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(54) **CAPSULE FOR THE PREPARATION OF BEVERAGES**

(57) A capsule (10) for the preparation of beverages is described, comprising a cup-shaped body provided with:
- a side wall (15) defining an upper opening (20) closed by a covering element (25),
- a bottom wall (30), provided with at least one perforated portion (50F) to which a protection element (35) is associated, wherein the bottom wall (30) of the cup-shaped body has:
- a peripheral flange (40), provided with a fixing surface (45) for the protection element (35), which delimits the perforated portion, and
- an abutment element (50), which is derived from the bottom wall (30) itself along a direction (A) in the direction of movement away from the upper opening (20), provided with an abutment surface (55) adapted to contact said protection element (35).

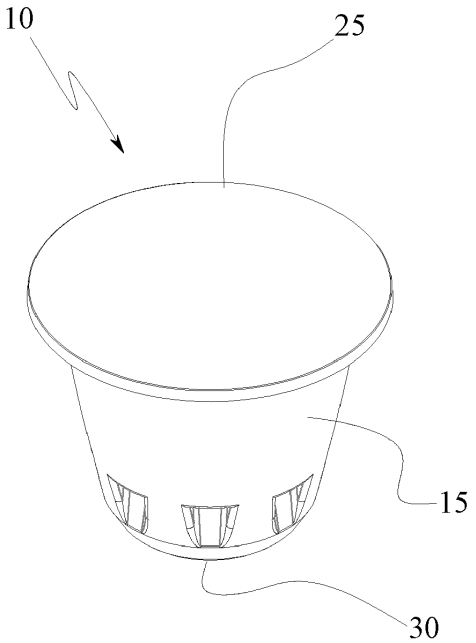

FIG.1A

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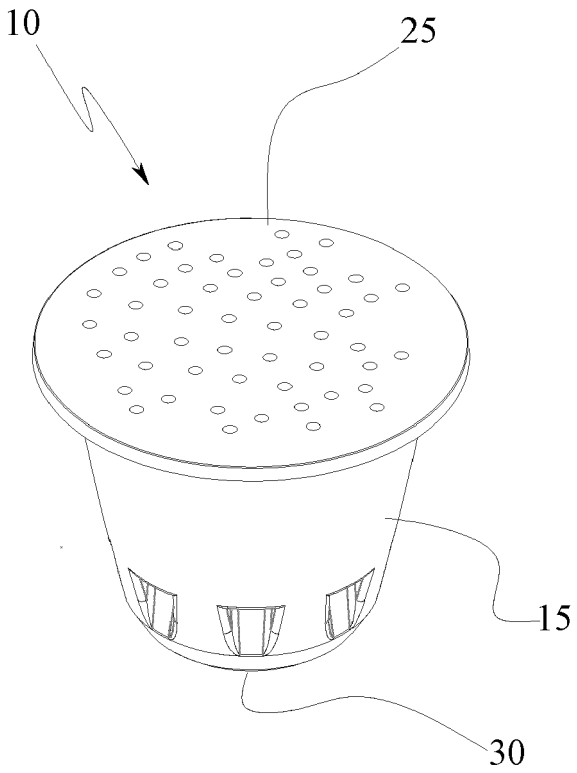


FIG.1B

Description

TECHNICAL FIELD

[0001] The present invention relates to a disposable capsule for the preparation of beverages, typically coffee, tea, or other beverages obtainable by infusion/extraction or by solution of a granular or powdery food substance.

PRIOR ART

[0002] As is known, for the preparation of beverages, typically coffee, tea, or other beverages obtainable by infusion/extraction or by solution of a granular or powdery food substance, disposable capsules are used comprising generally a cup-shaped container, defined by a wall side, a bottom wall and an opposite opening.

[0003] A dose of the food substance is then accommodated in said cup-shaped body, and a covering element is arranged to close the opening of the cup-shaped body, so as to retain the dose of food substance inside the capsule.

[0004] In particular, the bottom wall of the cup-shaped body may be perforated or perforable, with sufficiently small holes to retain the food substance inside the capsule, but large enough to allow the passage of water and/or steam necessary for the preparation of the beverage.

[0005] Furthermore, the covering element is perforated/perforable or breakable/frangible to allow the outlet of the beverage, obtained by means of water and/or steam that passes through the capsule, solubilizing and/or collecting the aroma of the food substance contained inside the capsule itself.

[0006] Furthermore, said capsules comprise a protection element, for example a film, fixed to the bottom wall of the cup-shaped body, at a peripheral edge thereof, so as to inferiorly close the perforated bottom wall, and which defines with the bottom wall itself an injection chamber for injecting water and/or pressurized steam which is injected into said chamber through needles which are inserted into said injection chamber by piercing the protection element.

