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(54) Sampling device for a flexible container

(57) A container assembly for containing fluids for transportation comprises (a) a flexible container formed from at least one sheet of a flexible material, a container having at least one port through which it can be emptied, the port being covered with a sealing membrane which includes a sealing material extending over at least part of the area of the port, the sealing material being capable of sealing the membrane after penetration by a sampling needle, and (b) a rigid casing in which the flexible container can be located for support, the casing including an opening for the emptying port, located in or towards the base of the casing.

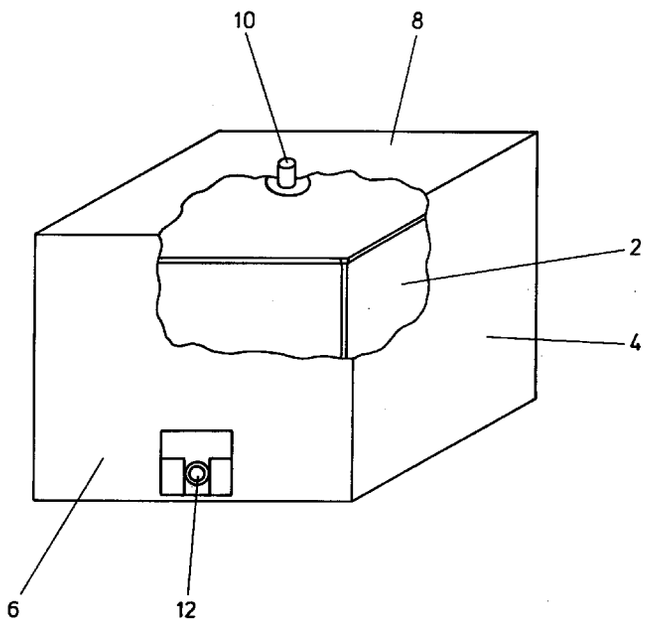

FIG. 1

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Description

This invention relates to a flexible container for containing fluids for transportation. Such containers are often supported in an outer rigid casing. One or more openings can be provided in the container and the casing when present through which the container can be filled or emptied or both.

Containers of this type can be made of flexible sheet material, for example flexible polymeric material. An opening in the container for filling or emptying can have a tube extending from it which can be used for example to mount a valve or to engage an appropriate conduit through which material can flow into or out of the container.

Flexible containers of this kind can be supported by means of a rigid casing which has an opening in it to allow access to the opening on the container.

Flexible containers of this general kind can be used for transportation of a wide variety of fluid materials. Such materials will often be liquids. They can however be of other kinds, for example particulate solid materials. The fluid materials can be used in a variety of applications, including for consumption by humans or animals. They can also be used in industrial processes. Examples of materials which can be transported in flexible containers of this kind include oils, fats, juices and powders for consumption, such as mayonnaise, jam, sugar, fruit juice, cooking oils and so on. Non-edible products which can be transported in this way include paints, bulk chemical materials, building materials such as sand and plaster, and so on.

It can be desirable to sample materials which are provided in a flexible container of this kind. For example, materials within a container might be sampled to monitor changes in their composition or characteristics, for example on deterioration or maturation. Materials might also be sampled for identification. An example of a material which might be sampled when in a flexible container is a yeast solution, whose characteristics can change as a result of for example bacterial attack.

Sampling techniques used for materials within a flexible container involve removal of the cap provided on the opening for which the container is filled. A tool is then used to extract fluid from within the container. This technique has several disadvantages. It involves admission of atmospheric gases into the container which can in some circumstances lead to a further change in the characteristics of the fluid within the container, in particular on oxidation. Furthermore, especially when the container is only part filled and is located within a rigid casing, it can be difficult to reach the fluid within the container, low down in the casing.

The present invention provides a quantity of a sealing material in a sealing membrane over the outlet port from the container, which allows sampling of fluid within the container.

Accordingly, in one aspect, the invention provides a container assembly for containing fluids for transportation, which comprises (a) a flexible container formed from at least one sheet of a flexible material, a container having at least one port through which it can be emptied, the port being covered with a sealing membrane which includes a sealing material extending over at least part of the area of the port, the sealing material being capable of sealing the membrane after penetration by a sampling needle, and (b) a rigid casing in which the flexible container can be located for support, the casing including an opening for the emptying port, located in or towards the base of the casing.

