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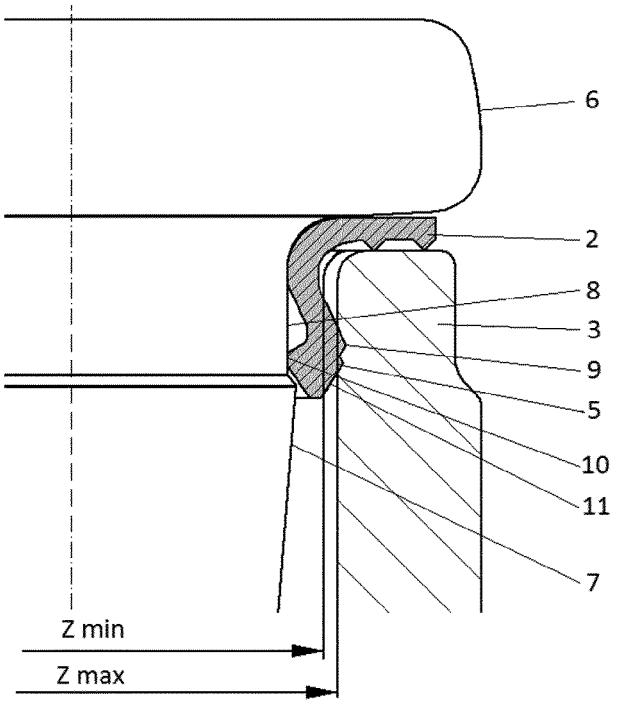
(54) **Adaptable glass stopper for sealing bottles**

(57) An adaptable glass stopper (1) for sealing bottles is disclosed. The stopper comprises a head part (6), the basic outer dimension of which is bigger than or at least identical to the outer dimension of the mouth (3) of the bottle, and a conical part (7) for inserting into the mouth of the bottle and following firmly the head part (6) and containing a fixing groove (8) where a highly adaptable sealing element (2) is fixed. The adaptable sealing element (2) is provided with a supporting place (10) facing the wall of the stopper (1), at least two sealing rims (9) in the main sealed place (5), and a homing part (11) under the main sealed place (5). The glass stopper (1) can be adapted for sealing bottles with a non-circular opening.

Fig. 1



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Description

Field of the invention

[0001] The invention relates to an adaptable glass stopper for sealing bottles with a circular or non-circular shape of the mouth of the bottle, comprising a head part of the stopper, a following conical part for inserting into the mouth of the bottle and an adaptable sealing element. The fitting area of the head part of the stopper has a ground plan which is at least identical or bigger compared to the outer dimension of the mouth of the bottle, whereas the upper part of the head part of the stopper may be of any shape, facilitating to distinguish the producers of beverage bottles. The lower conical part contains a fixing groove for the adaptable, highly efficient, sealing element, which guarantees the sealing of differences in the parameters of the mouth of the bottle of up to 1.1 mm, characterised by the fact that it has at least two or more sealing rims in the mouth of the bottle.

Prior art

[0002] The invention relates to an adaptable glass stopper for sealing bottles, namely bottles for spirits, distilled liquors, optionally wine, having a circular or non-circular shape of the mouth of the bottle. The adaptable glass stopper comprises a head part, the basic outer dimension of which is bigger than or at least identical to the outer dimension of the mouth of the bottle, further a conical part of the bottle, following firmly the head part and containing a fixing groove with a highly adaptable sealing element, for inserting into the mouth of the bottle. This sealing element is provided with at least two sealing rims with the function of sealing the bottle against leaking of the liquid and against spontaneous release of the stopper when used repeatedly.

[0003] Glass stoppers are known from the European patent 1 456 092. Several types of sealing methods are suggested for the glass stopper according to this patent, such as a frontal sealing between the neck and the head part of the stopper, and further a combination of the frontal and cylindrical sealing in the mouth of the bottle. A disadvantage of therein described methods is the requirement for use of special bottles with a guaranteed precision of the mouth of the bottle which requires a circular cross-section of the mouth of the bottle with a very small dimension tolerance. It means that for a reliable sealing function, the function dimensions, including the tolerance of the diameter of the mouth of the bottle, the stopper entering the mouth of the bottle, and the sealing ring, must be fulfilled. Another disadvantage is that there is only one sealing bead in the mouth of the bottle to perform the sealing and the resistance against spontaneous release of the stopper. In case this bead is damaged, the repeated sealing is very problematic.

