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(54) **BEVERAGE PREPARATION CAPSULE AND METHOD OF PRODUCING THE SAME**

(57) A capsule (10, 32) configured for preparing a beverage upon injection of liquid into the capsule (10, 32), the capsule (10, 32) comprising: a cup-shaped main body (12) including a bottom wall (14) and a side wall (16), a sealing lid (18) connected to the side wall (16), wherein the lid (18), the bottom wall (14), and the side wall (16) define a compartment for holding beverage preparation ingredients therein, and a scoring line (24, 34) extending on the lid (18) and being configured for weakening the lid (18).

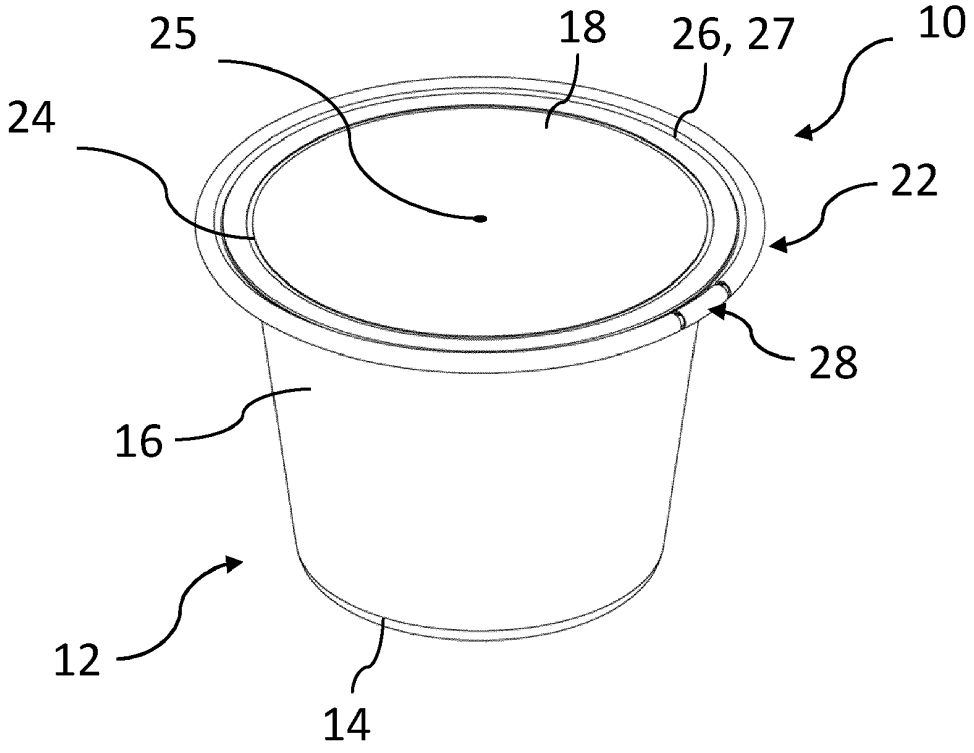

FIG. 1

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Description

Field of the invention

[0001] The present invention relates to a beverage capsule for preparing a beverage in a beverage preparation machine. The present invention further relates to a method of producing such a capsule. The present invention further relates to a use of such a capsule in a beverage preparation machine.

Background of the invention

[0002] Capsules for beverage preparation machines are well known in the art. Capsules are typically used for on demand dispensing of beverages like coffee, tea, hot chocolate or the like and enjoy popularity due to their fresh tasting, variability of flavors and the convenience of the beverage preparation.

[0003] Beverage preparation depends on a high number of parameters and effects, some of which can be attributed to the design of the capsule.

[0004] In an eco-responsible approach, some existing capsules or pods are made of compostable materials. For instance, documents WO 2016/139554 A1, WO 2020/114995 A1 disclose a compostable coffee pod. However, existing compostable capsules may not be ideal for use in coffee machines currently on the market, which may have been originally designed for non-compostable capsules.

[0005] It is thus an object of the present invention to provide a capsule particularly for use in a beverage preparation machine that shall ensure high quality and beverage consistency during preparation of the beverage. It is a further object of the present invention to propose a capsule wherein beverage preparation ingredients can be separated from the capsule such that the beverage preparation ingredients and the capsule can be disposed separately from one another. It is a further object of the present invention to propose a capsule that is fully compatible with widespread machines designed for non-compostable capsules and provide for a proper extraction in these machines.

Solution to the problem

[0006] These and other objects, which become apparent upon reading the description, are solved by the subject-matter of the independent claims. Further embodiments and developments are provided in the dependent claims.

[0007] According to a first aspect of the present invention, a beverage capsule is provided. The capsule is configured for use in a beverage preparation machine and in particular in a capsule beverage preparation machine. The capsule is configured for preparing a beverage upon injection of liquid into the capsule and dispensing the beverage through the capsule. The capsule comprises a cup-shaped main body including a bottom wall and a side wall. The capsule further comprises a sealing lid connected to the side wall, wherein the lid, the bottom wall, and the side wall define a volume or compartment for holding beverage preparation ingredients therein. The capsule further comprises a scoring line extending on the lid and being configured for weakening the lid.

