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(54) **CAPSULE WITH FILTER AND CAPSULE SYSTEM FOR PREPARING EDIBLE PRODUCTS**

(57) The present invention refers to a capsule (1), adapted for collecting an edible substance in a collection space (A) in oxygen-sealing manner, and to be used in a machine for preparing an edible product, for example an aromatic beverage such as espresso coffee and soluble coffee type. In particular, said capsule (1) presents a filter element (5) provided downstream of said collec-

tion space (A) and upstream of a discharge disposition (213), thereby improving the efficacy of filtering and constructive simplicity of the capsule (1).

The present invention further refers to a system for preparing edible products, including at least two types of capsule (1, 1') according to the present invention presenting different filter elements (5, 5').

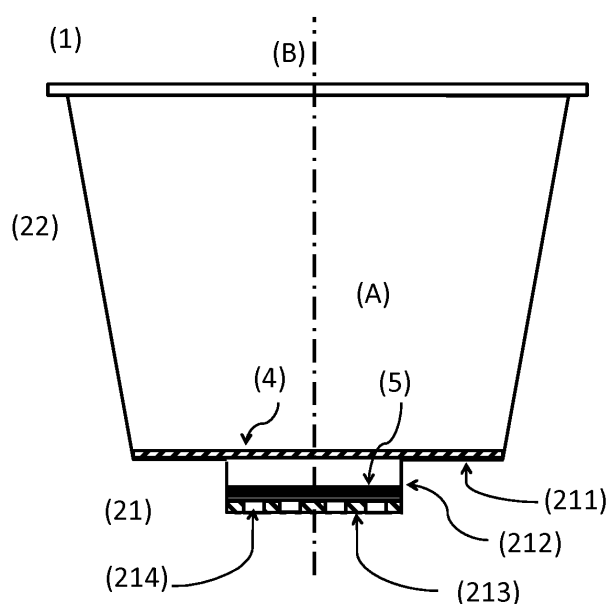


FIGURE 3

Description

Field of the technique

[0001] The present invention refers to the field of the capsules adapted for collecting an edible substance precursor of an edible product, such as for example an aromatic beverage.

[0002] The present invention further refers to a system for preparing edible products comprising a capsule of the type of the present invention.

Prior art

[0003] The prior art includes several solutions relating to capsules adapted for preparing edible products, in particular of aromatic beverages such as for example espresso type coffee and similar beverages. In general, said capsules provide an oxygen-sealed collection space so as to preserve the organoleptic properties of the edible substance, and are adapted so that can be used in machines for preparing edible products, for example in a respective brewing device of aromatic beverage, where they are crossed by a pressurized flow. In particular in the case of roasted ground coffee beans used for preparing espresso coffee type, the brewing flow can carry with it non-dissoluble particles that can thereby negatively change the beverage taste.

[0004] It is therefore further known that said capsules further present filter elements provided so as to retain non-soluble particles of said edible substance.

[0005] Document WO 2006/008243 A1 discloses a capsule of the type of the present invention comprising a filter element that is provided downstream of the collection space of edible substance. However, said collection space is not provided oxygen-sealed. Moreover, the capsule presents, in the respective beverage discharge region, a part in form of cupule or rounded with a cross-section decreasing along the prevailing flow direction, whereby said filter is provided upstream of said discharge region.

[0006] Document WO 2011/080022 A1 discloses a capsule of the type of the present invention that presents a container part with grooves in the interior surface presenting a smaller dimension than the average dimension of grain of the substance contained in the capsule. Moreover, the base part of said capsule presents a projection along the prevailing flow direction of characteristic dimension smaller than the characteristic dimension of the sidewall of container. In this case, the downstream edge of said projection is initially covered by a removable sealing element, and the upstream edge of said projection presents a plurality of flow passageways.

[0007] Document EP 2683625 B1 discloses a capsule with a general configuration similar to the one disclosed by the present invention, including a filter element that confines the collection space of edible substance downstream thereof, and is provided upstream of a discharge

opening provided in the base wall.

