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(71) Applicant: **Sterisol AB**
(Kronoängen)
S-592 00 VADSTENA (SE)

(72) Inventor: **Nilsson, Billy**
Finnstugatan 30
S-595 00 Mjölby (SE)

(74) Representative: **Schöld, Zaid**
Nobel Industries Sweden AB Patent
Department Box 11554
S-100 61 Stockholm (SE)

(54) **Fluid container.**

(57) The invention concerns a fluid container comprising a collapsible fluid chamber (21) for holding the fluid including at least one flexible portion (24) and an opening (25) sealingly connected to a dispensing device (26) capable of creating a negative pressure for sucking the fluid from the fluid chamber (21) in order to dispense it during simultaneous collapsing of said fluid chamber (21).

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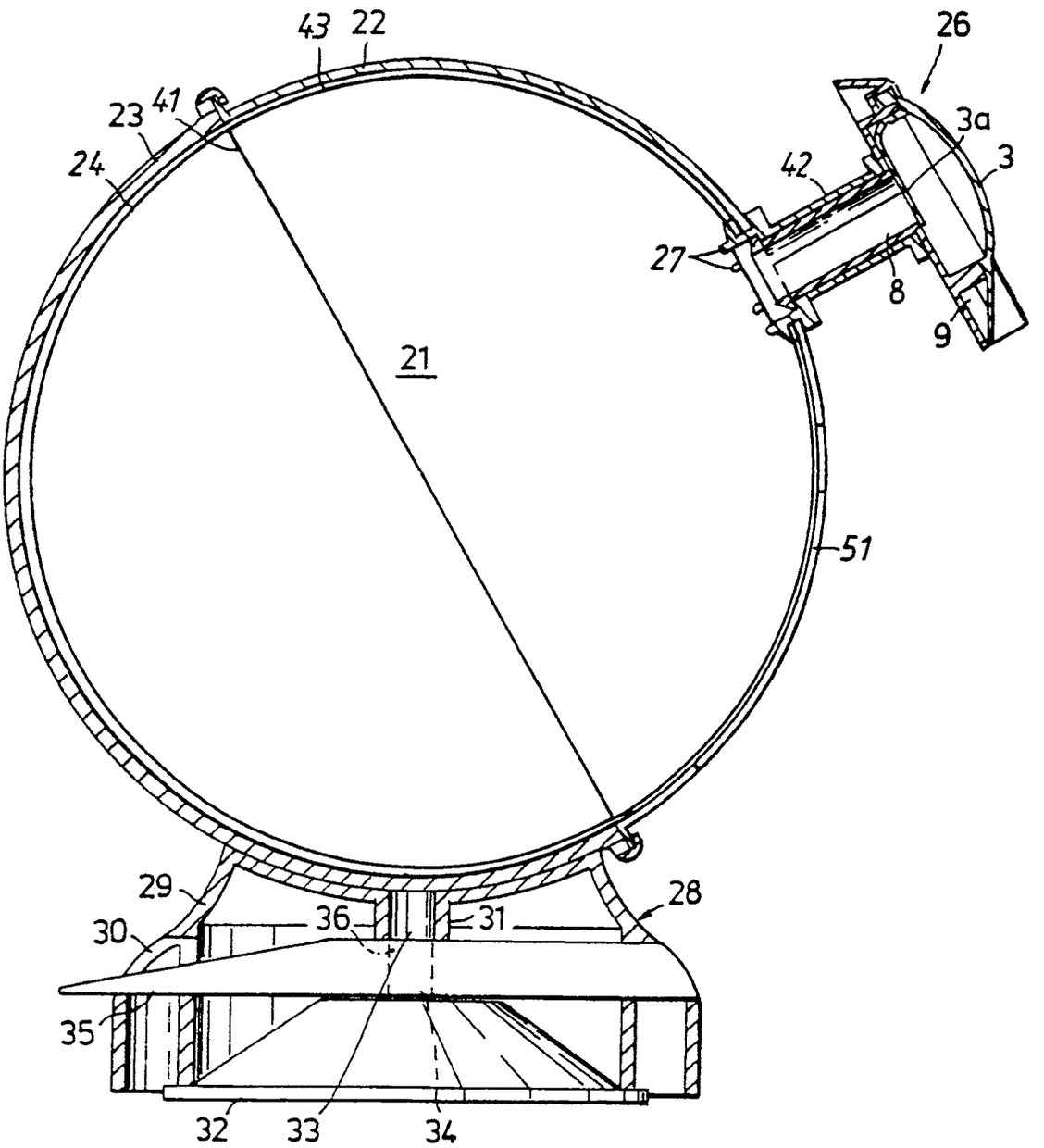
Fig. 7



FLUID CONTAINER

The present invention relates to a fluid container comprising a collapsible fluid chamber for holding a preferably viscous fluid. The fluid chamber includes at least one flexible portion and an opening sealingly connected to a dispensing device capable of dispensing the fluid from the fluid chamber.

Viscous fluids, such as liquid detergents, are often packed in flexible bags having a valve for dispensing the fluid such that the bag collapses and its volume is reduced, as described e.g. in GB, A, 2,131,394 and EP, A1, 207,279. These containers must be placed on a vertical surface, such as a wall or the like, with the valve located at the bottom so that the fluid in the bag will flow to the valve by gravity.

This disadvantage is offset in DE, A1, 2,628,979 suggesting the use of a pressure pack mounted inside a shell. However, pressure packs are in themselves relatively complicated and also require propellant gases which must not affect the fluid or the user.

GB, A, 654,113, for example, discloses a soap container of hard material which is pivotally mounted, so that the soap can be poured through an opening when the container is pivoted. It is then necessary that air be admitted through another opening, with the consequent drawback that microorganisms and other substances present in the air may also enter.

US, A, 3339803 and US, A, 4826045 disclose fluid containers including a diaphragm for expelling the fluid when subjected to external pressure. The diaphragm is provided with stiffening rings or a stabilizing pin to avoid buckling and thus obstruction of the dispensing opening. These containers are complicated and require a pressure medium in order to dispense the fluid.

