

(19)



(11)

**EP 4 585 535 A1**

(12)

**EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**16.07.2025 Bulletin 2025/29**

(51) International Patent Classification (IPC):  
**B65D 85/804<sup>(2006.01)</sup>**

(21) Application number: **24222127.3**

(52) Cooperative Patent Classification (CPC):  
**B65D 85/8043**

(22) Date of filing: **20.12.2024**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB  
 GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL  
 NO PL PT RO RS SE SI SK SM TR**  
 Designated Extension States:  
**BA**  
 Designated Validation States:  
**GE KH MA MD TN**

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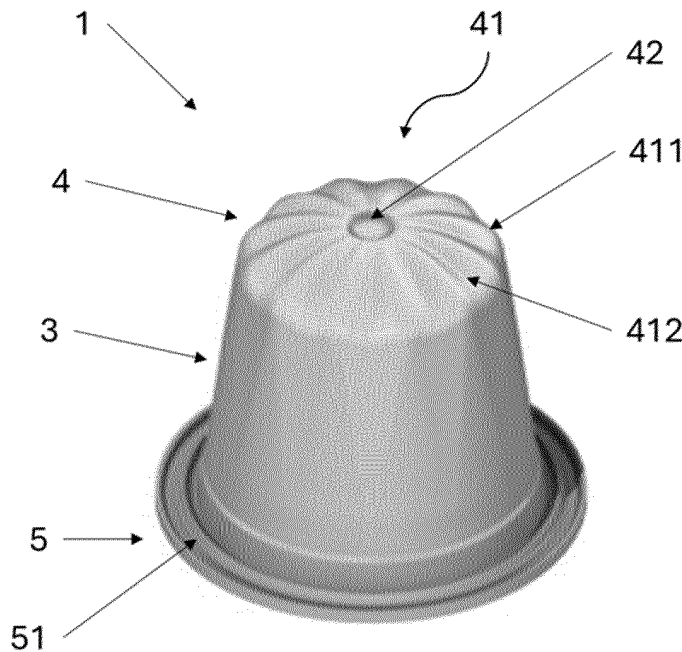
(30) Priority: **22.12.2023 GB 202319918**

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(54) **CAPSULE FOR PREPARING A BEVERAGE**

(57) In use, like other capsules, the supply starts with the entry of pressurized hot water which penetrates into the capsule through the holes of the base or bottom. The liquid goes through the ground coffee mass uniformly and the infusion exits towards the cup through the upper

cover, for which purpose said cover is perforated by means existing in the machine, which also provides the filtering means so that the infusion that fills the cup free is free of solid coffee residues.



**Figure 1**

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## Description

**[0001]** The present invention relates generally to a capsule for preparing a beverage, particularly a single serve capsule for use in a beverage brewing machine. For example, the capsule can be used in the preparation of tea or coffee contained in the capsule where in use, hot water is injected under pressure inside the capsule to prepare the beverage.

**[0002]** Capsule-based beverage systems have become increasingly popular in recent years, offering users the convenience of quickly and easily preparing a variety of beverages, including coffee, tea, and other flavoured drinks, by simply inserting a pre-packaged capsule into a compatible brewing machine.

**[0003]** EP 2 650 234 discloses a capsule having a perimetral supporting foot and a central area provided with multiple uniformly distributed perforations. Said central area is sunken or recessed towards the inside of the capsule, such that a hollow space with sufficient height so as to prevent the perforating means of the machine from penetrating into the capsule is established between the perforated central area and the support plane of the capsule, the cleanliness thus being fully maintained.

**[0004]** WO2019238898 discloses a perforable beverage capsule comprising a generally frustoconical body having a sidewall closed at one end by a pierceable inlet wall through which hot water can be injected in use, the end of the sidewall opposite the inlet wall having a rim, and a sealing ring is provided.

**[0005]** However, these solutions are not fully satisfactory in terms of their ability to be pierced without damaging the piercing mechanism of a brewing machine.

**[0006]** The invention relates to a perforable beverage capsule comprising a generally frustoconical body having a sidewall closed at one end by a pierceable inlet wall, wherein the pierceable inlet wall comprises a wavy area.