[0008] Document EP 2861508 B1 discloses a capsule that comprises a filter in a fibrous non-woven material, formed plastically, preferentially thermoformed, whereby said filter presents a filtering region and a fixation region that is fixed to a peripheral collar inside of the capsule.

[0009] Document WO 2015/087180 A1 discloses a capsule that confines a chamber and comprises a filter positioned downstream of the edible substance and supported by, not fixed to, the base portion of the capsule, so that can be moved to the interior of the chamber expect by the resistance exerted by the edible substance. However, said capsule further presents an oxygen-sealing element provided downstream of said filter, so that the filter is inside of the oxygen-sealed collection space.

[0010] Document EP 2995577 A1 discloses another capsule with a general configuration similar to the one disclosed by the present invention and that presents a projecting element in the base wall and an opening area that is opened by opening devices of the machine for preparing beverages, whereby there is provided a filter of non-woven structure within the capsule and next to the base, the specific weight of which is between 40 and 200 gr/ m², and the thickness of which is between 0,1 of 0,9 mm, whereby said filter is distanced apart from the base by means of several spacing element spaced apart in uniform manner.

[0011] There is a need of improving the filtering efficacy and construction simplicity of filtering dispositions in capsules of this type, in particular as a result of the position and relative dimension of the filter element.

General description of the invention

[0012] A first objective of the present invention is to provide a single portion package, notably of the capsule type or similar, adapted so that can collect and edible substance in oxygen-sealed manner, so that provides better beverage filtering conditions in the exit region of the capsule, as well as construction simplicity of the capsule.

[0013] This objective is solved according to claim 1.

[0014] Preferred embodiments are disclosed in the dependent claims.

[0015] In particular, the objective is solved by a capsule that comprises a first part of container type comprising a base wall and a sidewall developing along a circular alignment around a central longitudinal axis thereby defining a general shape of frusto-conic type or similar, a second part of lid type provided as a folio like element and adapted so that confines a collection space (A) upstream thereof in a oxygen-sealing manner, and a retention disposition provided as a folio-like element and adapted so that confines said collection space downstream thereof in oxygen-sealing manner, and adapted so that provides filtering of the beverage flow downstream of said collection space provided oxygen-sealed.

[0016] It is preferred when said filter element is further

provided upstream, supported in at least most part of the its surface in direct contact with a wall like disposition presenting at least one, preferentially a plurality of flow passageways with a characteristic dimension, for example diameter, different from the characteristic dimension of the flux through said filter element.

[0017] It is in particular preferred when said capsule presents a beverage discharge disposition including a filter element disposed downstream and upstream of flow passageways with a characteristic dimension of at least one or two orders of magnitude bigger than the characteristic dimension of the flux through said filter element.

[0018] It is preferred when said capsule presents a beverage discharge disposition including a filter element disposed downstream and upstream of flow passageways with a characteristic dimension comprised between 1 and 10 mm, preferentially between 3 and 7 mm.

[0019] A second objective of the present invention is to provide a system for preparing edible products based upon a plurality of types of single portion package, in particular in the form of capsules, that provides greater flexibility of operation according to the type of edible substance and of respective product to be prepared.

[0020] This objective is solved according to claim 14.

List of Figures

[0021] The present invention shall now be described in greater detail based upon preferred embodiments and in the attached figures that present schematic representations thereof.

[0022] The Figures show:

- Figure 1: side and top view of a capsule (1) of the type of the present invention;
- Figure 2: side and bottom view of a capsule (1) of the type of the present invention;
- Figure 3: side-cut view of a first embodiment of a capsule (1) according to the present invention;
- Figure 4: side-cut view of a second embodiment of a capsule (1) according to the present invention;
- Figure 5: side-cut view of a third embodiment of a capsule (1) according to the present invention;
- Figure 6: bottom view of the preferred embodiment of capsule (1) according to Figure 5.

Detailed description of preferred embodiments of the invention

[0023] Figures 1 and 2 show side (on the left-side) and top and bottom views, respectively, of a portion package, in particular of a single portion, or capsule (1) adapted

for preparing edible products, such as for example aromatic beverages and similar, of the type capsule (1) according to the present invention.

