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(54) A packaging with a spout for flowable products

(57) The present invention is directed to a container (1) comprising a deformable container body (2) with at least one compartment, for containing a flowable liquid, semi-liquid, or jellified product having a viscosity lower than 1 Pa.s at 20°C, and at least one dispensing opening (4) for dispensing said product, which is located in a spout element (3), said container having a capacity of at least 10ml, preferably at least 50ml, characterized in that the functional cross-section of said at least one opening is fixed and comprised between 0.002 mm^2 and 7 mm^2, preferably between 0.008 mm^2 and 0.8 mm^2, more preferably between 0.03 mm^2 and 0.4 mm^2, and most preferably between 0.07 mm^2 and 0.2 mm^2, such that said product flows through said opening only after an external force of at least 0.5 kg, preferably at least 1 kg, more preferably at least 3 kg, is exerted onto the container body walls which is directed towards the inside of said body.

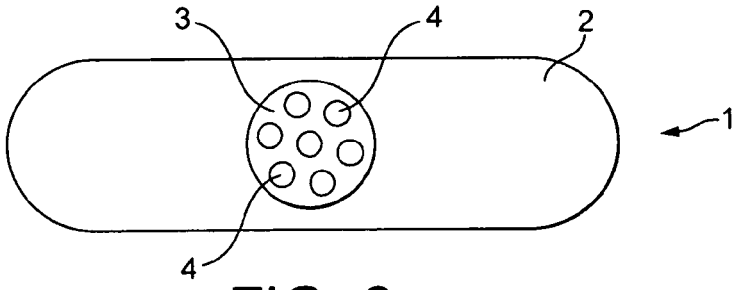

FIG. 3

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Description

Field of the invention

[0001] The present invention concerns a container for flowable products, comprising a dispensing spout with openings which prevent leakage when said openings are not closed.

Background of the invention

[0002] In the field covered by the present invention, "flowable" is meant to encompass liquid, or semi-liquid products, having a viscosity below 1 Pa.s at 20°C.

[0003] The container of the present invention is particularly advantageous for containing edible products. However, the scope of the present invention is not exclusively limited to such edible products, and can also apply to non-edible products such as fabric and home care products, such as bleach, fabric care liquid products, household detergents.

[0004] A few examples of fluid edible products which can be contained in a container according to the present invention are cited in **Table 1** herebelow, together with their corresponding viscosities.

Viscosity of fluids with variable compositions

Fluid	Viscosity [Pa·s]	Viscosity [cP]
honey	2–10	2,000–10,000
molasses	5–10	5,000–10,000
molten glass	10–1,000	10,000–1,000,000
chocolate syrup	10–25	10,000–25,000
molten chocolate*	45–130 [21]	45,000–130,000
ketchup*	50–100	50,000–100,000
peanut butter*	c. 250	c. 250,000
shortening*	c. 250	250,000

Table 1

[0005] For nomadic consumption of flowable products, in particular food edible products, packaging solutions typically comprise containers with a dispensing mouth that is reclosable with a closure elements, like a screw cap for instance. Such packages are widely known, and allow a consumer to dispense the contents with a good flow rate.

[0006] However, in order to guarantee a reliable dispensing and a good flow rate, the container is such that when the dispensing mouth is not closed, the contents can be spilled if the container is tilted, or generally if the contents comes in contact with the dispensing mouth. In such case, the contents directly flows out through the dispensing mouth.

[0007] To overcome this drawback, so-called "sports closures" have been developed which comprise a dispensing channel which can be closed easily by pushing a closing element which is generally not detachable from the rest of the closure. Such sports closures are widely know, and different systems are proposed, for instance push-pull closures, hinged closures, etc. However such closures are complex and expensive to manufacture, hence a higher price for the product to the consumer, particularly in case the container is for a nomadic consumption of a product with a limited content volume. Moreover, they require a large amount of material for their different constitutive parts. Moreover, one major drawback is that such sports cap leak if the consumer does not close them.

