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(54) CAPSULE WITH SEALING ELEMENT AND METHOD FOR PREPARING EDIBLE PRODUCTS USING SAID CAPSULE

(57) The present invention refers to a capsule (1) adapted for containing an edible substance in sealed manner relative to oxygen and to be used in a beverage preparation device (10), whereby said capsule (1) presents a container part (2) and a sealing element (4) of annular shape provided as a loose piece, so that can be displaced along the side wall (22) and in the proximity of the upstream oriented surface of the rim region (24) of said container part (2), whereby said sealing element (4) is adapted so that can be pressed against said up-stream-oriented surface of said rim region (24) when said capsule (1) is inside a product preparation device (10) in a position of readiness for preparing the product.

The present invention further refers to a process of preparation of an edible product based upon a capsule (1) according to the present invention.

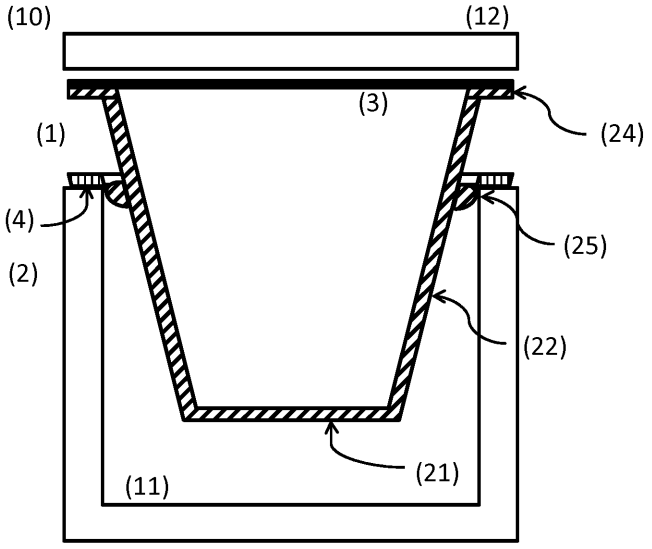

FIGURE 3

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Description

Field of the invention

[0001] The present invention refers to the field of capsules for preparing edible products, in particular aromatic beverages such as for example espresso type coffee and similar.

[0002] The present invention further refers to a process for preparing edible products using capsules of the type of the present invention.

Background of the invention

[0003] The prior art includes different solutions of capsules of the type of the invention, adapted for preparing edible products.

[0004] Said capsules typically present an envelope that provides an oxygen barrier and confines an individual portion of edible substance, such as for example roasted ground coffee beans. Moreover, said capsules typically present a wall adapted for entry of an upstream pressurized flow, and a downstream wall adapted for exit of a resulting beverage

The document CH 605293 discloses a capsule of the type of the present invention presenting a container part configured in frusto-conic shape that provides an opening and a rim region that develops in the perimeter of said opening, and a lid part that can be united with a rim region of the container part.

[0005] One of the problems that have been addressed in this type of capsules is that of sealing of said rim region when submitted to the pressurized flow inside of a respective brewing device.

[0006] The documents EP 1654966 B1, EP 1816934 B1 and EP 1839543 B1 disclose solutions for a better sealing of the rim region of a capsule by sealing means.

[0007] The document EP 2012994 B1 discloses a solution whereby the sealing means are injection moulded over the external surface of the container part of capsule.

[0008] The documents EP 1849715 B1, EP 2029457 B1 disclose solutions for providing a better connection of the sealing element to the container part of capsule.

[0009] The document EP 2289820 B1 refers the possibility of the sealing means being provided as an integral piece or a piece separate from the container part of capsule, and further, in the previous case, as a piece mounted in releasable manner or as a piece attached to the rim region, for example by means of a welding technique or of an adhesive. This document neither discloses nor advances any suggestion on how to provide a simple retention of sealing means on the capsule.

[0010] There is therefore the need for a solution of retention of sealing means in the container part of capsule, of simple construction and adapted so that can be actuated in effective and reliable manner when necessary.

General description of the invention

[0011] The objective of the present invention is that of providing a capsule that provides a more effective sealing disposition of the rim region and with smaller use of materials and energy, in particular by means of a simpler retention of the sealing means on the container part of capsule.

[0012] The objective above is solved according to the present invention by means of a capsule according to claim 1.

[0013] In particular, the present invention discloses a capsule for preparing edible products when provided inside of a respective product preparation device, whereby the container part of said capsule presents sealing means and retention means of said sealing means adapted so that said sealing means can be retained loose in the vicinity of the rim region and can be impinged by one of the capsule confining parts of said product preparation device being thereby pushed relative to the side wall of container part and pressed upon the rim region thereof when the capsule is inside of a respective product preparation device and the latter is at a product preparation position.

[0014] In particular, said capsule is adapted for preparing beverages such as for example aromatic beverages including espresso type coffee and similar, by means of a pressurized flow that flows through a portion of edible substance collected inside of said capsule.