[0024] Said capsule (1) presents a container part (2) with a general shape of frusto-conic type or similar, that comprises a part of container type presenting a base wall (21) and a sidewall (22), and a part of lid type (3) adapted for confining a collection space (A) adapted for collecting an edible substance.

[0025] Moreover, said part of lid type (3) is adapted for entry of a pressurized flow, in particular through a flow passageway provided by means of an opening device external to said capsule (1), or by means of the action of upstream flow pressure upon a weakened material part of said part of lid type (3), so that a pressurized flow flows through said collection space (A) along a prevailing flow direction of said part of lid type (3) upstream, to said base wall (21) of the part of container type (2) downstream.

[0026] Figures 3 and 4 represent preferred embodiments of a first and second types of capsule (1, 1') according to the present invention.

[0027] As represented, said capsules (1, 1') present a retention disposition (4) provided as a folio-like element and adapted so that confines said collection space (A) downstream thereof in oxygen-sealing manner.

[0028] According to a preferred embodiment, said retention disposition (4) is fixed in surface on said first base portion (211) and is preferentially provided as a sheet of aluminium, aluminium composite, or similar.

[0029] Moreover, said base wall (21) comprises a first base portion (211) that develops from said sidewall (22) inwards and along a direction non parallel with relation to said longitudinal central axis (B), and a second base portion (212) that projects in the central region of said base wall (21) downstream, with a shape of tubular type or of frusto-conic type of circular cross-section, and is adapted for flow discharge of the beverage that flows through said retention wall (4) out of the capsule (1).

[0030] It is preferred when said second base portion (212) presents a characteristic dimension of cross-section that is smaller than half the characteristic dimension of cross-section of said first base portion (211).

[0031] According to a first inventive aspect, the capsules (1, 1') further present a filter element (5) provided downstream of said retention disposition (4), so that said filter element (5) provides filtering of the beverage flow downstream of said collection space (A) provided oxygen-sealed.

[0032] In fact, according to results obtained in several tests, this position of the filter element (5), downstream of the exit region of beverage flow out of said collection space (A) provided in oxygen-sealed manner, presents several advantages including in terms of distribution of energy loss and turbulence in the discharge flow, as well as effectiveness of filtering of said discharge flow.

[0033] In particular, it is preferred when said filter element (5) is provided adjacent upstream with relation to the furthest downstream region of said second base por-

tion (212), whereby in said furthest downstream region there is provided a beverage discharge disposition (213) that presents a plurality of passageways.

[0034] It is preferred when said discharge disposition (213) presents a plurality of passageways with a characteristic dimension that is at least one order of magnitude bigger than the characteristic dimension of the passageways provided by said filter element (5).

[0035] It is preferred when said beverage discharge disposition (213) is provided in a single piece with the remanding parts of said first part of container type (2).

[0036] Alternatively, said base wall (21) is provided in a single piece including said beverage discharge disposition (213), and adapted so that can be united to said sidewall (22).

[0037] In terms of type of retention of said filter element (5), it is preferred when said filter element (5) is provided fixed along an interior perimeter region of said second base portion (212), preferentially is provided fixed to said discharge disposition (213).

[0038] It is preferred when said filter element (5) is provided as a mesh-like structure with a plurality of fluid passageways presenting a characteristic dimension of filtering adapted for retention of solid particles non dissolved in the beverage flow upstream, whereby said characteristic dimension of filtering is previously defined according to the type of edible substance contained in said collection space (A).

[0039] It is preferred when said filter element (5) is provided as a structure of rigid type, for example in a synthetic material, or as a structure of tissue type, of non-woven type, preferentially in a recyclable or biodegradable material.

[0040] According to an inventive aspect, in a system for preparing edible products according to the present invention, comprising at least two types of capsules (1, 1'), said at least two types of capsule (1, 1') present a filter element (5) provided downstream of respective collection space (A) along the prevailing flow direction, preferentially retained in said second base part (212) of characteristic dimension smaller than the characteristic dimension of said collection space (A).

