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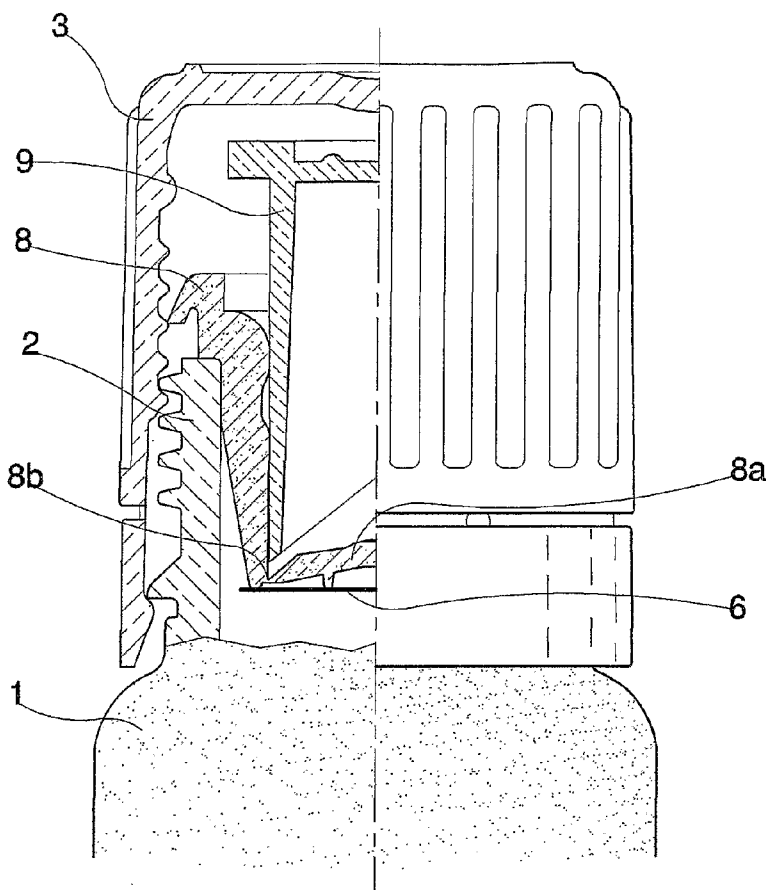
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(54) Title: A RESERVOIR WITH A CUTTER FOR SUBSTANCES TO BE MIXED WITH LIQUIDS AT MOMENT OF USE, IN PARTICULAR FOR SINGLE-DOSE CONTAINERS



(57) Abstract: The reservoir with a cutter for substances to be mixed with liquids at moment of use, in particular for single-dose containers, is of a type comprising a breakable bottom (8a) connected to a reservoir by means of an easy-break line (8b) and superiorly closed by a cutter (9) which on command causes breakage of the easy-break line (8b). The reservoir comprises a barrier element (6), which is easily removable or cuttable or penetrable by action of the cutter (9) and which is impermeable to humidity. The barrier element (6) is connected to the reservoir in a position between an inside of the container and the substance contained in the reservoir, and intercepts any humidity migrating from inside the container to inside the reservoir across the breakable line (8b).

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## Description

### A Reservoir with a Cutter for Substances to be mixed with Liquids at Moment of Use, in particular for Single-dose Containers.

#### Technical Field

The invention relates to the field of single-dose containers in which a substance is to be mixed at moment of use with a liquid.

#### Background Art

For some time now the prior art has taught containers, in particular single-dose  
5 containers, on which a capsule is fitted, the capsule being of various types:  
internally of the capsule there is a reservoir, having a breakable bottom, internally  
of which there is a cutting element which, following a pressure exerted thereon,  
causes the breakage of the breakable bottom. A substance is contained inside the  
reservoir, usually a powder or granules, which on rupture of the bottom falls into  
10 the container and is suspended in the liquid contained therein.

Independently of how the capsule and the reservoir are made, the breakable  
bottom of the reservoir, normally made of a plastic material, is connected to the  
remaining part of the reservoir by a circumferential line having a very much  
smaller thickness so as to be easily broken by exerting a little pressure on the  
15 cutting element. For purposes of explanation, while the thickness of the walls of  
the reservoir is usually comprised between 1 and 2 millimetres, the  
circumferential line along which the cut is performed is of a thickness which, in  
order to allow an easy cutting operation, generally does not go above 0.15 mm.  
and is even less in some cases.

