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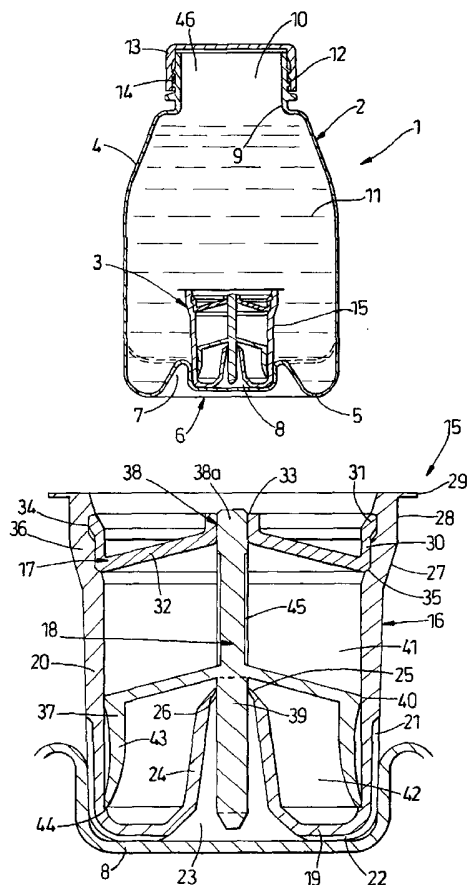
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- (72) Inventor; and  
(75) Inventor/Applicant (for US only): **DAVIS, Ron** [GB/GB];  
Coxmoor Road, Sutton-in-Ashfield, Nottinghamshire  
NG17 5LH (GB).
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- (74) Agent: **BARKER BRETTELL**; 138 Hagley Road, Edg-  
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- (71) Applicant (for all designated States except US): **BRITVIC  
SOFT DRINKS LIMITED** [GB/GB]; Broomfield Road,  
Chelmsford, Essex CM1 1TU (GB).

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(54) Title: BEVERAGE CONTAINER



(57) Abstract: A beverage package (1) comprises a primary container (2) for a beverage (11) and a secondary container (3) for releasing a component stored in the secondary container (3) into the beverage (11) when the primary container (1) is opened. The secondary container (3) comprises a body (16) housing a valve member (18) separating first and second chambers (41,42) within the body (16). The first chamber (41) contains the component to be released into the beverage (11) and has an outlet (33) that is closed by the valve member (18) until the primary container (2) is opened. The second chamber (41) contains a gas under pressure in equilibrium with gas in a headspace (46) of the primary container (2) such that, when the primary container (2) is opened, the pressure in the headspace (46) is released creating a pressure differential across the valve member (18) causing the valve member (18) to move to open the outlet (33) and release the stored component into the beverage (11).

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## BEVERAGE CONTAINER

This invention concerns improvements in or relating to beverages. The invention has particular application to a beverage package and a method  
5 of packaging a beverage in which a component of the beverage is stored separately and added to the beverage when a container in which the beverage is stored is opened for consumption of the beverage. The invention also includes a container for the stored component that is operable to release the component into a beverage when opening a  
10 beverage container in which the component container is received.

The market for canned or bottled beverages is huge with world-wide sales of a variety of different types of both alcoholic and non-alcoholic beverages. These beverages often contain a large number of ingredients to  
15 provide a desired colour or flavour and these can have an adverse effect on the storage life of the beverage. Accordingly, it is usual for the cans or bottles in which they are contained to carry a sell-by or beverage-by date to prevent sale and/or consumption of beverages that may have become unpalatable. For example, the beverage may become unpalatable  
20 due to degradation of an ingredient in the beverage and/or a reaction between ingredients which is normally slow but which may be accelerated under certain conditions such as exposure to strong sunlight or elevated temperatures. As a result, handling and storage of bottled and canned beverages is often critical to maintaining the beverage in a condition  
25 suitable for consumption.

Recently, demand for non-alcoholic or soft beverages having a particular characteristic such as high energy beverages and vitamin beverages has been increasing. Some beverages may be intended to provide a  
30 combination of desirable characteristics. These types of beverages are

particularly susceptible to degradation of the ingredients over a period of time and it would be beneficial if the component(s) providing the particular characteristic could be kept separate from the beverage and mixed with the beverage immediately prior to consumption. This would not only prevent degradation of the component(s) but also result in an enhanced freshness due to the improved condition of the component(s) added to the beverage.

To this end, we have previously proposed a beverage package in WO 01/51367 in which at least one component of the beverage is stored separately within the beverage container and is released automatically when the beverage container is opened so as to be mixed with the beverage immediately prior to consumption. In this way, the physical action of opening the beverage container is sufficient to release the component and additional manual actuation of a device for releasing the component is avoided. As a result, release and mixing of the component with the beverage may be achieved without any special operation or manipulation of the beverage container by the user.

In this known beverage package, the component is stored in an insert located in the beverage container and is released in response to a pressure differential created between the interior and exterior of the insert when the beverage container is opened. Such pressure differential provides a simple and effective motive force for dispensing the component into the beverage. Typically, the component is in the form of a liquid and the pressure differential may be employed to rupture a membrane to release the liquid into the beverage. The membrane may be in the form of a bag containing the liquid that is pierced by a spike. Alternatively, the membrane may be in the form of a bursting disc.

In this way, the contents of the insert are kept separate from the beverage in the beverage container until the beverage container is opened. As a result, any degradation that may otherwise occur if the contents of the insert were added to the beverage during production is avoided.

5 Moreover, the desired flavour, taste, aroma or other property of the beverage may be enhanced by adding the contents of the insert to the beverage when the beverage container is opened at the time it is desired to consume the beverage. Furthermore, the quality/freshness of the beverage may be improved and/or the storage/shelf life of the beverage

10 may be increased. This has advantages for the manufacturer and retailer.

We have found that while the inserts described in our aforementioned application operate in a satisfactory manner, manufacture and assembly of the insert can be complicated in some cases. In addition, for those inserts

15 where a membrane is ruptured to release the contents into the beverage, a safety margin is required to prevent accidental or premature release of the contents during the manufacturing process. As a result, the pressure differential created on opening the beverage container may sometimes be insufficient to cause rupturing of the membrane and the contents of the

20 insert are not released.

The present invention seeks to provide a beverage package and method of packaging a beverage characterised in that a beverage component is stored separately from a beverage within a beverage container and is released

25 automatically in response to a pressure differential created when the beverage container is opened.

