COMPACT LIQUID CONTAINER

The present invention relates to a liquid container, in particular to a liquid container system with a dispensing mechanism, and to a liquid dispensing system and method of using the liquid container.

Conventionally, many liquid products, for example perfume, liquid soap, moisturiser, etc., are sold in containers equipped with a delivery mechanism that dispense a controlled amount of the content of the containers, the most common being a pump mechanism which, when pressed, delivers the product in its original liquid form, or in the form of mist or foam. The design of the container and delivery mechanism is central to such a product, as the aesthetics of the container often draw in custom, and a well-designed dispensing system not only adds to the aesthetics of the product, but ensures that the optimal amount of the liquid content is delivered to the user in a desirable form.

However, it is often inconvenient for the user to transport a liquid product in its "standard pack" container when travelling, for overnight stays, or, especially for perfume and after-shave, carry the product in handbags or briefcases. In some cases, it would even be impossible for the user to transport a product in its standard pack, for example because of restrictions imposed on hand baggage for air travellers.

The user often resorts to transferring an amount of the liquid product from its original container to a smaller container, which is an inconvenience to the user, and often results in spillage or contamination. For some products, it may not be possible for the user to transfer the content from the original container to another container, for example if the original container is sealed and the content is to be dispensed as mist or foam.

the moving part being connected to, or forming part of the wall of, the second cavity. When the parent container and the child container are coupled together again, the restoring means releases the restoring force so as to expand the second cavity to the original state, urging the moving part back to its initial position, thereby drawing liquid from the first cavity into the second cavity.

With the earlier invention a travel or "child" container can thus be recharged a large number of times from a "parent" container containing liquid at atmospheric pressure. Moreover, this happens automatically whenever the two are coupled together. Meanwhile, the coupled container system can be used as a unit in the familiar way.

A first aspect of the present invention provides a compact dispenser for liquids, comprising a bowl or tray-shaped rigid container with an open face, the container having a refill opening, and a dispense opening, these openings being located with a spacing from each other; wherein the open face of the bowl is covered by a deformable membrane to form a closed dispense cavity adjacent to the refill opening, the volume of the cavity being reduced as the membrane is deformed inwardly so as to empty the cavity, wherein the dispenser is a free-standing container which can be connected to a supply container by way of the refill opening, and separated from it again, and the refill and dispense openings are such that if the dispenser is applied to the supply container by way of the refill opening, with the cavity initially empty, when the membrane is subsequently allowed to spring back to its rest shape it draws liquid from the parent into the cavity, while when the dispenser is separated from the supply container the refill opening is closed by a valve.

The present invention represents a further development of this idea and is concerned with a child container as claimed in claim 1. Here the moving part and the restoring means can be one and the same, namely a membrane which

partly defines the cavity in the child container ("second cavity"). The former application does disclose a membrane embodiment, namely in Figure 9. However, here the membrane 127c is so to speak radial – that is, across the direction of liquid flow from the inlet to the outlet of the (child) container. This means that it has to be penetrated by or connected to the tube or needle 123c. As a consequence, in the first place, manufacture and maintenance of a seal is not easy, and in the second place, the membrane's freedom to move and flex is considerably constrained. In the present invention, by contrast, the membrane helps to define a cavity adjacent to the refill opening; that is, the membrane is not penetrated by the liquid as the cavity is being filled from the main container.

If the cavity is of a simple shape, with no sharp angles or recesses, the membrane, if sufficiently elastic, can deform so as to empty the cavity virtually completely, reducing waste and allowing a compact format of the child container. Moreover, the seal is easy to make, being fixed, and no sliding parts are necessary.

The membrane can be made of any suitable material, such as rubber or synthetic rubber, provided that it is proof against the liquid used, and in particular the solvent, in the case of a fragrance.