[0008] Due to the drawbacks of sports closures, another type of closures was developed which comprise an elastomeric valve, like a slit valve. Such valve closures are reliable and their use in the food packaging industry increases, for instance for packing honey, ketchup, or the like. One particular advantage which is of high importance is that such closures do not necessarily require an additional overcap to seal the valve. In other words, the valve itself is sufficiently resilient to reclose after dispensing, so that even if the container is tilted, the contents in contact with the internal surface of the

valve does not leak through. This is a clear consumer benefit.

[0009] However such slit valves are expensive to manufacture because they involve several materials for the closure: the closure body is generally made out of polyethylene or polypropylene, and the slit valve itself is made of a silicon or other similar resilient material, which must be assembled or co-injected with the closure body.

[0010] Other types of containers are known which are single-piece flasks made by extrusion-blowing of a thermoplastic such as polyethylene. Such containers comprise a container body, which is manufactured together integrally with a detachable tip. When the tip is torn off by the user, a very tiny dispensing opening is created in the container walls, which allows for dispensing of the contents. Such containers are widely used in the pharmaceutical industry, for providing monodoses (unidoses) for instance for local treatment by a collyrium (i.e. eardrops or eyedrops). Such collyrium unidoses containers have an advantage that the contents, although liquid or at least very fluid, does not leak through the dispensing opening even if said contents is in contact with the internal surface of the dispensing opening. However, they have a clear disadvantage that due to their manufacturing process and structure, they are suitable for very small content volumes only, typically less 5ml, which are clearly not compatible with consumer products like in the food industry for instance, wherein containers with a contents over 10 ml, preferably over 50 ml are required.

[0011] There is therefore a need for a large container having a content volume compatible with consumption of fluid consumer goods, like food edible products (i.e. typically over 10ml, preferably over 50ml, more preferably over 25cl) wherein said container is inexpensive to manufacture.

[0012] Importantly, such a container should allow a sufficient flow rate during dispensing, but at the same time, it should prevent leakage of the contents even when the dispensing opening is not closed by a closure system, and the container is tilted such that the contents is in contact with the internal side of the dispensing opening.

Summary of the invention

[0013] The objectives set out above are met with the present invention, which provides a container comprising a deformable container body with at least one compartment, for containing a flowable liquid, semi-liquid, or jellified product having a viscosity lower than 1 Pa.s at 20°C (preferably less than 500 mPa.s, more preferably less than 100 mPa.s), and at least one dispensing opening for dispensing said product, which is located in a spout element, said container having a capacity of at least 10ml, preferably at least 50ml, characterized in that the functional cross-section of said at least one opening is fixed and comprised between 0.002 mm^2 and 7 mm^2, preferably between 0.008 mm^2 and 0.8 mm^2, more preferably between 0.03 mm^2 and 0.4 mm^2, and most preferably between 0.07 mm^2 and 0.2 mm^2, such that said product flows through said opening only after an external force of at least 0.5 kg, preferably at least 1 kg, more preferably at least 3 kg is exerted onto the container body walls which is directed towards the inside of said body.

[0014] By "functional cross-section" it is meant the cross section of the hollow internal portion of a dispensing opening.

[0015] It is to be noted that the deformation applied onto the container body surface is expressed as originated from a force exerted thereon, as it is supposed that the pressure applied onto said surface is evenly distributed across said surface.

[0016] In a highly preferred embodiment of the present invention, the container comprises a plurality of dispensing openings, whose number is at least 6, preferably at least 12, more preferably at least 18.

[0017] Also preferably, the container further comprises a closure system associated to said spout element. In that case, said closure system advantageously comprises a manually breakable tamper-evident means.

[0018] Said tamper-evident means can be for instance a laser-scored pre-cutting disposed such that said closure system can be torn-off in order to give access to the container contents through said opening.

[0019] The deformable container body can be a flexible film pouch, or alternatively it can be a plastic bottle with walls having at least one portion whose thickness is lower than 200 microns, preferably lower than 100 microns.

[0020] In the latter case, said bottle is preferably made of PET (polyethylene terephtalate) or PEN (polyethylene naphthalate), and manufactured by a stretch blow-moulding process from a PET, respectively a PEN preform.

[0021] Yet in another case, said deformable container body can be a bottle comprising deformable at least one accordion-shaped portion with bellows which can be deformed under force.