[0041] It is preferred when said at least two types of capsule (1, 1') present filter elements (5) provided in at least one of: a different position with relation to said collection space (A), a different characteristic dimension of filtering.

[0042] As one can observe by comparing Figures 3 and 4, it is further preferred when said at least two types of capsule (1, 1') present a dimension of base (213) that differs in at least one of: number and dimension of respective flow passageways (214). In the represented case, the second type of capsule (1') represented in Figure 4 comprises a base disposition de base (213') that presents a smaller number of flow passageways (214), in relation to the base disposition (213) of the first type of capsule (1) represented in Figure 3.

[0043] It is preferred when said filter element (5, 5') is

retained, preferentially fixed, in the upstream-oriented side of said base disposition (213, 213'), so that results adjacent to respective flow passageways (214).

[0044] It is herewith provide in advantageous manner, the possibility of adapted said capsule (1) to different types of beverage, such as for example espresso type coffee and soluble type coffee, by means of only changing said base disposition (213).

[0045] Figures 5 and 6 represent a third embodiment of capsule (1) according to the present invention, whereby said second base portion (212) presents a projection portion (215) that extends downstream of said base disposition (213), with a shape of tubular type or of frusto-conic type of circular cross-section.

[0046] It is preferred when said projection portion (215) presents a central element (216) configured as an element of cylindrical form, or similar, and provided in a central region with relation to said flow passageways (214).

Claims

1. **Capsule (1)** adapted for collecting an edible substance in an oxygen-sealed collection space (A), and comprising:

- a first part of container type (2) comprising a base wall (21) and a sidewall (22) developing along a circular alignment around a longitudinal central axis (B) thereby defining a general shape of frusto-conic type or similar,
- a second part of lid type (3) provided as a folio-like element and adapted so that confines said collection space (A) upstream thereof in oxygen-sealing manner,
- a retention disposition (4) provided as a folio-like element and adapted so that confines said collection space (A) downstream thereof in oxygen-sealing manner,

whereby said base wall (21) comprises:

- a first base portion (211) that develops from said sidewall (22) inwards and along a direction non parallel with relation to said longitudinal central axis (B), and
- a second base portion (212) that projects in the central region of said base wall (21) downstream, with a shape of tubular type or of frusto-conic type of circular cross-section, and is adapted for discharge of beverage flow that flows through said retention wall (4) outwards of said capsule (1),

characterized

in that presents a filter element (5) provided downstream of said retention disposition (4) so that provides filtering of beverage flow downstream of said

collection space (A) provided oxygen-sealed.