There is a current demand for a container for holding a preferably viscous fluid, especially liquid detergent, where the fluid can be dispensed without the risk of any foreign substances or biological organisms entering the container. The container should also be easy to manufacture, practical to handle, flexible as to the place of mounting and of aesthetical appearance.

This demand has now been complied with by the provision of a fluid container as stated in claim 1. More specifically, the container comprises a collapsible fluid chamber including at least one flexible portion and an opening sealingly connected to a dispensing device capable of creating a negative pressure for sucking the fluid from the fluid chamber in order to dispense it during simultaneous collapsing of said fluid chamber. Suitably, projecting means extending into the fluid chamber are provided near the opening, preferably around the periphery of the opening, to prevent any part of the flexible portion of the fluid chamber from obstructing said opening, whereby the formation of fluid pockets having no contact with the opening is prevented. It is preferred that the fluid chamber, when filled, is substantially spherical, which means maximal economy of material and maximal strength. The flexible portion should constitute at least half the fluid chamber to permit substantially complete discharge of the content therein.

According to a preferred embodiment, substantially the whole fluid chamber is flexible. In a manufacturing point of view, it is particularly preferred that the fluid chamber is made of two substantially equally large flexible sheetings joined to each other along their edges, e.g. by welding or gluing. One of the sheetings is provided with an opening, preferably at its central portion. Thus, if the fluid chamber is spherical, the opening will constitute one of the poles while the joint between the sheetings, e.g. a welding seam, will constitute the equator.

A container consisting of a collapsible fluid chamber as described sealingly connected to a dispensing device will work, but it is preferred that the container also comprises a rigid house in which the collapsible fluid chamber is mounted. Preferably the house comprises a front shell, preferably provided with an opening for the dispensing device, and a back shell. The front shell is preferably provided with a slot extending from the edge of the shell to the opening for the dispensing device, which slot can be widened for facilitating mounting of the front shell on the fluid chamber. The shells are detachably assembled so as to form a closed, but not gastight, preferably spherical space enclosing the fluid chamber. Further, the shells are suitably joined together by means of some type of quick-connective lock, such as a bayonet catch or the like, but different types of screw joints are also conceivable. To permit reducing the volume of the fluid chamber when being emptied, air must be admitted into the above-mentioned space, either at the joint or through apertures.

In another embodiment the fluid chamber is defined by the front shell and a flexible sheeting connected to the front shell, e.g. by welding. The front shell is provided with an opening sealingly connected to the dispensing device. Preferably the front shell and the flexible sheeting constitute substantially equally large parts of the fluid chamber. The front shell may be joined to the back shell as in the embodiment described above.

In all embodiments comprising a rigid house, the container may be mounted, preferably through its back shell, in a holder comprising means for attaching the holder to a surface. These means may comprise adhesive material, but it is preferred that the holder can be detachably fixed to the surface, e.g. by means of a suction cup. A preferred holder comprises annular means having a biaxial through bore and encircling

projecting means having a biaxial through bore and coaxially cooperating with projecting means provided in the central portion of a suction cup and having a biaxial through bore. The through bores are so designed that a pin or wedge can be inserted for mounting the suction cup in the holder. It is preferred, in particular, that the through bores are so adapted that the central portion of the suction cup is lifted when the pin or wedge is inserted, thereby increasing the negative pressure in the suction cup and, thus, the force of adhesion. The annular means should then have an inner diameter which is smaller than the outer diameter of the suction cup, such that the peripheral portion thereof is pressed against the mounting surface. Such a container can easily be fixed to all flat surfaces, such as a washbasin or a wall.

In another embodiment, the outer side of the house has one or more flat surfaces, so that it can be placed steadily on horizontal surfaces, such as washbasin, a shelf or a table. It is also possible to provide one or more of the flat surfaces with a layer of adhesive material.

Any dispensing device capable of creating a negative pressure for sucking the fluid from the fluid chamber in order to dispense it may be used. A preferred dispensing device is described in our copending patent application with priority from Swedish applications 9000568-7 and 9002753-3. Such a device comprises a pump, preferably in the form of a mechanically actuated dome, which is capable of creating a negative pressure for sucking the fluid from the fluid chamber, and of creating a positive pressure for discharging the fluid through a channel communicating with the pump, and non-return valve means for preventing fluid from flowing back into the fluid chamber. The channel has an inlet and an outlet end and an axial direction of fluid flow, means being provided at the outlet end for opening at a certain interior positive pressure and for closing when this positive pressure decreases. Preferably, the channel is defined by a body portion consisting of rigid material and formed with a groove of substantially arcuate cross-section, and a cover portion of flexible material. The side edges of the cover portion extending in the direction of flow are sealingly connected to the body portion and gradually conform towards the outlet end to the shape of the groove. The cover portion is prestressed and thereby caused in a region at the outlet end of the channel to sealingly engage the wall of the groove with a certain engagement pressure. Preferably, the cover portion has a thickness which increases towards the side edges as seen in a section transversely of the direction of flow. The groove is suitably so shaped that its cross-section, at least at the outlet end, substantially constitutes the arc of an imaginary sector of a circle where the angle between the straight lines is from 5 to 40 degrees, preferably from 20 to 40 degrees.

The hard and rigid parts of the container can be manufactured by injection-moulding polyethylene or polypropylene, while the flexible sheetings may consist of a vacuum-formed laminate comprising a layer of polyethylene or polypropylene and a layer of polyamide or polyester. The flexible parts of the dispensing device, i.e. the dome and the cover portion, may consist of vacuum-formed thermoplastic polyethylene. All permanent joints may be welded or glued. It is however obvious to a person skilled in the art that other methods of manufacture and other construction materials having suitable properties can be used.

A container as described above offers all the advantages of flexible bags, since it is easy to manufacture and to use and it can be emptied without admitting any foreign substances or organisms. As opposed to prior art containers of this type, it may be placed with the opening for dispensing its content pointing in any direction, upwards as well as downwards. It can be fixed, either detachably or permanently, on both horizontal, vertical and inclined surfaces, or be placed directly on a horizontal surface without being fixed to it, which makes the container highly flexible as to its place of use. With its clean outer configuration, it also has an aesthetical appearance.