[0022] In all the above embodiments of the invention, each of said at least one dispensing opening can take the form of a channel, having a length comprised between 0.1 and 20mm, preferably between 0.5 and 10mm, more preferably between 1 and 7mm.

Brief description of the drawings

[0023] Additional features and advantages of the present invention are described in, and will be apparent from, the description of the presently preferred embodiments which are set out below with reference to the drawings in which:

Figure 1 is schematic profile view of a flexible pouch according to the invention;

Figure 2 is a schematic profile view of a flexible bottle according to the invention;
Figure 3 is a schematic top cut view along A-A of figures 1 and 2;
Figure 4 is a schematic top cut view similar to figure 3, wherein the dispensing openings have an alternative design to those shown in figure 3.

Detailed description of the invention

[0024] The present invention is directed to a container 1 comprising a dispensing opening that is structured and designed such that:

- it allows the fluid product contained inside the container body 2 to be dispensed therethrough, and
- it allows the fluid product to be retained inside the container without leaking through said opening when the latter is open and the container is disposed such that said product is in contact with the inner surface of the dispensing opening.

[0025] The container 1 as illustrated in figure 1 comprises a deformable container body 2 having one compartment, for containing a flowable liquid, semi-liquid, or jellified product having a viscosity lower than 1 Pa.s at 20°C.

[0026] The container body shown in **figure 1** is a flexible film pouch 2.

[0027] As shown in **figure 1,** a spout element 3 is attached to the container pouch body 2. The spout element is an injection moulded element made of a thermoplastic such as polyethylene (PE) or polypropylene (PP). The spout element comprises a base which is sealed with the film pouch 2, such that the sealing is leaktight.

[0028] As illustrated in **figure 3,** the spout element 3 comprises a plurality of openings which run through the thickness of said spout, so as to establish a fluid communication between the interior of the pouch, and the exterior. According to the invention the functional cross-section of the dispensing openings is fixed and comprised between 0.002 mm^2 and 7 mm^2, preferably between 0.008 mm^2 and 0.8 mm^2, more preferably between 0.03 mm^2 and 0.4 mm^2, and most preferably between 0.07 mm^2 and 0.2 mm^2, such that said product flows through said opening only after an external force of at least 0.5 kg, preferably at least 1 kg, more preferably at least 3 kg, is exerted onto the container body walls which is directed towards the inside of said body.

[0029] The dispensing openings illustrated in **figure 3** are straight channels having a circular functional cross section, and having a length of about 15 mm. In some alternative embodiments, the channels can be curved or comprise angled portions.

[0030] The number of dispensing openings will be chosen according to the viscosity of the product contained in the pouch, and also on the dispensing flow which must be obtained, i.e. depending on the type of use of the contents. For instance the output flow can be slower for viscous products such as culinary sauces for instance, whereas a liquid like mineral water should be able to flow sufficiently rapidly to allow a proper thirst quenching.

[0031] Typically the number of dispensing openings can be a multiple of six, but not necessarily. In the example illustrated in **figure 3,** the number of dispensing openings is seven.

[0032] In an alternative embodiment illustrated in **figure 2,** the container body is a very thin-walled bottle 5 made for instance of a blow-moulded polyethylene terephtalate (PET) material which is obtained by stretch blow-moulding of an injected preform. According to the invention, the bottle walls 6 are flexible and can be deformed by hand squeezing. Therefore, the bottle wall thickness is preferably less than 100 μm.

[0033] In this embodiment, the spout element 3 is clipped, sealed, or similarly attached in a leaktight manner to the bottle body.

[0034] In all embodiments of the invention, it should be clear that by increasing the number of openings, and despite their small functional cross-section, it is possible to achieve a reasonably good flow rate depending on the force applied to the deformable container body and also depending on the viscosity of the product contained therein, and on the flexibility of the deformable container.

[0035] In any case, the material which is used to manufacture the deformable container body is such that flow rates can be obtained which are sufficient to guarantee a proper dispensing of the product to a consumer, and such flow rates values can be obtained by applying a manual force onto the container body walls which is reasonable, i.e. compatible with use of the container by grown-ups, teenagers, adults and elderly people.