[0015] The container part of said capsule is provided in a material that provides oxygen barrier, such as known in prior art, including in aluminium or aluminium alloy, and in plastic or in a plastic composite.

[0016] The capsule disclosed by the present invention is particularly adapted for containing an individual portion of aromatic edible substance, such as for example roasted ground coffee, tea, or similar, and presents capsule walls disposed in direct opposition and adapted for injection of a pressurized fluid flow upstream, and discharge of resulting aromatic beverage downstream.

[0017] Preferred embodiments are described in the dependent claims.

[0018] A related objective of the present invention is to provide a process of preparation of edible products, in particular based upon a capsule according to the present invention.

[0019] The objective above is solved according to the present invention by means of a process according to claim 15.

Description of the figures

[0020] The present invention shall hereinafter be explained in greater detail based upon preferred embodiments and the attached Figures.

[0021] The Figures show, in simplified schematic representations:

Figure 1: side cut-view of a capsule (1) of the type of the present invention, according to prior art;

Figure 2: side cut-view of a capsule (1) of the type of the present invention, according to prior art, inside of a product preparation device (10);

Figure 3: side cut-view of a capsule (1) according to the present invention in a non-operative position;

Figure 4: side cut-view of a capsule (1) according to the present invention in an operative position;

Figure 5: plane and side cut-view of a first embodiment of a sealing element (4) in a capsule (1) according to the present invention;

Figure 6: plane and side cut-view of a second embodiment of a sealing element (4) in a capsule (1) according to the present invention;

Figure 7: inferior top view of a first embodiment of a container part (2) in a capsule (1) according to the present invention;

Figure 8: inferior top view of a second embodiment of a container part (2) in a capsule (1) according to the present invention;

Figure 9: side cut-view of a first embodiment of a container part (2) in a capsule (1) according to the invention;

Figure 10: side cut-view of a second embodiment of a container part (2) in a capsule (1) according to the invention.

Description of preferred embodiments of the invention

[0022] It is known in the prior art to configure capsules (1) for preparing edible products such as aromatic beverages, inside of product preparation devices (10), such as espresso coffee brewing devices.

[0023] A capsule (1) of the type of the present invention (see **Figure 1**) comprises a container part (2), configured for example in generally frusto-conic shape, presenting a base wall (21) upstream, and a sidewall (22) that defines an opening (23) downstream, and further presenting a rim region (24) that extends sideways along the perimeter of said opening (23). The capsule (1) further comprises a li part (3) configured as membrane or foliolike element, and adapted so that can be united with the downstream-oriented surface of said rim region (24).

[0024] It is further known in the prior art to provide a sealing element (4) configured in annular shape and provided in the upstream-oriented face of said rim region (24) so that can be compressed by an upstream confining part (11) of said product preparation device (10) when in a position of readiness to operate (see **Figure 2**).

[0025] Said sealing element (4) is typically provided united to the upstream-oriented surface of said rim region (24). Said sealing element (4) can be provided in the same material as said container part (2), or in a different material.

[0026] According to a first inventive aspect, the capsule (1) according to the present invention presents a sealing element (4) of annular shape provided as a loose piece, so that can be displaced along the sidewall (22) and in the proximity of the upstream-oriented surface of said rim region (24), see **Figures 3** and **4.**

[0027] According to a second inventive aspect, the capsule (1) presents a container part (2) provided so that retains said sealing element (4) in the vicinity of the upstream-oriented of said rim region (24), whereby said sealing element (4) is adapted so that can be pressed, by an upstream confining part (11) of said product preparation device (10), against said upstream-oriented surface of said rim region (24) when said capsule (1) is inside of a product preparation device (10) in a position of readiness for preparing the product.

[0028] It is therefore proposed an inventive sequence in the preparation of an edible product based upon said capsule (1) according to the present invention and comprising the steps of providing a product preparation device (10) in an open position where an upstream confining part (11) is apart from a downstream confining part (12), providing a capsule (1) to the interior of said product preparation device (10), in particular a capsule (1) according to any one of claims 1 to 14, whereby said capsule (1) presents a rim region (24) and a sealing element (4), and actuating said product preparation device (10) in a closing movement until reaching a closed position where said upstream and downstream confining parts (11, 12) confine said capsule (1), whereby during said closing movement of product preparation device (10), said upstream confining part (11) displaces said sealing element (4) of said capsule (1) to a position next to the upstream-oriented surface of the rim region (24), so that said sealing element (4) provides a sealing function of pressurized liquid flow between the interior and exterior of said product preparation device (10) .

[0029] It is preferred (see **Figures 5** and **6**) when said sealing element (4) presents a first surface (41) downstream-oriented and adapted so that can be pressed against the upstream-oriented surface of said rim region da (24), and a second surface (42) upstream-oriented, whereby said first and second surfaces (41, 42) are different, preferentially develop along non-coplanar planes.

