Oct. 23, 1956 O. ERNST 2,767,711

EYE MEDICANT PACKAGE

Filed Feb. 25, 1954

Fig. 1.

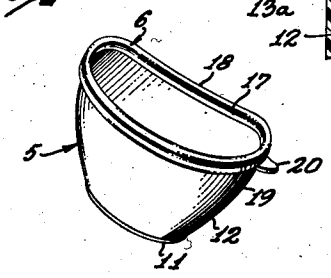


Fig. 9

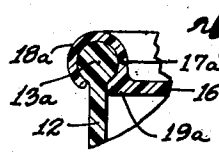


Fig. 2.

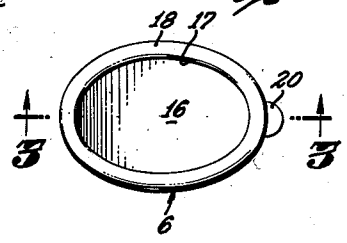


Fig. 3.

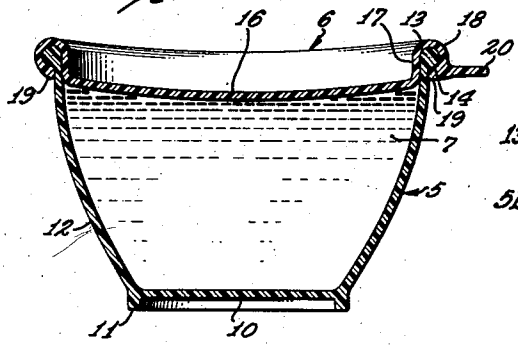


Fig. 10

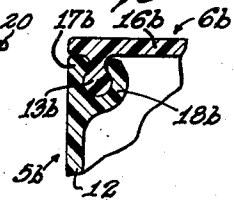


Fig. 5.

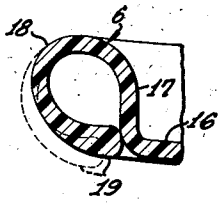


Fig. 6.

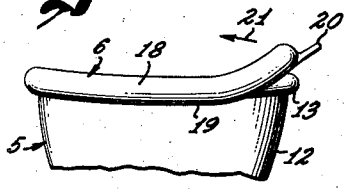


Fig. 7.

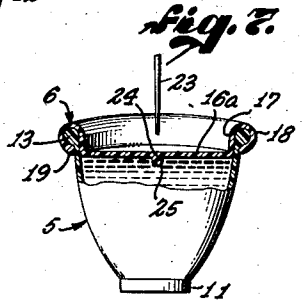


Fig. 4.

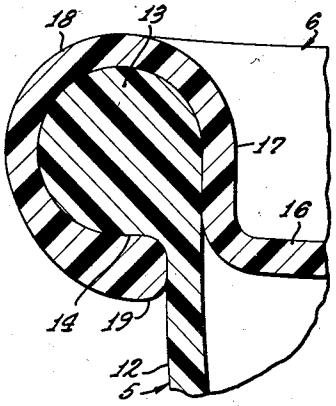
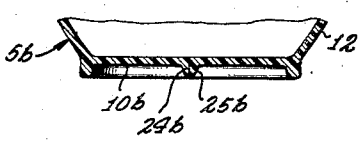


Fig. 8.



OTTO ERNST,
INVENTOR.

BY Lynn N. Latta

ATTORNEY.

United States Patent Office 2,767,711 Patented Oct. 23, 1956

2,767,711

EYE MEDICAMENT PACKAGE

Otto Ernst, Sherman Oaks, Calif.

Application February 25, 1954, Serial No. 412,473

9 Claims. (Cl. 128—249)

This invention relates to unit medicament articles combining a medicament with a sealed receptacle of unit size, for package sale on a drugstore shelf. The general object of the invention is to provide such a unit medicament article embodying a container, a readily removable cap or cover for the container, and a liquid medicament sealed therein, the cap being sealed to the container adequately to prevent the escape of the medicament.

A particular object of the invention is to provide such a medicament article which is of extremely inexpensive construction.

A further object is to provide such a medicament article which may embody a container of resin, elastomer or rubber material.

A further object is to provide such an article embodying a container which, in addition to being inexpensive, has the combination of the following characteristics: impermeability (to prevent loss of liquid contents by diffusion or migration over prolonged periods of time intervening between fabrication and ultimate use); full resistance to breakage or damage from handling; resistance to corrosion from its contents; transparency such as to render its contents visible; adaptability for eye-pleasing contouring, finish and coloration; and ability to effect a moisture-tight mechanical seal between the container and its closure cap without resorting to cementing, bonding or welding.