20 The substances contained in the reservoir, which are soluble in the liquid

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contained in the container and are dissolved in the liquid at moment of use, are generally sensitive to humidity both because of their physical nature (they are prone to clotting together to make unwanted lumps) or due to their chemical nature (their properties can be modified); this is often the reason why these  
5 preparations involve mixing the dry substance in the liquid only at moment of use.

The materials the reservoirs containing the dry substance are made of are by their nature permeable to damp, although only by modest amounts; this permeability does not lead to significant consequences in the zones of the reservoir having  
10 greater wall thickness, as the time needed for migration of the humidity to those zones is very long; the phenomenon is, however, of considerable importance in the proximity of the circumferential line of the reservoir along which the cut is to be made, as the thickness of that line is extremely small and the time for migration of humidity through it is much less. This phenomenon leads to  
15 deterioration, over relatively short times, of the chemical-physical characteristics of the substance contained in the reservoir, or at least part of it.

In order to obviate the above drawback, plastic materials have been used to make the reservoirs which materials have a lower permeability to humidity. But apart from the fact that this solution does not eliminate the problem, but only slows it  
20 down, these materials have characteristics that make them very difficult to break with normally-used cutters, and their use has been abandoned.

A further solution which has been adopted is to put into the reservoir a greater than necessary quantity of the powder substance, so that as the deterioration thereof is progressive, even if a part of it deteriorates there will still be enough,  
25 and for a long enough time, for the aims of the preparation. This however is an expensive solution, and is not very precise in terms of doses effectively used.

Another solution is to indicate a use-by date which takes account of the

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absorption times of the humidity through the circumferential line in the reservoir; this time limit is much more restricted than the actual degradation times of the substance. This is also rather an expensive solution.

The main aim of the present invention is to obviate the drawbacks in the prior art,  
5 by providing a reservoir with a cutter that is easy to cut through and which has long permeability times with regard to humidity.

An advantage of the present invention is that it provides a reservoir that can be used with existing containers without any need for modifications to the packaging line, and that is easy to construct.

10 A further advantage of the invention is that it provides a reservoir which is impermeable to humidity over a long period of time both when the reservoir is free (it is an independent product) and when it is inserted in the container to constitute the definitive packaging.

### **Disclosure of Invention**

15 Further characteristics and advantages of the present invention will better emerge from the detailed description that follows of a preferred embodiment of the reservoir, illustrated purely by way of non-limiting example in the accompanying figures of the drawings, in which:

figure 1 is a section in vertical elevation of the reservoir;

20 figure 2 shows, in small scale, a vertical elevation, partially sectioned, of the reservoir of the invention applied on a capsule inserted on a container.

In the figures of the drawings, 1 denotes a container having a mouth, at the end of a neck 2, which is closed by a capsule 3 of known type. A reservoir 8 is afforded internally of the capsule 3, which reservoir 8 has a breakable bottom 8a and  
25 contains a cutter 9; the reservoir 8 is inserted sealedly in the mouth 2 of the container 1.

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The substance to be inserted into the container at moment of use is located internally of the reservoir 8, or internally of the cutter 9 (as illustrated in figure 2), if the cutter is internally hollow. To perform this operation the capsule is opened and a pressure is applied on the upper part of the cutter so that the end  
5 part of the cutter moves towards the bottom of the reservoir and cuts the breakable bottom along an easy-break line 8b. The cutter has a cylindrical shape and exhibits a spout-shape, with the perimeter thereof being the inclined cutting edge of the element. Thus the action of the cutter on the line 8b, which develops along the internal circumference of the reservoir, has a progressive action and is  
10 thus facilitated; the extremely thin width of the line 8b also makes the cutting operation easier. In many cases a small cutting arc is included in the cutter, in particular at a zone of the cutter that is most distant from the bottom of the reservoir, which either does not cut or does not arrive (with the cutter at endrun position) at the bottom of the reservoir and cannot cut it. This is in order that the  
15 cut part of the reservoir does not detach completely and therefore does not fall into the underlying container.

The above all belongs to the prior art. Both the container and the capsule are not necessarily like the ones illustrated, but can be of any type.

The reservoir 8 comprises a barrier element the chief characteristics of which are  
20 that it is easily removable, or cuttable, or in any case penetrable, by the cutter or by the cutting action thereof, and that it is impermeable to humidity. The barrier element is connected to the reservoir at a position which places it between the substance contained in the reservoir and the outside environment so that it can intercept any humidity which might migrate through the line 8b from the  
25 container towards the inside of the reservoir. Naturally, if the reservoir is inserted in the container, the outside environment will be represented by the inside of the container itself, and passage of humidity coming therefrom will be prevented.