[0007] The injected pressurized fluid then enters the cup-shaped body through the holes made in the bottom wall and passes through the cup-shaped body, dissolving the food substance contained therein and, finally, the solution thus obtained escapes through the upper opening or through said fractured or perforated covering element.

[0008] A known problem with this solution is that often the protection element under the action of the needles that try to perforate it becomes deformed and/or bends without piercing, making it impossible to inject the fluid under pressure into the injection chamber and thus make the desired beverage.

[0009] One object of the present invention therefore is to obviate such a drawback of the prior art.

[0010] A further object is to achieve such an object in the context of a rational, effective and cost-effective solution.

[0011] Such objects are achieved by the features of the invention disclosed in the independent claim. The dependent claims describe preferred and/or particularly advantageous aspects of the invention.

DISCLOSURE OF THE INVENTION

[0012] In particular, the invention provides a capsule for the preparation of beverages, comprising a cup-shaped body provided with:

- a side wall defining an upper opening closed by a covering element,
- a bottom wall, provided with at least one perforated portion to which a protection element is associated,

wherein the bottom wall (30) of the cup-shaped body has:

- a peripheral flange, provided with a fixing surface for the protection element, which delimits the perforated portion, and
- an abutment element, which is derived from the bottom wall itself along a direction in the direction of movement away from the upper opening, provided with an abutment surface adapted to contact said protection element.

[0013] Thanks to this solution, the invention provides a capsule for preparing beverages in which the protection element is fixed to the bottom wall and is placed in direct contact with the abutment element so as to be kept in tension by means of the abutment surface of the abutment element itself, thus obviating the possibility that the protection element may become deformed and/or bend under the action of the needles adapted to perforate it and thus solving the aforementioned drawback of the prior art capsules.

[0014] Another aspect of the invention provides that the abutment element may extend beyond the peripheral flange, along the direction A in the direction of movement away from the upper opening.

[0015] Thanks to this solution, the abutment element is particularly adapted to tension the protection element, in the context of a particularly simple and rational solution.

[0016] A further aspect of the invention provides that the abutment element may extend beyond the peripheral flange, along said direction in the direction of movement away from the upper opening, by a height of between 0.05 mm and 6 mm.

[0017] Preferably, one aspect of the invention provides that the abutment element may extend beyond the peripheral flange by a height of up to 4 mm.

[0018] Thanks to this solution, a difference in level is obtained between the peripheral flange and the abutment element so as to effectively tension the protection element, without tearing it.

[0019] Another aspect of the invention provides that the abutment surface of the abutment element may be coplanar to the fixing surface of the peripheral flange.

[0020] Thanks to this solution, the protection element cannot become deformed under the action of the needles that press on it to perforate it, thanks to the abutment surface placed at the same level as the peripheral flange fixing surface, which constrains the protection element to remain extended even under said pressing action of the needles, thus making the piercing operation by the needles themselves simple and effective.

[0021] Yet another aspect of the invention provides that the protection element may be fixed to the abutment surface of the abutment element.

[0022] Thanks to this solution, the capsule according to the invention is further more effective in obviating the aforementioned drawback of the prior art capsules, or in tensioning the protection element being this fixed both peripherally by means of the flange and in a central zone by means of the abutment element.

[0023] Yet another aspect of the invention provides that the abutment surface of the abutment element is rounded.

[0024] Thanks to this solution, the abutment surface is particularly adapted to contact the protection element to put it under tension, without the risk of tearing it.

[0025] A further aspect of the invention provides that the protection element may be fixed to the bottom wall at the fixing surface of the peripheral flange by gluing.

[0026] Thanks to this solution, the protection element is fixed to the bottom wall in the context of a particularly simple and cost-effective solution.

[0027] Another aspect of the invention provides that the protection element may be fixed to the bottom wall at the fixing surface of the peripheral flange by heat-sealing.

[0028] Thanks to this solution, the protection element is fixed to the bottom wall in a particularly stable and effective manner, in the context of a particularly simple and cost-effective solution.

[0029] Furthermore, another aspect of the invention provides that the protection element may be made of polypropylene (PP).

[0030] Thanks to this solution, the protection element is made of a material which is particularly simple to process, therefore in the context of a solution of limited cost.

[0031] Another aspect of the invention provides that the protection element may be made of polylactic acid (PLA).

[0032] Thanks to this solution, the protection element is made of a material which is particularly simple to process, therefore in the context of a solution of limited cost, as well as of a biodegradable material.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033] Further features and advantages of the invention will become apparent from the following description, provided by way of non-limiting example with the aid of the figures shown in the accompanying drawings.

Figure 1A is a perspective view of a capsule according to the invention provided with a covering element according to an embodiment.

Figure 1B is a perspective view of a capsule according to the invention provided with a covering element according to an alternative embodiment.

Figure 2 is a perspective view of a capsule according to the invention without the covering element.

Figure 3 is a front side view of a first embodiment of a capsule according to the invention.