Some different embodiments according to the invention will now be described in more detail with reference to the accompanying drawings. Figure 1 is a sectional side view of an empty fluid chamber, Figure 2 is a sectional side view of a filled fluid chamber, Figures 3 and 4 are a front view and a top view respectively of a front shell, Figures 5 and 6 are a front view and a sectional side view respectively of a back shell, Figure 7 is a sectional side view of a container comprising a filled fluid chamber mounted in a house, Figure 8 is a sectional side view of container according to another embodiment, Figures 9-11 illustrate step by step how the back shell is attached to a mounting surface, Figure 12 shows an embodiment where the outside of the back shell is provided with flat surfaces, Figures 13a and 13b are front views of a preferred dispensing device, and Figures 14a and 14b are sections taken along the lines I-I in Figures 13a and 13b, respectively. The invention is however not restricted to these embodiments, but only to that stated in the accompanying claims.

Fig. 1 shows an empty fluid chamber 21 comprising a flexible sheeting 43 provided with an opening 25 to which a pipe end 42 is joined, preferably by welding. The mouth of the pipe end is provided with projecting means 27 extending into the fluid chamber 21 around the opening 25. The sheeting 43 is joined, preferably by welding, to an equally large flexible sheeting 24 tightly engaging the former 43.

Fig. 2 shows a spherical fluid chamber 21 filled with a fluid, for instance liquid detergent, on which the

joint 41 between the two flexible sheetings 24, 43 extends along the equator of the sphere. A dispensing device 26 capable of creating a negative pressure is sealingly connected to the pipe end 42 through a connecting pipe 8. A preferred method of making a fluid chamber according to figs. 1 and 2 includes forming two endless sheetings, punching out openings 25 at predetermined distances in one of the sheetings and joining a pipe end 42 to each opening 25, joining the two sheetings in ring shaped joints 41 and finally punching out every fluid chamber 21. The joining and punching is preferably performed in a mould shaped as a hemisphere in which the sheetings also are stretched, resulting in an empty fluid chamber as shown in fig. 1. Each fluid chamber 21 can be filled through the pipe end 42 before the dispensing device 26 is mounted.

Figs. 3 and 4 show a front shell 22 shaped as a hemisphere and provided with an opening 50 for the dispensing device 26 and a slot 51 extending from the opening 50 to the edge. The slot 51 can be widened to facilitate mounting of the front shell 22 to a fluid chamber 21 with a dispensing device 26. Further, the front shell 22 is provided with symmetrically positioned locking means 52 which may be of any construction, such as L-shaped projecting means.

Figs. 5 and 6 show a back shell 23 shaped as a hemisphere and provided with locking means 53 which fit into the locking means 52 of the front shell 22. Since the locking means 52, 53 are symmetrically positioned around the edges of the shells 22, 23 they can be mounted in as many different positions relative to each other as there are locking means 52, 53 on each shell 22, 23.

Fig 7 shows a container comprising a fluid chamber 21 mounted in a spherical house including a front shell 22 and a back shell 23 detachably assembled and enclosing said fluid chamber 21. The dispensing device 26 comprises a connecting pipe 8 mounted in the pipe end 42 so as to be sealingly connected to the opening 25. The fluid chamber 21 is filled and thus takes up substantially the entire spherical space between the shells 22, 23. As the fluid is being dispensed, the fluid chamber 21 collapses and air from the atmosphere enters through the joint between the shells 22, 23 and fills the increasing empty space thus created in the house. The projecting means 27 extending into the fluid chamber 21 will prevent any obstruction of the opening 25 and thus enabling substantially complete discharge of the fluid from the fluid chamber 21.

Fig. 8 shows another embodiment of a container according to the invention. The container comprises a house of two equally large, detachably assembled shells, a front shell 22 and a back shell 23, forming a closed spherical space enclosing a flexible sheeting 24. The sheeting forms, together with the front shell 22, a fluid chamber 21. A dispensing device 26 capable of creating a negative pressure is sealingly connected to an opening 25 provided in the front shell 22. The back shell 23 may be the same as in the embodiment described above. When the fluid chamber 21 is filled it takes up substantially the entire spherical space. As the fluid is being dispensed, the fluid chamber 21 collapses and the sheeting 24 approaches the inner side of the front shell 22. The reduction of the volume of the fluid chamber is compensated for by air entering the spherical space through the joint between the shells 22, 23. When the fluid chamber 21 has been emptied, the sheeting 24 tightly engages the front shell 22. The dispensing device 26 comprises a connecting pipe 8 mounted in the front shell 22 so as to be sealingly connected to the opening 25 and so as to form a projecting portion 27 in the fluid chamber 21. The projecting portion has slots 18 allowing fluid to enter even if the sheeting 24 engages the mouth of the connecting pipe 8.

In both the embodiments according to Figs. 7 and 8, the back shell 23 is mounted in a holder 28 comprising an outwardly extending annular means 29 surrounding a projecting sleeve 31. The annular means 29 and the sleeve 31 are formed with biaxial through bores 30, 36. The holder 28 also comprises a suction cup 32 whose central portion is provided with a projecting pin 33 having a biaxial through bore 34. The inner diameter of the annular means 29 is slightly smaller than the outer diameter of the suction cup 32, such that it engages the peripheral portion of the suction cup 32. The through bores 30, 34 are so adjusted that the central portion of the suction cup 32 is lifted when a pin or wedge 35, preferably having a pointed front portion, is passed therethrough for detachably mounting the container.

Figs. 9-11 show, step by step, how a back shell 23 is attached to a flat mounting surface. First, the suction cup 32 is pressed onto a surface, whereupon the holder 28 with the back shell 23 is applied to the suction cup 32, such that the projecting pin 33 of the suction cup is inserted in the sleeve 31 and the annular means 29 holds the periphery of the suction cup 32 in place. The through bore 34 in the pin 33 will then be located slightly below the through bores 30, 36 in the annular means 29 and the sleeve 31. When the wedge 35 is inserted, the central portion of the suction cup 32 will be urged upwards so as to bring the through bore 34 into alignment with the through bores 30, 36. As a result, the negative pressure in the suction cup 32 is increased, as is the force required for making the suction cup come loose from the mounting surface. When the back shell 23, as in Fig. 11, is firmly fixed to the mounting surface, the front shell 22, with the fluid chamber 21 and the fluid contained therein, can be mounted. If the container is to be detached from the mounting surface, the wedge 35 is extracted, whereby the suction cup 32 easily comes loose.