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A rather simple way to create this barrier is to use a thin sheet 6 of multi-layer material comprising at least one metal layer and a plastic layer; from among the various known multilayer materials, a preferable choice for the barrier would be a material comprising at least one layer of aluminium, a metal which even in very  
5 thin sheets constitutes an excellent barrier to humidity, and a layer of polyethylene, with functions that will be better explained herein below.

It is particularly easy and practical to connect a barrier element such as the one described above, to the outside of the bottom zone of the reservoir. For this purpose the reservoir 8 comprises at least a closed-perimeter projection 5, made  
10 in the external zone of the bottom of the reservoir which completely surrounds the line 8b; in particular, the projection 5 is annular and is afforded at the lower peripheral edge of the reservoir 8.

The projection 5, which is realised in a single piece with the reservoir during the forming thereof, defines a flat surface to an edge of which, represented by the  
15 perimeter of the projection 5, the sheet 6 is heat-welded. This operation is made extremely easy because of the presence of the layer of polyethylene present in the sheet 6.

The bottom 8a of the reservoir 8 is generally concave; as a consequence, when the sheet 6 is connected to the projection 5, between the bottom 8a and the sheet  
20 6, an empty zone is created, in which the sheet is free. To avoid this situation causing an accidental laceration of the sheet, although this is improbable, connection points 5a can be included, arranged internally of the perimeter of the projection 5 and projecting externalwards of the bottom 8a of the reservoir in order that the terminal part thereof is coplanar with the flat surface defined by the  
25 projection 5. The sheet 6 is thus heat-welded to the reservoir 8 not only at the projection 5, but also at the connection points 5a, and the possibility of an accidental laceration of the sheet is considerably reduced.

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The presence of the barrier sheet, the thickness of which is extremely small (around 0.05 mm) does not minimally influence the functioning of the cutter, which is perfectly able, with no appreciable additional force, to cut the breakable bottom of the reservoir 5 and the sheet 6. Further, as happens with the bottom 8a, the sheet 6 too is not cut completely, but a piece remains attached (corresponding to the non-cut part of the bottom) to the reservoir 5, and does not fall into the underlying container, where the substance falls.

The described reservoir can be used in all applications for which known reservoirs are used and, with respect to known reservoirs, exhibits the very considerable advantage of not allowing humidity originating from outside or from the container to reach the substance in the reservoir. Obtaining this advantage is also easy and economical and requires no modifications to present packaging lines inasmuch as the reservoir is supplied to the packaging lines already structured as described herein and can be inserted in a container in the same way as traditional reservoirs.

As it is often true that the person packing the reservoir containing the powders is different from the one who is packaging the final product by insertion of the reservoir in the container, and given that the reservoir protects the powders contained therein from possible infiltrations of humidity present in the outside environment, the risk of infiltration of humidity over a possibly quite long period is prevented when it is inserted in the container.

The above-illustrated ways of realizing the barrier element enable a simple and easy realisation of the invention. Though more complex, the barrier element can be realised in other ways: for example, the sheet 6 could be connected internally of the reservoir during the forming process of the reservoir itself, or the easy-break line 8b could be covered with a sheet of material, obviously a biocompatible material which does not react in any way either with the substance

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contained in the reservoir 5 or with the liquid contained in the container, which material remains in the plastic state and can easily be crossed by the cutter.