More particularly, the present invention seeks to provide an insert for storing the component in the beverage container that is of simple

30 construction and is reliable in operation.

Other features, benefits and advantages of the invention will be apparent to those skilled in the art from the description hereinafter of embodiments of a beverage package and method of packaging a beverage according to  
5 the invention.

According to a first aspect of the present invention there is provided a beverage package comprising an openable primary container containing a beverage and a gas at a pressure greater than atmospheric pressure in a  
10 head space, and a secondary container within the primary container, the secondary container containing a component for adding to the beverage in the primary container prior to consumption thereof and a gas in equilibrium with the gas in the head space when the primary container is closed, the arrangement being such that the component is stored  
15 separately from the beverage when the primary container is closed and, when the primary container is opened, the pressure in the head space is released creating a pressure differential with the gas in the secondary container whereby the stored component in the secondary container is forced from the secondary container into the primary container for mixing  
20 with the beverage in the primary container prior to consumption thereof, characterised in that the secondary container comprises a first chamber for the stored component and a second chamber for the gas to create the pressure differential, the first chamber having an outlet closed by a valve member when the gas in the second chamber is in equilibrium with the  
25 gas in the headspace of the primary container, and the valve member being movable to open the outlet and release the stored component into the beverage in response to the pressure differential created on opening the primary container.

The contents of the secondary container may be a colouring agent, a flavouring agent or the like to alter the appearance, taste of the beverage. For example, bottles/cans of lemonade may be provided with secondary containers which, on opening, release colouring and/or flavouring agents to produce a range of beverages such as limeade, raspberryade, cherryade, strawberryade, orangeade etc. In this way, one basic or stock beverage may be produced and bottled/canned with an appropriate secondary container for converting the beverage to another beverage having a specific flavour and/or colour.

10

Alternatively or additionally, the contents of the secondary container may be chosen to provide the beverage with a desired property or characteristic. For example, the secondary container may contain a health supplement such as a vitamin and/or an energy supplement which is added to the beverage when the primary container is opened immediately prior to consumption.

15

Where the contents of the secondary container produce a colour change in the beverage, the release and mixing of the colouring agent may be used to provide a visual effect for the consumer by the use of a clear or transparent container for the beverage. The secondary container may also be clear or transparent so that the contents are visible prior to being discharged into the beverage.

20

Preferred materials for the primary and secondary containers are food grade plastics that can be moulded to the required shape. Thus, the primary container may be a bottle and the secondary container may be a hollow insert positioned within the bottle. The bottle may be provided with a removable closure such as a screw cap for the user to open the bottle causing the contents of the insert to be released into the beverage.

25  
30

Advantageously, the secondary container is arranged to release the contents below the surface of the beverage when the primary container is opened. Thus, the secondary container may be attached to the primary  
5 container so as to be submerged below the surface of the beverage in the normal upright position of the primary container. For example, the secondary container may be attached to the base of the primary container so that the contents of the secondary container are released upwards into the beverage when the primary container is opened.

10

Preferably, the valve member separates the first and second chambers and is slidably mounted in the insert for axial movement to open the outlet in the first chamber in response to the pressure differential created when the beverage container is opened.

15

Advantageously, the valve member is co-operable with an inlet in the second chamber to allow gas to enter the second chamber to bring the pressure in the second chamber into equilibrium with the pressure in the headspace and prevent a rapid reduction of the pressure in the second  
20 chamber when the primary container is opened.

25

In a preferred arrangement, the valve member comprises a piston slidably mounted in the insert to separate the first and second chambers and having a head portion co-operable with the outlet in the first chamber and  
a tail portion co-operable with the inlet in the second chamber. In this way, the valve member is guided for axial sliding movement by engagement with the inlet and outlet while maintaining sealing contact between the piston and the opposed wall of the insert to separate the first and second chambers.

30



Preferably, the outlet is closed by the head portion in a first end position of the valve member and is opened by movement of the valve member away from the first end position in response to the pressure differential created when the primary container is opened. For example, the head  
5 portion may have a part of reduced cross-section that is received in the outlet when the valve member is displaced away from the first end position to form at least one passageway for releasing the contents of the first chamber into the beverage. The part of reduced cross-section may  
10 comprise a series of axially extending grooves formed in the outer surface of the head portion.

Advantageously, the tail portion co-operates with the inlet to allow gas to enter the second chamber in the first end position of the valve member and prevent or inhibit the gas escaping rapidly to reduce the pressure  
15 when the primary container is opened. For example, the inlet may define a restricted orifice with the tail portion that allows gas to enter the second chamber slowly and prevent rapid escape of gas from the second chamber. Alternatively, the inlet may have a flexible lip that engages the  
20 tail portion in the first end position of the valve member to form a one-way valve that allows gas to enter the second chamber and prevent escape of gas from the second chamber.

The co-operation between the inlet and tail portion is preferably maintained as the valve member is displaced away from the first end  
25 position to prevent a rapid reduction of pressure in the second chamber when the primary container is opened. The valve member may be movable to a second end position in which the tail portion is clear of the inlet to allow excess pressure in the second chamber to be released when the contents of the first chamber have been released into the beverage.

Preferably, the insert is attached to the primary container by engagement with a formation formed integrally with the container. For example, the insert may be an interference push-fit in a recess in the base of the container. Alternatively, the insert may be a snap-fit with a boss on the  
5 base of the primary container.

In a preferred arrangement, the insert has an opening in the base leading to the inlet to the second chamber, and the engagement of the insert with the container is such that gas can flow between the insert and primary  
10 container to the inlet. For example, formations such as ribs or grooves on one or both of the insert and the container may provide passageways for gas in the primary container to flow to the inlet. Alternatively, the insert may be secured by adhesive to leave gaps for gas to reach the inlet for priming the insert.

15

Advantageously, the insert has a portion that is deformable to allow the insert to be pushed through an opening in primary container and which returns to its original shape within the container to inhibit removal of the insert from the container. For example, the insert may have an external  
20 deformable flange. In this way, the risk of the insert being swallowed if it becomes detached from the container is reduced.

According to a second aspect of the present invention, there is provided a method of packaging a beverage comprising providing a primary  
25 container and a secondary container of smaller volume than the primary container, the secondary container having a first chamber and a second chamber separated by a valve member, charging the first chamber with a liquid or solid and locating the secondary container in the primary container with the valve member closing an outlet from the first chamber,  
30 charging the primary container with a beverage and sealing the primary

container to form a primary head space containing a gas at a pressure higher than atmospheric pressure in the primary container, and charging the second chamber with gas from the primary head space to substantially equalise the pressures in the primary and secondary containers so that, when the primary container is opened the primary headspace is vented to atmosphere creating a pressure differential between the primary and secondary containers whereby the valve member is displaced by the gas pressure in the second chamber to open the outlet in the first chamber and release the contents of the first chamber into the beverage.