[0036] According to the invention, acceptable flow rates should be comprised within the range of 50-5000 ml/min, preferably 100-1000 ml/min, more preferably 200-500 ml/min.

[0037] Also according to the invention, reasonable force to be exerted onto the walls of the container body is defined as follows:

- minimal force is comprised within the range of 1-5kgs, preferably within 2-4kgs, more preferably it is set at about 3kgs. With such values, we ensure that for volumes below about 3 litres of very fluid products (e.g. water), flowing does not occur just by gravity, and

- maximal force is comprised within the range of 20-40kgs, preferably within 25-35kgs, more preferably it is set at about 30kgs. According to tests, 30kgs is a very intense grip to achieve for a teenager or an adult, and certainly not reachable for a baby or a very old person.

[0038] Forces are measured using testing appliance, method and conditions as follows: the pouch is placed on a flat surface; a force is uniformly applied on the pouch by placing different weights on the support plate.

[0039] Examples of flow rates, obtained when different forces are applied onto the surface of the container body, are shown in **Table 2** below. In this case, the product contained in the container body is water, at 20°C (its viscosity is 1.002 mPa.s). The container body is a flexible pouch having a volume of 250ml, made of a multilayer plastic film having a total thickness of about 150μm. The dispensing openings have a circular functional cross section (i.e. diameter), similar to the embodiment described above with reference to **figure 3.**

Table 2

Example of Water (20°C)			
	Flow rate (ml/min)		
Force in N (/kg)	6 holes Ø 0.2mm^2	12 holes Ø 0.2mm^2	18 holes Ø 0.2mm^2
19.62 (/2kg)	50	106	158
39.24 (/4kg)	86	-	-
49.05 (/5kg)	106	204	312
98.10 (/10kg)	144	302	450
147.15 (/15kg)	180	330	510
196.20 (/20kg)	198	-	-
245.25 (/25kg)	220	-	-

[0040] In an alternative embodiment of the invention illustrated in **figure 4,** the container 1 is similar to the container described above in reference to **figure 3,** but for the design of the dispensing openings. In this embodiment, the dispensing openings 9 have a non-circular cross section, more particularly a trapezoidal cross section. All openings are disposed in a star-shaped configuration, as can be seen in figure 4, with their short end turned towards the centre of the star.

[0041] In all embodiments of the invention, the spout element 3 can be constructed such that it comprises a closing system 7, which closes the dispensing openings 4 at least at the time of manufacture, filling, and during storage. Then, at the time of dispensing the consumer can remove the closing system 7 by tearing it off, by unclipping, unscrewing, or other similar operation as necessary.

[0042] For instance, as illustrated in figures 1 and 2, the closing system 7 is manufactured as an integral distal element of the spout element 3, such that it can be detached along a weakness line 8. After the distal closing system 7 is detached, the dispensing spout 3 is as shown in **figure 3,** i.e. with open dispensing openings, ready for dispensing by squeezing the container body.

[0043] It should be understood that various changes and modifications to the presently preferred embodiments described herein will be apparent to those skilled in the art. Such changes and modifications can be made without departing from the spirit and scope of the present invention and without diminishing its attendant advantages. It is therefore intended that such changes and modifications be covered by the appended claims.

[0044] For instance, although the spout element is meant to be rigid, it could also be envisaged to apply a soft spout element, made of an elastomeric material, or being a spongy material.

Claims

1. A container (1) comprising a deformable container body (2) with at least one compartment, for containing a flowable liquid, semi-liquid, or jellified product having a viscosity lower than 1 Pa.s at 20°C, and at least one dispensing opening for dispensing said product, which is located in a spout element (3), said container having a capacity of at least 10ml, preferably at least 50ml, **characterized in that** the functional cross-section of said at least one opening (4, 9) is fixed and comprised between 0.002 mm^2 and 7 mm^2, preferably between 0.008 mm^2 and 0.8 mm^2, more preferably between 0.03 mm^2 and 0.4 mm^2, and most preferably between 0.07 mm^2 and 0.2 mm^2, such that said product flows through said opening only after an external force of at least 0.5 kg, preferably at least 1 kg, more

preferably at least 3 kg, is exerted onto the container body walls which is directed towards the inside of said body.

