formed. Once the liquid has been dispensed, the container is discarded.

A significant drawback to current single-use containers is they are not adapted for engagement between the finger tips, (e.g. between the forefinger finger tip and the finger

tip of the thumb or other finger). That is, the outer surface of the vessel is egg-shaped, cylindrical, or wedge-shaped. As a consequence, when squeezing the vessel of current containers, the vessel tends to slip away from the opposing pressure of the finger tips. This problem is compounded with containers employing thicker vessel walls which are not easily deformed by squeezing. This situation is further compounded for persons suffering with arthritis or those otherwise having compromised hand and finger strength.

Another problem with current containers is the difficulty of removing the seal top. In order to avoid seal breakage during shipping and storage, the wall thickness of containers can be significant, thus making the seal tops difficult to remove. This problem is compounded by the small size of the seal top and its relatively smooth surface.

OBJECT OF THE INVENTION

It is an object of the present invention to overcome or ameliorate some of the disadvantages of the prior art, or at least to provide a useful alternative.

SUMMARY OF THE INVENTION

There is firstly disclosed herein a single-use container comprising a vessel for holding liquid wherein the vessel includes two opposing engagement surfaces, a removable seal top for sealing the vessel, and a neck portion interconnecting the vessel and the seal top, wherein each engagement surface of the vessel has a concave surface along the longitudinal axis of the container which corresponds to the rounded surface of the finger tips so that the vessel is self-centering between one's finger tips while being squeezed therebetween, and wherein the seal top comprises two opposing engagement surfaces with a plurality of ridges provided on at least one of the engagement surfaces of the seal top.

There is further disclosed herein a method of applying drops of a liquid to an eye employing a single-use container comprising a vessel for holding the liquid, a removable seal top for sealing the vessel, and a neck portion interconnecting the vessel and the seal top, wherein the vessel comprises two opposing engagement surfaces each having a concave surface along the longitudinal axis of the container which corresponds to the rounded surfaces of the finger tips so that the vessel is self-centered between one's finger tips while being squeezed therebetween, and wherein the seal top comprises two opposing engagement surfaces with a plurality of ridges provided on at least one of the engagement surfaces of the seal top.

The present invention, at least in a preferred embodiment, provides a single-use container having greater ease of dispension, and which is more easily opened.

The present invention, at least in a preferred embodiment, provides a single-use container including: a vessel for holding liquid wherein the vessel includes two opposing engagement surfaces, a removable seal top for sealing the vessel, and a neck portion interconnecting the vessel and the seal top. In order to provide greater ease of dispension, the engagement surfaces of the vessel are specifically adapted for engagement between the finger tips. More specifically, the engagement surfaces of the vessel are concave, (along the longitudinal axis of the container), thus trapping the vessel between the finger tips as the vessel is squeezed. The concave surface preferably extends the entire length of the vessel and where the axial center is closest to the longitudinal axis.

The seal top of the subject container is also preferably provided with two opposing engagement surfaces. In order to provide a container which is easier to open, at least one, and preferably both engagement surfaces of the seal top are provided with a plurality of ridges, thus providing a surface which is easier to grip between the finger tips.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a top view of the subject single-use container;

Figure 2 is a side view of the subject single-use container;

Figure 3 is a front view of the subject single-use container;

Figure 4 is a rear view of the subject single-use container;

Figure 5 is a perspective view of the subject single-use container;

Figure 6 is a top view showing several container attached laterally forming a strip;

Figure 7 is a side view showing the container being opened; and

Figure 8 is a side view showing the container opened and liquid being dispensed therefrom.

DETAILED DESCRIPTION OF THE INVENTION

As indicated above, the present invention is a single-use container useful for storing and dispensing small quantities of liquids. Although the subject container is particularly useful for dispensing sterile, preservative-free formulations, such as those used in single dose eye drop applications, the subject container may also be used with other liquids, e.g. dyes, adhesive, medicines such as those administered orally, ear drops, nasal drops, and the like. The subject container is particularly well suited for providing introductory or promotional sample size quantities of liquids.

With reference to the Figures, the subject container is generally shown at 10, including a vessel 12, neck 14, seal top 16, and tab 18. With most applications, the vessel 12 is designed to hold small quantities of liquid, i.e. typically from about 0.1 to 3 milliliters; however, vessels for accommodating larger quantities of liquid may be used. The vessel 12 includes two opposing engagement surfaces 20, 20' which are designed to accommodate the surface of one's fingers tips, thus making the container easier to hold and squeeze. As best shown in Figures 2, 7, and 8, the engagement surfaces 20, 20' have concave surface (provided along the longitudinal axis A of container) which corresponds to the rounded surface of the finger tips. Consequently, the vessel 12 is self-centering between ones finger tips while being squeezed therebetween, rather than sliding away as with outwardly rounded, egg-shaped, cylindrical, or wedge-shaped vessels.