[0030] In this sense, it is further preferred (see **Figure 5**) when said second surface (42) presents a surface characteristic (43) adapted for providing a sealing con-

nection with a part (11) of said product preparation device (10). This surface characteristic (43) can be embodied as a surface that is non co-planar with the downstream-oriented surface of said sealing element (4), as represented in Figure 5. This surface characteristic (43) can further be embodied as a non-plane surface along a region that is adjacent to the interior perimeter of said sealing element (4).

[0031] It is preferred when said sealing element (4) is provided in a material that provides a stable and substantially rigid form. In particular, it is preferred when said sealing element (4) is provided in a plastic material, and preferentially in a material that is different or of different composition from the material of said container part (2).

[0032] It is further preferred (see **Figure 6**) when said sealing element (4) presents two perimeter regions of different wall thickness, including an interior perimeter region (44) that develops along the interior perimeter of said sealing element (4), whereby said exterior perimeter region is preferentially provided substantially rigid and said interior perimeter region (44) is preferentially provided flexible. This disposition advantageously provides an easier first introduction of the sealing element (4) beyond the retention means provided on the sidewall (22) of the container part (2).

[0033] **Figures 7** to **10** represent embodiments of a capsule (1) according to the present invention whereby there is provided a plurality of salience zones (25) in the sidewall (22) of the container part (2), whereby said salience zones (25) are adapted so as to retain the sealing element (4) in the extension of sidewall (22) downstream thereof up until said rim region (24) of the container part (2).

[0034] In particular, **Figures 7** and **8** reproduce the inferior plane view (that is, from the upstream-oriented base wall (21)) of an embodiment of capsule (1) according to the present invention whereby there are provided five salience zones (25) in the sidewall (22) of container part (2). As represented, said salience zones (24) correspond to a localized increase of the dimension of exterior perimeter of said sidewall (22), and are uniformly distributed along the perimeter extension.

[0035] It is preferred when said salience zones (24) are provided as an integral part of said sidewall (22) of container part (2). In particular, it is preferred when said salience zones (25) are configured as at least one of a localized variation of shape of said sidewall (22) and a localized variation of wall thickness of said sidewall (22) .

[0036] Alternatively, said salience zones can be provided as a piece that is different from said container part (2).

[0037] As shall be promptly understood by an expert in the field, said salience zones (25) are adapted so that provide passage of said sealing element (4) in a downstream oriented movement. In this sense, said salience zones (25) are preferentially configured in a downstream-oriented wedge shape, so that provide an increase of perimeter of said sidewall (22) in the downstream direction thereof (vide **Figures 9** and **10**).

[0038] In particular, it is preferred when said salience zones (25) present a projection of height smaller than 2 mm, preferentially smaller than 1 mm, relative to the surface plane of said sidewall (22).

[0039] Moreover, it is further preferred when said salience zones (25) are provided so that provide retention of said sealing element (4) along a height extension (hi) of said sidewall (22) that is smaller than 30%, preferentially smaller than 10%, of the total height (h) of said container part (2) of capsule (1).

Claims

1. **Capsule (1)** for preparing an edible product, adapted so that can be confined in a product preparation device (10) by respective confining parts (11, 12) so that can be crossed by a pressurized liquid flow inside thereof, whereby said capsule (1) comprises:

   - a container part (2) configured for example in a generally frusto-conic shape, presenting a base wall (21) arranged upstream and a sidewall (22) that defines an opening (23) arranged downstream, and further presenting a rim region (24) that develops sideways along the perimeter of said opening (23),
   - a lid part (3) configured as a membrane or foliolike element, and adapted so that can be united with said rim region (22), and
   - a sealing element (4),

   said capsule (1) being **characterized**
   in that said sealing element (4) is provided as a loose piece of annular shape, so that can be displaced along an extension of the exterior side of said sidewall (22) in the proximity of the upstream-oriented surface of said rim region (24), and
   in that said container part (2) is provided so that retains said sealing element (4) within said extension of sidewall (22) in the vicinity of the upstream-oriented surface of said rim region (24),
   whereby said sealing element (4) is adapted so that can be pressed against said upstream-oriented surface of rim region (24) when said capsule (1) is inside of said product preparation device (10) at a position of readiness to prepare said edible product.

2. Capsule (1) according to claim 1, **characterized in that** said sealing element (4) presents a first sealing surface (41) oriented downstream and adapted so that can be pressed directly against the upstream-oriented surface of said rim region (24), and a second sealing surface (42) oriented upstream, whereby said first and second surfaces (41, 42) are different.

3. Capsule (1) according to claim 2, **characterized in**

that said second sealing surface (42) presents a surface characteristic (43) adapted to provide a sealing connection with one of said confining parts (11, 12) of said product preparation device (10).

4. Capsule (1) according to claims 1 to 3, **characterized in that** said sealing element (4) presents two perimeter regions of different wall thickness, including an interior perimeter region (44) that develops along the interior perimeter extension of said sealing element (4), whereby said interior perimeter region (44) is preferentially provided flexible.