Fig. 12 shows an embodiment where the back

shell 23 has an outer side in the form of a truncated pyramid. In this manner, the outside of the shell 23 will have five flat surfaces 40, all of which can be used as contact surfaces against a flat mounting surface. If the back shell 23 is made sufficiently heavy, the container will stand steadily on any of the surfaces 40. One or several of the flat surfaces 40 may be provided with an adhesive layer.

Figs. 13-14 show a preferred dispensing device comprising a pump 1 and a valve 2. The pump 1 has a mechanically actuated dome 3 of flexible material and a housing 4 of rigid material. The dome 3 is sealingly connected to the housing 4 by means of a mounting flange 5 engaging in a groove 6 in the housing 4, whereby the dome 3 and the housing 4 will define a chamber 7 whose volume can be varied by mechanical actuation of the dome 3, as illustrated in Figs. 13b and 14b. Preferably, the dome is square shaped to facilitate deformation thereof. In the housing 4 opens a channel 8 communicating with the fluid chamber 21 according to the invention. The mouth 8a of the channel 8 forms, together with a tongue 3a extended from the dome 3, a non-return valve preventing fluid from flowing from the chamber 7 through the channel 8 and back into the fluid chamber 21 of the container.

The valve 2 has a channel 9 extending between an inlet end 9a opening into the chamber 7, and an outlet end 9b and defining a direction of fluid flow as indicated by an arrow 10.

The channel 9 is defined by a body portion 11 of rigid material and a cover portion 12 of flexible material. In the embodiment shown in the drawing, the body portion 11 is integrally formed with the housing 4 and the cover portion 12 integrally formed with the dome 3. The body portion 11 is formed with a groove 13 which is arcuate in cross-section and defines the arc of an imaginary sector of a circle having an angle of about 30 degrees. Like the dome 3, the cover portion 12 is sealingly connected to the body portion 11 by means of mounting flanges 14 which at the respective edges of the cover portion 12 extend in the direction of flow 10 and engage in corresponding grooves 15 in the body portion 11. Towards the outlet end 9b, the cover portion 12 gradually conforms to the shape of the groove 13 and is caused in one region to sealingly engage the wall of the groove 13. This sealing engagement is enhanced both by the combination of the concave shape of the cover portion 12 and its connection to the body portion 11, and by the fact that the thickness of the cover portion is smaller at the center than at the edges thereof, as appears from Figs. 13a and 13b.

Fluid is dispensed from the container described above in the following manner. It is assumed that the chamber 7 is filled with a fluid from the fluid chamber 21 in a container according to the invention. Upon mechanical actuation of the dome 3, as illustrated by an arrow 16 in Figs. 13b and 14b and brought about by pressure from e.g. a finger, a positive pressure is created in the fluid. This positive pressure propagates through the channel 9 and imparts to the cover portion 12 a locally convex shape in the region where it engages the wall of the groove 13, as illustrated in Fig. 13b. The instantaneous formation of this convex shape is facilitated by said thickness distribution of the cover portion and produces an opening 17 through which fluid can pass. The positive pressure in the chamber 7 and the channel 9 is then equalized and the dispensing of fluid ceases. Thanks to the switching of the cover portion 12 between concave and convex shape, the valve 2 will open and close in a highly distinct manner. Thus, fluid is prevented from remaining between the cover portion 12 and the wall of the groove 13 after closure of the valve, which assists in creating an aseptic seal. As long as a positive pressure prevails, the valve 22 automatically closes by the non-return valve means 3a, 8a, thus preventing reflux of fluid into the fluid chamber 21. When the mechanical actuation of the dome 3 ceases, this will resume its initial shape, so that a negative pressure is created and fluid is again sucked into the chamber 7 from the fluid chamber 21 through the channel 8. Thus, the volume of the fluid chamber 21 is reduced by collapsing while air is flowing into the spherical space through the joint between the shells 22, 23. When all the content is eventually discharged, the empty fluid chamber 21 with the dispensing device 26 is replaced.

Claims

1. Fluid container, **characterised** in that it comprises a collapsible fluid chamber (21) for holding the fluid including at least one flexible portion (24) and an opening (25) sealingly connected to a dispensing device (26) capable of creating a negative pressure for sucking the fluid from the fluid chamber (21) in order to dispense it during simultaneous collapsing of said fluid chamber (21).

2. Container as claimed in claim 1, **characterised** in that projecting means (27) extending into the fluid chamber (21) are provided near the opening (25) to prevent any part of the flexible portion (24) of the fluid chamber (21) from obstructing said opening (25).

3. Container as claimed in claim 1 or 2, **characterised** in that the container comprises a rigid house (22, 23) in which the collapsible fluid chamber (21) is mounted.

4. Container as claimed in any one of claims 1-3, **characterised** in that the house comprises a front

shell (22) provided with an opening (50) for the dispensing device (26) and a back shell (23), said shells (22, 23) being detachably assembled so as to form a closed, however not gastight space enclosing the fluid chamber (21)

5. Container as claimed in claim 4, **characterised** in that the front shell (22) is provided with a slot (51) extending from the edge of the shell (22) to the opening (50) for the dispensing device (26).

6. Container as claimed in any one of claims 1-5, **characterised** in that substantially the whole fluid chamber (21) is flexible.

7. Container as claimed in any one of claims 1-4, **characterised** in that the fluid chamber (21) is defined by a front shell (22) and a flexible sheeting (24), which front shell (22) is provided with an opening (25) sealingly connected to the dispensing device (26).

8. Container as claimed in any one of claims 3-7, **characterised** in that it includes a holder (28) comprising a suction cup (32) which is intended to be detachably fixed to a surface and whose central portion is provided with projecting means (33) having a biaxial through bore (34), and annular means (29) which has a biaxial through bore (30) and whose inner diameter is smaller than the outer diameter of the suction cup (32) and which encompasses projecting means (31) having a biaxial through bore (36) and coaxially cooperating with said projecting means (33) provided on the suction cup (32), and that said through bores (30, 34, 36) are designed for the insertion of a pin or wedge (35) therethrough, whereby the central portion of the suction cup is lifted when the pin or wedge (35) is inserted.