Other objects will become apparent in the ensuing specifications and appended drawings in which:

Fig. 1 is a perspective view of a medicament article embodying the invention;

Fig. 2 is a plan view of the same;

Fig. 3 is a longitudinal vertical sectional view of the article;

Fig. 4 is an enlarged fragmentary detail sectional view showing the seal;

Fig. 5 is a detail sectional view of the cap rim;

Fig. 6 is a side view of the upper part of the container, showing the initial stage of removing the cap;

Fig. 7 is a fragmentary, partially sectional view of an article embodying a modified form of the invention;

Fig. 8 is a fragmentary sectional view of another modified form;

Fig. 9 is a fragmentary sectional view of another modified form; and

Fig. 10 is a fragmentary sectional view of another modified form.

Referring now to the drawings, I have shown in Figs. 1–3, as an example of one form in which the invention may be embodied, a medicament article comprising a container (eye cup) indicated generally at 5, a closure cap 6, and a body of liquid medicament 7 sealed within the container 5 by the cap 6. The liquid medicament 7 may be any eye medicine, such as for example an aqueous solution of boric acid. The closure 6 is so associated with the container 5 as to effectively seal the container against the escape of the medicament.

Container 5 has a bottom 10 reinforced by a base flange 11, and a lateral wall 12 of oval shape in plan as indicated in Fig. 2, and having a rim 13 in the form of an outwardly projecting bead which, where it joins the lateral wall 12, defines a shoulder 14.

Eye cup 5 may be constructed of any suitable material, preferably of molded construction, such as molded synthetic resin, glass, hard rubber, impregnated papier mâché, sheet plastic material, or drawn metal corrosion resistant to the fluid contained therein either through the nature of the metal itself or by virtue of a corrosion resistant coating superimposed thereupon. In the latter case the bead 13 may be a bead of rectangular section. The preferred construction is a molded article of thermoplastic synthetic resin which may be a polystyrene or polyethylene, chlorinated polystyrene, fluorinated polyethylene such as the tetra fluoro ethylene polymer, polyvinyl halide resins such as polyvinyl chloride or polyvinylidene-chloride or copolymers thereof, either unplasticized or slightly plasticized if necessary so as to have adequate toughness to resist fracture, combined with form retaining rigidity.

The rim 13 may have the characteristic bowed shape, as viewed in side elevation or in longitudinal vertical section (Fig. 3), the end portions of the rim being somewhat higher than the central side portions thereof, whereby the rim may better fit the contour of the eye. This feature however constitutes no part of the present invention except insofar as it does add to the problem of sealing the cap 6 thereto.

Cover cap 6 includes a central web portion 16, having a shape and area corresponding to that of the space defined within rim 13; a marginal flange 17 projecting outwardly from the web 16 and adapted to fit snugly against the inner wall of the eye cup 5 at the rim 13; a curled collar 18 forming a continuation of flange 17 and shaped to mate with the external contour of rim bead 13; and a marginal lip 19 which projects inwardly toward flange 17 and is adapted to snugly seat beneath the shoulder 14 and against the outer face of lateral wall 12 of the eye cup 5. As pre-formed, lip 19 is adapted to bear against lateral wall 12 prior to reception of the rim bead 13 within the toroidal channel defined by lip 19 and collar 18, as disclosed in Fig. 5. Accordingly, it is necessary to stretch the lip 19 away from flange 17 which it surrounds, in order to accommodate the thickness of eye cup lateral wall 12, and in the assembled article, the hoop tension in marginal lip 19 will cause it to constantly bear snugly against the outer surface of lateral wall 12. It is of course necessary to stretch the lip 19 to an even greater diameter than its final diameter in the assemled article, in order that it may pass over bead 13. However, the cap 6 is made of a material sufficiently resilient to allow this stretching and sufficiently elastic to return to the position shown in Fig. 3, wherein it snugly engages the lateral wall of the eye cup with residual hoop tension therein. In general, the cap 6 has the characteristics of rubber and may be formed thereof, whereby the rubber may be a compounded natural gum rubber or a synthetic elastomer as for instance chloroprene polymer or butadiene copolymers of various types. I prefer however to mold cap 6 by use of a thermoplastic polymer particularly from those previously enumerated and, in particular preference, from polyethylene since these synthetic resin polymers afford a highly form retaining yet sufficiently elastic material of construction. They are equally high in chemical resistance to the medicaments contained in the receptacle and are particularly resistant to moisture absorption and moisture vapor transmission, thereby preventing the loss of the medicament by evaporation, diffusion and migration. A still further advantage of the use of polyethylene and for

this matter plasticized polystyrene as well as the vinyl halogen polymers and copolymers, is the translucent or transparent nature when unpigmented, which permits observation of the medicament in the container.

The cap **6** has the following essential characteristics: inertness to the medicament contents of the container; resistance to migration, absorption and vapor transmission; toughness; and flexibility sufficient to allow apron **18** to be stretched around rim bead **13**.