10

In the case of carbonated beverages, gas evolved from the beverage itself when the primary container is sealed may be used to produce or assist in producing the pressure in the primary headspace. Where the volume of gas in the beverage is low or in the case of non-carbonated (still) beverages, evaporation of liquid nitrogen or other inert gas introduced into the primary container may be used to produce or assist in producing the pressure in the primary headspace.

The contents of the secondary container are preferably in the form of liquids as these are generally easier to release and mix with the beverage. However, any fluent material that can be added to the beverage when the primary container is opened can be stored in the secondary container. This may include liquids or syrups. Alternatively, solids such as powders, granules or the like can also be employed and may be preferred in some cases.

25

The contents of the secondary container may be chosen to alter or modify a property or character of the beverage prior to consumption. For example, the contents of the secondary container may be chosen to change

the appearance, flavour, or aroma of the beverage. Thus, the contents may include one or more of colouring agents, flavouring agents.

Alternatively or additionally, the contents of the secondary container may  
5 be chosen to provide the beverage with a particular quality. For example, the contents may include vitamins or other health supplements and/or glucose or other high energy supplements.

Preferably, the method includes the step of securing the secondary  
10 container to the base of the primary container, inverting the primary container from its normal upright position to locate the secondary container in the headspace for equalising the gas pressures in the headspace and the second chamber of the secondary container, and returning the primary container to its normal upright position.

15 Advantageously, the method further includes releasing excess pressure remaining in the second chamber into the beverage when all or substantially all the contents of the first chamber have been released into the beverage. This may assist mixing of the contents of the first chamber  
20 with the beverage prior to consumption of the beverage.

According to a third aspect of the present invention, there is provided a secondary container for use in a beverage package according to the first aspect of the invention or in a method of packaging a beverage according  
25 to the second aspect of the invention.

The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings, wherein:-

**Figure 1** is a side view of a beverage package according to the present invention;

5 **Figure 2** is an enlarged side view of the secondary container shown in Figure 1;

**Figure 3** is an enlarged side view of an alternative secondary container for the beverage package according to the present invention;

10 **Figure 4** is an exploded view of the component parts of the secondary container shown in Figure 3;

15 **Figure 5** shows a method for securing the secondary container of Figure 3 within the primary container of the beverage package; and

**Figure 6** shows an alternative method of securing the secondary container of Figure 3.

20 Referring first to Figure 1 of the accompanying drawings, there is depicted a beverage package 1 according to the present invention comprising a main or primary container 2 and an auxiliary or secondary container 3 within the primary container 2.

25 In this embodiment, the primary container 2 comprises a bottle 4 of food grade plastics material, for example polypropylene or polyethylene. The bottle 4 is of generally cylindrical shape with a base wall 5 at the lower end to allow the bottle 4 to be free-standing in an upright position for storage and point of sale display, for example on a shelf.

30

A centre portion 6 of the base wall 5 is shaped to form an annular groove 7 in the base wall 5 surrounding a recess 8 that opens into the bottle 4. The bottom of the recess 8 is inset and spaced above the horizontal plane containing the base wall 5.

5

The side wall of the bottle 4 tapers inwardly at the upper end and terminates in a cylindrical neck 9 of reduced diameter. The neck 9 defines an opening 10 through which the bottle 4 can be filled with a beverage 11 and later emptied when the beverage 11 is consumed. In this  
10 embodiment, the beverage 11 is a carbonated soft drink, for example lemonade.

The neck 9 has an external screw thread 12 for mounting a screw cap 13 having a complementary internal screw thread 14 for releasably closing  
15 and sealing the opening 10. The screw cap 13 may be secured with a tamper proof fastening such as a drop ring or tear-off tab (not shown) which must be released when the bottle 4 is opened for the first time. Such tamper-proof fastening ensures integrity of the bottle 4 and prevents the contents of the bottle 4 being altered prior to purchase and  
20 consumption by the end user.

The secondary container 3 is in the form of a hollow insert 15 comprising a main body 16, a lid 17 and a valve member 18 made of food grade plastics material such as polypropylene. The body 16 has a base wall 19  
25 and a generally cylindrical side wall 20 that is an interference push-fit in the recess 8 to secure the insert 15 in the bottle 4 without additional fixing means such as adhesive.

As best shown in Figure 2, the lower end of the side wall 20 is formed on  
30 the outside with a plurality of axially extending grooves 21 spaced apart

in the circumferential direction and contiguous with radially extending grooves 22 on the underside of the base wall 19.

The grooves 22 lead to a central opening 23 in the base wall 19 that is  
5 bounded by an upstanding wall 24 in the lower part of the body 16. The wall 24 terminates at the upper end in an inwardly directed flexible sealing lip 25 defining an aperture 26.

The upper end of the side wall 20 is formed with an external shoulder 27  
10 leading to a cylindrical portion 28 terminating in an outwardly directed flange 29.

The body 16 is sized to enable the insert 15 to be introduced into the bottle 4 through the opening 10 in the neck 9. The diameter of the flange  
15 29 exceeds the diameter of the opening 10 and the flange 29 is deformable to allow the insert 15 to be pushed into the bottle 4 and thereafter returns to its original shape. In this way, the insert 15 is retained within the bottle 4 if the insert 15 becomes dislodged from its position secured in the recess 8 at the bottom of the bottle 4.

20

The lid 17 has an annular outer wall 30 with an outwardly directed locking collar 31 at the upper end. An end wall 32 extends inwardly from the lower end of the wall 30 and is inclined upwardly terminating in a central hole 33 axially aligned with the aperture 26.

25

The lid 17 is a push fit in the open end of the body 16 and is retained by snap engagement of the collar 31 in an annular recess 34 in the body 16. The lower end of the outer wall 30 locates against an internal abutment shoulder 35 and the outer wall 30 forms a fluid-tight seal with a  
30 cylindrical portion 36 of the body 16.

The valve member 18 comprises a piston 37 having a head portion 38 slidably located in the hole 33 in the lid 17 and a tail portion 39 slidably located in the aperture 26 in the wall 24 of the body 16.