2. Capsule (1) according to claim 1, **characterized in that** said filter element (5) is provided at a downstream distance of said retention disposition (4), preferentially at a distance similar to the extension of said second base portion (212) along the prevailing flow direction, particularly preferentially at a distance similar to the dimension of the cross-section of said second base portion (212). 5
3. Capsule (1) according to claim 1 or 2, **characterized in that** said filter element (5) is provided adjacent upstream with relation to the furthest downstream region of said second base portion (212), whereby said filter element (5) is preferentially retained fixed to a region of said second base portion (212). 10
4. Capsule (1) according to any one of previous claims 1 to 3, **characterized in that** said second base portion (212) comprises a discharge disposition (213) that is provided in the downstream edge of said second base portion (212), developing in all of the cross-section of said second base portion (212) and preferentially along an orthogonal direction relative to said longitudinal central axis (B), whereby said discharge disposition (213) presents a plurality of flow passageways (214) that are open before the pressurized flow exits from said collection space (A) provided oxygen-sealed, and said filter element (5) is provided upstream of said discharge disposition (213), preferentially retained on the upstream-oriented side of said discharge disposition (213), so that results adjacent to said flow passageways (214). 15 20 25 30 35
5. Capsule (1) according to any one of previous claims 1 to 4, **characterized in that** said second base portion (212) presents a characteristic dimension of cross-section that is smaller than half the characteristic dimension of said first base portion (211). 40
6. Capsule (1) according to any one of previous claims 1 to 5, **characterized in that** said filter element (5) is provided fixed along an interior perimeter region of said second base portion (212), preferentially is provided fixed to said discharge disposition (213). 45
7. Capsule (1) according to any one of previous claims 1 to 6, **characterized in that** said filter element (5) is provided as a mesh-like structure with a plurality of fluid passageways presenting a characteristic dimension of filtering adapted for retention of solid particles undiluted in the upstream beverage flow, whereby said characteristic dimension of filtering is previously defined according to the type of edible substance de contained in said collection space (A). 50 55
8. Capsule (1) according to any one of previous claims 1 to 7, **characterized in that** said filter element (5) is provided as a structure of rigid type, for example in a synthetic material, or as a structure of tissue type, of non-woven type, preferentially in a biodegradable material.
9. Capsule (1) according to any one of previous claims 4 to 8, **characterized in that** said discharge disposition (213) presents a plurality of passageways (214) with a characteristic dimension that is at least one order of magnitude bigger than the characteristic dimension of filtering of the passageways provided by said filter element (5).
10. Capsule (1) according to any one of previous claims 1 to 9, **characterized in that** said first base portion (211) develops inwards with relation to said longitudinal central axis (B), along an extension until said second base part (212), so that forms a substantially orthogonal plane in relation to said longitudinal central axis (B), whereby said retention disposition (4) is fixed in at least part of the extension provided by said first base portion (211).
11. Capsule (1) according to any one of previous claims 1 to 10, **characterized in that** said second base portion (212) presents a projection portion (215) that extends downstream of said base disposition (213), with a shape of tubular type or of frusto-conic type of circular cross-section, and preferentially presenting a central element (216) configured as an element of cylindrical shape, or similar, and provided in a central region with relation to said flow passageways (214).
12. Capsule (1) according to any one of previous claims 1 a 11, **characterized in that** said first part of container type (2) is provided as single piece in synthetic material, in particular a piece that can be obtained by injection moulding.
13. Capsule (1) according to any one of previous claims, **characterized in that** said retention disposition (4) is fixed in surface on said first base portion (211) and is preferentially provided as an aluminium sheet, aluminium composition, or similar.
14. **System** for preparing an edible product, such as for example an aromatic beverage, and comprising at least two types of capsule (1, 1') adapted for collecting an edible substance in a collection space (A), whereby said at least two types of capsules (1, 1') present a first part of container type (2) of similar shape and dimension, comprising a base wall (21) and a sidewall (22), whereby said base wall (21) comprises:

- a first base portion (211) that develops from said sidewall (22) inwards and along a direction non-parallel with relation to said longitudinal central axis (B), and
- a second base portion (212) that projects downstream in the central region of said base wall (21), with a shape of tubular type or of frusto-conic type of circular cross-section, and is adapted for discharge of the beverage flow that flows through said retention wall (4) out of the capsule (1)

in particular of a capsule (1) according to any one of claims 1 to 13,

characterized

in that said at least two types of capsule (1, 1') present a filter element (5) provided downstream of respective collection space (A) along the prevailing flow direction, preferentially retained on said second base part (212), of smaller characteristic dimension than the characteristic dimension of said collection space (A).

- 15.** System according to claim 14, **characterized in that** said at least two types of capsule (1, 1') present filter elements (5) provided in at least one of: a different position with relation to said collection space (A), and a different characteristic dimension of filtering.
- 16.** System according to claim 14 or 15, **characterized in that** said at least two types of capsule (1, 1') present a respective base disposition (213, 213') that differs in at least one of: number and dimension of respective flow passageways (214).