[0008] The capsule according to the present invention is based at least partially on the idea that by including a scoring line extending on the lid, the lid can be weakened. The expressions "weakening" or "weakened" may be understood as any material deficiency or combination of deficiencies which may result in, for example, a reduced strength of the material. For instance, and preferably, the thickness of the material in the region of the scoring line may be reduced by at least one third. The capsule is further based on the idea that such a weakened lid can be torn open, preferably by hand, to gain access to the beverage preparation ingredients contained inside the capsule. The capsule is further based on the idea that once the capsule is opened, the beverage preparation ingredients can be removed from the opened capsule and the beverage preparation ingredients can be disposed or composted separately from the opened capsule. If the capsule is made of recyclable material such as a recyclable aluminum alloy material, the opened capsule can be recycled, for example at a consumer collection station as part of a waste disposal and recycle system. The capsule according to the present invention proposes an eco-friendly way of using capsules in a beverage preparation machine.

[0009] The capsule according to the present invention is particularly intended for use in a capsule beverage preparation machine as known, for example, from EP 0 512 470 A1 or EP 2 919 628 A1 which are incorporated by reference herein in their entirety. Preferably, the capsule according to the present invention is configured such that it can be used as an alternative to known capsules typically used in such a machine.

[0010] Preferably, the scoring line is produced by means of laser scoring and/or mechanical cutting or other suitable techniques. The scoring line may be produced prior to or after the insertion of the beverage preparation ingredients. The scoring line may be produced prior to or after connecting the lid to the main body. The scoring may be produced during manufacturing of the lid.

[0011] Preferably, the lid has a substantially circular or arcuate shape and the scoring line extends on the lid in a substantially circular or arcuate shape adapted to the shape of the lid.

[0012] Preferably, the scoring line is such that the lid and/or capsule remains in one piece after the capsule is opened along the scoring line.

[0013] Preferably, the scoring line extends about 360° around a central point on the lid. Alternatively or additionally, the scoring line extends in a range between about 180° and about 360°, preferably in a range be-

tween about 310° and about 330°, around the central point. Alternatively or additionally, the scoring line extends 330° or less, preferably 310° or less, around the central point of the lid. In other words, the scoring line may extend fully around the central point or partially around the center point.

[0014] Preferably, the scoring line extends along an external periphery of the lid, preferably in a circumferential manner. Preferably, the scoring line extends between a central section of the lid and a peripheral rim section of the lid attached to the capsule body. Preferably, the peripheral rim section is attached to a flange of the side wall.

[0015] Preferably the scoring line extends on the lid in a closed curve. More preferably, the scoring line extends on the lid in a closed and smooth curve. The expression "closed curve" may be understood as a curve wherein the start and the end point of the curve are connected to one another. The expression "closed and smooth curve" may be understood that any derivatives of the curve at the start and at the end point of the curve are equal or at least substantially equal. As an example, a scoring line extending on the lid in the shape of an ellipse may be referred to as a closed curve. A scoring line extending on the lid in the shape of a circle may be referred to as a closed and smooth curve. A person skilled in the art will understand that other shapes providing a closed or closed and smooth curve are possible.

[0016] Preferably, the scoring line extends in a peripheral rim section of the lid, the peripheral rim section being arranged peripherally or radially outside of a central section of the lid, the central section being configured to be pierced by a piercing plate configured for creating a plurality of openings in the lid for dispensing the beverage therethrough. This embodiment is based at least partially on the idea that a capsule of the present invention may be compatible with capsule preparation machines wherein a lid of the capsule is pierced by a piercing plate or pyramid plate for creating a plurality of openings in the lid for dispensing the beverage therethrough. Pyramid plates are described, for example, in EP 0 512 470 A1. Such piercing plates typically produce a plurality of openings in a central section of the lid. The preferred embodiment is based on the idea that if a plurality of openings is produced in the central section of the lid, the scoring line is arranged peripherally or radially outside of this central section. This has the effect that any creation of openings in the lid by such a piercing plate does not interfere with the scoring line and vice versa. In other words, the idea is to have a scoring line that extends in a section on the lid which is peripherally or radially outside of the central section and which remains undamaged and/or unaltered and/or does not interfere with the piercing plate during preparation of the beverage. Capsule beverage preparation machines which produce a plurality of openings in a central section of the lid are, for example, capsule beverage preparation machines of the Nespresso™ original line.

[0017] Preferably, the scoring line has a distance from an outer edge of the lid of about 5 mm or less, preferably of about 2 mm or less. This preferred embodiment is based on the idea that a peripheral rim section of about 5 mm or less, preferably 2 mm or less is typically outside of the aforementioned central section.