Figure 4 is a sectional view along a median longitudinal section plane of the capsule in figure 3.

Figure 5 is a front side view of an alternative embodiment of the capsule according to the invention.

Figure 6 is a sectional view along a median longitudinal section plane of the capsule in figure 5.

BEST MODE OF CARRYING OUT THE INVENTION

[0034] With reference to the figures, reference numeral 10 generally designates a disposable capsule for the preparation of beverages, typically coffee, tea, or other beverages obtainable by infusion/extraction or by solution of a granular or powdery food substance. The capsule 10 comprises a cup-shaped body defining a housing compartment intended to contain said food substance.

[0035] The cup-shaped body comprises firstly a side wall 15, with a preferably circular cross-section.

[0036] Obviously, the shape of the cup-shaped body, and in particular of the side wall 15, may be any, for example truncated cone, or cylindrical, hemispherical, polygonal or any other suitable shape.

[0037] The side wall 15 defines an upper opening 20, through which the food substance is inserted inside the cup-shaped body, closed by a covering element 25.

[0038] The covering element 25 is applied after the filling of the cup-shaped body with the food substance through the opening defined by the side wall 15.

[0039] Said covering element 25 comprises, for example, a thin film which is fixed, for example by heat-sealing or gluing, at a peripheral upper edge of the side wall 15.

[0040] The covering element 25 is, for example, made of polypropylene (PP), however it is not excluded that in alternative embodiments of the invention it may be made of aluminium (Al) or of a multilayer material comprising aluminium, or a biopolymer or other material, however suitable for the purpose.

[0041] The covering element 25 is configured to be sealably associated with the cup-shaped body so as to seal the food substance inside the compartment, with respect to the external environment.

[0042] The covering element 25 is frangible/breakable or perforable, i.e. it is configured so as to be fractured or perforated, with a fracture or holes such as to allow the escape of the beverage, obtained by means of water,

and/or of the steam which passes through the capsule 10 so as to solubilize and/or collect the aroma of the food substance contained within the capsule itself.

[0043] For example, the covering element 25 may be pre-drilled, with holes configured to retain the food substance inside the cup-shaped body of the capsule 10, or the covering element 25 may have a primer (for example made of the aforesaid holes) configured to retain the food substance inside the cup-shaped body, and which triggers and/or allows during the beverage preparation an easier fracture and/or perforation of the covering element itself for the outlet of the drink.

[0044] Preferably, the covering element 25 has a thickness of between 10 μm and 140 μm, for example it has a thickness of 30 μm.

[0045] The cup-shaped body also comprises a bottom wall 30 which at the bottom closes the side wall 15 in opposite position with respect to the covering element 25.

[0046] The bottom wall 30 is, for example made integrally with the side wall 15, i.e. the bottom wall 30 and the side wall 15 may be made in an integral monolithic body, i.e. the bottom wall 30 and the side wall 15 may be made during the same processing of the material in which said cup-shaped body is made.

[0047] For example, the cup-shaped body (and therefore the side wall 15 and the bottom wall 30) is made by molding a plastic material, for example polypropylene (PP) for food use or bioplastics, PLA type.

[0048] However, it is not excluded that in alternative embodiments, the cup-shaped body (and therefore the side wall 15 and the bottom wall 30) may be made of another material, for example a composite material, or in any other material suitable for the purpose.

[0049] The bottom wall 30 is configured so as to seal the food substance inside the compartment, with respect to the external environment.

[0050] In detail, the bottom wall 30 may be perforated, or it has at least one perforated portion, with holes configured to retain the food substance inside the cup-shaped body of the capsule 10, and configured to allow the passage of water and/or of steam needed for the preparation of the beverage.

[0051] Associated with said perforated portion is a protection element 35, configured to be sealably associated with the cup-shaped body so as to inferiorly seal the bottom wall 30. Said protection element 35 comprises, for example, a film or a thin film.

[0052] The protection element 35 is, for example, made of polypropylene (PP), however it is not excluded that in alternative embodiments of the invention it may be made of aluminium (Al) or of a multilayer material comprising aluminium, or a biopolymer, for example in polylactic acid (PLA), or other material, however suitable for the purpose.

[0053] Preferably, the protection element 35 has a multilayer structure.

[0054] For example, said multilayer structure may be made of polypropylene (PP) and ethylene-polyvinyl alcohol (EVOH), for example said multilayer structure may comprise two outer layers of polypropylene (PP) separated by an intermediate layer, called barrier layer, made of ethylene-polyvinyl alcohol (EVOH).

[0055] Alternatively, said multilayer structure may be made of polylactic acid (PLA) and polyvinyl alcohol (PVOH), for example said multilayer structure may comprise two outer layers of polylactic acid (PLA) separated by an intermediate layer, called barrier layer, made of polyvinyl alcohol (PVOH).