As to the absorption characteristics of both the cap and the container, the invention contemplates the use of only those materials which meet the following requirement: a sheet of the material at least ⅛" thick, in contact with water (or an aqueous solution) at room temperature (approximately 70–78° F.) for at least 24 hours, shall allow a water absorption no greater than 1%. As examples of materials and their absorptivity, is given:

Vinyl chloride resins—0.1% to —.6%
Vinylidene chloride resins—less than 0.1%
Polyethylene resins—less than 0.01%
Polystyrene resins—0.04% to 0.27%
Chlorinated rubber—0.1% to 0.3%
Isomerized rubber—0.02%
Hard or semi-hard rubber—0.02%

The following materials are listed as examples of unsuitable materials:

Ethyl cellulose—1% to 2.5%
Cellulose acetate—1.9% to 6.0%
Cellulose acetate, high acetyl—1.5% to 2.9%
Cellulose acetate butyrate—1.1% to 2.2%
Cellulose acetate proprionate—1.5% to 2.3%

The cap **6** includes in addition to the parts previously mentioned, a tab **20** which is positioned as a radially outwardly projecting extension of lip **19**, substantially in the same plane therewith. Tab **20** serves the purpose of providing a grip which may be grasped between the fingers of a person preparing to use the medicament **7** and pulled outwardly so as to stretch the lip **19** at one end of the cap **6**. Thus the lip **19** may be elongated sufficiently to slip it over the rim bead **13** at one end of the eye cup **5**, until the lip **19** in the immediate vicinity of tab **20** rests on top of rim bead **13** as indicated in Fig. 6. Thereupon, the remaining circumference of lip **19** may be stripped from rim bead **13** by pulling the tab end of the cap **6** (retaining the grip upon tab **20**) toward the opposite end of the eye cup as indicated by arrows **21** in Fig. 6.

In the packaged article, web **16** of cap **6** will normally be bowed inwardly, in full contact with the upper surface of liquid medicament body **7**.

In the manufacturing process of filling the container, filling may be done atmospherically, by simply pouring the medicament into the container, or forcibly expelling it from a nozzle into the container in the case of a salve or other non-fluid material. This is the preferred method where the medicament is not deteriorated by contact with residual traces of air in the sealed container.

Optionally, the container may be vacuum-filled in those instances where the presence of residual traces of air may be considered deleterious or otherwise undesirable, or for the purpose of obtaining the benefit of suction clinging of the cap to the container to supplement the mechanical clinging of collar **18** to rim **13**.

In such instances, during the filling and capping of the container **5**, all residual air is withdrawn from the container in a suitable manner to effect this result of completely evacuating the container of air. This may be accomplished by doing the capping in a vacuum chamber according to methods known in the canning industry. It may be accomplished by withdrawing excess liquid or air through the cap **6**, using a hollow needle **23** as illustrated in Fig. 7 and inserting the needle through a capillary passage **24** which may be formed for example in a boss **25** on the underside of cap web **16***a* of Fig. 7, the boss **25** being sufficiently resilient and elastic to stretch the amount required to enlarge capillary aperture **24** to receive withdrawal needle **23** and to then return to a contracted condition wherein capillary aperture **24** is of such minute size as to be incapable of allowing air molecules to pass therethrough. In this connection, the pressure of air at normal atmospheric pressure against the external boss **25**, creating a differential of substantially 15 pounds per square inch over the substantially zero pressure within the container **5**, assists the inherent contractile tension of boss 25 to completely close capillary passage **24** to this extent, so that a permanent seal is maintained.

Similarly, there may be an evacuation connection in the form of an external boss **25***b* on the bottom **10***b* of contanier **5***b* as shown in Fig. 8, with a capillary passage **24***b* into which a withdrawal needle such as the needle **23** of Fig. 7 may be inserted while the container is in an inverted position, so that the residual air within the container may be evacuated therefrom. The boss **25***b* in this case is adapted to have a self-sealing action upon capillary passage **24***b* when the needle **23** is withdrawn, as in the arrangement described above with reference to Fig. 7.

In Figs. 5–8 inclusive, those parts which are designated by the same numerals as are used in Figs. 1–4 are corresponding parts, whereas those parts which are designated by numerals that correspond to the numerals of Figs. 1–4 with the exception that exponential letters are added thereto, of parts which are modified as described above.

In the form of the invention shown in Fig. 9, the rim **13***a*, instead of projecting wholly outwardly of the inner wall of side member **12** (as in Fig. 4), has its axis centered above side member **12**, and lip **19***a*, instead of being the outer marginal portion of curled collar **18***a*, is formed at the inner margin of offset flange **17***a*, as a co-planar continuation of web **16**, and is engaged beneath a shoulder defined between the inner wall of the side member **12** and the inner, under side of rim **15***a*.