2. A container (1) according to claim 1, which comprises a plurality of dispensing openings (4, 9), whose number is at least 6, preferably at least 12, more preferably at least 18.

3. A container (1) according to any of the preceding claims, which further comprises a closure system (7) associated to said spout element (3).

4. A container (1) according to claim 3, wherein said closure system comprises a manually breakable tamper-evident means.

5. A container (1) according to claim 4, wherein said tamper-evident means is a laser-scored pre-cutting disposed such that said closure system can be torn-off in order to give access to the container contents through said opening.

6. A container (1) according to any of the preceding claims, wherein said deformable container body (2) is a flexible film pouch.

7. A container (1) according to any of the preceding claims 1 to 5, wherein said deformable container body (2) is a plastic bottle with walls having at least one portion whose thickness is lower than 200 microns, preferably lower than 100 microns.

8. A container (1) according to claim 6, wherein said bottle is made of PET (polyethylene terephtalate) or PEN (polyethylene naphthalate).

9. A container (1) according to any of the preceding claims 1 to 5, wherein said deformable container body (2) is a bottle comprising deformable at least one accordion-shaped portion with bellows which can be deformed under force.

10. A container (1) according to any of the preceding claims, wherein said at least one dispensing opening (4, 9) is a channel having a length comprised between 0.1 and 20mm, preferably between 0.5 and 10mm, more preferably between 1 and 7mm.