[0056] Preferably, the protection element 35 has a thickness of between 10 μm and 140 μm, for example it has a thickness of 30 μm.

[0057] The protection element 35 is fixed to the bottom wall 30 at a fixing surface 45 thereof.

[0058] In particular, the bottom wall 30 has a peripheral flange 40, in the example having a full circumferential extension, which circumferentially delimits a central portion of the bottom wall 30, which therefore is lowered with respect to a lower edge of the peripheral flange 40, for example it may lie on a plane parallel to a lying plane of the upper opening 20, and which circumferentially delimits said perforated portion of the bottom wall 30 itself.

[0059] The peripheral flange 40 provides the aforementioned fixing surface 45 to the protection element 35, which for example is made of the surface of the peripheral flange 40 distal from the upper opening 20.

[0060] For example, said fixing surface 45 is substantially flat, and may lie on a parallel or inclined plane with respect to said lying plane of the upper opening 20 defined by the side wall 15.

[0061] The protection element 35 may therefore have a plan shape substantially equal to the plan shape of the bottom wall 30, and a peripheral edge thereof, for example a circumferential edge, is fixed to the fixing surface 45 of the bottom wall 30, for example is fixed at said fixing surface 45 provided by the peripheral flange 40.

[0062] In particular, the protection element 35 may be fixed to the fixing surface 45 of the peripheral flange 40 by gluing.

[0063] Alternatively, it is possible to provide that the protection element 35 can be fixed to the fixing surface 45 of the peripheral flange 40 by means of heat-sealing.

[0064] However, it is not excluded that, in alternative embodiments, the protection element 35 may be fixed to the bottom wall 30 by means of a different fixing system, however suitable for the purpose.

[0065] The protection element 35 therefore inferiorly seals the bottom wall 30 so as to protect the perforated portion thereof.

[0066] Furthermore, between the protection element 35 and the bottom wall 30 a closed injection chamber is defined, inside which, in use, the liquid and/or steam is injected which then passes through said holes of the perforated portion of the wall bottom 30, enters the cup-shaped body so as to solubilize the food substance for the preparation of the beverage. The capsule 10 also comprises an abutment element 50 which is derived,

preferably without interruption, from the bottom wall 30 and extends along a direction A, orthogonal to said lying plane of the upper opening 20, in the direction of movement away from the upper opening 20 itself.

[0067] In particular, the abutment element 50 derives (preferably without interruption) from said central portion of the bottom wall 30, delimited by the peripheral flange 40, in the example lying on a plane parallel to said lying plane of the upper opening 20.

[0068] The abutment element 50 itself provides a portion of the bottom wall 30 of the cup-shaped body of the capsule 10.

[0069] For example, it is possible to provide, as in the illustrated embodiment, that said perforated portion of the bottom wall 30 is formed on a surface of the abutment element 50.

[0070] That is, it is possible to provide that the abutment element 50 has holes F on one of its surfaces 50F, for example at a side surface thereof, which put the interior of the cup-shaped body in communication with the outside, and that said holes F are configured to retain the food substance inside the cup-shaped body of the capsule 10, and to allow the passage of the water and/or steam necessary for preparing the beverage.

[0071] Preferably, the abutment element 50 is made in one piece with the bottom wall 30, and therefore with the cup-shaped body.

[0072] Said abutment element 50 provides an abutment surface 55 adapted to directly contact the protection element 35.

[0073] In an embodiment of the invention shown in figures 4 and 5, the abutment element 50 is substantially like a base of truncated cone shape.

[0074] As can be seen in the figures, the abutment element 50 is preferably made in the bottom wall 30 at a central area thereof, i.e. in such an embodiment, the abutment element 50 is preferably equidistant from the peripheral flange 40 throughout the circumferential development thereof.

[0075] The abutment element 50 in such an embodiment has an abutment surface 55, distal to the bottom wall 30 itself, substantially flat.

[0076] In particular, the abutment element 50 is totally contained in an axial encumbrance of the peripheral flange 40 along said direction A in the direction of movement away from the upper opening 20.

[0077] In greater detail, in such an embodiment, the abutment surface 55 of the abutment element 50 is coplanar with the fixing surface 45 of the peripheral flange 40 for the protection element 35.

[0078] Moreover, in this embodiment, said fixing surface 45 and said abutment surface 55 lie on a plane parallel to said lying plane of the upper opening 20.

[0079] In particular, according to such an embodiment, the peripheral flange 40 preferably has a maximum height, intended as a development along said direction A, comprised between 0.2 mm and 12 mm, preferably having a height of 2.5 mm.

[0080] Likewise, the abutment element has a maximum height, intended as development along said direction A, of between 0.2 mm and 12 mm, preferably having a height of 2.5 mm. The protection element 35, or the film, when fixed to the peripheral flange 40 at the fixing surface 45 thereof, is therefore consequently in direct and stable contact with said abutment surface 55 of the abutment element 50.