5

The piston 37 slidably engages the inner surface of the body 16 and forms a fluid-tight seal 40 with the body 16 that divides the insert 15 internally into an upper fluid chamber 41 and a lower fluid chamber 42.

10 The valve member 18 is shown in a lower end position in Figure 2 in which an outer wall 43 of the piston 37 seats on an internal shoulder 44 of the body 16. In this position, the upper chamber 41 is sealed by engagement of the head portion 38 in the hole 33 and the lower chamber 42 is sealed by engagement of the tail portion 39 in the aperture 26.

15

The head portion 38 is formed with a series of axially extending grooves 45 that terminate at a point spaced from the outer end 38a of the head portion 38. The grooves 45 co-operate with the hole 33 to form passageways for releasing the contents of the upper chamber 41 when the  
20 valve member 18 is displaced upwards from the lower position shown in Figure 2.

The tail portion 39 is tapered and forms an annular clearance gap (not shown) with the sealing lip 25 for releasing excess gas pressure in the  
25 lower chamber 42 when the valve member 18 reaches an upper end position (not shown) located against the lid 17.

In use, the valve member 18 is inserted in the body 16 in the lower position and the upper chamber 41 filled with a colouring and/or  
30 flavouring agent, e.g. a juice concentrate or syrup. The lid 17 is then



secured to close the upper chamber 42 with the outer end 38a of the head portion 38 of the valve member 18 sealing the hole 33. The seal 40 prevents the contents of the upper chamber 41 leaking into the lower chamber 42.

5

The insert 15 is then positioned in the empty bottle 4 and secured by push-fit in the recess 8 at the bottom of the bottle 4 as shown in Figure 1. The bottle 4 is then filled with the beverage, e.g. lemonade, under pressure and the screw cap 13 attached to close and seal the bottle 4  
10 creating a headspace 46 containing a gas at higher than atmospheric pressure above the beverage. The gas pressure in the headspace 46 prevents carbon dioxide from coming out of solution in the beverage.

The closed and sealed bottle 4 is then inverted to position the insert 15 in  
15 the headspace 46. The lower chamber 42 contains gas at atmospheric pressure and gas at higher than atmospheric pressure in the headspace 46 enters the clearance space between the wall 24 and the tail portion 39 of the piston 38 via the passageways formed by the grooves 21, 22. From there, the gas enters the lower chamber 42 past the sealing lip 25 to  
20 equalise the gas pressure in the lower chamber 42 with the pressure in the headspace 46. As will be appreciated the engagement of the sealing lip 25 with the tail portion 39 forms a one-way valve that allows gas to enter the lower chamber 42.

25 The insert 15 is now primed and the bottle 4 can be re-inverted to its original upright position for storage, transport and display at the point of sale. When the bottle 4 is opened for the first time, the pressure in the headspace 46 is released creating a pressure differential with the gas trapped in the lower chamber 42. As a result, the valve member 18 is  
30 displaced upwards from the lower position shown in Figure 1 bringing the

grooves 45 on the head portion 38 into the hole 33 in the lid 17. The liquid in the upper chamber 41 is forced out of the insert 15 into the beverage through the passageways formed by the grooves 45.

- 5 When the valve member 18 reaches the upper end position, the clearance gap formed between the tapered end of the tail portion 39 and the sealing lip 25 allows excess gas pressure in the lower chamber 42 to escape. In this way, the insert 15 is de-pressurised and the excess gas pressure released into the bottom of the bottle 4 may assist mixing of the released  
10 liquid with the beverage.

In this embodiment, the bottle 4 is made of clear or translucent plastics such that release of the liquid stored in the insert 15 into the bottle 4 can be seen by the consumer. The visual effect created as the colour of the  
15 base liquid is changed by mixing with the liquid from the insert 5 adds to the "theatre" when the bottle 4 is opened for the first time which many consumers may find exciting, especially young children.

The body 16 of the insert 15 may also be of clear or translucent plastics  
20 so that the liquid stored in the insert 15 may also be visible to the consumer/retailer prior to opening the bottle 4. Alternatively, the body 16 and lid 17 may be of opaque plastics to conceal the stored liquid until the bottle 4 is open and the liquid expelled into the bottle 4. This may add to the "theatre".

25

In some cases, the stored liquid may be light sensitive and degradation of the stored liquid may be prevented by constructing the body 16 and lid 17 to prevent exposure of the stored liquid to light prior to opening the bottle 4. In this way, the storage life of the packaged beverage may be  
30 enhanced.

Referring now to Figures 3 and 4, an alternative version of insert is shown for use in the beverage package above described. For convenience, like reference numerals in the series 100 are used to indicate parts corresponding to the previous embodiment and it will be understood the operation of this alternative version is similar to the previous embodiment.

In this embodiment, the valve member 118 is modified to increase the diameter of the head portion 138 of the piston 137 and the hole 133 in the lid 117 is likewise of increased diameter. As shown, the head portion 138 has an inwardly domed end wall 147 whereby the surface area of the piston 138 exposed to the pressure in the primary container is increased.

In this way, operation of the insert 115 may be enhanced. In particular, the release of the contents of the insert 115 into the beverage may be achieved more effectively and reliably. Thus, accidental or premature firing of the insert 115 during equilibration of the pressure in the lower chamber 142 with the pressure in head space 146 and during subsequent storage of the beverage package prior to sale and opening may be avoided.

In this embodiment, the lip seal is omitted and the aperture 126 is sized to provide a small clearance for sliding movement of the tail portion 139 of the piston 137 that allows gas to flow into and out of the lower chamber 142 at a slow rate. As a result, when the beverage package is inverted to position the insert 115 on the head space 146, the pressure in the lower chamber 142 gradually increases until equilibration is reached.

This may also assist in preventing accidental or premature firing of the insert 115 during priming by avoiding a sudden surge of gas into the lower chamber 142 causing the pressure to increase rapidly.

- 5 Furthermore, when the beverage package is opened, the gas is prevented from escaping rapidly from the lower chamber 142 and the insert 115 is fired to release the contents in the upper chamber 141 by the pressure differential that is created as described above for the previous embodiment.

10

Referring now to Figure 5, there is shown an alternative method of securing the insert 115 to the base of the primary container or bottle 104. As shown, the insert 115 is a push fit on a boss 148 formed integrally in the base wall 105 of the bottle 104. The insert 115 may be retained by  
15 friction between the boss 148 and the wall 124 of the body 116.