The container of the invention has the advantage that fluid within a container can be sampled by means of a sampling needle without having to gain access to the fluid through the inlet to the container. In this way, admission of air to the container can be avoided, avoiding any change to the characteristics of the fluid within the container. Furthermore, access to fluid through the outlet port of the container is generally possible, even when the container is only partially filled. This is in contrast to gaining access to the fluid through the inlet, which is generally located towards the top of the container.

The flexible container of the invention can be provided with a rigid casing in which the container can be located for support. The rigid casing can be provided on a pallet for ease of manipulation, for example, using a fork-lift truck. The rigid casing can enable flexible containers on pallets to be stacked, facilitating transportation and storage of fluids contained within flexible containers.

The rigid casing can include an opening for the emptying port in the container. The opening will generally be located in or towards the base of the casing. In many cases, the opening will be located towards the lower edge of a side wall of the casing.

The flexible container can comprise multiple plies of a sheet material. The container can include two walls, each comprising one or more plies of material. The plies can be bonded to one another around their edges to define the walls of the container. The sheet material will generally be a polymeric material, especially a polyolefin material such as polyethylene or polypropylene. It can include other materials such as polyamides, polyesters and so on, in addition to or instead of polyolefin materials. When there is more than one material in a ply, they can be provided as a laminate such as is formed by coextrusion of the two materials. Information concerning the construction of multiple wall containers is disclosed in UK patent application no. 9501004.7 filed on 19 January 1995. Subject matter disclosed in the specification of that application is incorporated in this specification by this reference.

Preferably, the membrane comprises a thin film of a polymeric material. The polymeric material of the thin film can be the same as that from which the flexible container of the invention is made. Suitable polymeric materials for the membrane include polyolefin materials, polyesters, polyamides and so on. Especially preferred

materials include polyethylenes and polypropylenes. It can be preferred for some applications to form the membrane from more than one material, for example two plies formed from different materials, or from an intimately bonded laminate. For example, a sealing membrane can be formed from a thin laminated film of polyethylene and polyester materials.

Preferably, the sealing membrane has a quantity of the sealing material attached to the said thin film. The sealing material will frequently be a material that is different from the material of the thin film. It can be attached to the thin film by techniques which include use of a material which is different from that of the film and the sealing material (for example using an adhesive), or without an additional material, for example by welding or by casting *in situ*.

It is preferred that the sealing membrane be attached to the thin film by means of lamination between two layers of the film, so that one of the film acts as a locating sheet. For example, the sealing membrane can be positioned between two layers of film which can be attached to one another around the sealing membrane. The layers of film might be attached to one another by welding, or by means of another material such as a sealing material, especially an adhesive.

A sealing material can be provided on an outwardly facing surface of the said film. This has the advantage that the sealing material does not come into direct contact with fluid within the container. This can reduce contamination of the fluid by the sealing material.

The sealing material can be provided on an inwardly facing surface of the said film. This has the advantage that pressure of fluid within the container can aid sealing of the membrane after penetration by a sampling needle.

The sealing membrane can have the sealing material extending over substantially the entire area of the outlet port from the container. In this arrangement, the sealing membrane can consist of the sealing material without an additional film. Alternatively, a laminate of a thin film and the sealing material can be used for the membrane. Sealing material will however generally be provided over a part only of the area of the outlet port, for example in a circular region substantially centrally in the port.

Preferably, the outlet port includes a tube extending from the container, through which fluid flows when the container is emptied. Such a tube can be used for example to mount a valve or to engage an appropriate conduit through which material can flow into or out of the container. When the container is to be used with a rigid casing having an opening for the outlet port from the container, the tube can extend through the opening.

When the outlet port includes a tube on the outlet port, the sealing membrane can be provided across an opening in the tube, either the inwardly facing or the outwardly facing opening. Generally, the membrane will be provided across the inwardly facing opening of the tube; this has the advantage that the membrane is protected against physical damage when the container is in use.

The sealing material can suitable comprise an elastomeric material. The sealing material is selected so that it will self-seal after penetration by means of a sampling needle. A suitable sampling needle can be provided on a syringe. The dimensions of a needle will depend on the nature of the fluid to be sampled, the dimensions of the opening, and the pressure of fluid in the container. Suitable needles might have a transverse dimension of up to about 4 mm, for example up to about 2.5 mm, or up to about 1.5 mm. Larger sampling needles can however be used for some applications. Suitable sealing materials might include, for example, silicone materials and polytetrafluoroethylene and rubbers. Suitable materials will be characterised by an ability to seal penetrating openings, which can be affected by thickness, hardness, ability to flow, density and rigidity. Suitable materials must also be compatible with the fluid to be provided in the container and with other components of the container, such as a polymeric film layer of the sealing membrane.