The seal top 16 is relatively flat and includes two opposing engagement surfaces 22, 22' which are designed to be grasped between the finger tips. During removal, the seal top 16 is bent, twisted, and removed from the neck 14. This process is best shown in Figure 7. In order to provide for greater ease of removal, at least one and preferably both engagement surfaces 22 ,22' are provided with a plurality of ridges or ribs 24. These ribs 24 permit the engagement surface(s) 22, 22' to be easier grasped, (i.e. the engagement surface is less smooth), thus permitting the seal top 16 to be more easily removed. Similarly, although not shown, such ribs may be used on the engagement surfaces 20, 20' of the vessel 12.

As previously indicated, the container 10 may further include a flat tab portion 18 extending longitudinally from the vessel 12, opposite the seal top 16. As shown in Figure 6, multiple containers 10 may be connected laterally by attaching the tabs 18 of each container 10 to form a strip, generally shown at 26. This is usually accomplished during manufacturing wherein several containers 10 are made simultaneously, in lateral arrangement, as indicated in Figure 6. With respect to eye drop applications, strips 26 including four or five containers 10 are packaged. When needed, a single container 10 is removed from the strip 26 by grasping the tab 18 and tearing the intended container 10 from the strip 26.

Unlike prior art containers which include sharp corners at the end of the tab, the subject container 10 includes a tab 18 having a rounded corner, shown at 28. Thus, the subject container is less likely to catch on articles and may be easily stored in pockets of clothing. Furthermore, the subject rounded end 28 of the tab 18 provides an area, best shown as 30 in Figure 6, which is not attached to adjacent containers during form-fill manufacturing. This area 30 provides a self-starting location for easing the removal of individual containers 10 from the strip 26.

Many modifications and variations of the instant invention are possible in light of the above teachings. It is therefor, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

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The claims defining the invention are as follows:-

1. A single-use container comprising a vessel for holding liquid wherein the vessel includes two opposing engagement surfaces, a removable seal top for sealing the vessel, and a neck portion interconnecting the vessel and the seal top, wherein each engagement surface of the vessel has a concave surface along the longitudinal axis of the container which corresponds to the rounded surface of the finger tips so that the vessel is self-centering between one's finger tips while being squeezed therebetween, and wherein the seal top comprises two opposing engagement surfaces with a plurality of ridges provided on at least one of the engagement surfaces of the seal top.

2. The single-use container of claim 1 wherein the seal top further comprises a plurality of ridges on the two opposing surfaces.

3. The single-use container of claim 1 and claim 2 wherein the concave surface extends the entire length of the vessel.

4. The single-use container of any one of claims 1 to 3 wherein the axial center of the concave surface is closest to the longitudinal axis.

5. A method of applying drops of a liquid to an eye employing a single-use container comprising a vessel for holding the liquid, a removable seal top for sealing the vessel, and a neck portion interconnecting the vessel and the seal top, wherein the vessel comprises two opposing engagement surfaces each having a concave surface along the longitudinal axis of the container which corresponds to the rounded surfaces of the finger tips so that the vessel is self-centered between one's finger tips while being squeezed therebetween, and wherein the seal top comprises two opposing engagement surfaces with a plurality of ridges provided on at least one of the engagement surfaces of the seal top.

6. A single-use container, substantially as herein described with reference to any one of the embodiments of the invention shown in the accompanying drawings.

7. A method of applying drops of a liquid to an eye employing a single-use container, said method substantially as herein described with reference to any one of the embodiments of the invention shown in the accompanying drawings.

Dated 11 October, 2000

Bausch & Lomb Incorporated

Patent Attorneys for the Applicant/Nominated Person

SPRUSON & FERGUSON

FIG. 1

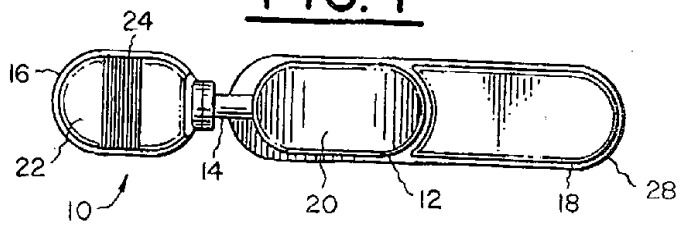
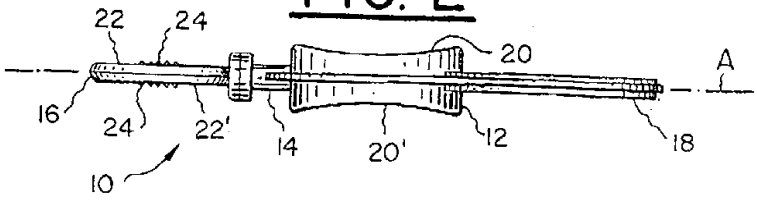