The insert 115 and the boss 148 may be formed with grooves or the like (not shown) to allow passage of gas into the lower chamber 142 during priming of the insert 115. Alternatively, the friction fit may not provide  
20 a complete seal so as to allow gas to pass through between the insert 115 and the boss 148.

Referring now to Figure 6, there is shown a modification to the method of securing the insert 115 in which the boss 148 is formed with an undercut  
25 groove 149 and the wall 124 of the insert 115 is provided with an annular rib 150 that snap engages the groove 149 when the insert 115 is pushed onto the boss 148 to retain positively the insert 115.

Again the engagement may not provide a complete seal so as to allow gas  
30 to pass between the insert 115 and boss 148. Alternatively, the insert 115

and/or boss 148 may be formed with grooves or the like to provide passageways for gas to pass through when the insert 115 is being primed.

As will now be understood, the insert 15, 115 of the beverage package 1  
5 is of simple construction consisting of parts that can be made and assembled relatively easily with a high degree of accuracy. Furthermore, the valve member 18, 118 separates the liquid from the gas and controls the operation of the insert 15, 115 in response to opening the bottle 4 in a reliable manner.

10

In the above-described embodiments, a liquid is added to the beverage for providing a desired property or characteristic in the beverage prior to consumption. For example, altering the colour or flavour of the initial beverage for producing the desired beverage for consumption.

15

It will readily be appreciated however, that the benefits and advantages of keeping one or more components separate from the beverage until it is desired to consume the beverage has application to the addition of components in a solid form. For example, powders or granules of one or  
20 more materials could be stored in the insert and added to the beverage when the bottle is opened.

The use of a solid form of the separate component may be preferable for certain materials. For example, vitamins may retain their effectiveness  
25 for a longer period of time if stored in a solid form. Also, a solid form may allow a higher concentration of the material to be stored until required.

While the invention has been described for beverages contained in a  
30 bottle, it will be understood the production and operation of the beverage

package is equally applicable to other forms of container capable of withstanding the higher than atmospheric pressures required to cause the insert to release the stored component(s) into the beverage when the container is opened.

5

Thus, the invention has application to metal and plastic cans which may have a ring-pull or similar means for opening the can. For certain beverages, especially non-carbonated (still) beverages, less robust containers may be employed, for example cartons of cardboard or similar material capable of withstanding the pressures.

10

In addition, it will also be understood that the invention is not limited to non-alcoholic beverages and could be applied to alcoholic beverages of both carbonated and non-carbonated types. For example, the beverage could be lager with the insert containing lime that is added to the lager when the bottle is opened to produce a lager and lime beverage. Alternatively, the beverage could be cola with the insert containing rum that is added to the cola when the bottle is opened to produce a rum and cola beverage.

15  
20

Moreover, although the invention has been described with particular reference to alcoholic and non-alcoholic beverages, it will be understood that the invention has wider application for the addition of a substance to a base liquid where it is desirable to keep the substance and base liquid separate prior to consumption.

25

For example, the invention as described herein could be employed to add a drug, medicament or other pharmaceutical to a base liquid where keeping the substance separate from the base liquid until required for

consumption may be beneficial in preventing or reducing degradation of the substance.

Accordingly, the term 'beverage' used herein is to be construed as including all such other applications and is not limited to alcoholic and non-alcoholic beverages as described in the exemplary embodiments.

It will also be appreciated that the exemplary embodiments described herein are intended to illustrate the diverse range and application of the invention and that features of the embodiments may be employed separately or in combination with any other features of the same or different embodiments to produce any desired beverage package.

Moreover, while the specific materials and/or configuration of the inserts described and illustrated are believed to represent the best means currently known to the applicant, it will be understood that the invention is not limited thereto and that various modifications and improvements can be made within the spirit and scope of the claims.

## CLAIMS

1. A beverage package comprising an openable primary container (2) containing a beverage (11) and a gas at a pressure greater than  
5 atmospheric pressure in a head space (46), and a secondary container (3) within the primary container (2), the secondary container (3) containing a component for adding to the beverage (11) in the primary container (2) prior to consumption thereof and a gas in equilibrium with the gas in the head space (46) when the primary container (2) is closed, the arrangement  
10 being such that the component is stored separately from the beverage (11) when the primary container (2) is closed and, when the primary container (2) is opened, the pressure in the head space (46) is released creating a pressure differential with the gas in the secondary container (3) whereby the stored component in the secondary container (3) is forced from the  
15 secondary container (3) into the primary container (2) for mixing with the beverage (11) in the primary container (2) prior to consumption thereof, **characterised in that** the secondary container (3) comprises a first chamber (41;141) for the stored component and a second chamber (41;142) for the gas to create the pressure differential, the first and  
20 second chambers (41,42;141,142) being separated by a valve member (18;118), the first chamber (41;141) having an outlet (33;133) closed by the valve member (18;118) when the gas in the second chamber (41;142) is in equilibrium with the gas in the headspace (46) of the primary container (2), and the valve member (18;118) being movable to open the  
25 outlet (33;133) and release the stored component into the beverage (11) in response to the pressure differential created on opening the primary container (2).



2. A beverage package according to Claim 1 characterised in that, the secondary container (3) is arranged to release the contents below the surface of the beverage (11) when the primary container (2) is opened.
- 5 3. A beverage package according to Claim 2 characterised in that, the secondary container (3) is attached to the primary container (2) so as to be submerged below the surface of the beverage (11) in the normal upright position of the primary container (2).
- 10 4. A beverage package according to Claim 3 characterised in that, the secondary container (3) is attached to the base (5;105) of the primary container (2) so that the contents of the secondary container (3) are released upwards into the beverage (11) when the primary container (2) is opened.
- 15 5. A beverage package according to Claim 3 or Claim 4 characterised in that, the secondary container (3) and the primary container (2) are co-operable to attach the secondary container (3) by push fit.
- 20 6. A beverage package according to Claim 3 or Claim 4 characterised in that, the secondary container (3) and the primary container (2) are co-operable to attach the secondary container (3) by snap fit.
- 25 7. A beverage package according to any one of the preceding Claims characterised in that, the valve member (18;118) is slidably mounted in the secondary container (3) for axial movement to open the outlet (33;133) in the first chamber (41;141) in response to the pressure differential created when the primary container (2) is opened.

8. A beverage package according to Claim 7 characterised in that, the valve member (18;118) is co-operable with an inlet (26;126) in the second chamber (41;142) to allow gas to enter the second chamber (41;142) to bring the pressure in the second chamber (41;142) into equilibrium with the pressure in the headspace (46) and prevent a rapid reduction of the pressure in the second chamber (41;142) when the primary container (2) is opened.