9. Container as claimed in any one of claims 3-7, **characterised** in that the outer side of the house is provided with one or more flat surfaces (40).

10. Container as claimed in any one of claims 1-9, **characterised** in that the dispensing device (26) comprises a pump (1) capable of creating a negative pressure for sucking the fluid from the fluid chamber (21), and of creating a positive pressure for discharging said fluid through a channel (9) communicating with said pump, and non-return valve means (8a, 3a) for preventing fluid from flowing back into the fluid chamber (21), and that the channel (9) has an inlet and an outlet end (9a, 9b) and an axial direction of fluid flow (10), means (12, 13) being provided at said outlet end (9b) for opening at a certain interior positive pressure and for closing when said positive pressure decreases.

Fig.1

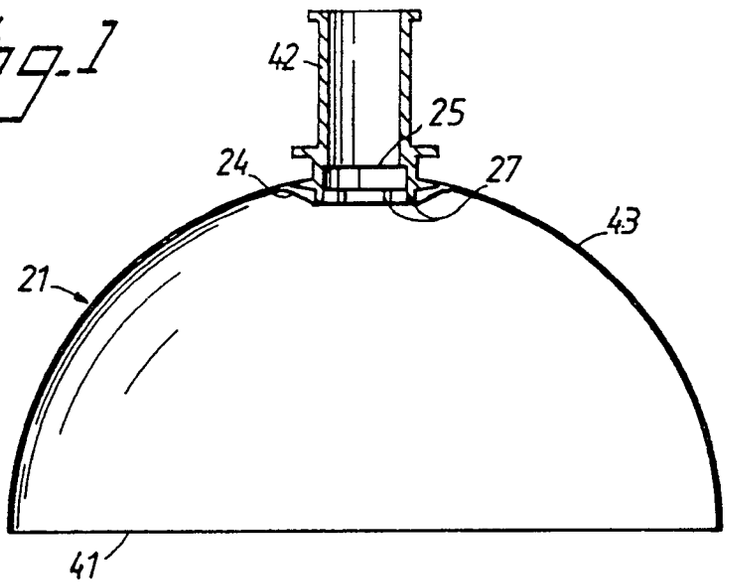


Fig.2

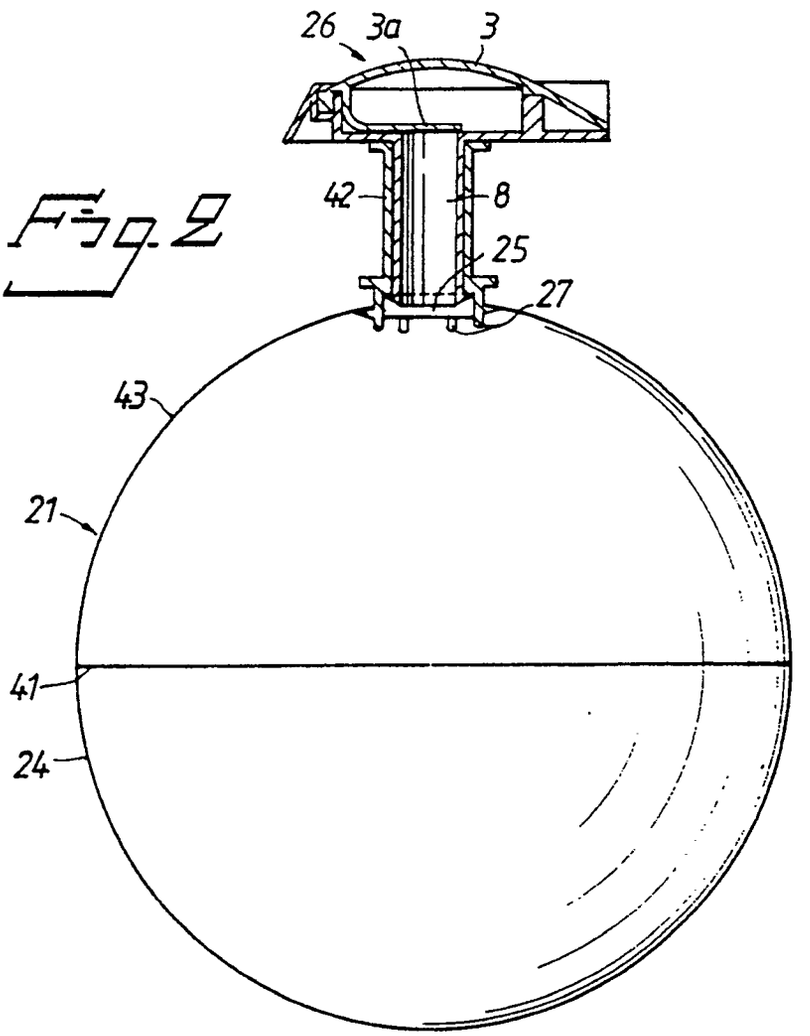


Fig. 3

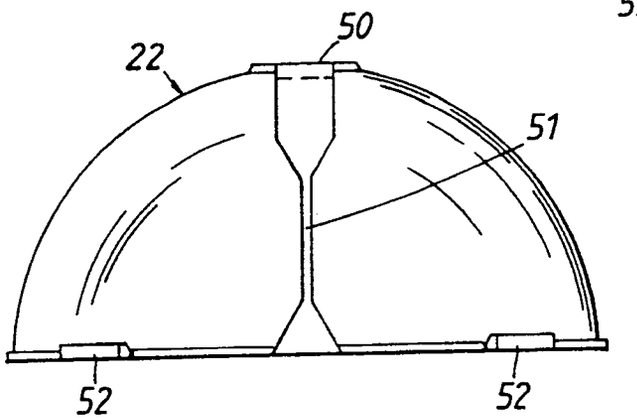


Fig. 5

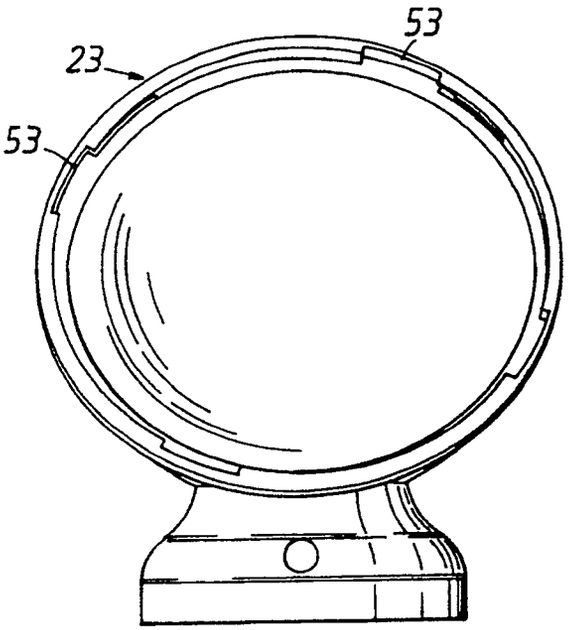


Fig. 4

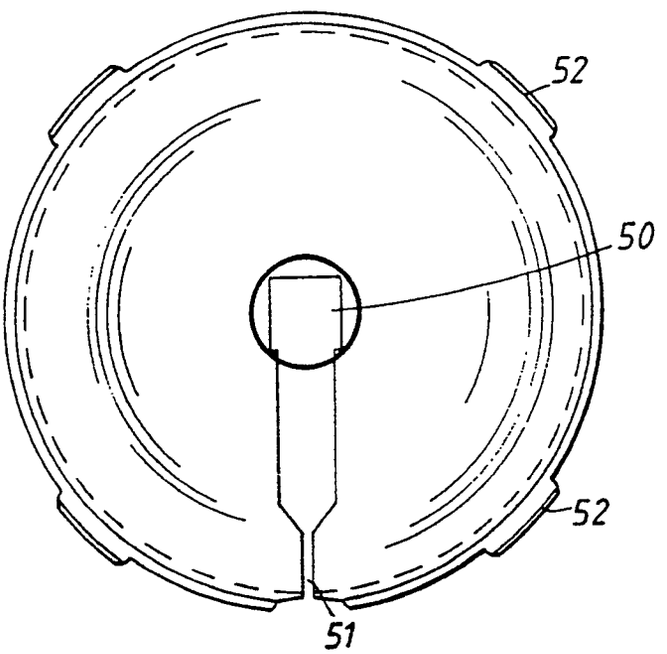


Fig. 6

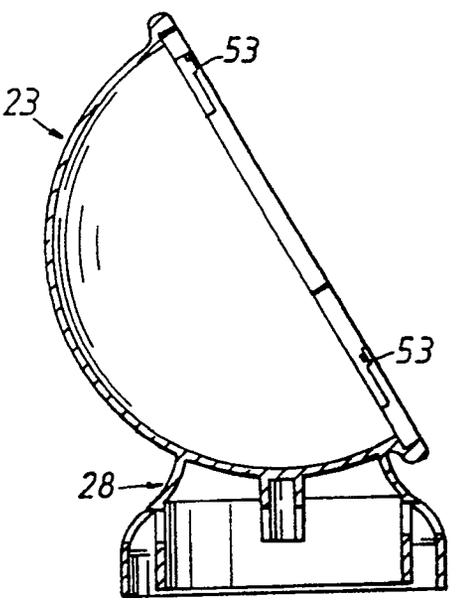


Fig. 7

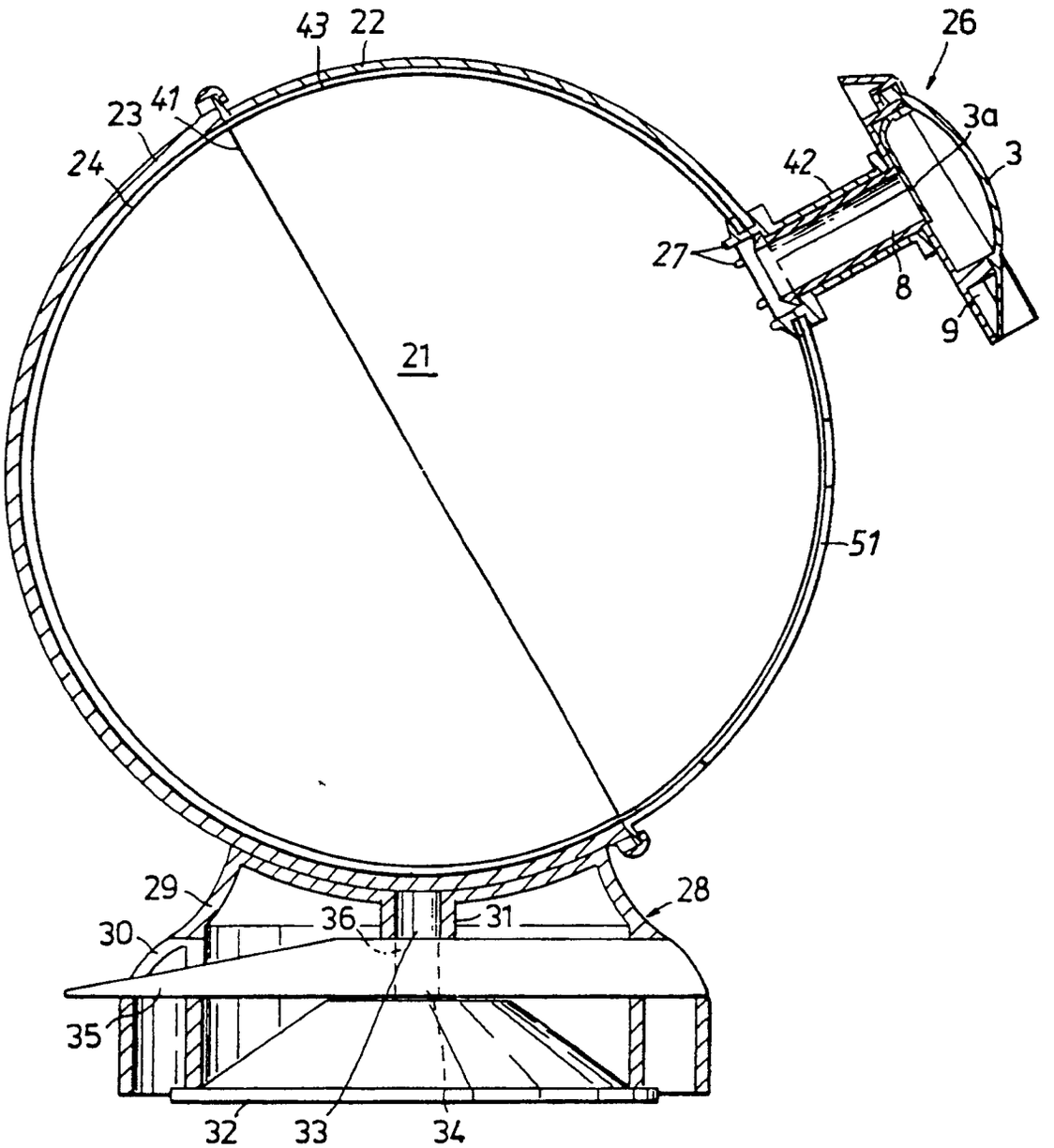


Fig. 8

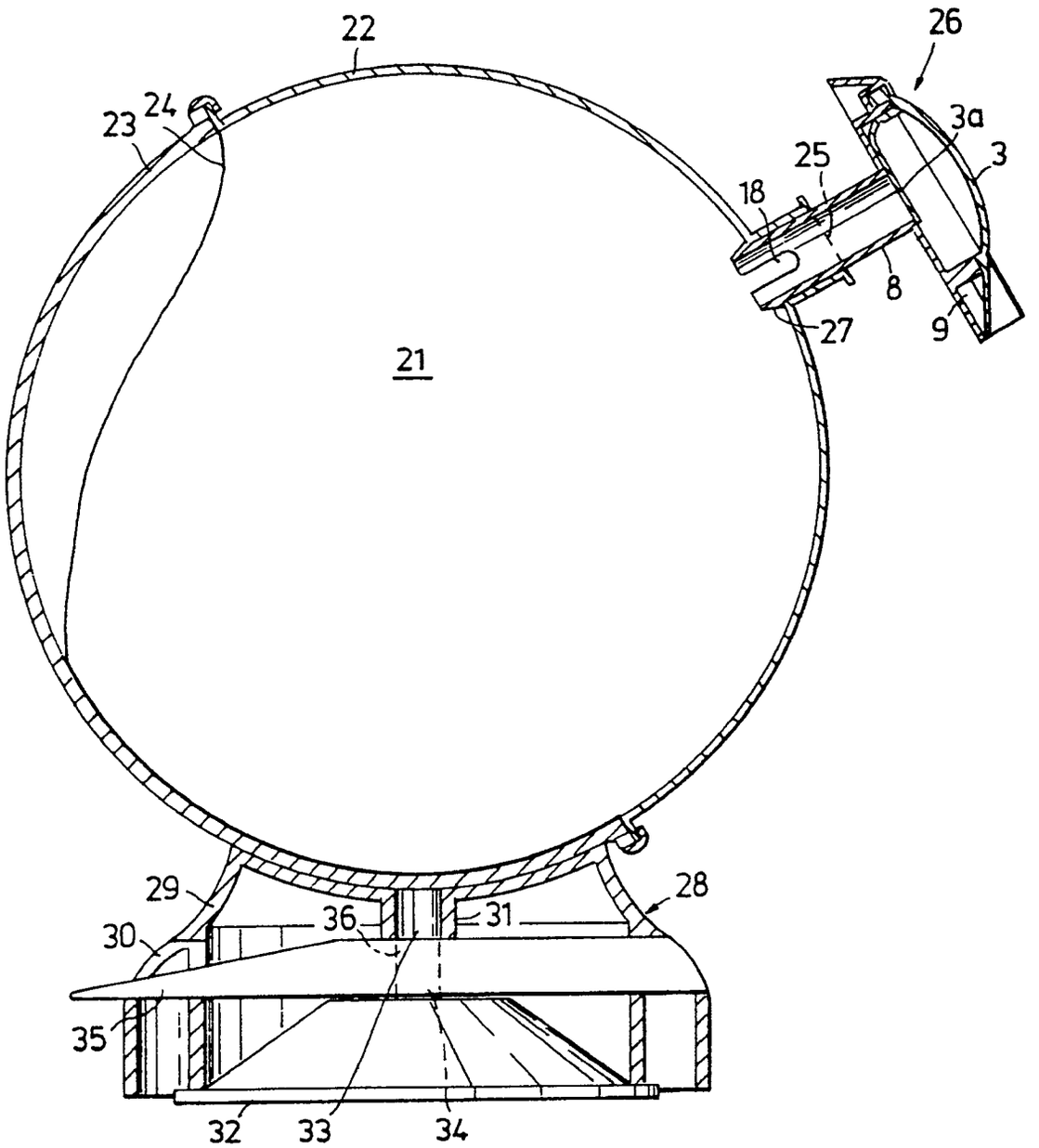


Fig. 9