[0081] Furthermore, it is possible to provide that the protection element 35, in addition to being in direct and stable contact, may be fixed to the abutment surface 55 of the abutment element 50.

[0082] For example, the protection element 35 may be fixed to the abutment surface 55 of the abutment element 50 by gluing.

[0083] Alternatively, the abutment element 50 may be fixed to the abutment surface 55 of the abutment element 50 by heat-sealing.

[0084] It is not excluded that the protection element 35 may be fixed to the abutment surface 55 of the abutment element 50 by means of another system, however suitable for the purpose.

[0085] Figures 5 and 6 illustrate an alternative embodiment of the capsule 10 according to the invention.

[0086] As before, the abutment element 50 appears as a substantially truncated cone-shaped base.

[0087] Also in this embodiment, as can be seen in the figures, the abutment element 50 is preferably made in the bottom wall 30 at a central area thereof, i.e., in such an embodiment, the abutment element 50 is preferably equidistant from the peripheral flange 40 throughout the circumferential development thereof.

[0088] In such an embodiment, the peripheral flange 40 preferably has a maximum height, intended as a development along said direction A, comprised between 0.2 mm and 12 mm, preferably having a height of 2.5 mm.

[0089] In particular, in such an embodiment of the invention, the abutment element 50 extends beyond the peripheral flange 40 along said direction A in the direction of movement away from the upper opening 20.

[0090] The abutment surface 55 of the abutment element 50 is therefore placed at a distance from the fixing surface 45 of the peripheral flange 40 along said direction A.

[0091] More precisely, the abutment element 50 extends beyond the peripheral flange 40, along said direction A in the direction of movement away from the upper opening 20, by a height (intended as the maximum distance between the abutment surface 55 of the abutment element 50 and the fixing surface 45 of the peripheral flange 40) preferably comprised between 0.05 mm and 6 mm, for example by a height of 0.8 mm.

[0092] Even more preferably, it is possible to provide that the abutment element 55 may extend beyond the peripheral flange 40 by a height of up to 4 mm, or by a height of between 0.05 mm and 4 mm.

[0093] Therefore, in such an embodiment, the abutment element preferably has a maximum height, intend-

ed as a development along said direction A, comprised between 0.25 mm and 12.6 mm, preferably having a height of 3.3 mm.

[0094] Preferably, the abutment element 50 has a rounded surface 55.

[0095] That is, the abutment element 50 may have a concave abutment surface 55 with concavity facing the upper opening 20.

[0096] In detail, in the illustrated embodiment (as best seen in figure 6), the abutment surface 55 and the fixing surface 45, in any section of the capsule 10 with respect to a median longitudinal section plane, may be divided into two portions symmetrical with respect to each other with respect to a central axis of symmetry orthogonal to the lying plane of the upper opening 20.

[0097] Furthermore, each portion of the abutment surface 55 of the abutment element 50 is coplanar with the respective (or on the same side with respect to the axis of symmetry) portion of the fixing surface 45 of the peripheral flange 40, and each portion of the abutment surface 55 and each respective portion (or on the same side with respect to the axis of symmetry) portion of the fixing surface 45 lie on a plane inclined by an acute angle with respect to said lying plane of the upper opening 20.

[0098] Preferably, each portion of the abutment surface 55 and the respective portion (i.e. on the same side with respect to the axis of symmetry) portion of the fixing surface 45 lie on a plane inclined, with respect to said lying plane of the upper opening 20, by an angle of between 0° and 55°, preferably inclined by an angle of 20°.

[0099] Also in such an embodiment, it is possible to provide that the protection element 35, in addition to being in direct and stable contact, may be fixed to the abutment surface 55 of the abutment element 50, for example by gluing or heat-sealing.

[0100] The invention thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept.

[0101] Moreover, all the details can be replaced by other technically equivalent elements.

[0102] In practice, the materials used, as well as the contingent shapes and sizes, can be whatever according to the requirements without for this reason departing from the scope of protection of the following claims.

Claims

1. A capsule (10) for the preparation of beverages, comprising a cup-shaped body provided with:

   - a side wall (15) defining an upper opening (20) closed by a covering element (25),
   - a bottom wall (30), provided with at least one perforated portion (50F) to which a protection element (35) is associated,

   wherein the bottom wall (30) of the cup-shaped body has:

   - a peripheral flange (40), provided with a fixing surface (45) for the protection element (35), which delimits the perforated portion, and
   - an abutment element (50), which is derived from the bottom wall (30) itself along a direction (A) in the direction of movement away from the upper opening (20), provided with an abutment surface (55) adapted to contact said protection element (35).

2. A capsule (10) according to claim 1, wherein the abutment element (50) extends beyond the peripheral flange (40), along the direction (A) in the direction of movement away from the upper opening (20).