9. A beverage package according to Claim 8 characterised in that, the valve member (18;118) comprises a piston (37;137) slidably mounted in the secondary container (3) to separate the first and second chambers (41,42;141,142) and having a head portion (38;138) co-operable with the outlet (33;133) in the first chamber (41;141) and a tail portion (39;139) co-operable with the inlet (26;126) in the second chamber (41;142).

10. A beverage package according to Claim 9 characterised in that, the outlet (33;133) is closed by the head portion (38;138) in a first end position of the valve member (18;118) and is opened by movement of the valve member (18;118) away from the first end position in response to the pressure differential created when the primary container (2) is opened.

11. A beverage package according to Claim 10 characterised in that, the head portion (38;138) has a part (45;145) of reduced cross-section that is received in the outlet (33;133) when the valve member (18;118) is displaced away from the first end position to form at least one passageway for releasing the contents of the first chamber (41;141) into the beverage (11).

12. A beverage package according to Claim 11 characterised in that, the part (45;145) of reduced cross-section comprises one or more axially

extending grooves (45;145) formed in the outer surface of the head portion (38;138).

13. A beverage package according to any one of Claims 9 to 12  
5 characterised in that, the tail portion (39;139) co-operates with the inlet (26;126) to allow gas to enter the second chamber (41;142) in the first end position of the valve member (18;118) and prevent or inhibit the gas escaping rapidly to reduce the pressure when the primary container (3) is opened.

10

14. A beverage package according to Claim 13 characterised in that, the inlet (26;126) defines a restricted orifice with the tail portion (39;139) that allows gas to enter the second chamber (41;142) slowly and prevent rapid escape of gas from the second chamber (41;142).

15

15. A beverage package according to Claim 13 characterised in that, the inlet (26) has a flexible lip (25) that engages the tail portion (39) in the first end position of the valve member (18) to form a one-way valve that allows gas to enter the second chamber (41) and prevent escape of  
20 gas from the second chamber (41).

16. A beverage package according to any one of Claims 13 to 15 characterised in that, the co-operation between the inlet (26;126) and tail portion (39;139) is maintained as the valve member (18;118) is displaced  
25 away from the first end position to prevent a rapid reduction of pressure in the second chamber (41;142) when the primary container (2) is opened.

17. A beverage package according to any one of Claims 13 to 16 characterised in that, the valve member (18;118) is movable to a second  
30 end position in which the tail portion (39;139) is clear of the inlet

(26;126) to allow excess pressure in the second chamber (41;142) to be released when the contents of the first chamber (41;141) have been released into the beverage (11).

5 18. A beverage package according to any one of the preceding Claims characterised in that, the secondary container (3) is attached to the primary container (2) by engagement with a formation (8;148) formed integrally with the primary container (2).

10 19. A beverage package according to Claim 18 characterised in that, the formation (8) is a recess (8) in the base (5) of the primary container (2).

15 20. A beverage package according to Claim 18 characterised in that, the formation (148) is a boss (148) on the base (105) of the primary container (2).

20 21. A beverage package according to Claim 8 characterised in that, the secondary container (3) has an opening (23;123) in the base leading to the inlet (26;126) to the second chamber (42;142), and the secondary container (3) is secured to the primary container (2) so that gas can flow between the secondary container (3) and primary container (2) to the inlet (26;126).

25 22. A beverage package according to Claim 21 characterised in that, formations (21) such as ribs or grooves (21) are provided on one or both of the secondary container (3) and the primary container (2) to provide passageways for gas in the primary container (2) to flow to the inlet (26).

23. A beverage package according to Claim 21 characterised in that, the secondary container (2) is secured by adhesive to leave gaps for gas to reach the inlet (26;126) for priming the secondary container (3).

5 24. A beverage package according to any one of the preceding Claims characterised in that, the primary container (2) and/or secondary container (3) is/are adapted to allow the secondary container (3) to be inserted into the primary container (2) and restrict removal of the secondary container (3) from the primary container (2).

10

25. A beverage package according to Claim 24 characterised in that, the secondary container (3) has a portion (29) that is deformable to allow the secondary container (3) to be pushed through an opening (10) in the primary container (2) and which returns to its original shape within the  
15 primary container (2) to inhibit removal of the secondary container (3) from the primary container (2).

26. A beverage package according to Claim 25 characterised in that, the secondary container (3) has an external deformable flange (29).

20

27. A method of packaging a beverage comprising providing a primary container (2) and a secondary container (3) of smaller volume than the primary container (2), the secondary container (2) having a first chamber (41;141) and a second chamber (42;142) separated by a valve member  
25 (18;118), charging the first chamber (41;141) with a fluent material and locating the secondary container (3) in the primary container (2) with the valve member (18;118) closing an outlet (33;133) from the first chamber (41;141), charging the primary container (2) with a beverage (11) and sealing the primary container (2) to form a primary head space (46)  
30 containing a gas at a pressure higher than atmospheric pressure in the

primary container (2), and charging the second chamber (42;142) with gas from the primary head space (46) to substantially equalise the pressures in the primary and secondary containers (2;3) so that, when the primary container (2) is opened the primary headspace (46) is vented to atmosphere creating a pressure differential between the primary and secondary containers (2;3) whereby the valve member (18;118) is displaced by the gas pressure in the second chamber (42;142) to open the outlet (33;133) in the first chamber (41;141) and release the contents of the first chamber (41;141) into the beverage (11).

5  
10

28. A method according to Claim 27 characterised in that, the beverage (11) is a carbonated beverage (11) and gas evolved from the beverage (11) when the primary container (3) is sealed is used to produce or assist in producing the pressure in the primary headspace (46).

15

29. A method according to Claim 27 or Claim 28 characterised in that, evaporation of liquid nitrogen or other inert gas introduced into the primary container (2) is used to produce or assist in producing the pressure in the primary headspace (46).

20

30. A method according to any one of Claims 27 to 29 characterised in that, the secondary container (3) stores and releases a liquid into the beverage (11) when the primary container (2) is opened.