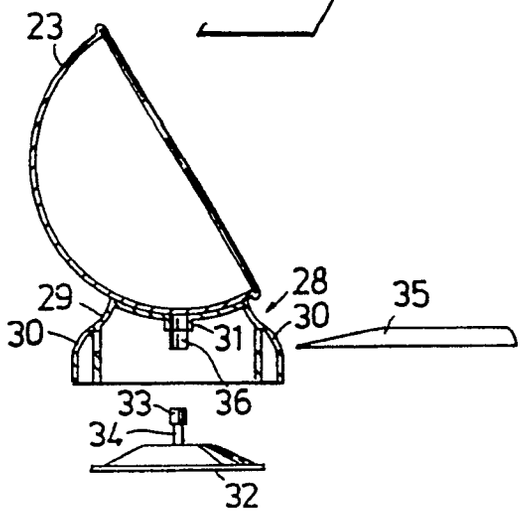


Fig. 10

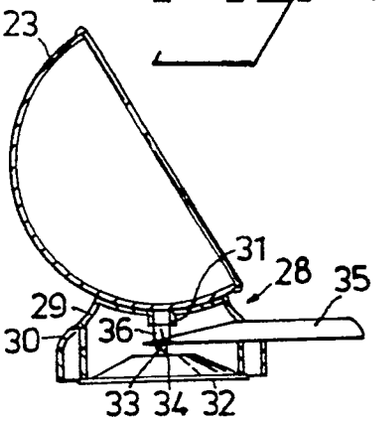


Fig. 11

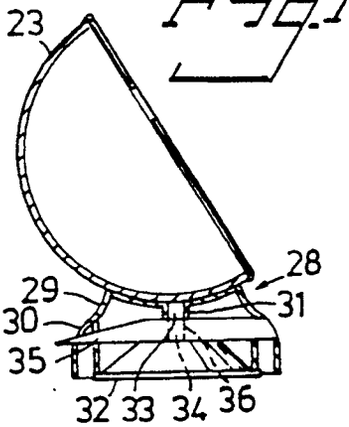


Fig. 12

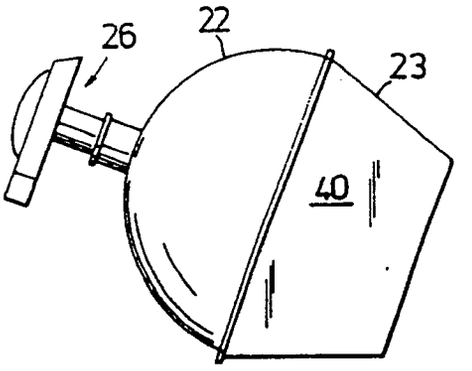


Fig.13a

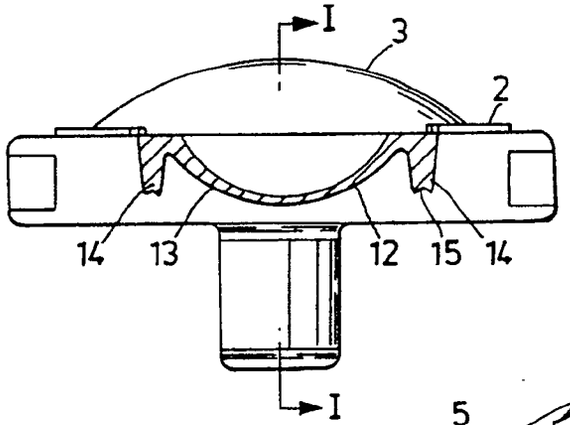


Fig.14a

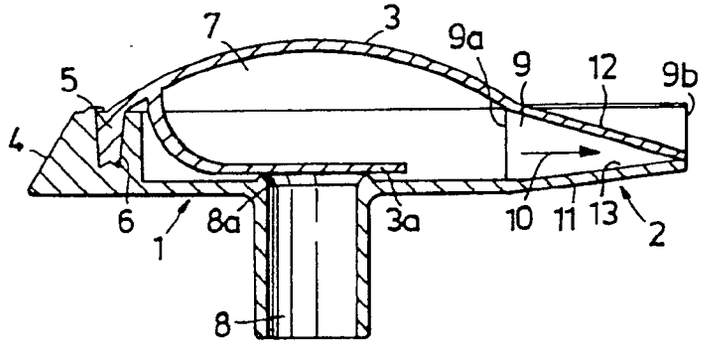


Fig.13b

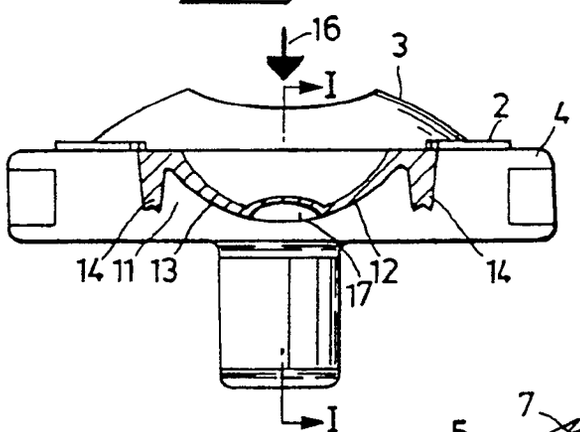
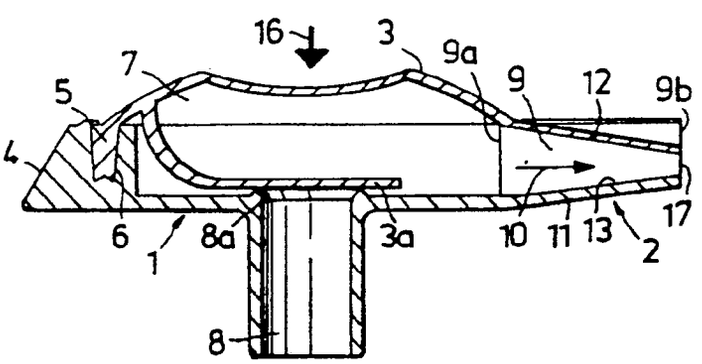


Fig.14b



European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 85 0023

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.5)
X	EP-A-0 072 783 (PATARA)	1,3,6,9, 10	A47K5/12
Y	* page 3, line 18 - page 5, line 6 * * page 6, line 27 - page 7, line 4; figures 1-3 *	2,4,7	
Y	LU-A-38 593 (VANLAER) * page 21, line 14 - page 22, line 2; figure 4 *	2	
Y	US-A-2 981 445 (H. RUSSEL) * column 2, line 26 - line 41; figures 1,4 *	4	
D,Y	US-A-3 339 803 (S. WAYNE, B. ALECK)	7	
A	* column 2, line 18 - line 50; figure 1 *	2,4	
A	US-A-3 159 317 (J. MINI) * column 1, line 51 - line 66; figures 1,2 *	8	
A	CH-A-342 719 (A. BARBIER) * page 2, line 18 - line 24; figure 1 *	8	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A47K
B65D
B67D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17 MAY 1991	GUILLAUME G.E.P.

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