3. A capsule (10) according to claim 1, wherein the abutment element (50) extends beyond the peripheral flange (40), along said direction (A) in the direction of movement away from the upper opening (20), by a height of between 0.05 mm and 6 mm.

4. A capsule (10) according to claim 1, wherein the abutment surface (55) of the abutment element (50) is coplanar with the fixing surface (45) of the peripheral flange (40).

5. A capsule (10) according to claim 1, wherein the protection element (35) is fixed to the abutment surface (55) of the abutment element (50).

6. A capsule (10) according to claim 1, wherein the abutment surface (55) of the abutment element (50) is rounded.

7. A capsule (10) according to claim 1, wherein the protection element (35) is fixed to the bottom wall (30) at the fixing surface (45) of the peripheral flange (40) by gluing.

8. A capsule (10) according to claim 1, wherein the protection element (35) is fixed to the bottom wall (30) at the fixing surface (45) of the peripheral flange (40) by heat-sealing.

9. A capsule (10) according to claim 1, wherein the protection element (35) is made of polypropylene.

10. A capsule (10) according to claim 1, wherein the protection element (35) is made of polylactic acid.

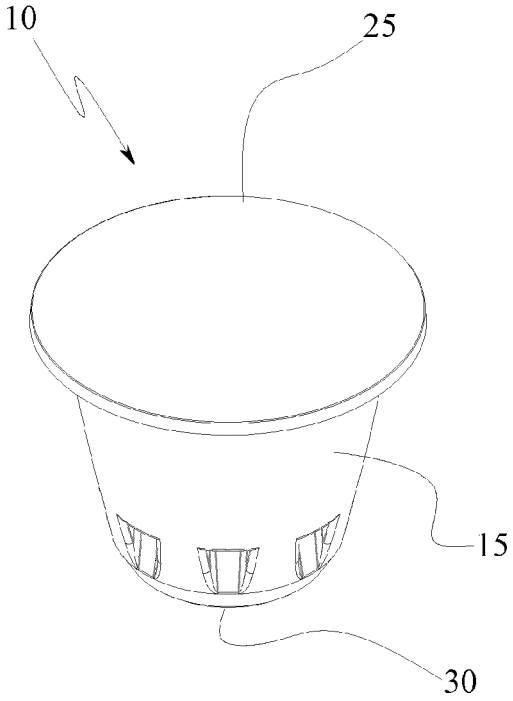


FIG.1A

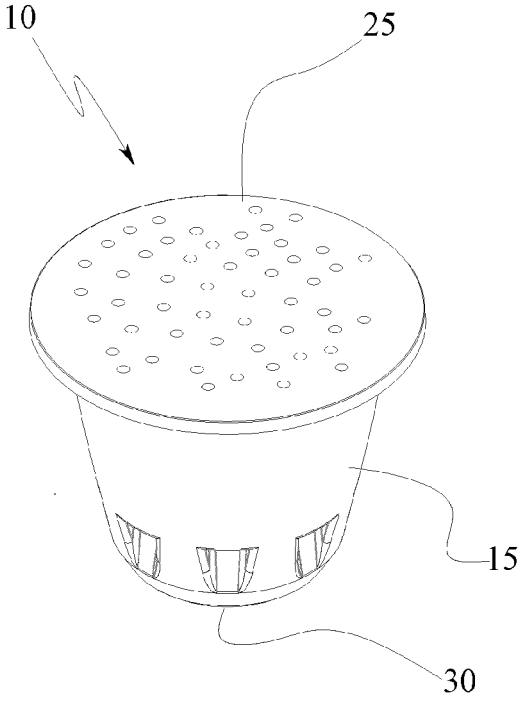


FIG.1B

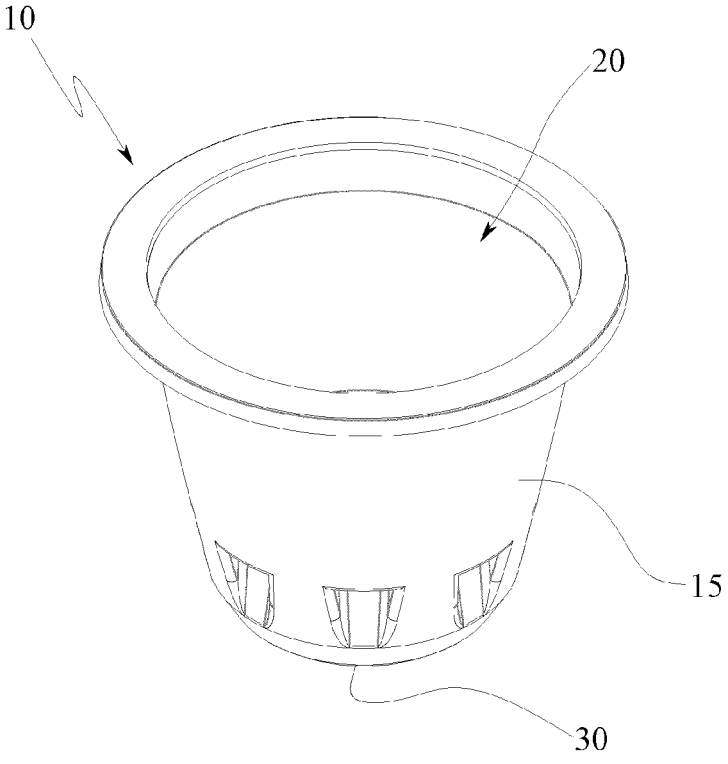


FIG.2

FIG.4

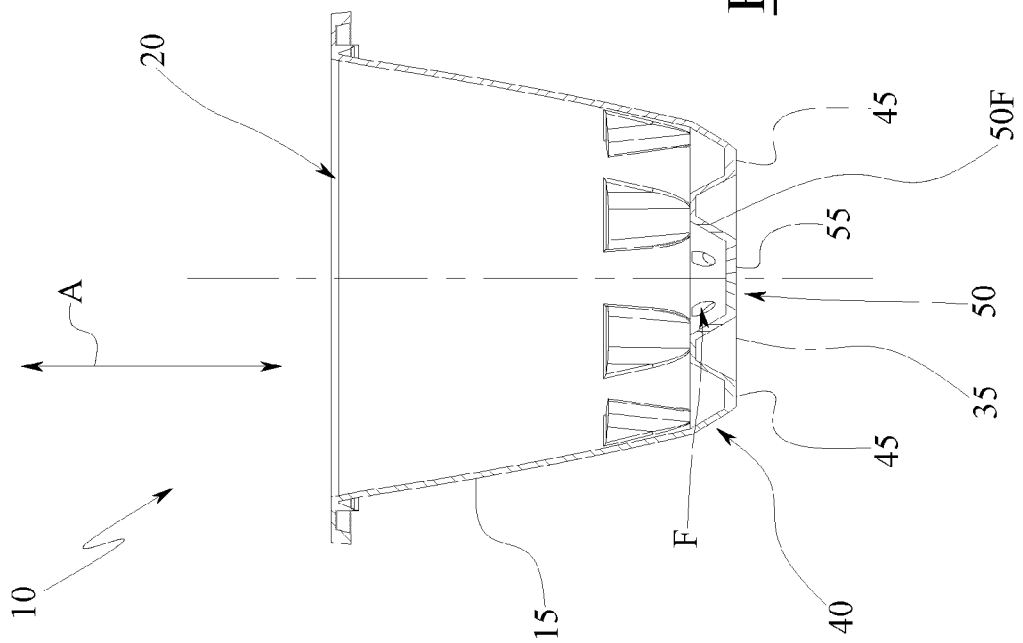


FIG.3

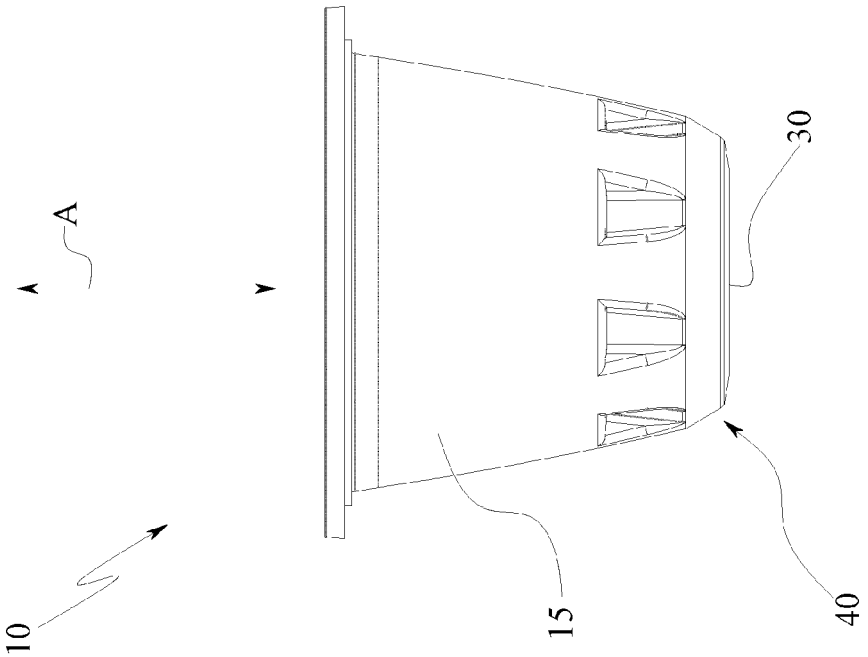


FIG.6

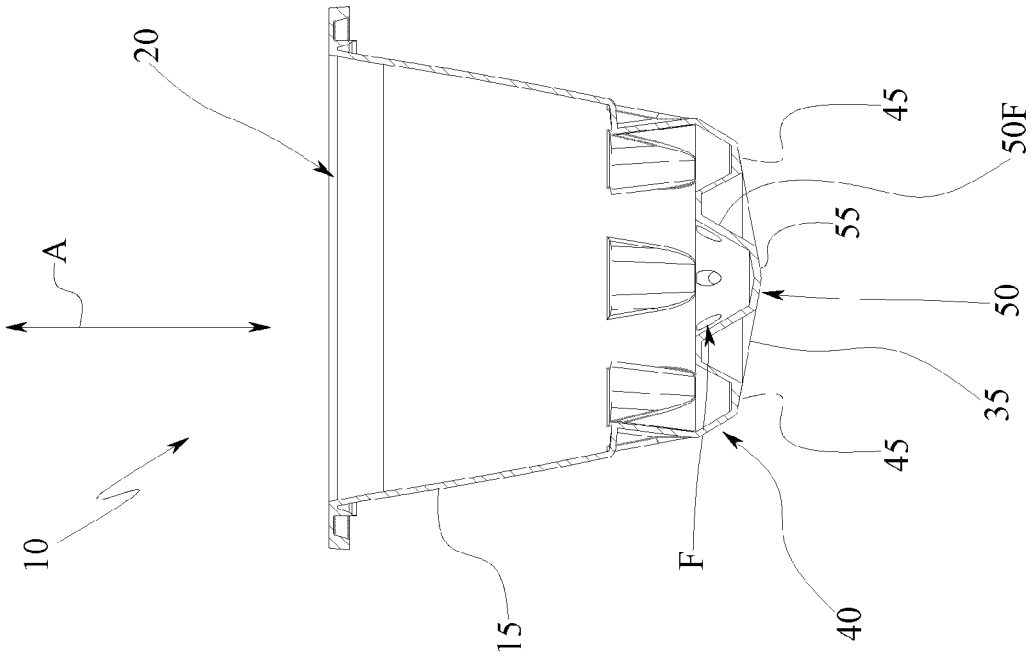