25

31. A method according to any one of Claims 27 to 30 characterised in that, the method includes the step of securing the secondary container (3) to the base (5;105) of the primary container (2), inverting the primary container (2) from its normal upright position to locate the secondary container (3) in the headspace (46) for equalising the gas pressures in the headspace (46) and the second chamber (42;142) of the secondary

30

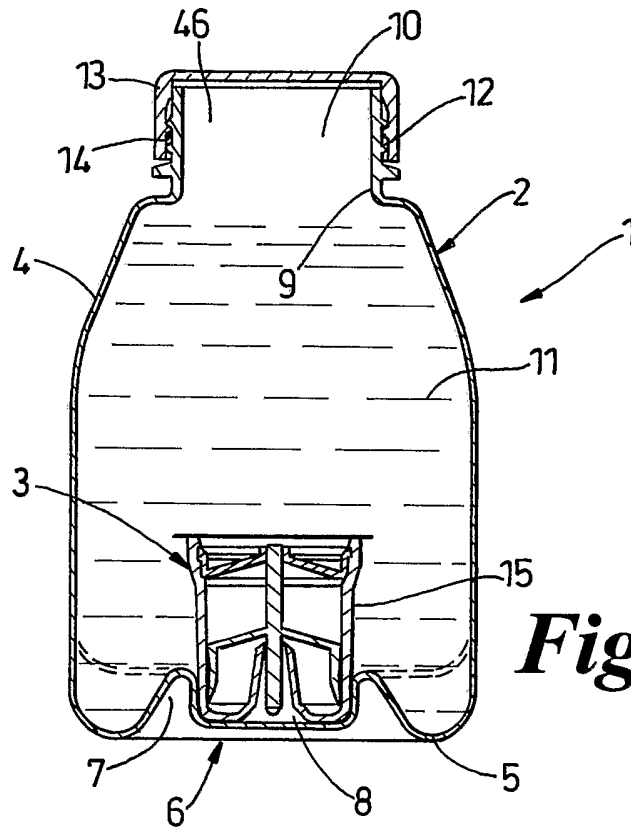
container (3), and returning the primary container (2) to its normal upright position.

32. A method according to any one of Claims 27 to 31 characterised in  
5 that, the method further includes releasing excess pressure remaining in  
the second chamber (42;142) into the beverage (11) when all or  
substantially all the contents of the first chamber (41;141) have been  
released into the beverage (11).

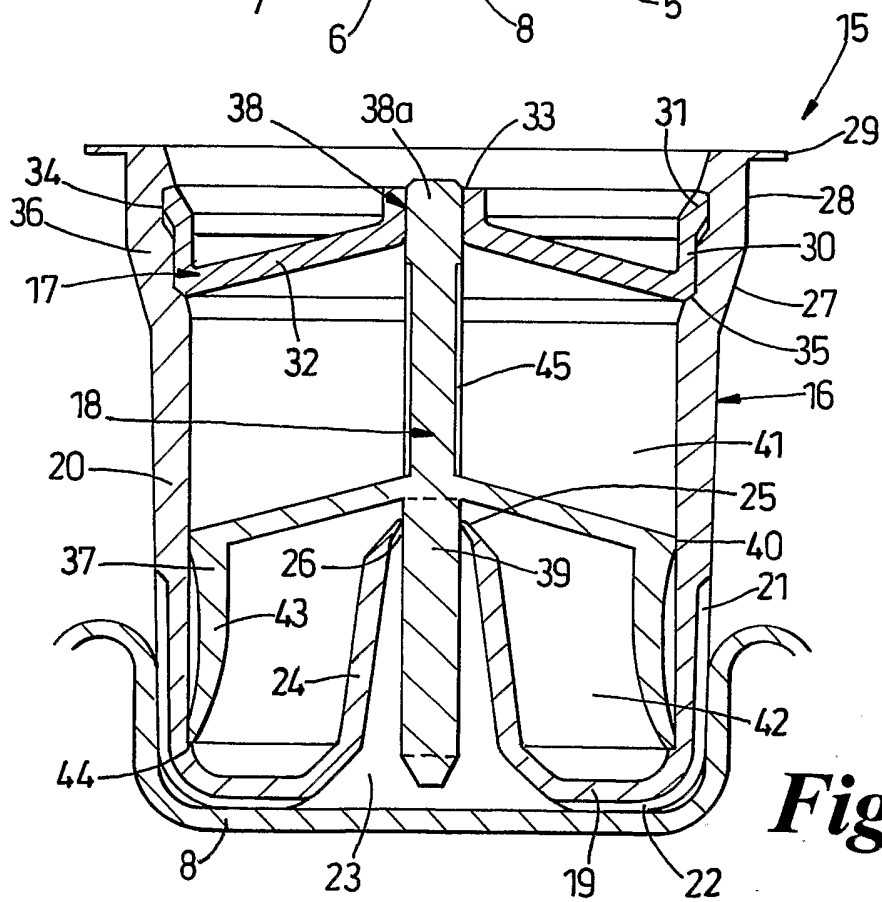
10 33. A secondary container for use in a beverage package according to  
any one of Claims 1 to 27.