[0004] Another closure element is known from the European patent 1 755 973. In case of this element, a combined sealing ring is used. Another bead is added on the sealing ring in the mouth of the bottle in order to prevent the possible moving of the stopper from the bottle by increasing the frictional power. An apparent disadvantage of this closing element is, similarly as in case of the European patent 1 456 092, that it requires the use of special bottles with a guaranteed precision of the mouth of the bottle which requires a circular cross-section of the mouth of the bottle with a very small dimension tolerance. Another disadvantage of this principle is that according to this method the sealing ring is not permanently fixed on the glass stopper. There is a risk of a possible damaging of the sealing ring and the loss of its functionality due to the fact that it is not provided with a homing part for correct first inserting of the stopper into the mouth of the bottle.

[0005] Another principle of a glass stopper for sealing bottles is mentioned in the application DE 10 2010 014876 A1. In this glass stopper, a sealing ring with a V cross-section with one sealing edge is used. The basic disadvantage, similarly as in case of the European patent 1 456 092, is that the sealing and the resistance against spontaneous release of the stopper is only secured by one sealing edge, and in case this only edge is damaged, a repeated sealing is problematic. Another disadvantage is that in this method the sealing ring is not permanently fixed on the glass stopper.

[0006] The aim of this invention is to eliminate the above mentioned disadvantages of stoppers.

Summary of the invention

[0007] The subject-matter of the invention is an adaptable glass stopper for sealing bottles, namely bottles for spirits, distilled liquors, optionally wine, having a circular or non-circular shape of the mouth of the bottle. The adaptable glass stopper comprises a head part, the basic outer dimension of which is bigger than or at least identical to the outer dimension of the mouth of the bottle, further a conical part of the bottle, following firmly the head part and containing a fixing groove with a highly adaptable sealing element, stretching into the mouth of the bottle. This sealing element is provided with at least two sealing rims with the function of sealing the bottle against leaking of the liquid and against spontaneous release of the stopper when used repeatedly.

[0008] According to this invention, the sealing method is based on the adaptable adaptation of the stopper itself, together with a new type of adaptable efficient sealing element which is capable of sealing a circular or non-circular

shape of the mouth of the bottle, in differences in the sealed parameters of up to 1.1 mm. The main sealing effect of the adaptable sealing element is in the mouth of the bottle, under the forefront of the neck. This adaptable sealing element from an elastic material is characterised by the fact that the principle of the efficient sealing is based on a principle of at least two- or more-rim sealing in the mouth of the bottle with a homing part on the sealing element.

[0009] The main sealed place in the mouth of the bottle is sealed by at least two or more sealing rims. In case of the multi-rim system, the increase in resistance against spontaneous release of the stopper from the mouth of the bottle has been unexpectedly achieved, as depicted in Table 1. It is evident from the measured values that the new multi-rim system has up to a threefold resistance against inner pressure compared to that of the original system. Another important advantage is that the multi-rim system is suitable for repeated sealing of the mouth of the bottle.

Table 1 - A comparison of the resistance against inner pressure in the bottle between the original solution with one sealing bead and the new multi-rim system

	Value of the maximum sealable inner pressure inside the bottle [MPa]	Value of the maximum sealable inner pressure inside the bottle [MPa]
Method of fixation of the stopper in the mouth of the bottle	Without a fixing element	With the fixing element
The original solution with one sealing bead	**0,035**	**0,25**
New solution - multi-rim sealing element	**0,13**	**0,35**
Coefficient of the increase of the maximum sealable inner pressure inside the bottle	**3,7x**	**1,4x**
New solution - multi-rim system after 10 repeated closures	**0,13**	**0,35**

[0010] Remark: When measuring, an aluminium overloading capsule was used as a fixing element.