5. Capsule (1) according to claims 1 to 4, **characterized in that** the exterior side of said sidewall (22) presents retention means adapted so that limit the movement of said sealing element (4) along said sidewall (22) to only a region neighbouring of said rim region (24), whereby said neighbouring region preferentially does not extend beyond an extension that corresponds to 1/3, more preferentially to 1/4, of the total extension of said sidewall (22).

6. Capsule (1) according to claims 1 to 5, **characterized in that** the exterior side of said sidewall (22) presents a plurality of salience zones (25) disposed along a radial direction and at a distance from said rim region (24), whereby said salience zones (25) are adapted so that prevent said sealing element (4) from passing in a upstream-oriented movement beyond said salience zones (25) .

7. Capsule (1) according to claims 1 to 4, **characterized in that** the exterior side of said sidewall (22) presents at least two, preferentially at least three salience zones (25) on said sidewall (22), whereby said salience zones (25) are preferentially distributed in regular manner along the exterior perimeter of said sidewall (22).

8. Capsule (1) according to claims 6 and 7, **characterized in that** said salience zones (25) are configured in a downstream oriented wedge shape, or similar, so that provide an increase of perimeter of said side wall (22) in the downstream direction, and adapted so that provide passage of said sealing element (4) under pressure in a downstream-oriented movement but prevent said sealing element (4) from passing beyond.

9. Capsule (1) according to claims 6 to 8, **characterized in that** said salience zones (25) present a height projection smaller than 2 mm, preferentially smaller than 1 mm, relative to the surface plane of said sidewall (22).

10. Capsule (1) according to any one of claims 6 to 9, **characterized in that** said salience zones (25) are provided as at least one of:

- a single piece together with said container part (2), and
- a piece that is different from said container part (2) .

11. Capsule (1) according to claims 6 to 10, **characterized in that** said salience zones (25) are configured as at least one of:

- a localized variation of shape of said sidewall (22), e
- a localized variation of thickness of said sidewall (22) .

12. Capsule (1) according to any one of claims 1 to 11, **characterized in that** said sealing element (4) presents a surface characteristic (43) provided as a surface non co-planar with the upstream oriented of said sealing element (4).

13. Capsule (1) according to any one of claims 1 to 12, **characterized in that** said sealing element (4) presents a surface characteristic (43) provided as a non-plane surface along a region adjacent to the interior perimeter of said sealing element (4).

14. Capsule (1) according to any one of claims 1 to 13, **characterized in that** said sealing element (4) is provided in a material that provides a stable and substantially rigid, and **in that** said sealing element (4) is provided in a plastic material, and preferentially in a different material, or of different composition, than said container part (2).

15. Process for preparing an edible product, such as a espresso coffee, whereby said process comprises the steps:

- providing a product preparation device (10) in an open position where an upstream confining part (11) is apart from a downstream confining part (12),
- providing a capsule (1) to the interior of said product preparation device (10), in particular a capsule (1) according to any one of claims 1 to 14, whereby said capsule (1) presents a rim region (24) and a sealing element (4),
- actuating said product preparation device (10) in a closing movement until reaching a closed position where said upstream and downstream confining parts (11, 12) that confine said capsule (1),

characterized in that during said closing movement of product preparation device (10), said upstream confining part (11) displaces said sealing element

(4) of said capsule (1) to a position next to the upstream-oriented surface of the rim region (24), so that said sealing element (4) provides a sealing function of pressurized liquid flow between the interior and exterior of said product preparation device (10).