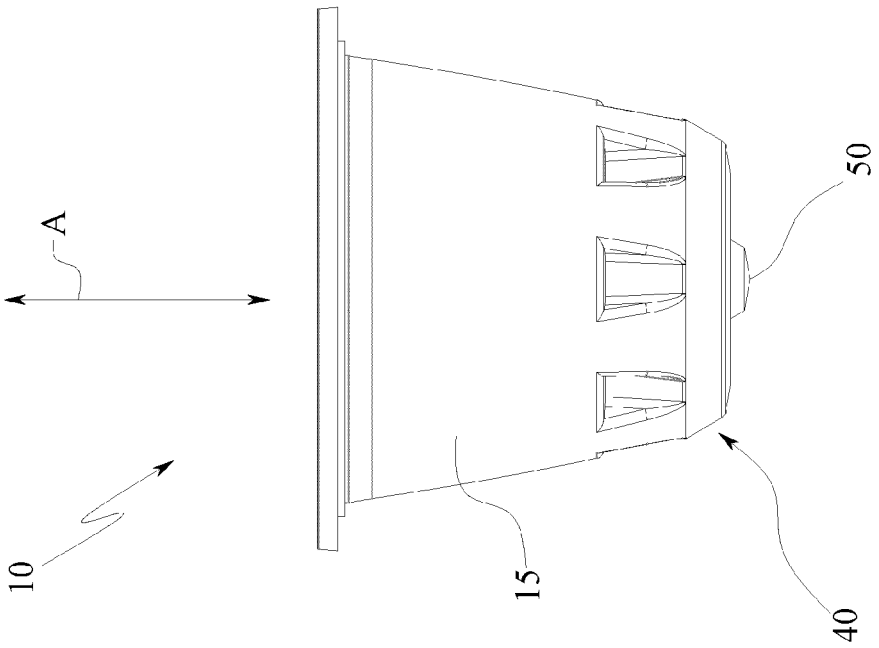


FIG.5



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EUROPEAN SEARCH REPORT

Application Number
EP 20 16 3703

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	WO 2013/171649 A1 (CAFFITA SYSTEM SPA [IT]) 21 November 2013 (2013-11-21) * figures 1-3 *	1-10	INV. B65D85/804
X	WO 2011/154666 A1 (FRYDMAN ALAIN [FR]) 15 December 2011 (2011-12-15) * figures 10-13,16 *	1-10	
A	WO 2015/056202 A1 (SARONG SPA [IT]) 23 April 2015 (2015-04-23) * figure 1 *	1-10	
A	EP 2 592 021 A1 (NESTEC SA [CH]) 15 May 2013 (2013-05-15) * figure 1 *	1-10	
			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
Munich	30 March 2020	Brochado Garganta, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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