**[0007]** The wavy area of the pierceable inlet wall permits to increase the ability of the pierceable inlet wall to be pierced without damaging the piercing mechanism of a beverage preparation machine.

**[0008]** This is done through improving the rigidity of the capsule head as well as the stability during the piercing.

**[0009]** The absence of ribs on the capsule head reduces the risk of damaging piercing means of a beverage preparation device.

**[0010]** The pierceable inlet wall is configured so as to be pierced or opened by piercing means of a beverage preparation device for supplying liquid, preferably hot water, under pressure into the capsule for the preparation of a coffee beverage.

**[0011]** The perforable beverage capsule is configured so as to comprise an inner hollow area which can be used as a space useful for filling the capsule with coffee or tea.

**[0012]** The wavy area comprises an alternating pattern of crests and valleys which are oriented towards the revolution axis of the generally frustoconical body. The alternating pattern is continuous around the revolution

axis of the generally frustoconical body.

**[0013]** In some embodiments, the sidewall of the generally frustoconical body comprises a plurality of generally triangular, contiguous facets. In some preferred embodiments, the contiguous facets are alternating facets being oppositely oriented.

**[0014]** In some embodiments, the faceting may constitute the entire wall thickness. Alternatively, in some embodiments, the faceting may be provided on the interior and/or exterior face of a capsule wall. Such faceting on only one side permits to provide venting and avoid a vacuum when capsules are pulled apart. For example, hollow facets may be provided only on the exterior side of the generally frustoconical body.

**[0015]** In some embodiments, the thickness of the sidewall is from 0.40 to 0.50 millimetre. Such a thickness provides a sufficient rigidity to be used in most beverage preparation machines while being easily handled by the user.

**[0016]** In some embodiments, the pierceable inlet wall comprises an injection point area. This injection point results from the manufacturing of the perforable beverage capsule. In some even more preferred embodiments, the injection point area is aligned with the revolution axis of the frustoconical body. In some preferred embodiments, the injection point area is centred with regard to the pierceable inlet wall. In some even more preferred embodiments, the succession of crests and valleys are oriented towards injection point area.

**[0017]** In some embodiments, the thickness of the pierceable inlet wall is from 0.30 to 0.40 millimetres.

**[0018]** In some embodiments, the thickness of the wavy area is smaller than the thickness of the sidewall. It permits to ease the piercing of the pierceable inlet wall while providing a sufficient rigidity to be used in most brewing machines. In some preferred embodiments, the thickness of the pierceable inlet wall is smaller than the thickness of the sidewall.

**[0019]** In some embodiments, the pierceable inlet wall is essentially a bulged wall. In some preferred embodiments, the bulge is pointing upwards.

**[0020]** In some embodiments, the wavy area has a uniform thickness. It means that the thickness of the wall forming the wavy area is uniform. In some preferred embodiments, said wavy area has a thickness from 0.30 to 0.40 mm. It means that the thickness of the wall forming the wavy area is from 0.30 to 0.40 mm. In other words, thickness of the wall of the wavy area is from 0.30 to 0.40 mm.

**[0021]** In some embodiments, the waves of the wavy area are essentially sinusoidal waves.

**[0022]** The pierceable inlet wall comprises an outer edge. In some embodiments, said outer edge is contiguous to the upper edge of the sidewall. In some embodiments, the wavy area extends essentially from the outer edge of the pierceable inlet wall to the injection point area.

**[0023]** In some embodiments, the capsule may comprise internal vertical ribs. It permits to prevent capsules

from stacking together when moved in a chaotic manner in the feeder of the filling station, and the capsules are therefore completely separated from one another.

**[0024]** In some preferred embodiments, the internally vertical ribs are positioned in the inner hollow area on the generally frustoconical body.

**[0025]** In some embodiments, an intermediate wall section may be provided between the sidewall of the generally frustoconical body and the pierceable inlet wall of the generally frustoconical body.

**[0026]** In some preferred embodiments, the intermediate wall section may be inclined radially inwardly with respect to the sidewall.