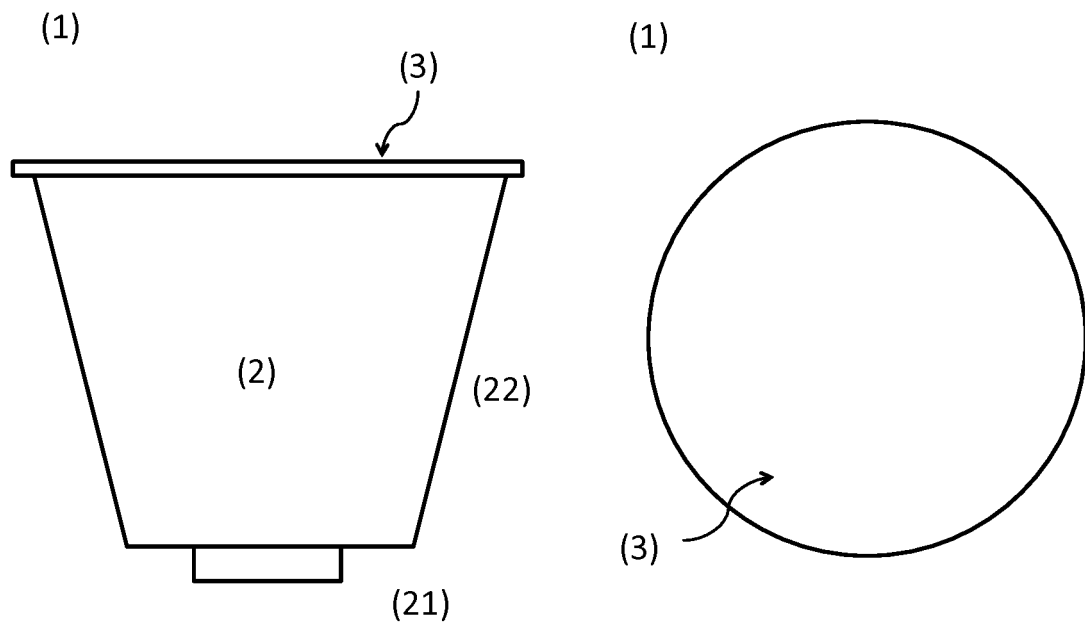


FIGURE 1

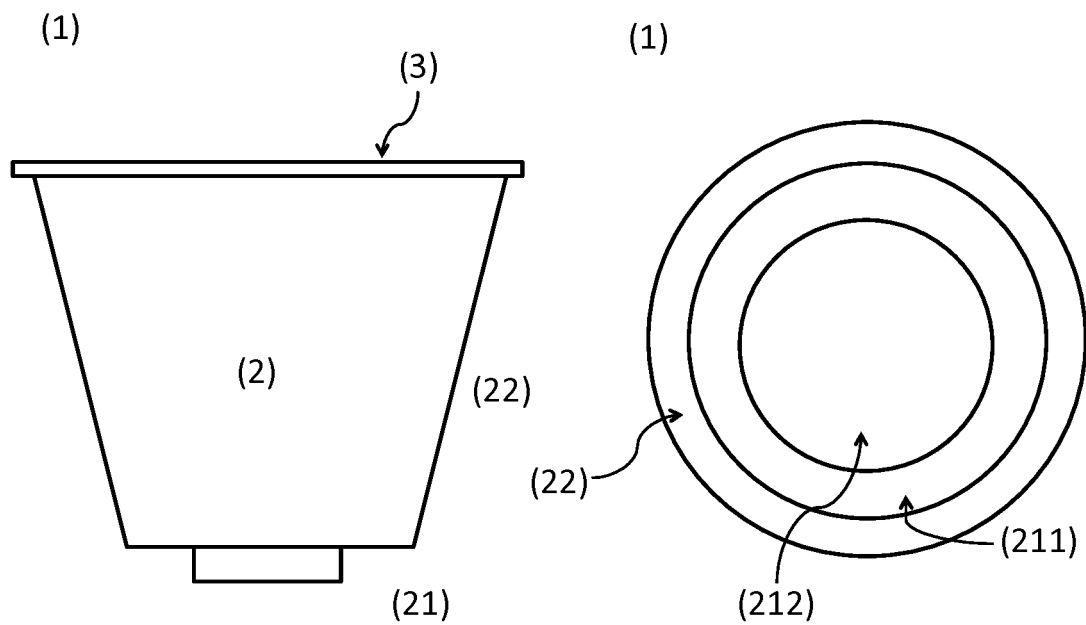


FIGURE 2

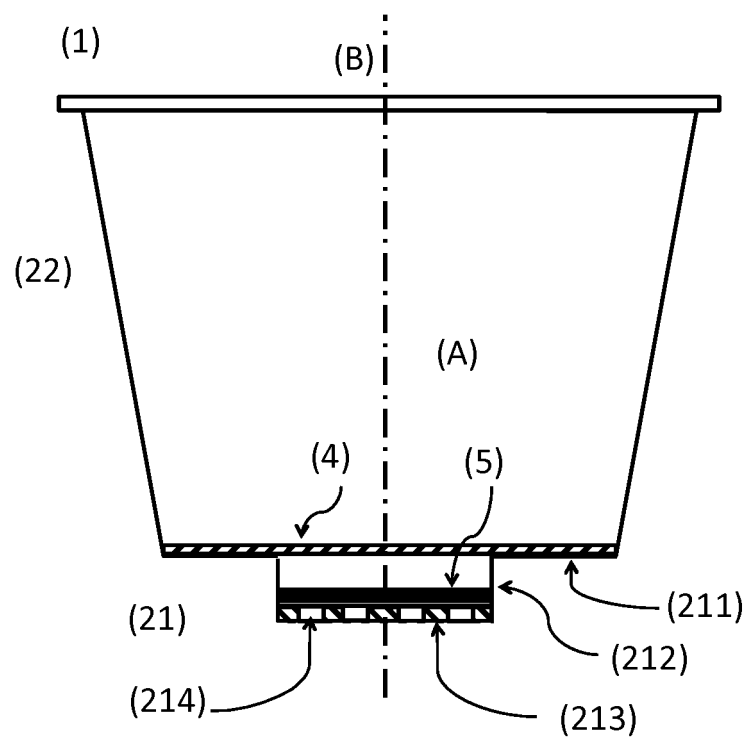


FIGURE 3

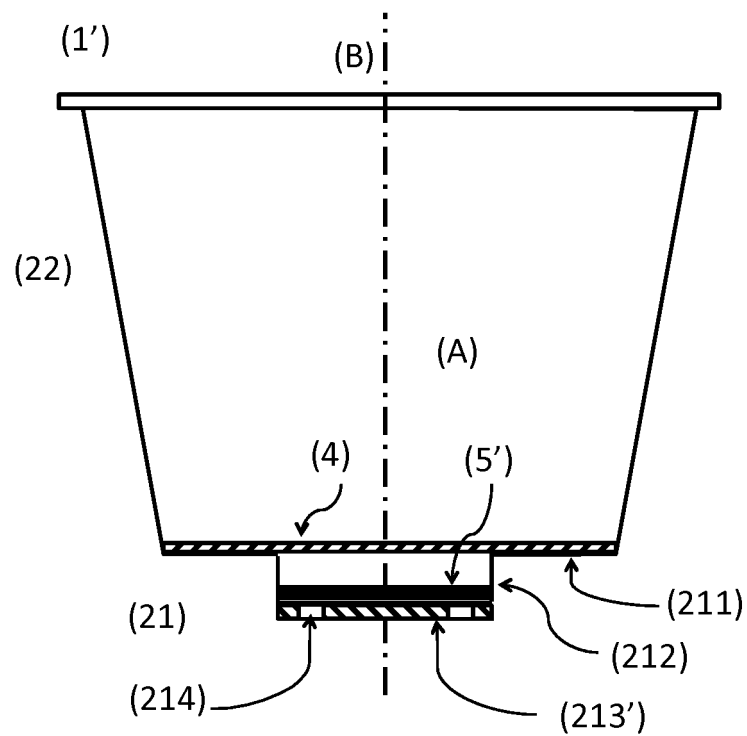


FIGURE 4

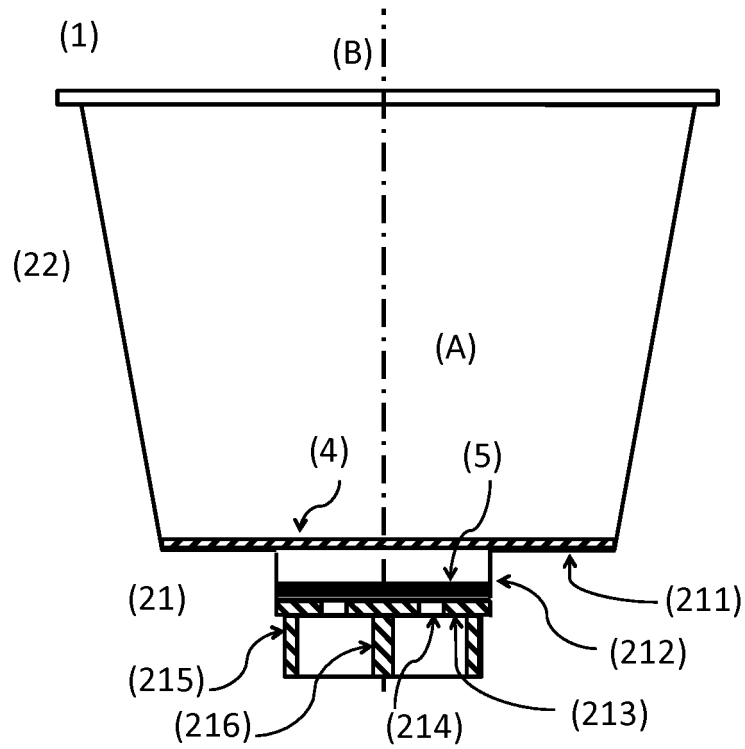


FIGURE 5