PRIOR ART

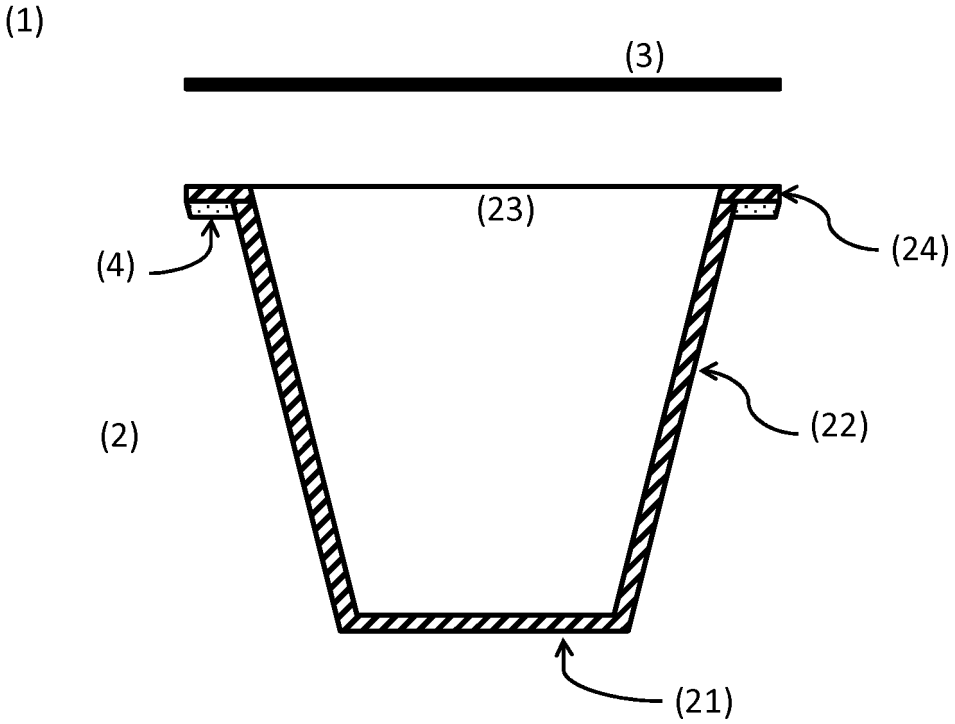

FIGURE 1

PRIOR ART

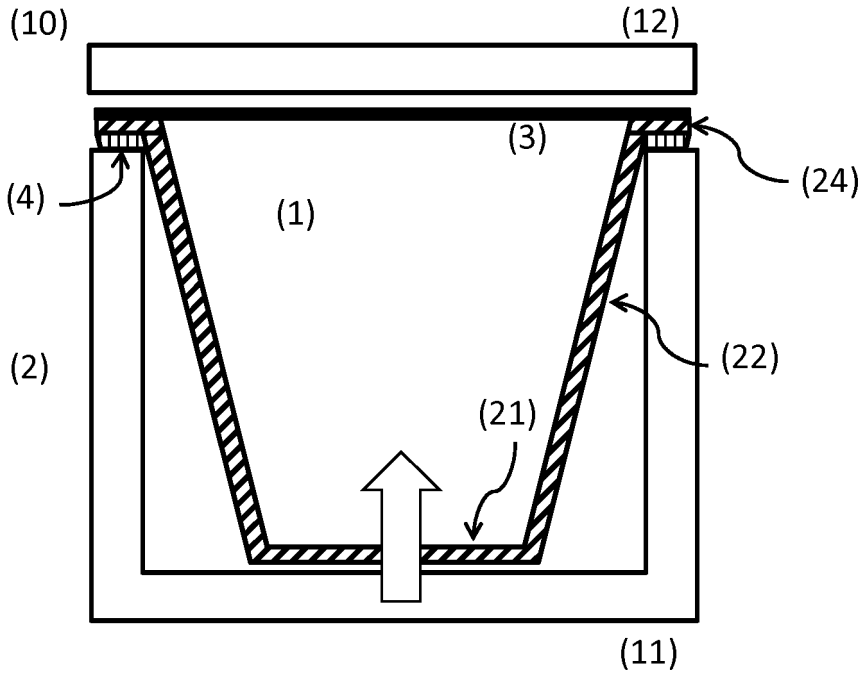

FIGURE 2

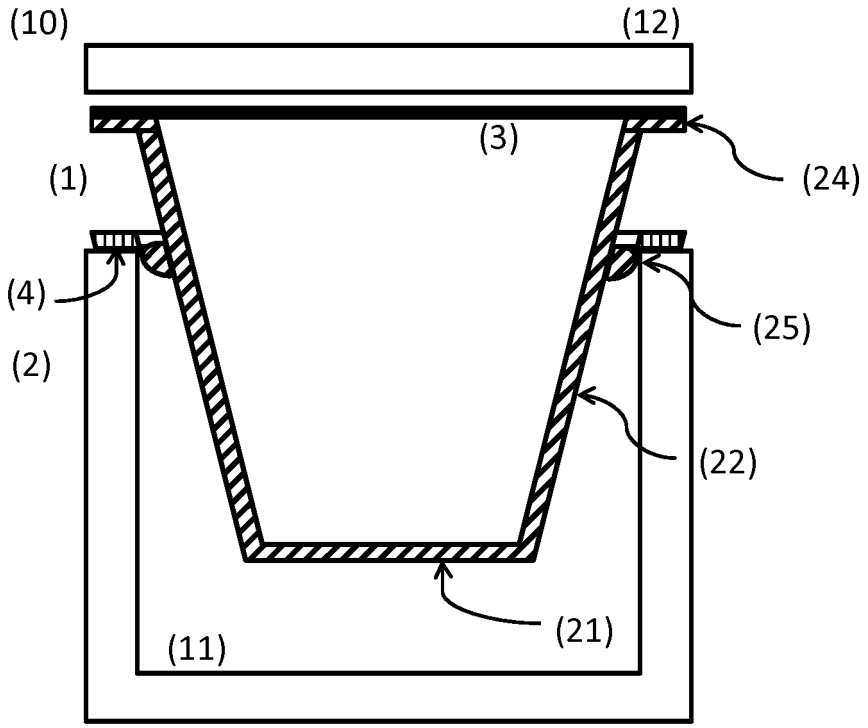

FIGURE 3

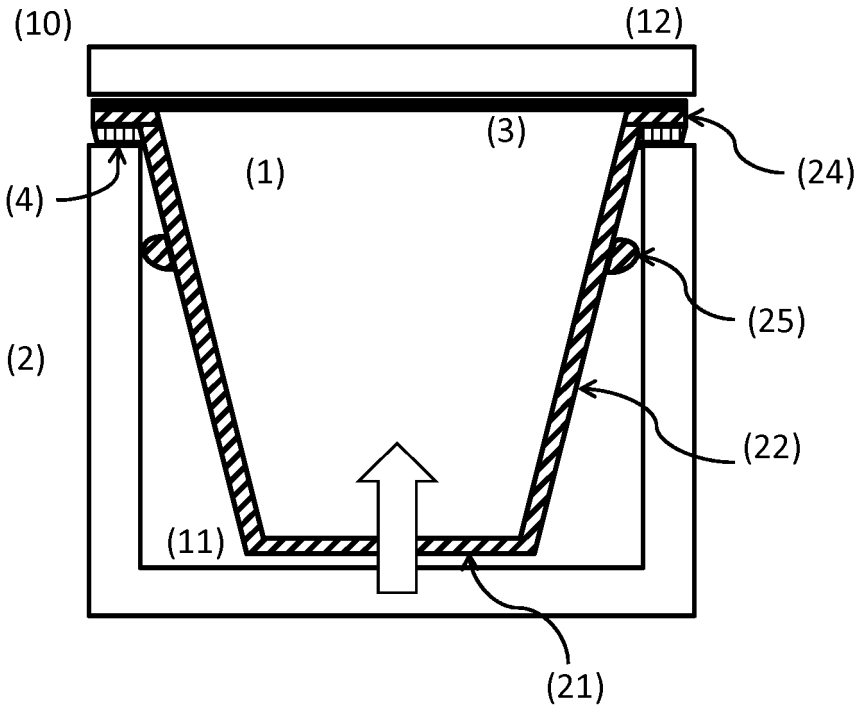

FIGURE 4

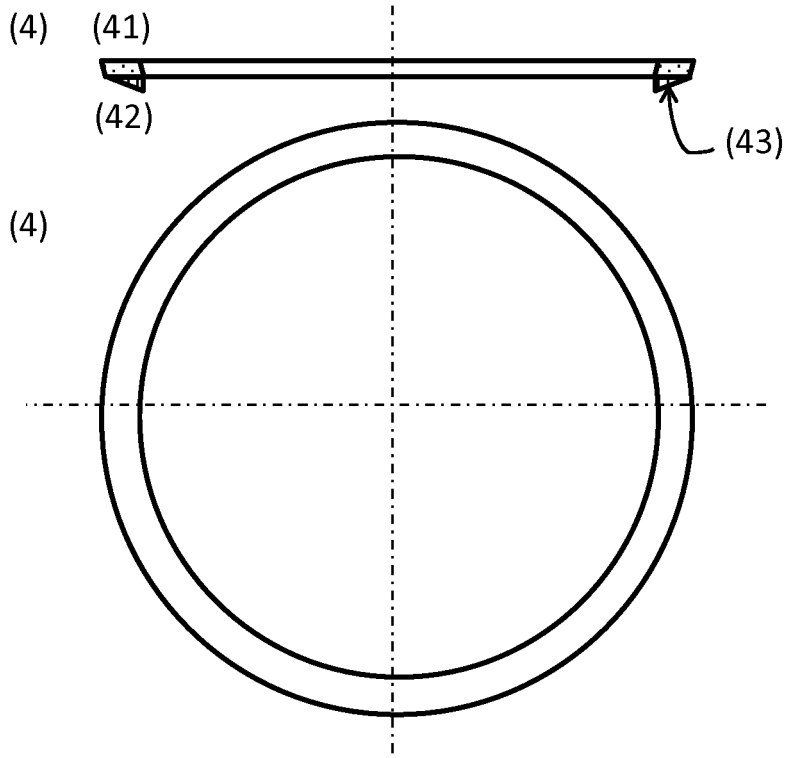

FIGURE 5

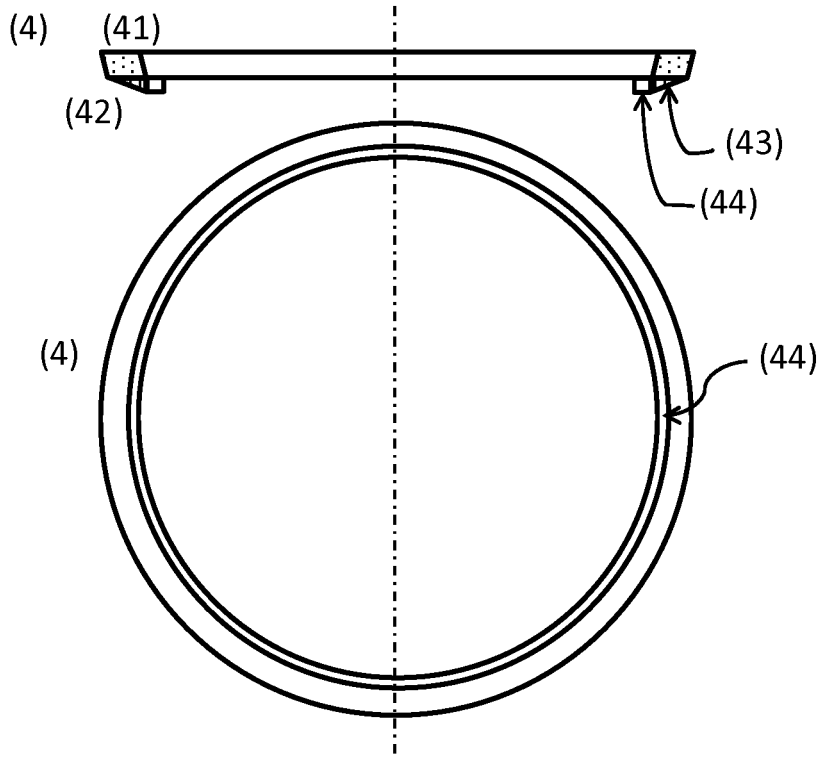

FIGURE 6

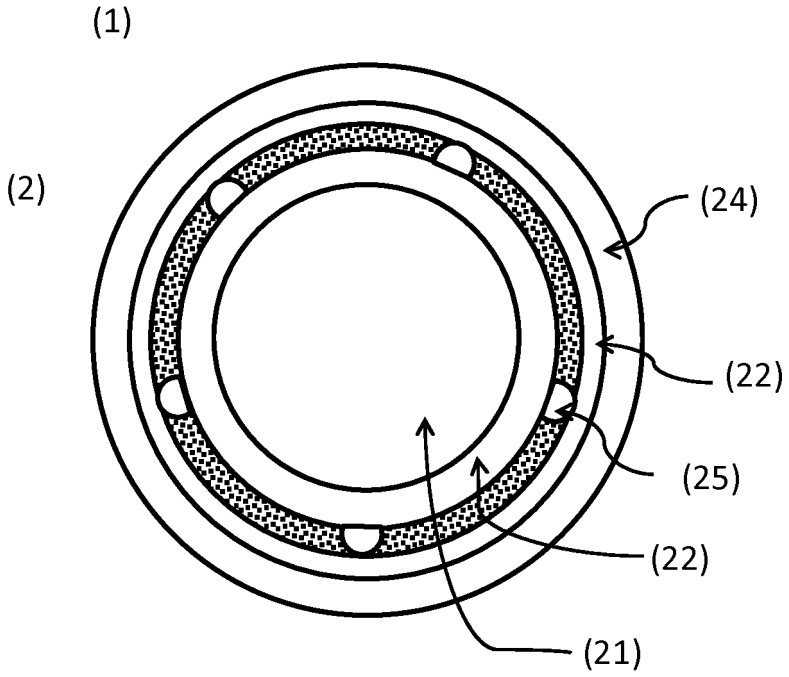

FIGURE 7

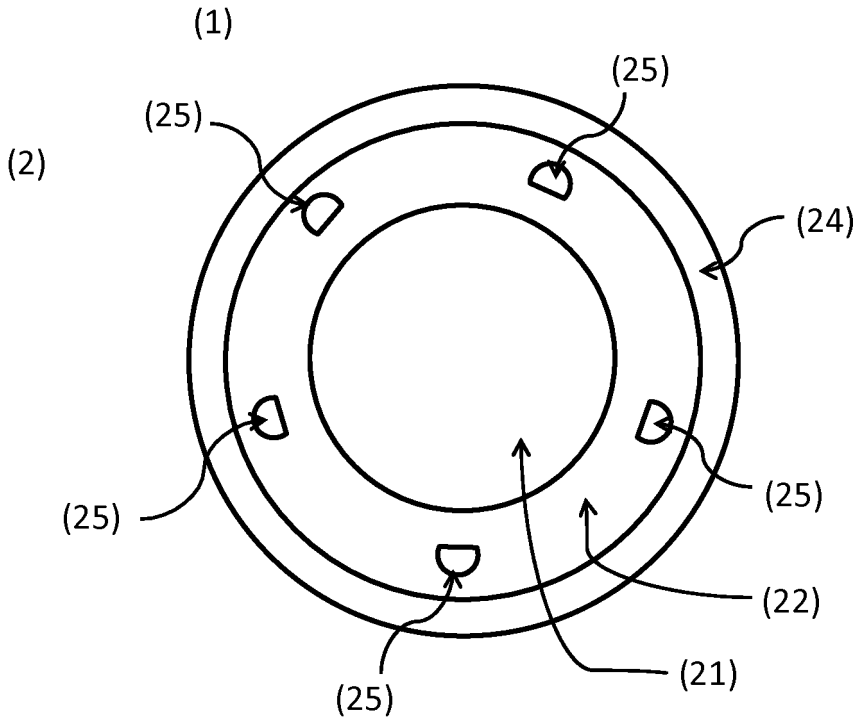

FIGURE 8