The cavity can be in the form of a shallow cylinder, with the large "drum" face, or one of them, occupied by the membrane stretched across it, and the liquid entering and leaving more or less across the diameter. As the container is emptied, the membrane is sucked in until is covers the floor and sides of the cavity. The edge of the drum opposite the membrane should be rounded off, to allow the membrane to lie flat against the rigid inner surface of the cavity. In general, if the cavity has a shape in which one face is larger than the other or others, i.e. a large flat face, that face should be occupied by the membrane.

Alternatively the dispenser can be spherical, half being rigid and the other half being the membrane, whose rest configuration is a sphere, like a squash ball half. The membrane is deformed inwardly before the container is applied to the parent, to suck up a defined quantity of liquid.

A second aspect of the present invention provides a container system for liquids, including a parent container and a child container, in which the parent container provides a storage cavity for confining a liquid, and is configured to couple detachably to the child container for refilling the child container through a supply opening in the parent container, and the child container is a dispense container according to any preceding claim.

A third aspect of the present invention provides a container system for liquids, including a parent container and a child container, in which the parent container provides a storage cavity for confining a liquid, and is configured to couple detachably to the child container for refilling the child container through a supply opening in the parent container; the child container comprises a refill opening, which is kept closed by a valve unless the dispenser is connected to the parent container, and a dispense opening, these openings being located with a spacing from each other; and a dispense cavity adjacent to the refill opening, whose volume is reduced as liquid is dispensed, the refill and dispense openings being such that if the dispenser is applied to a suitable parent container by way of the refill opening, with the cavity initially empty, a resilient component draws liquid from the parent into the cavity; in which the connection between parent and child containers is magnetic.

The term "comprising" as used in this specification and claims means "consisting at least in part of". When interpreting statements in this specification and claims which include the term "comprising", other features besides

the features prefaced by this term in each statement can also be present. Related terms such as "comprise" and "comprised" are to be interpreted in a similar manner.

For a better understanding of the present invention, various examples will now be explained with reference to the accompanying drawings, in which:

Figure 1A shows a container system representing an embodiment in PCT/GB 2010/50265;

Figure 1B shows a line drawing of the container system of Figure 1A;

Figure 2 shows the cap portion of a container system in the Figure 9 embodiment of the earlier application;

Figures 3A and 3B show an embodiment of the present invention;

Figures 4 and 5 show a different embodiment, with the dispense valve on the membrane;

Figure 6 shows a variant; and

Figure 7 shows a further embodiment in bottle form.

The general scheme to which the present invention relates is shown in **Figures 1A and 1B** as a bottle (liquid container system) 100, comprising a main body (parent container) 110, which can be made of glass, plastic or any suitable material, and a refillable cap portion (child container) 120, which is detachably secured to the main body 110 by means of a securing mechanism 130, here a screw thread, though it could also be, say, a bayonet or clip-on mechanism.

The main body 110 has an opening (supply opening) 111, which is occupied by or connected to a valve 112. When the main body 110 is separated from the cap portion 120 the valve 112 is closed, providing a sealed cavity 113 for confining a liquid therein. The cavity 113 holds a tube 114, which extends from the supply opening towards the bottom of the cavity 113, for extracting the liquid content

WHAT WE CLAIM IS:

1. A compact dispenser ~~(220; 320; 420; 520)~~ for liquids, comprising a bowl~~-~~ or tray-shaped rigid container ~~(221)~~ with an open face, the container having a refill opening ~~(222), which is kept closed by a valve unless the dispenser is connected to a supply container~~, and a dispense opening ~~(224)~~, these openings being located with a spacing from each other;

~~characterised in that~~wherein the open face of the bowl is covered by a deformable membrane ~~(227)~~ to form a closed dispense cavity ~~(226)~~ adjacent to the refill opening, ~~whose~~ the volume ~~is~~ of the cavity being reduced as the membrane is deformed inwardly so as to empty the cavity, wherein the dispenser is a free-standing container which can be connected to a supply container by way of the refill opening, and separated from it again, and the refill and dispense openings ~~being~~ are such that if the dispenser is applied to ~~a suitable parent~~the supply container by way of the refill opening, with the cavity initially empty, when the membrane is subsequently allowed to spring back to its rest shape it draws liquid from the parent into the cavity, while when the dispenser is separated from the supply container the refill opening is closed by a valve.