FIG. 2



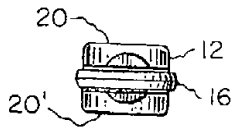
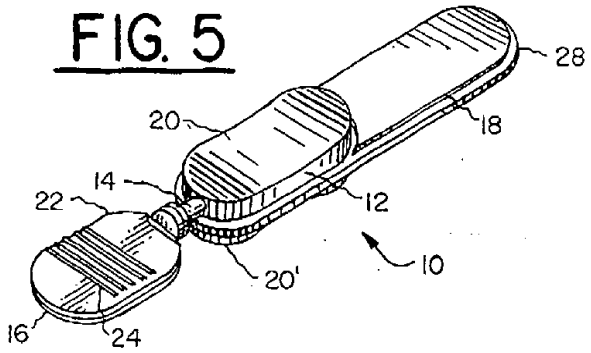


FIG. 3

FIG. 4

FIG. 5



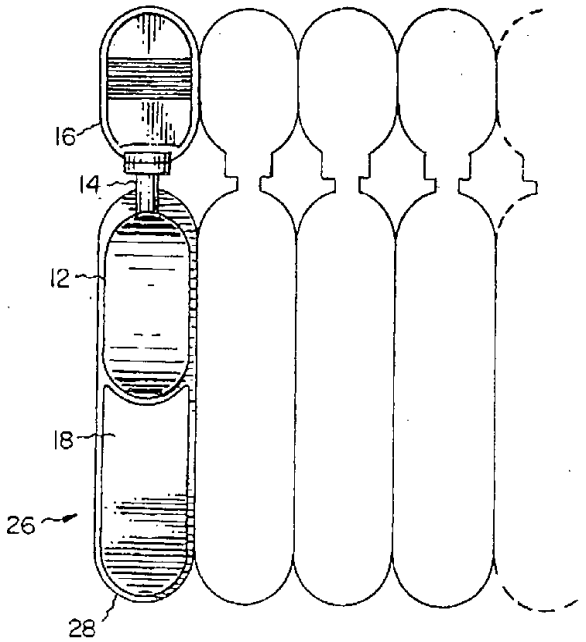


FIG. 6

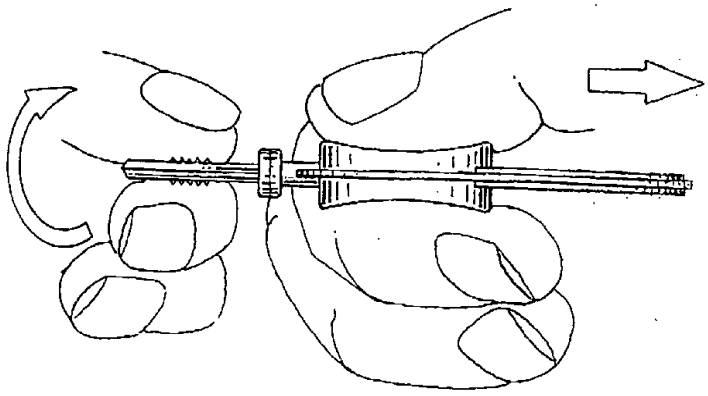


FIG. 7

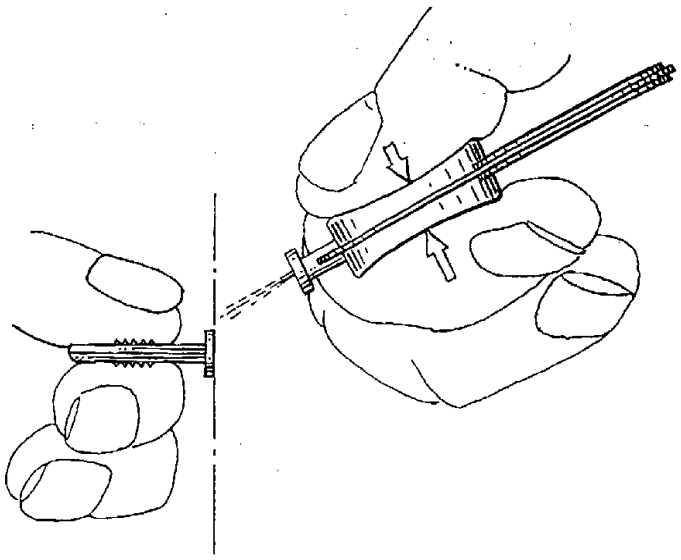


FIG. 8