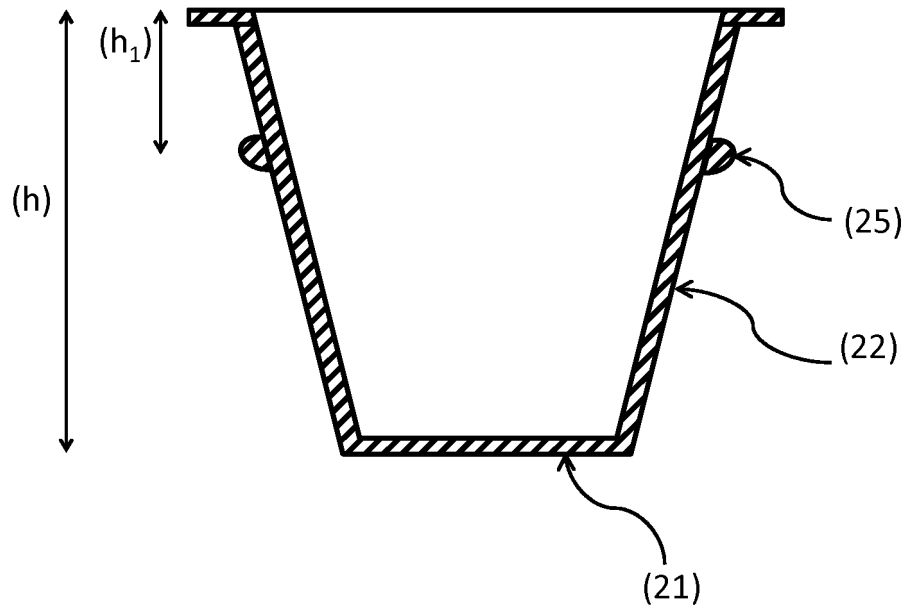

FIGURE 9

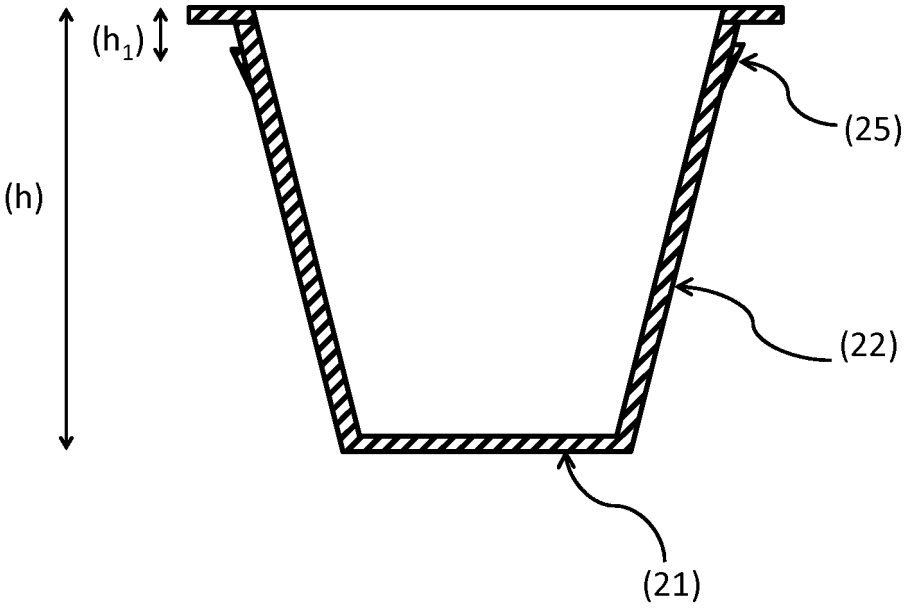

FIGURE 10

INTERNATIONAL SEARCH REPORT

International application No
PCT/PT2018/000001

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65D85/804
ADD.

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 practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 20 2015 100813 U1 (HUBER CHRISTOPH [CH]) 27 May 2016 (2016-05-27) paragraph [0025] - paragraph [0037]; claims 1,15; figure 1 paragraph [0076]	1-15
A	EP 2 289 820 A1 (NESTEC SA [CH]) 2 March 2011 (2011-03-02) cited in the application claims 1-11; figures 1a,1b	1-15
A	WO 2007/137974 A2 (NESTEC SA [CH]; SIMANSKI BERND [DE]) 6 December 2007 (2007-12-06) cited in the application the whole document	1-15

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 April 2018	02/05/2018

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Brochado Garganta, M

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INTERNATIONAL SEARCH REPORT

International application No
PCT/PT2018/000001

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 2013/136209 A1 (CAFFITA SYSTEM SPA [IT]) 19 September 2013 (2013-09-19) the whole document	1-15
A	WO 2015/128827 A1 (SARONG SPA [IT]) 3 September 2015 (2015-09-03) the whole document	5

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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