[0011] Another advantageous aspect of the invention is that the sealing element comprises a homing part which follows the rim system in the mouth of the bottle and which reliably ensures the correct coaxial and uniform insertion of the stopper into the mouth of the bottle, which in turn ensures an even distribution of the stress and the sealing effects on individual rims of the sealing element.

[0012] The adaptable sealing element is characterised in that the overall height of the sealing element in the axial direction of the part of the stopper is higher than 5.5 mm.

[0013] From the point of view of repeated uses of the stopper with such an adaptable sealing element, it is convenient that in order to eliminate a possible slipping or dropping of the adaptable sealing element, a fixing groove is provided on the conical part of the stopper inserted into the bottle, where this adaptable sealing element is fixed by moulding.

[0014] A preferred embodiment of the invention features a sealing element with four sealing rims.

[0015] Another preferred embodiment is characterised by the fact that in case of a multi-rim system, the edges of individual sealing rims may be of a different outer parameter. From the point of view of reliability of the sealing, it is namely convenient for a better adaptation of individual rims to the inner dimension of the mouth of the bottle and to possible shape defects in the mouth of the bottle when inserting the stopper into the mouth of the bottle.

[0016] Another preferred embodiment of the invention is characterised by the fact that the adaptable element enables to use the principle for sealing non-circular shapes, such as elliptic openings, or even openings formed by a polygon shape with rounded corners.

[0017] Another preferred embodiment of the invention is preferably that the head part, the outer dimension of which is equal to or bigger than the outer dimension of the mouth of the bottle, may be of any shape. It thus enables creative design solutions of bottle and stopper shapes. At the same time, further fixing elements may be used for transport securing of the stopper, for example thermo capsules, coating or wire bandages etc.

[0018] Preferably, the invention is oriented at a glass stopper for closing distilled liquor bottles, optionally this principle may be used for other liquids, for which the materials of the bottle, stopper and sealing element would be chemically inert.

[0019] Thanks to this new principle with the new adaptable sealing element, it is possible to improve the economy of bottle production, since the mouth dimension may have a bigger tolerance, thus minimising production losses due to less strict production tolerances.

[0020] The principle of the adaptable glass stopper in this invention provides in the above mentioned sense the required

functional safety and repeatability of the sealing effect both in beverage bottles, namely for spirits, and in bottles intended for other liquids, or alternatively for powdery materials.

[0021] The principle of the adaptable stopper in this invention is in the above mentioned sense applicable to other non-glass materials of the stopper and the bottle.

[0022] The invention and its advantages are depicted in detail by means of the figures.

Fig. 1 represents a partial cross-section of the mouth of the bottle with an adaptable stopper with a two-rim sealing element, highlighting the overlap of the sealing element relative to the maximum and minimum sealed dimension of the bottle.

Fig. 2 represents a partial cross-section of the mouth of the bottle with an adaptable stopper with a four-rim sealing element, highlighting the overlap of the sealing element relative to the maximum and minimum sealed dimension of the bottle.

Fig. 3 represents, in a partial cross-section of the mouth of the bottle, the contact of the homing part of the sealing element when inserting the glass bottle into the mouth.

Fig. 4 represents a partial cross-section of the mouth of the bottle with an adaptable stopper with a four-rim sealing element, highlighting the principle of sealing by the contact of all rims on the sealed area.

Fig. 5 represents the possibility of using the principle of the invention for non-circular openings.

Fig. 6 represents the possibility of using the transport securing of the stopper by a thermo capsule.

Fig. 7 represents the possibility of using different shapes of the head part of the stopper.