In the form of the invention shown in Fig. 10, container **5***b* is of softer, more flexible material than cover **6***b*, and curled toroidal collar **18***b* is formed at the rim of container **5***b* instead of being the marginal portion of the cover. The outer portion of collar **18***b* constitutes a rim flange **17***b* of the container. Flange **17***b* and collar **18***b* are radially spaced to define a toroidal space having a narrowed mouth. Cover **6***b* has a downwardly projecting annular coupler bead **13***b* which as a narrowed neck portion joining it to cover web **16***b* and is widened beyond this base portion to define upwardly facing shoulders which are engaged by rim flange **17***b* and the terminal portion of collar **18***b*, respectively. Rim flange **17***b* and collar **18***b* are stretched around bead **13***b*, when bead **13***b* is inserted through the narrowed mouth and into the annular space defined between flange **17***b* and collar **18***b*, for the purpose of removing or replacing cover **6***b*.

The invention provides a highly sanitary and quick to use combination package comprising a container and a ready to use medicament as contrasted to the former practice usually involving a dirty and dusty eye cup in a medicine chest, having to be cleaned and filled before using, with costly time loss, etc.

I claim:

1. A unit medicament article comprising a container in the form of an eye cup having an outwardly projecting rim bead defining a mouth shaped to fit a human eye; a body of liquid medicament therein; and a cap of resilient, elastic material including a covering web portion having a shape and area corresponding generally to that of said mouth, an offset flange projecting outwardly from said covering web portion and shaped to fit snugly within said mouth, and a return-curled toroidal collar portion adapted to fit snugly around said bead and to effect a seal therewith to prevent escape of said medicament from the container, said collar portion including a marginal lip normally of

smaller diameter than said rim bead and adapted to engage beneath said rim bead to effect a seal.

2. In a unit medicament article, a container in the form of an eye cup including a rim bead defining there-within a mouth shaped to fit the eye and projecting radially outwardly from said lateral wall to define, where it joins the outer surface thereof, a undershot shoulder; a body of liquid medicament in said container; and a closure cap of resilient, elastic material including a central web portion having a shape and area generally corresponding to said mouth, an offset flange projecting outwardly from said central web portion and having a corresponding shape so as to fit snugly against the wall of said mouth, an outwardly curled toroidal collar constituting a continuation of said offset flange and shaped to fit snugly around said rim bead, and a marginal lip at the extremity of said collar, having a diameter which is less than the diameter of said rim bead, said lip being adapted to engage with a sealing action beneath said shoulder.

3. An article as defined in claim 2, wherein said cap is of a molded polyethylene resin material.

4. An article as defined in claim 2, wherein said cap and container are of molded synthetic resin thermoplastic material of which a sheet of ⅛" thickness will show an absorptivity of not over 1% when exposed to water in contact therewith at room temperature over a period of at least 24 hours.

5. An article as defined in claim 2, wherein said cap and container are of molded synthetic resin thermoplastic material of which a sheet of ⅛" thickness will show an absorptivity of not over 1% when exposed to water in contact therewith at room temperature over a period of at least 24 hours, said container being relatively rigid and form retaining and said cap being relatively soft and resilient, and being of a polyethylene resin material.

6. A medicament article as defined in claim 2, wherein the diameter of said lip in its unstressed condition is sufficiently small to correspond to the external diameter of said flange, whereby said lip, as installed on said container, will be stretched to the extent of the thickness of the container wall and will thereby hug the container wall under hoop tension to establish sealing contact therewith.

7. A medicament article as defined in claim 6, wherein said cap includes, at one end thereof, a tab projecting radially outwardly therefrom, adapted to be grasped between the fingers of the user to permit the stretching of one end of said lip sufficiently to slip it over the said rim bead at the corresponding end of the container, preparatory to slipping the cap from the container so as to open the container.

8. An article as defined in claim 7, wherein said tab is disposed substantially in the plane of said lip.

9. In combination: a container in the form of an eye cup including a side member and a bead defining the rim thereof, said bead having a horizontal thickness greater than that of said side member where it is joined thereto and defining therewith an undershot shoulder, said bead also defining a mouth shaped to fit a human eye; a body of liquid medicament in said eye cup; and a closure cap of resilient, elastic material including a central web portion having a shape and area generally corresponding to said mouth, an offset flange projecting outwardly from said central web portion and having a corresponding shape so as to fit snugly against the wall of said mouth, an outwardly curled toroidal collar constituting a continuation of said offset flange and shaped to fit snugly around said rim bead, and a marginal lip at the junction between said web portion and offset flange, having a diameter which is less than the diameter of said rim bead, said lip being adapted to engage with a sealing action beneath said shoulder.

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