2. A dispenser according to claim 1, further including a pump ~~(225)~~ for dispensing liquid from the dispense opening ~~(224)~~, the cavity becoming mainly or completely evacuated as the dispensing means is operated.

3. A dispenser according to claim 1 or 2, in which the rigid container is generally round in outline and the refill and dispense openings are located approximately at opposite ends of a diameter.

4. A dispenser according to any preceding claim, in which ~~the lip of~~ the bowl has a lip~~,~~ defining the open face,

~~has~~ the bowl has a groove, and the membrane is retained in this groove by a sealing ring ~~(228)~~.

5. A dispenser according to any one of claims 1 to 3, in which the membrane is integral with the bowl.

6. A dispenser according to claim 1, in which the dispenser ~~(320)~~ is generally spherical, the rigid container ~~(321)~~ being approximately a hemisphere and the membrane ~~(327)~~ approximately the other half.

7. A dispenser according to claim 6, in which the dispense opening takes the form of a manual valve ~~(325)~~.

8. A dispenser according to claim 7, in which the valve ~~(325)~~ is located on the membrane ~~(327)~~.

9. A dispenser according to any preceding claim and including an auxiliary restoring means ~~(340)~~ assisting the membrane to return to the full configuration.

10. A dispenser according to claim 1 and having the form of a flat-sided bottle ~~(420)~~, one or each flat side being constituted by a membrane ~~(427)~~.

11. A container system for liquids, including a parent container ~~(110; 310)~~ and a child container ~~(220; 320)~~, in which

- the parent container ~~(110)~~ provides a storage cavity ~~(113)~~ for confining a liquid, and is configured to couple detachably to the child container ~~(220)~~ for refilling the child container ~~(220)~~ through a supply opening ~~(111)~~ in the parent container ~~(110)~~, and
- the child container ~~(220)~~ is a dispense container according to any preceding claim.

12. A container system ~~(100)~~ according to claim 11, wherein the membrane urges liquid from the parent container ~~(110; 310)~~ to the child container ~~(220; 320)~~

when the child container ~~(220)~~ is coupled to the parent container ~~(110)~~, so as to cause an amount of liquid to pass from the first cavity ~~(113)~~ into the second cavity ~~(226)~~, ensuring that the child container ~~(220)~~ is filled when connected to the parent container ~~(110)~~.

13. A container system according to claim 11 or 12, wherein the child is attached to the parent by a magnetic connection.

14. A container system for liquids, including a parent container ~~(510)~~ and a child container ~~(520)~~, in which

- the parent container ~~(510)~~ provides a storage cavity for confining a liquid, and is configured to couple detachably to the child container ~~(520)~~ for refilling the child container ~~(520)~~ through a supply opening in the parent container ~~(510)~~;
- the child container ~~(520)~~ comprises a refill opening ~~(522)~~, which is kept closed by a valve unless the dispenser is connected to the parent container, and a dispense opening ~~(524)~~, these openings being located with a spacing from each other; and a dispense cavity ~~(526)~~ adjacent to the refill opening, whose volume is reduced as liquid is dispensed, the refill and dispense openings being such that if the dispenser is applied to a suitable parent container by way of the refill opening, with the cavity initially empty, a resilient component draws liquid from the parent into the cavity;

in which the connection between parent and child containers is magnetic.

15. A container system according to claim 13 or 14, wherein the child container ~~(520)~~ does not contain a ~~ferromagnetic part~~magnet.

16. A dispenser according to claim 1, substantially as herein described with reference to any embodiment disclosed.

17. A compact dispenser for liquids, substantially as herein described with reference to any embodiment shown in Figures 3A to 8.

18. A container system according to claim 11 or 14, substantially as herein described with reference to any embodiment disclosed.

19. A container system for liquids, substantially as herein described with reference to any embodiment shown in Figures 3A to 8.