Examples

[0023] Fig. 1 shows the glass stopper (1) comprising the head part (6) and the conical part (7) and especially the position of the adaptable sealing element (2) with two sealing rims (9) in its unloaded, non-deformed position, in order to enlighten the possibility of sealing reliably both circular and non-circular shapes of the mouth of the bottle in the difference of sealed dimensions (Zmax - Zmin) of up to 1.1 mm. The adaptable sealing element (2) is fixed by moulding into the fixing groove (8) in the conical part (7) of the glass stopper (1). This secures the sealing element (2) against axial movement. Since this sealing element is moulded into the fixing groove (8), a sufficient sealing effect is guaranteed on the side of the glass stopper. The outer dimension of the edge of sealing rims (9) in each direction of the cross-section of the neck of the bottle is bigger than the opening of the bottle in the corresponding direction. The subsequent insertion of the glass stopper into the mouth of the bottle (3) due to the elastic and flexible properties of the material of the sealing element (2) thus creates - in the main sealed place (5) between the supporting place (10), sealing rims (9) and the inner wall of the neck of the bottle (3) - a prerequisite for the formation of a reliable sealing effect with a sufficient resistance against spontaneous release of the stopper from the mouth of the bottle (3). The homing part (11) is provided to ensure the correct coaxial and uniform insertion of the stopper into the mouth of the bottle (3).

[0024] The preferred four-rim solution is shown on Fig. 2. The outer dimensions of the edge of individual rims (9) may be identical, related to the symmetry axis of the glass stopper. From the point of view of the inserting of the glass stopper into the mouth of the bottle (3), the sealing effect and the even loading of individual rims, it is preferable, if the outer dimension of the edges of the sealing rims (9) decrease towards the homing part (11) of the sealing element (2), as depicted in this figure. An undisputable advantage is that the multi-rim system is suitable for repeated sealing of the mouth of the bottle. In some cases it may be possible that the outer dimensions of edges of individual rims (9) will increase towards the homing part (11).

[0025] Fig. 3 shows the function of the homing part (11) when the stopper (1) is being inserted into the mouth of the bottle. The homing part (11) guarantees an improved coaxiality, with the subsequent even loading of sealing rims (9), when inserting the glass stopper into the mouth of the bottle (3).

[0026] The sealing effect as such in case of the stopper (1) inserted into the mouth of the bottle (3) is depicted on Fig. 4. The flexible deformation of the sealing element (2) between the supporting place (10) and the main sealed place (5) guarantees an even contact of all rims (9) on the sealed area.

[0027] Another preferred embodiment of the invention and an undisputable advantage of the adaptable sealing element (2) is that the advantages of this principle of sealing may be used in bottles with non-circular shape of the neck, as suggested on Fig. 5. It may be assumed that some non-circular shapes may be advantageous for the subsequent pouring of the liquid out of the bottle.

[0028] This new solution does not limit the use of transport securing element (4), for example thermo capsules, as suggested on Fig. 6.

[0029] Another preferred embodiment of the invention is that it enables the use of various creative shapes of the head part of the stopper (6), as for example suggested on Fig. 7. This is convenient for creative design solution of shapes of the bottle and the stopper.

Industrial applicability

[0030] Adaptable glass stoppers for sealing bottles with a circular or non-circular shape may be used for beverage bottles, for example for distilled liquors, wine etc.

[0031] List of reference numerals

1 Adaptable glass stopper
2 Adaptable sealing element
3 Mouth of the bottle
4 Transport securing element
5 Main sealed place
6 Head part of the stopper
7 Conical part of the stopper
8 Fixing groove
9 Sealing rims
10 Supporting place
11 Homing part of the sealing element

Claims

1. An adaptable glass stopper (1) for sealing bottles, comprising a head part (6), the basic outer dimension of which is bigger than or at least identical to the outer dimension of the mouth (3) of the bottle, and a conical part (7) for inserting into the mouth of the bottle and following firmly the head part (6) and containing a fixing groove (8) where a highly adaptable sealing element (2) is fixed **characterised in that** the adaptable sealing element (2) is provided with a supporting place (10) facing the wall of the stopper (1), at least two sealing rims (9) in the main sealed place (5), and a homing part (11) under the main sealed place (5).

2. The adaptable glass stopper (1) according to claim 1, **characterised in that** the adaptable sealing element (2) is provided with four sealing rims (9) in the main sealed placed (5).

3. The adaptable glass stopper (1) according to claims 1 or 2, **characterised in that** the outer dimension of the edge of rims (9) decreases towards the homing part (11).

4. The adaptable glass stopper (1) for sealing bottles according to claims 1 to 3 for sealing bottles with a non-circular opening.