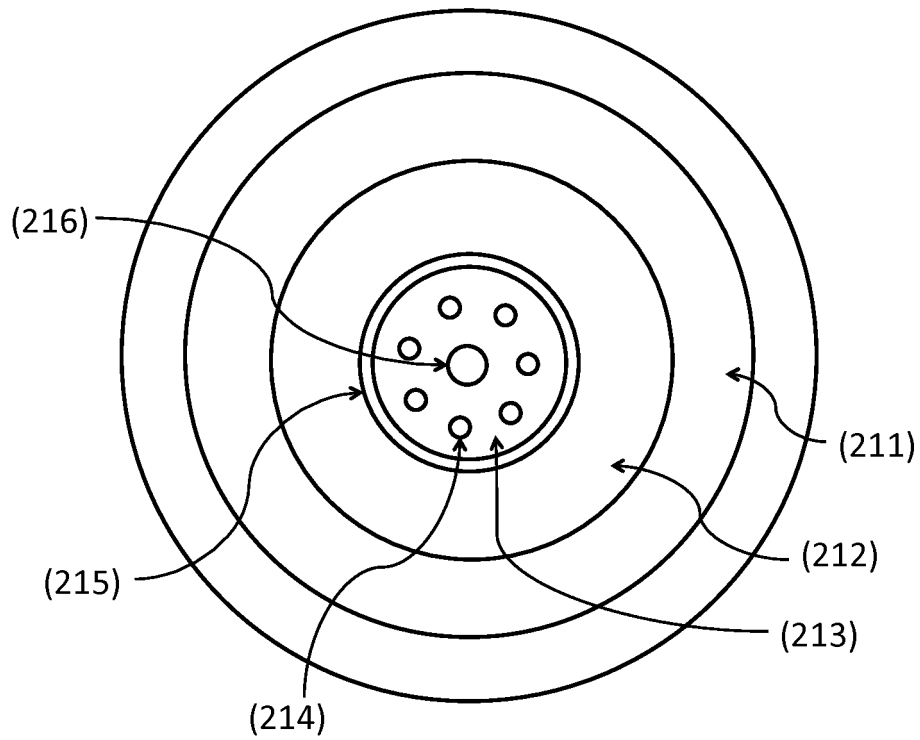


FIGURE 6

INTERNATIONAL SEARCH REPORT

International application No

PCT/PT2018/000007

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

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Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

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Date of mailing of the international search report

08/08/2018

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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