Containers of the type with which this invention is concerned will often be generally rectangular (which includes square) when viewed in plan. The side faces of the container will frequently have an area of at least about 0.2 m^2, for example at least about 0.5 m^2, preferably at least about 0.8 m^2. The said area will often be less than about 4 m^2, preferably less than about 2.5 m^2, for example less than about 1.5 m^2. An example of the container of the invention has a rectangular base with dimensions of about 0.9 m × 1.1 m, and a height of about 0.8 m.

The outlet port for the container will generally have an area of less than about 0.03 m^2, preferably less than about 0.01 m^2, for example less than about 0.008 m^2. The outlet will generally have an area of at least about 10^{-3} m^2, preferably at least about 5×10^{-3} m^2. The opening will generally be circular when viewed along the direction where fluid fluids through the outlet port.

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

Figure 1 is an isometric view, partially in section, through a flexible container located in a rigid casing;

Figure 2 is a view along the axis of the outlet port in the flexible container shown in Figure 1; and

Figure 3 is a cross-section through a flexible container in the region of the outlet port, showing the sealing membrane provided in the port.

Referring to the drawings, Figure 1 shows a flexible container 2 contained within a rigid casing 4. Openings are provided towards the base of a side wall 6 and in the top 8 of the rigid-casing for inlet and outlet ports 10, 12,

by which the flexible container 2 can be filled an emptied respectively. A filling operation generally involves connecting an inlet hose to the inlet 10 of a flexible container. The flexible container can then be positioned within the rigid casing 4 and filled. As it is filled, the filling fluid causes the container to inflate. As the container inflates. The outlet port 12 includes a rigid tube 14 extending outwardly from the container, to which an outlet hose can be connected. The rigid tube 14 can protrude through an opening in the side wall 6 of the rigid casing 4.

As shown in Figure 2, a sealing membrane 16 extends across the inwardly facing opening of the outlet tube 14. The sealing membrane contains a thin film laminate of polyester and polyethylene materials. This can be the same as the material of the flexible container itself; flexible containers can conveniently be made from multiple plies of polyethylene material.

The sealing membrane is attached to the outlet tube around its periphery by a technique such as welding or adhesive bonding.

The sealing membrane includes a disk 18 of a silicone sealing material, attached to the thin polyester/polyethylene film.

The disk is provided on the outwardly facing surface of the polyethylene film.

Fluid within the container can be sampled by penetration of the silicone sealing material on the sealing membrane using a syringe with a fitted needle. The sealing material on the membrane enables the membrane to seal itself when the sampling needle on the syringe is withdrawn.

When it is desired to allow fluid within the container to flow out of the container, the sealing membrane is cut away using conventional tools.

Figure 3 shows a flexible container 20 which has an outlet port 22 provided in it. The port comprises a moulded port which is bonded to the material of the container, for example by welding.

A sealing membrane in the outlet port comprises a film 24 of a polyethylene laminate, a disk 26 of a silicone sealing material, and a locating sheet 28 formed from polyethylene. The silicone disk is retained between the film 24 and the locating sheet 28 by means of welds between the film and the sheet around the periphery of the disk.

Claims

1. A container assembly for containing fluids for transportation, which comprises (a) a flexible container formed from at least one sheet of a flexible material, a container having at least one port through which it can be emptied, the port being covered with a sealing membrane which includes a sealing material extending over at least part of the area of the port, the sealing material being capable of sealing the membrane after penetration by a sampling needle, and (b) a rigid casing in which the flexible container can be located for support, the casing including an opening for the emptying port, located in or towards the base of the casing.

2. A container assembly as claimed in claim 1, in which the outlet port includes a tube extending outwardly from the container, through which fluid can flow when the container is emptied.

3. A container assembly as claimed in claim 1 or claim 2, in which the membrane comprises a thin film of a polymeric material.

4. A container assembly as claimed in claim 3, in which the membrane includes a quantity of the sealing material attached to the said film.