Fig. 1

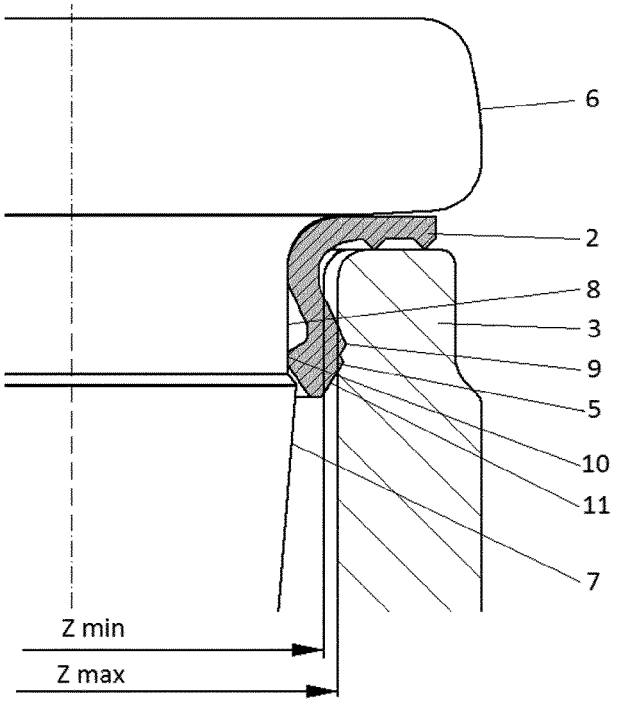


Fig. 2

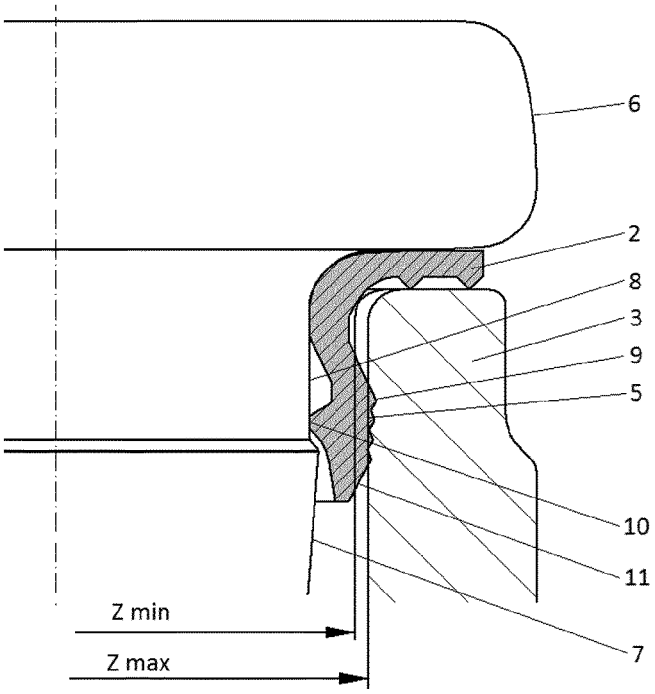


Fig. 3

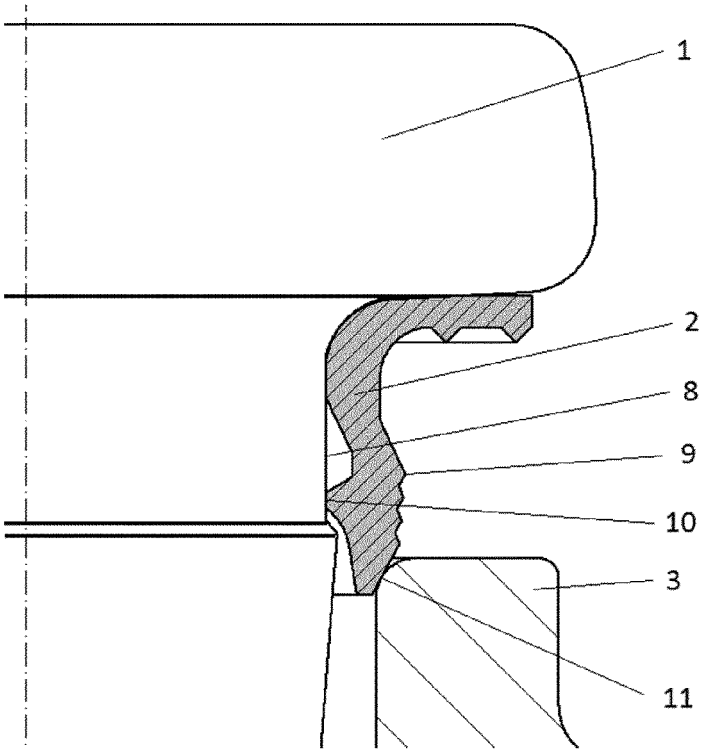


Fig. 4

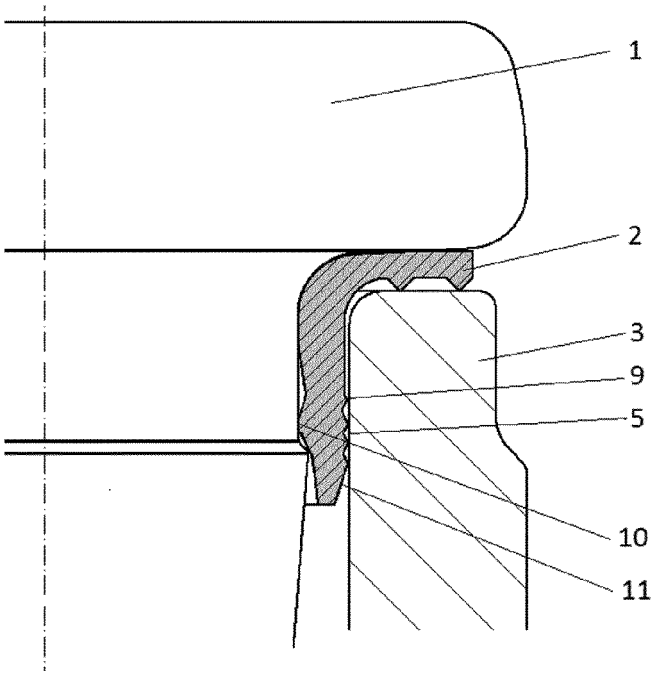


Fig. 5

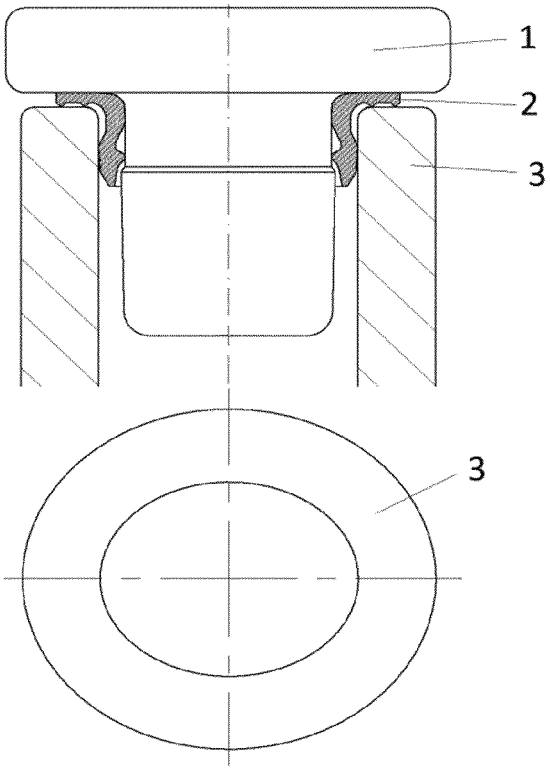


Fig. 6

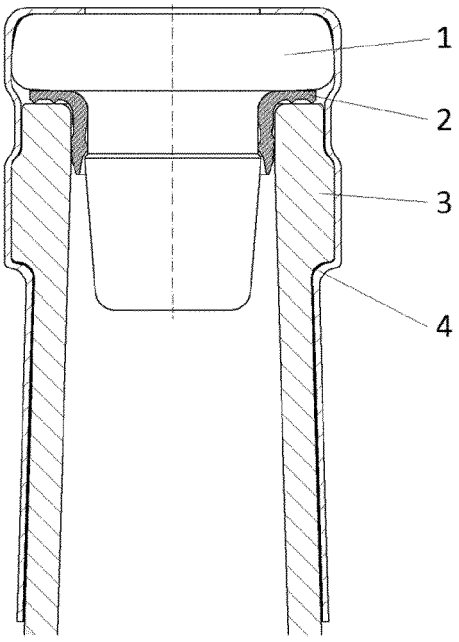
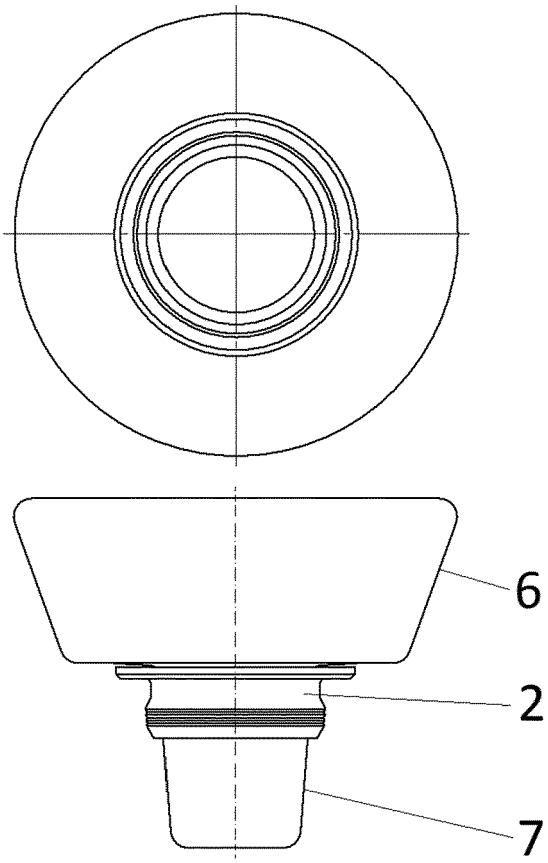


Fig. 7



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EUROPEAN SEARCH REPORT

Application Number
EP 13 18 3064

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	FR 1 479 255 A (NIQUET) 5 May 1967 (1967-05-05) * page 1, left-hand column, paragraph 4 - right-hand column, paragraph 1; figures * * page 2, line 12, last paragraph - right-hand column, paragraph 3 * -----	1,3,4 2	INV. B65D39/00