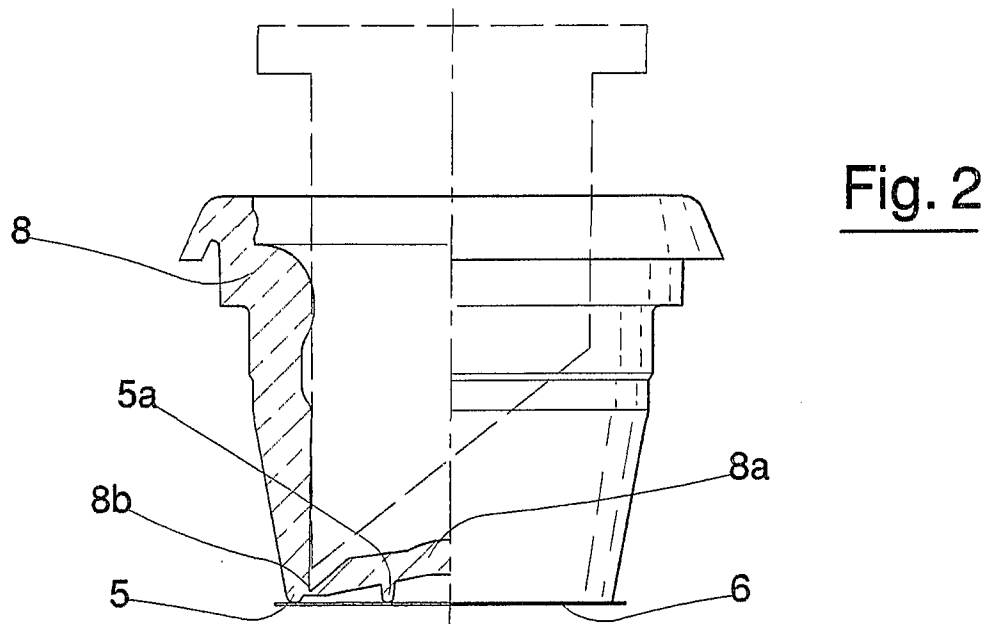
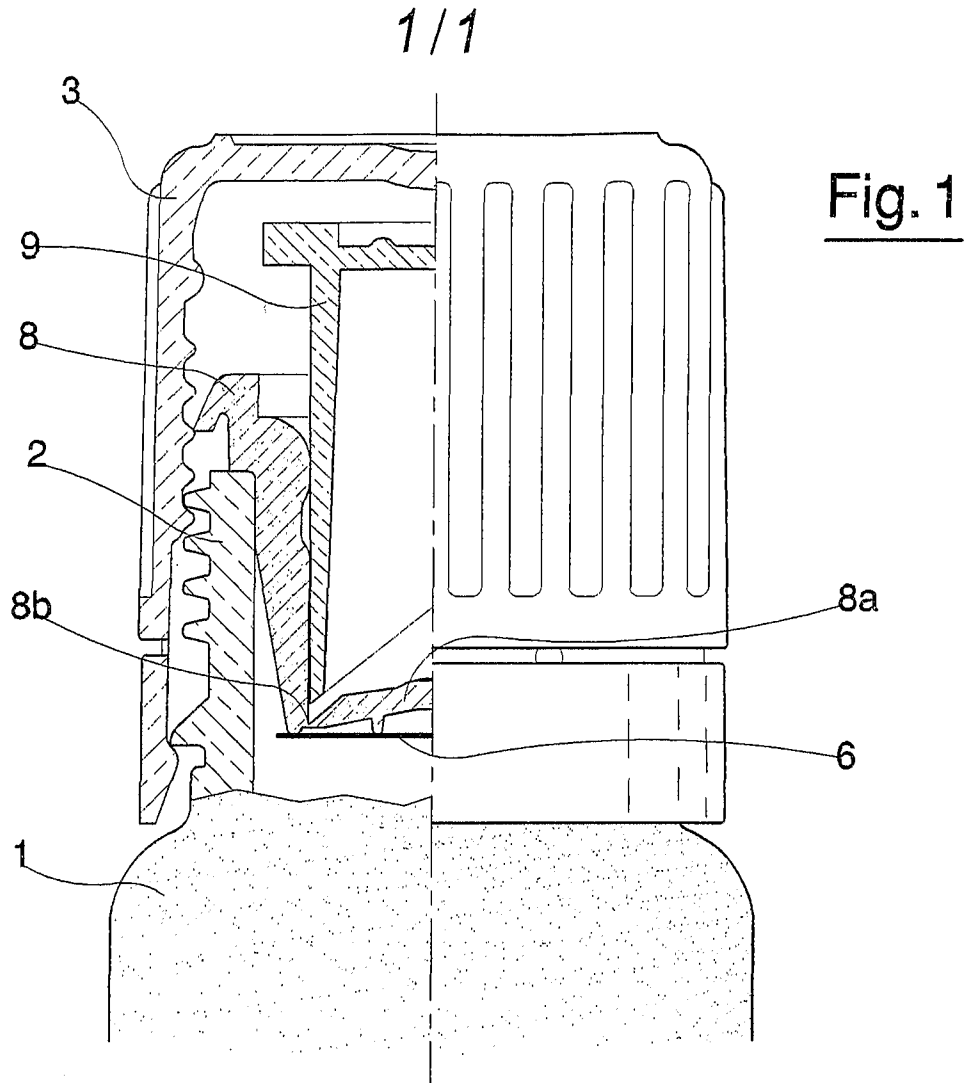
**Claims.**