**[0027]** In some preferred embodiments, the intermediate wall section may be faceted.

**[0028]** In some even more preferred embodiments, the outer edge of the pierceable inlet wall is contiguous to the intermediate wall section.

**[0029]** In some embodiments, the perforable beverage capsule may comprise a rim. The rim being essentially a circumferential flange. The rim permits to form a good base for coupling and fixing the leak-tight closure cover and to provide good flexibility for optimum coupling, which must be a completely leak-tight coupling, between the capsule and the machine during supply.

**[0030]** In some preferred embodiments, the rim may comprise sealing means configured to seal the generally frustoconical body. In some even more preferred embodiments a foil member, such as an (aluminium foil) or a foil liner or paper, which may be home compostable. The foil member can be bonded or melted on the rim.

**[0031]** In some preferred embodiments, the foil is made of paper and can serve as a filter in use. In some alternative embodiments, the generally frustoconical body has a sidewall closed at one end by the pierceable inlet wall and is opened at the other end.

**[0032]** In some preferred embodiments, the rim may comprise means for sealing against components of a beverage making machine into which the capsule is inserted in use.

**[0033]** In some preferred embodiments, the rim is provided with a channel, gully, undercut or the like to receive a sealing ring.

**[0034]** In some even more preferred embodiments, the sealing ring may be formed as a separate part which is joined or otherwise secured to the rest of the capsule.

**[0035]** In some even more preferred embodiments, the sealing ring may be a flat, disc-like annulus.

**[0036]** In some even more preferred embodiments, the sealing ring may be formed from a foamed material.

**[0037]** In some embodiments, the sealing ring may be produced in various processes. E.g.:

- punched out of plate of a foamed material.
- being injected and foamed in the injection process
- sequential moulding with the body

**[0038]** Alternatively, in some preferred embodiments,

the capsule does not comprise a sealing ring. The absence of a sealing ring improve the compostability and/or recyclability of the capsule.

**[0039]** In some embodiments, the generally frustoconical body may be formed from a plastics material and formed by, for example, injection moulding, compression moulding, or thermoforming. In some preferred embodiments, the capsule is made of an injected plastic material.

**[0040]** In some preferred embodiments, the generally frustoconical body may be formed from PP-EVOH-PP.

**[0041]** In some preferred embodiments, the generally frustoconical body may be formed from home compostable plastic. For example, it can comprise polymers, such as polypropylene, natural fibres of sunflower seed husk.

**[0042]** Example embodiments are described below in sufficient detail to enable those of ordinary skill in the art to embody and implement the systems and processes herein described. It is important to understand that embodiments can be provided in many alternate forms and should not be construed as limited to the examples set forth herein.

**[0043]** Accordingly, while embodiments can be modified in various ways and take on various alternative forms, specific embodiments thereof are shown in the drawings and described in detail below as examples. There is no intent to limit to the particular forms disclosed. On the contrary, all modifications, equivalents, and alternatives falling within the scope of the appended claims should be included. Elements of the example embodiments are consistently denoted by the same reference numerals throughout the drawings and detailed description where appropriate.

**[0044]** The terminology used herein to describe embodiments is not intended to limit the scope. The articles "a," "an," and "the" are singular in that they have a single referent, however the use of the singular form in the present document should not preclude the presence of more than one referent. In other words, elements referred to in the singular can number one or more, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises," "comprising," "includes," and/or "including," when used herein, specify the presence of stated features, items, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, items, steps, operations, elements, components, and/or groups thereof.

**[0045]** Unless otherwise defined, all terms (including technical and scientific terms) used herein are to be interpreted as is customary in the art. It will be further understood that terms in common usage should also be interpreted as is customary in the relevant art and not in an idealized or overly formal sense unless expressly so defined herein.

**[0046]** Example embodiments are described below in sufficient detail to enable those of ordinary skill in the art to embody and implement the systems and processes

herein described. It is important to understand that embodiments can be provided in many alternate forms and should not be construed as limited to the examples set forth herein.