Y,D	EP 1 456 092 A2 (ALCOA DEUTSCHLAND GMBHVERPACKU [DE] ALCOA GMBH VERPACKWERKE [DE]) 15 September 2004 (2004-09-15) * paragraph [0107] - paragraph [0116]; figures 13-18 * -----	1,4	
Y	DE 296 01 568 U1 (SCHIMA MIRKO [DE]; BILLEKENS BART [NL]) 9 May 1996 (1996-05-09) * page 5 - page 6; figures * -----	1,2,4	

TECHNICAL FIELDS SEARCHED (IPC)

B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	22 January 2014	Gino, Christophe

CATEGORY OF CITED DOCUMENTS

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22-01-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 1479255 A	05-05-1967	NONE	
EP 1456092 A2	15-09-2004	AR 037781 A1	01-12-2004
		AT 320383 T	15-04-2006
		AU 2002361041 A1	23-06-2003
		EP 1456092 A2	15-09-2004
		ES 2260504 T3	01-11-2006
		HU 0402414 A2	29-03-2005
		NZ 533678 A	24-03-2005
		PT 1456092 E	31-07-2006
		US 2005167390 A1	04-08-2005
		US 2010252524 A1	07-10-2010
		WO 03050009 A2	19-06-2003
DE 29601568 U1	09-05-1996	DE 29501432 U1	08-06-1995
		DE 29601568 U1	09-05-1996

EPO FORM P0459

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Patent documents cited in the description

- EP 1456092 A **[0003] [0004] [0005]**
- EP 1755973 A **[0004]**
- DE 102010014876 A1 **[0005]**