5. A container assembly as claimed in claim 4, in which the sealing material is provided on the outwardly facing surface of the said film.

6. A container assembly as claimed in claim 4, in which the sealing material is provided on the inwardly facing surface of the said film.

7. A container assembly as claimed in any one of claims 4 to 6, in which the sealing material is retained against the said film by means of a locating sheet, the sealing material being located between the film and the locating sheet.

8. A container assembly as claimed in claim 7, in which the film and the locating sheet are attached to one another around the periphery of the sealing material.

9. A container assembly as claimed in claim 8, in which the film and the locating sheet are attached to one another by welding.

10. A container assembly as claimed in claim 9, in which the membrane is provided across the inwardly facing opening into the said tube.

11. A container assembly as claimed in any one of claims 1 to 10, in which the sealing material comprises an elastomer.

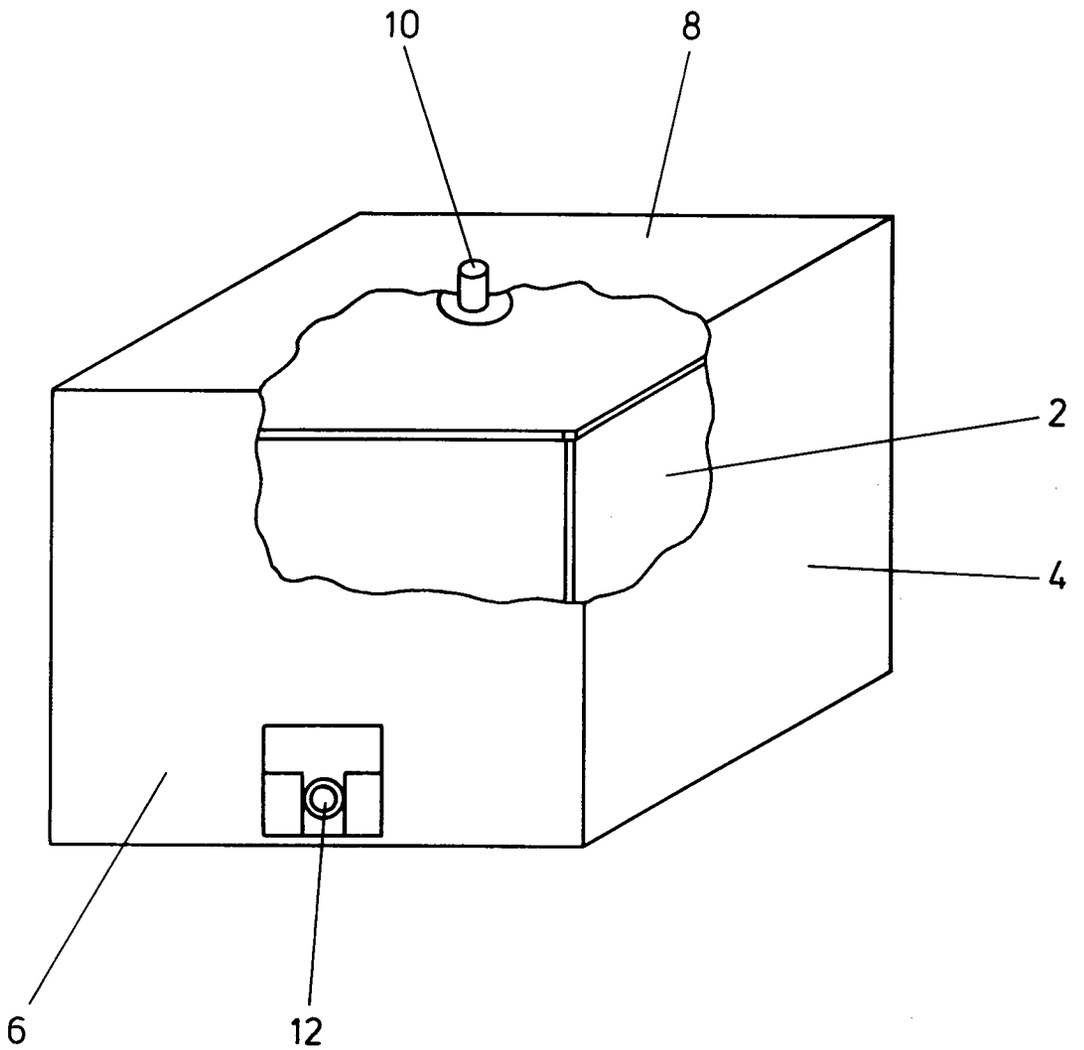

FIG. 1

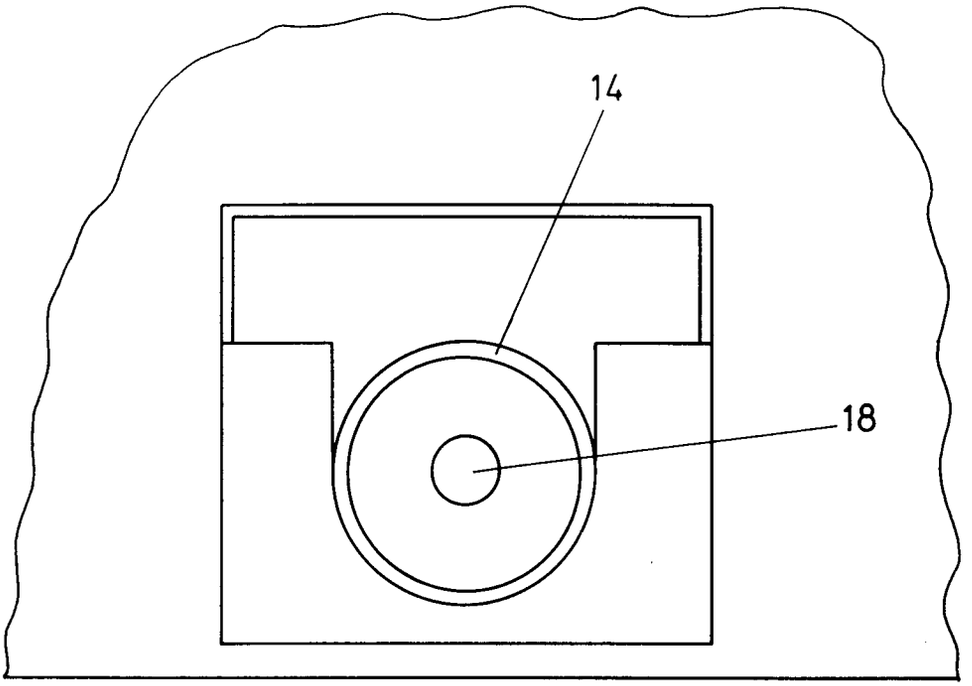

FIG. 2

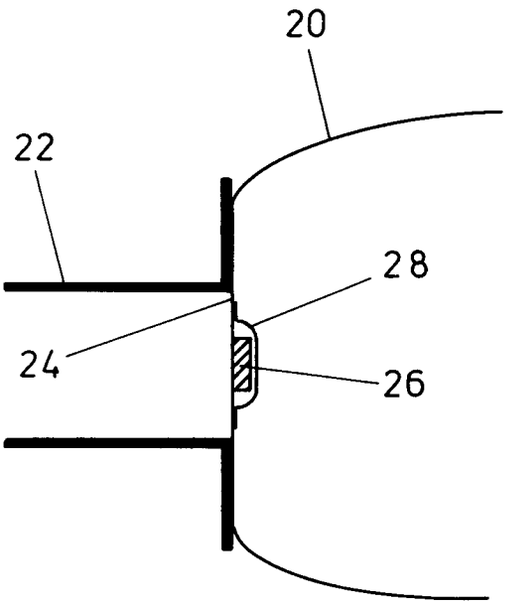

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 96 30 1240

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X Y	US-A-5 390 814 (CHRISTINE WILLIAM ET AL) 21 February 1995 * abstract; figure 1 *	1,2 3,4,11	B65D77/06
Y	PATENT ABSTRACTS OF JAPAN vol. 017, no. 606 (C-1128), 8 November 1993 & JP-A-05 184645 (NIPPON MEDICAL SUPPLY CORP), 27 July 1993, * abstract *	3,4,11 1,2	
A	FR-A-2 593 144 (LEBIEDINSKY GEORGES) 24 July 1987 * abstract; figures *	1	
A	DE-C-43 40 910 (V.FREUDENBERG) * column 4, line 39 - line 41; figure 1 *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)
B65D A61J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 May 1996	Zanghi, A

CATEGORY OF CITED DOCUMENTS

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