**[0047]** The following contains specific information related to implementations of the present disclosure. The drawings and their accompanying detailed disclosure are merely directed to implementations. However, the present disclosure is not limited to these implementations. Other variations and implementations of the present disclosure will be obvious to those skilled in the art. The phrases "in one implementation," or "in some implementations," may each refer to one or more of the same or different implementations. The term "coupled" is defined as connected whether directly or indirectly through intervening components and is not necessarily limited to physical connections. The expression "at least one of A, B and C" or "at least one of the following: A, B and C" means "only A, or only B, or only C, or any combination of A, B and C."

**[0048]** The terms "system" and "network" may be used interchangeably.

**[0049]** For the purposes of explanation and non-limitation, specific details such as functional entities, techniques, protocols, and standards are set forth for providing an understanding of the present disclosure. In other examples, detailed disclosure of well-known methods, technologies, systems, and architectures are omitted so as not to obscure the present disclosure with unnecessary details

Figure 1 is a schematic representation of a first embodiment of a capsule according to the invention.  
 Figure 2 is a schematic representation of a first embodiment of a capsule according to the invention.  
 Figure 3 is a schematic representation of a first embodiment of a capsule according to the invention.  
 Figure 4 is a schematic section of a first embodiment of a capsule according to the invention.

**[0050]** As illustrated in Figures 1 and 2, the perforable beverage capsule 1 comprises a generally frustoconical body 2. This frustoconical body comprises a sidewall 3 closed at one end by a pierceable inlet wall 4.

**[0051]** This sidewall 3 comprises twenty-four triangular contiguous facets 31, said facets being oppositely oriented. Two contiguous triangular facets 31 as illustrated on Figures 2 and 3.

**[0052]** As illustrated on Figures 1 and 3, the pierceable inlet wall 4 is essentially a bulged wall comprising a wavy area 41 and an injection point area 42 aligned with the revolution axis 21 of the frustoconical body 2. In this embodiment, the pierceable inlet wall has a thickness of 0.35mm.

**[0053]** This wavy area comprises twelve crests 411 and twelve valleys 412 in a continuous alternating pattern, as illustrated in Figure 1 and 3. The wavy area is formed by outward and inward directed U-shaped

grooves, forming said crests 411 and valleys 412, which are oriented towards the revolution axis 21 of the generally frustoconical body 2.

**[0054]** The grooves, e.g., the crests and valleys, extends from the outer edge 413 of the pierceable inlet wall towards its centre.

**[0055]** The wavy area extends essentially from the outer edge 413 of the pierceable inlet wall 4 to the injection point area 42.

**[0056]** The capsule 1 comprises a rim 5 comprising a channel 51 able to receive a sealing ring.

**[0057]** As illustrated in Figure 4, the generally frustoconical body 2 comprises internal vertical ribs 22 positioned in the inner hollow area of the capsule. The internal vertical ribs 22 extends essentially from the upper edge 23 of the sidewall 3 and downwards.

## Claims

1. The invention relates to a perforable beverage capsule (1) comprising a generally frustoconical body (2) having a sidewall (3) closed at one end by a pierceable inlet wall (4), wherein the pierceable inlet wall (4) comprises a wavy area (41).
2. A perforable beverage capsule (1) according to claim 1, wherein the sidewall (3) of the generally frustoconical body (2) comprises a plurality of generally triangular, contiguous facets (31).
3. A perforable beverage capsule (1) according to any one of the claims 1 or 2, wherein the thickness of the sidewall (3) is from 0.40 to 0.50 millimetre.
4. A perforable beverage capsule according to any one of the claims 1 or 3, wherein the wavy area (41) of the pierceable inlet wall (4) has a uniform thickness.
5. A perforable beverage capsule according to claim 1 to 4, wherein the pierceable inlet wall (4) comprises, at its centre, an injection point area (42).
6. A perforable beverage capsule according to claim 5, wherein the wavy area (41) of the pierceable inlet wall (4) extends essentially from the outer edge of the pierceable inlet wall to the injection point area.
7. A perforable beverage capsule according to any one of the claims 1 to 6, wherein said wavy area (41) has a thickness from 0.30 to 0.40 millimeter.
8. A perforable beverage capsule according to any one of the claims 1 to 7, wherein the thickness of the wavy area is smaller than the thickness of the sidewall.
9. A perforable beverage capsule according to any one of the claims 1 to 8, wherein the waves of the wavy

area are essentially sinusoidal waves.