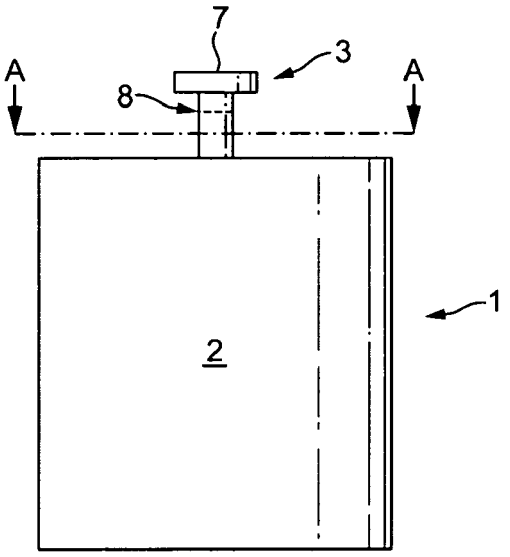

FIG. 1

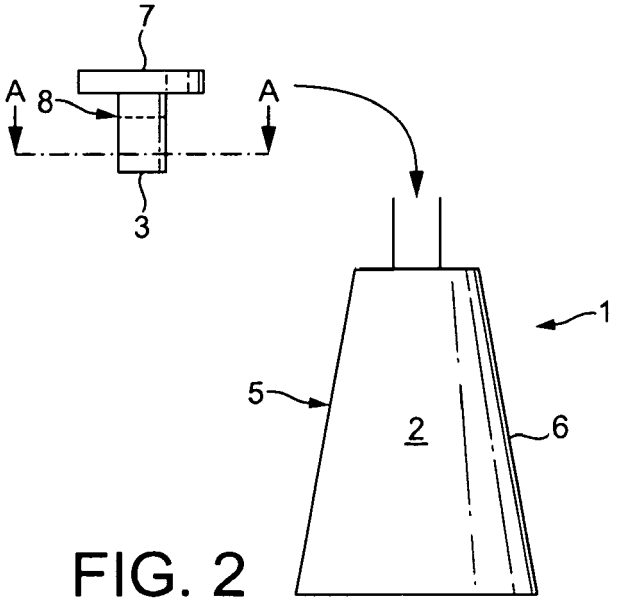

FIG. 2

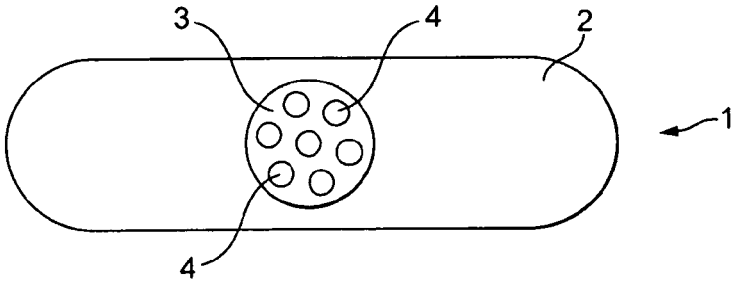

FIG. 3

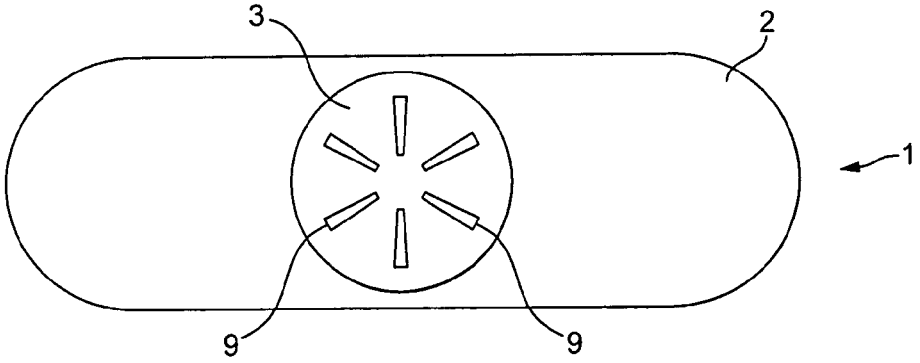

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 11 17 6558

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	WO 2009/056819 A2 (CARBONITE CORP [PA]; SMITH MATTHEW ERIC [GB]; MONDSZEIN KARL [GB]) 7 May 2009 (2009-05-07) * abstract * * page 8, line 9 * * page 9, lines 11,12; figures 1,4 *	1-3 4-10	INV. B65D1/32 B65D47/20 B65D83/00
X	WO 2009/151106 A1 (KAO CORP [JP]; IWATSUBO MITSUGU [JP]; FUJITA MICHIAKI [JP]) 17 December 2009 (2009-12-17) * page 15, line 7 - page 15, line 28; figures *	1,3	
Y	FR 2 238 642 A1 (LAB RIUNITI SPA [IT]) 21 February 1975 (1975-02-21) * claim 4; figures *	4,5	
Y	US 4 232 721 A (MARTIN JERRY D ET AL) 11 November 1980 (1980-11-11) * column 5, lines 46-55; figures *	6	
Y	EP 2 113 308 A1 (EPOPACK CO LTD [TW]) 4 November 2009 (2009-11-04) * claim 2; figures *	7	TECHNICAL FIELDS SEARCHED (IPC) B65D
Y	US 7 172 087 B1 (AXE TIMOTHY P [US] ET AL) 6 February 2007 (2007-02-06) * column 4, lines 21-33; figures *	8	
Y	US 3 833 154 A (MARKOWITZ I) 3 September 1974 (1974-09-03) * figures *	9	
Y	DE 20 2010 007898 U1 (PANTLEN FELICITAS [DE]) 19 August 2010 (2010-08-19) * figures *	10	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	26 September 2011	Vigilante, Marco

CATEGORY OF CITED DOCUMENTS

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26-09-2011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2009056819 A2	07-05-2009	EP 2219976 A2	25-08-2010
		JP 2011504116 A	03-02-2011
		US 2010303535 A1	02-12-2010
WO 2009151106 A1	17-12-2009	AU 2009258504 A1	17-12-2009
		CN 102026881 A	20-04-2011
		EP 2293986 A1	16-03-2011
		US 2011204095 A1	25-08-2011
FR 2238642 A1	21-02-1975	NONE	
US 4232721 A	11-11-1980	FR 2453786 A1	07-11-1980
		IL 59562 A	31-03-1983
		JP 55143166 A	08-11-1980
		ZA 8002068 A	27-05-1981
EP 2113308 A1	04-11-2009	NONE	
US 7172087 B1	06-02-2007	NONE	
US 3833154 A	03-09-1974	NONE	
DE 202010007898 U1	19-08-2010	NONE	

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