- 1). A reservoir with a cutter for substances to be mixed with liquids at moment of use, in particular for single-dose containers, of a type comprising a breakable bottom (8a) connected to a reservoir by means of an easy-break line (8b) and superiorly closed by a cutter (9) which on command causes breakage of the easy-break line (8b), wherein the reservoir comprises a barrier element (6), which is easily removable or cuttable or penetrable by action of the cutter (9) and which is impermeable to humidity, connected to the reservoir in a position between a substance contained in the reservoir and the outside environment, such as to intercept any humidity migrating from inside the container to inside the reservoir across the breakable line (8b).
- 2). The reservoir of claim 1, wherein the barrier element is connected externally to a bottom zone of the reservoir (8).
- 3). The reservoir of claim 2, wherein: it comprises a closed-perimeter projection (5), made in an external zone of the bottom of the reservoir, which completely surrounds the easy-break line (8b); the barrier comprises a thin sheet (6) of multi-layer material, of known type, comprising at least a metal layer and a layer of plastic material; the sheet (6) being heat-weldable to the projection (5).
- 4). The reservoir of claim 3, wherein the sheet (6) comprises a layer of aluminium and a layer of polyethylene.

5). The reservoir of claim 3, wherein the projection (5) has an annular shape and is made at a lower peripheral edge of the reservoir.

6). The reservoir of claim 5, wherein the projection (5) is made in a single piece with the reservoir during a forming operation thereof, and defines a flat surface at an edge of which the sheet (6) is heat-welded.

7). The reservoir of claim 6, wherein it comprises one or more connection points (5a) arranged internally of the perimeter of the projection (5), projecting externally of the bottom (8a) of the reservoir in such a way that a terminal part thereof is coplanar to the flat surface defined by the projection (5).



# INTERNATIONAL SEARCH REPORT

International application No

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**A. CLASSIFICATION OF SUBJECT MATTER**

B65D51/28

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)

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**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 599 189 A (IBSA - INSTITUT BIOCHIMIQUE S.A) 1 June 1994 (1994-06-01)	1,2
Y	column 2, line 52 - column 3, line 40; figure 1	3-6
X	WO 2004/113190 A (CEDEVITA D.O.O. PREHRAMBENA INDUSTRIJA; FRONGILLO, ALESSIO) 29 December 2004 (2004-12-29)	1,2
	page 6, line 11 - page 9, line 21; claim 5; figures 3-11	
Y	DE 199 50 884 A1 (WELLA AG) 26 April 2001 (2001-04-26)	3,5,6
	column 2, lines 25-30; figure 1	
Y	GB 2 208 640 A (* IMPERIAL CHEMICAL INDUSTRIES PLC) 12 April 1989 (1989-04-12)	4
	page 21, lines 11-30; figure 14	
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Further documents are listed in the continuation of Box C.

See patent family annex.

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 02/051711 A (VISY INDUSTRIAL PLASTICS PTY LTD ; VISY PACKAGING PTY LTD; MCFADYEN, R) 4 July 2002 (2002-07-04) figure 4 -----	1-7
A	DE 24 59 683 A1 (CAPSULIT S.R.L) 2 October 1975 (1975-10-02) figures 1,2 -----	1-7

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/IT2005/000405
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
EP 0599189	A	01-06-1994	AT 163617 T	15-03-1998
			CA 2109535 A1	28-05-1994
			DE 69317216 D1	09-04-1998
			DE 69317216 T2	06-08-1998
			ES 2115708 T3	01-07-1998
			IT 227015 Y1	09-09-1997
			US 5388690 A	14-02-1995
WO 2004113190	A	29-12-2004	AU 2003274385 A1	04-01-2005
			HR 20030525 A2	31-12-2003
DE 19950884	A1	26-04-2001	AU 1138301 A	08-05-2001
			WO 0130665 A1	03-05-2001
			EP 1222122 A1	17-07-2002
GB 2208640	A	12-04-1989	NONE	
WO 02051711	A	04-07-2002	NONE	
DE 2459683	A1	02-10-1975	ES 208751 Y	01-08-1976
			IT 1010856 B	20-01-1977