- 10.** A perforable beverage capsule according to any one of the claims 1 to 9, wherein the wavy surface (5) comprises an alternating pattern of crests and valleys oriented towards the revolution axis (21) of the generally frustoconical body (2). 5
- 11.** A perforable beverage capsule according to any one of the claims 1 to 10, wherein the perforable beverage capsule may comprise a rim. 10
- 12.** A perforable beverage capsule according to claim 11, wherein the rim comprises a sealing means configured to seal the generally frustoconical body. 15
- 13.** A perforable beverage capsule according to any one of the claims 1 to 12, wherein said generally frustoconical body is made of plastic. 20
- 14.** A perforable beverage capsule according to claim 13, wherein said generally frustoconical body is made of home compostable plastic. 25

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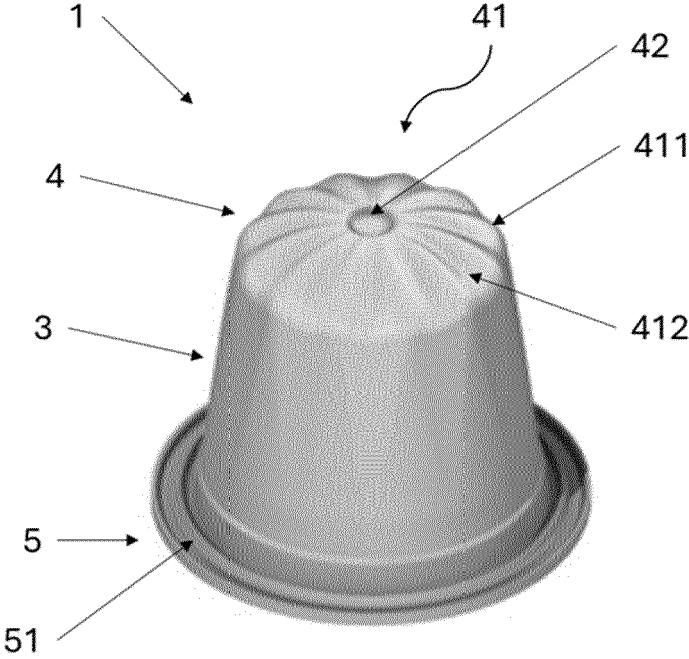