34. A secondary container for use in a method of packaging a beverage  
according to any one of Claims 27 to 32.

15



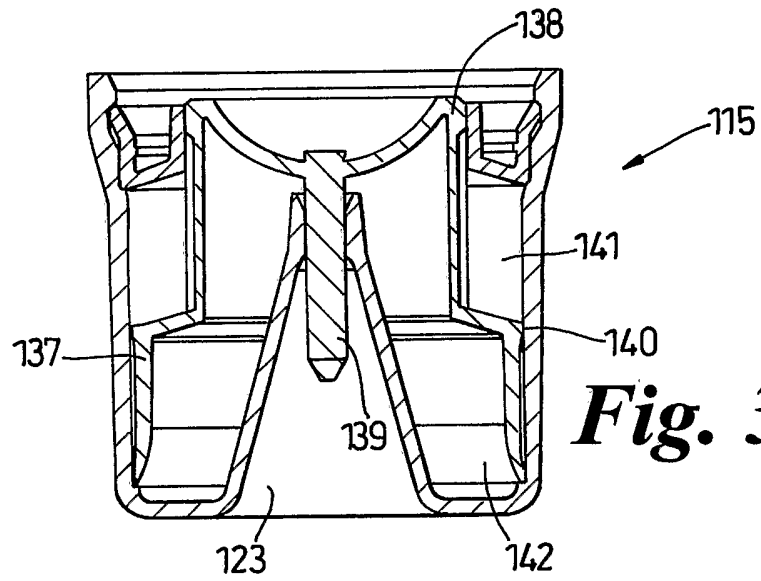
**Fig. 1**



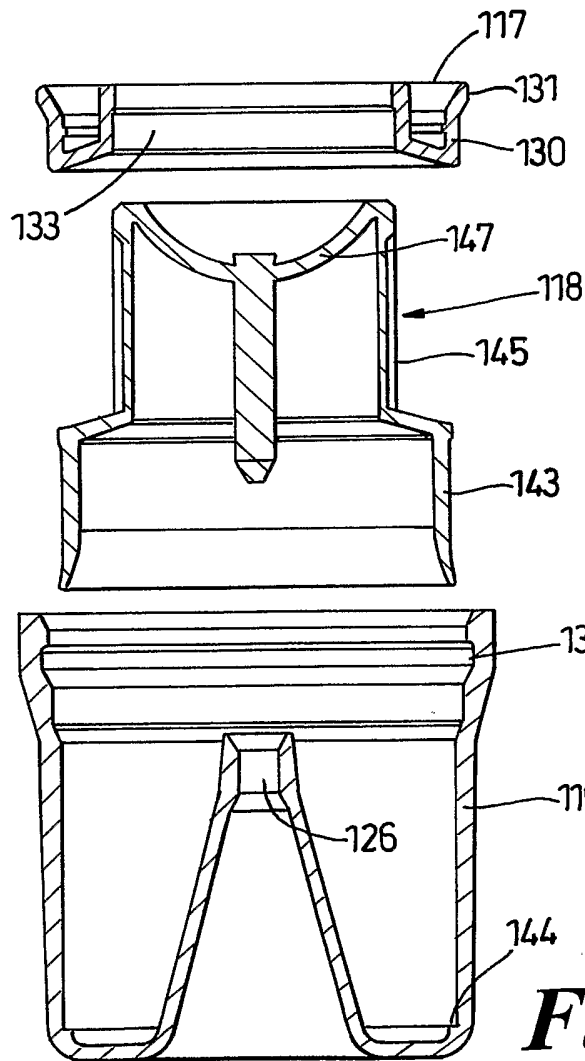
**Fig. 2**



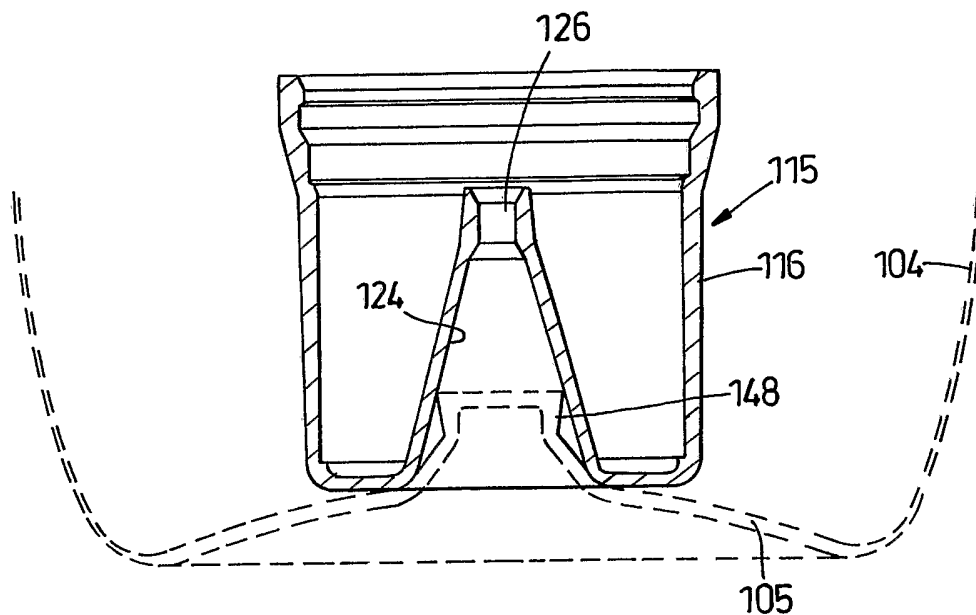
2/3



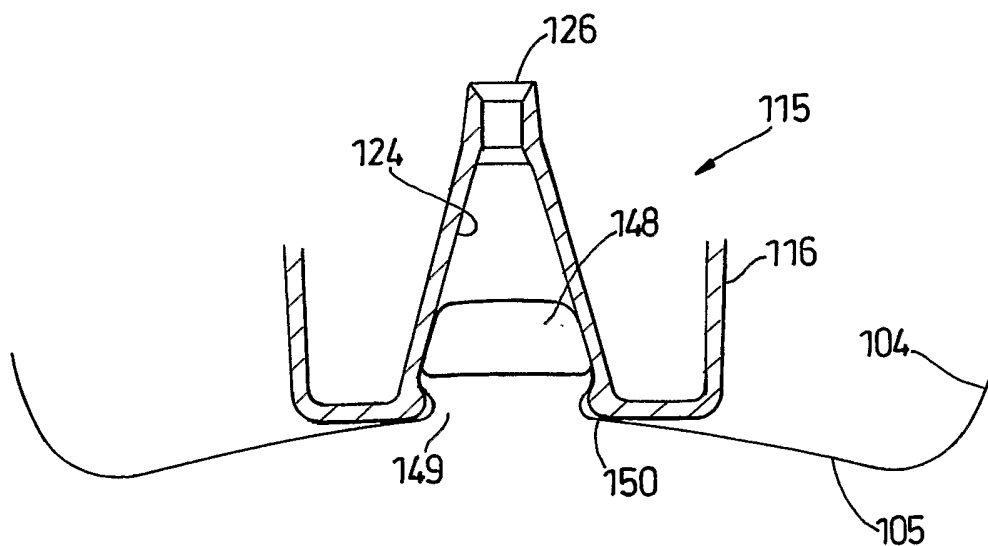
**Fig. 3**



**Fig. 4**



**Fig. 5**



**Fig. 6**

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 02/05044

A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 7 B65D81/32 B65D79/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	column 2, line 31 -column 4, line 1  column 4, line 37 -column 5, line 37; figures 1-3	5, 6, 19, 20, 28, 29
Y	--- GB 2 332 413 A (BASS PLC) 23 June 1999 (1999-06-23) figures 10-26  ---	5, 6, 19, 20
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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\*P\* document published prior to the international filing date but later than the priority date claimed

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\* & \* document member of the same patent family

Date of the actual completion of the international search

3 March 2003

Date of mailing of the international search report

12/03/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
 NL - 2280 HV Rijswijk  
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
 Fax: (+31-70) 340-3016

Authorized officer

Berrington, N

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 02/05044

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