Figure 1

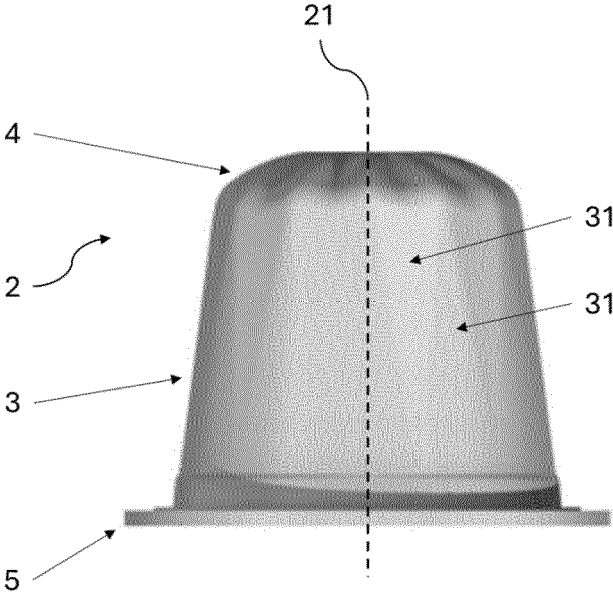


Figure 2

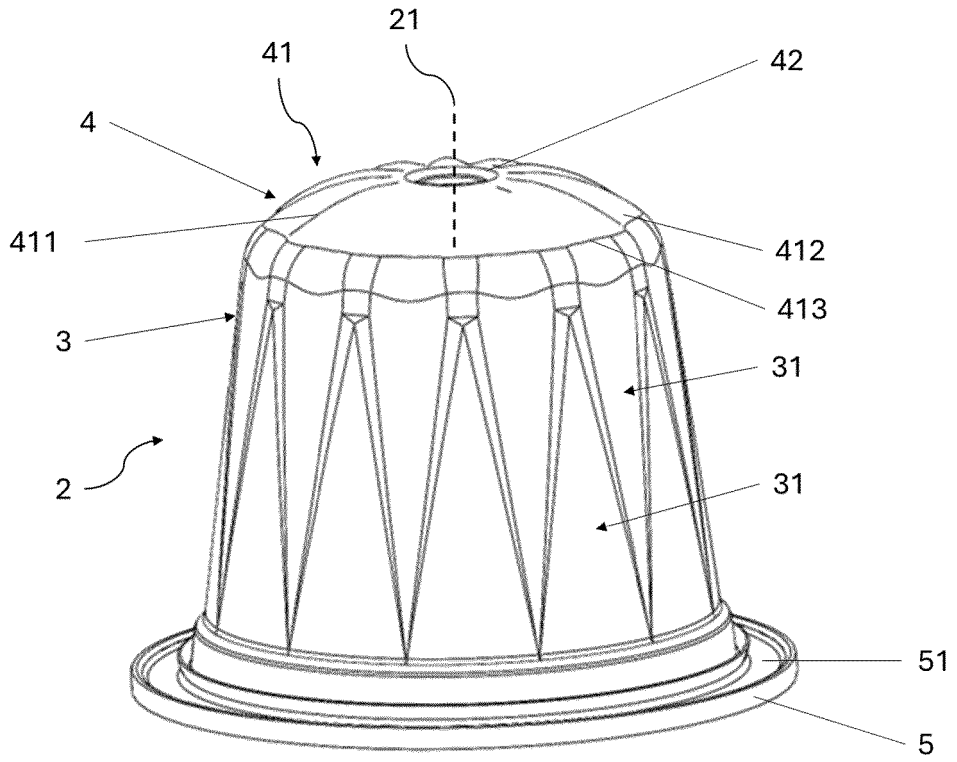


Figure 3

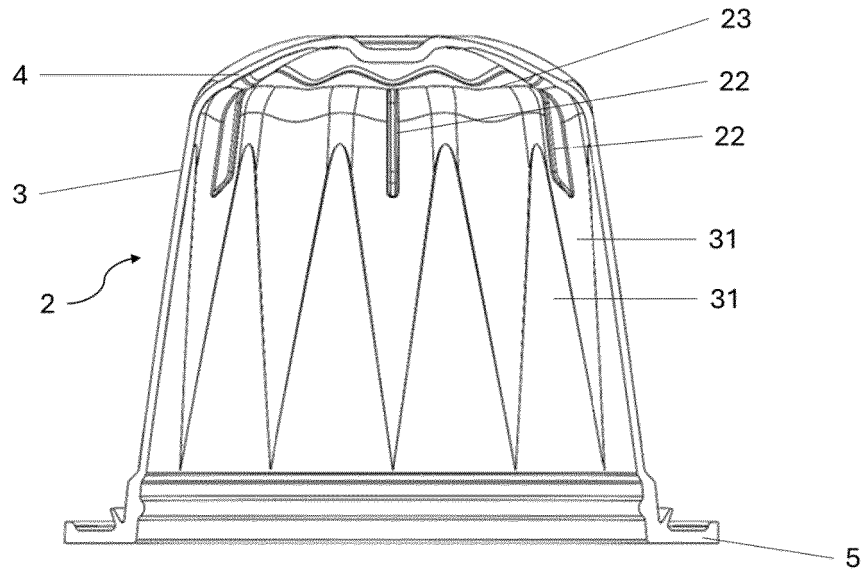


Figure 4



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Application Number

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The present search report has been drawn up for all claims			
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