[0018] Preferably, a depth of the scoring line is in a range between about 30% and about 80%, preferably between about 50% and about 70%, of a thickness of the lid. The depth may be measured in a direction perpendicular to an interior and/or exterior face of the lid.

[0019] Preferably, a width of the scoring line is in a range between 100 micrometers and 500 micrometers, preferably between 200 micrometers and 300 micrometers. The width of the scoring line may be adjustable by the machine cutting and/or laser scoring technique used to produce the scoring line.

[0020] A width and/or a depth of the scoring line may be constant or may vary along the scoring line, as desired.

[0021] Preferably, the capsule further comprises a grasping section for grasping at least a portion of the lid for opening the lid along the scoring line. The grasping section may form a pull tab.

[0022] Preferably, the grasping section is formed as an incision in the lid and/or in a flange of the side wall.

[0023] Preferably, the flange may be configured such that the capsule can be clamped into a capsule holder of a capsule beverage preparation machine as know, for example from EP 0 512 470 A1 or EP 2 919 628 A1 mentioned earlier.

[0024] Preferably, the scoring line extends onto the flange. Preferably, the scoring line connects with the grasping section arranged on the flange. Additionally or alternatively, the scoring line may extend onto the flange for forming the grasping section or at least a portion thereof.

[0025] Preferably, the scoring line or portions thereof may be arranged on an interior or internal face of the lid, the interior or internal face being a face facing the beverage preparation ingredients inside the capsule. Preferably, only the grasping section of the capsule may be visible from outside of the capsule.

[0026] Preferably, the scoring line is configured such that the side wall is openable manually, preferably without using tools, more preferably by hand. Preferably, an opening of the capsule can be assisted by grasping the grasping section and pulling on the grasping section until the lid is torn open along the scoring line.

[0027] Preferably, the scoring line of the capsule is configured to withstand a pressure difference between an outside and an inside of the capsule during preparation of the beverage. Preferably, the scoring line is configured to withstand a pressure difference of at least 4 bar, more preferably of at least 8 bar, more preferably of at least 10 bar, during preparation of the beverage. The pressure differences are typical pressure differences used in a capsule beverage preparation machine as known, for example from EP 0 512 470 A1 or EP 2 919

628 A1 mentioned earlier.

[0028] Preferably, the main body has a cylindrical shape or a frustoconical shape or a domical shape or a frustodomical shape. Preferably, the side wall has a frustoconical shape and the bottom wall has a flat or domical shape. The shape of the main body may generally be such that the capsule according to the present invention can be used in a capsule beverage preparation machine as described, for example in EP 0 512 470 A1 or EP 2 919 628 A1.

[0029] Preferably, the capsule further comprises a coating, preferably a spray coating and/or lacquer, that is applied over at least a segment of the scoring line. The coating may be configured for preventing sharp edges during opening of the lid.

[0030] Preferably, the main body and/or the lid are made of a non-compostable material and/or a recyclable material, preferably a recyclable aluminum alloy material or a polymeric material.

[0031] The expression "compostable" may be understood as any material that complies with certain compostability standards. For example, industrial compostability is defined in European Norm EN 13432. Home compostability conditions are adapted based on national standards within certain testing specifications, such as TÜV testing specifications. Materials or products compliant with these standards can be recognized, for example, by a conformity mark stating their home compostability. Some examples of home compostability certifications at a national level include, but are not limited to, the following. For example, the certifier TÜV AUSTRIA BELGIUM offers such a home compostability certification scheme, and DIN CERTCO offers a certification for home compostability according to the Australian standard AS 5810. Italy has a national standard for composting at ambient temperature, UNI 11183:2006. In November 2015, the French Standard "NF T 51-800 Plastics - Specifications for plastics suitable for home composting" was introduced. This standard is covered in the DIN CERTCO scheme.

[0032] Another aspect of the present invention, which may form an independent aspect of the present invention, relates to a use of a capsule in a beverage preparation machine and in particular to a use of a capsule according to the first aspect or embodiments thereof in a beverage preparation machine. The use of the capsule includes the steps of: inserting the capsule into a beverage preparation machine; preparing a beverage by injecting liquid into the capsule, whereby liquid is mixed with beverage preparation ingredients contained inside the capsule for forming a beverage that is dispensed through the capsule; removing the capsule from the beverage preparation machine; and manipulating the capsule such that the capsule and in particular the lid opens along the scoring line.

[0033] Preferably, the step of manipulating the capsule is performed manually, preferably without using tools, more preferably by hand.

[0034] Preferably, the capsule includes a grasping section such as the one described earlier and the step of manipulating the capsule includes the step of grasping the grasping section and pulling on the grasping section until the capsule opens along the scoring line.

[0035] Preferably, the method further comprises: after opening the capsule along the scoring line, separating the beverage preparation ingredients from the opened capsule for disposing the same. Preferably, the capsule remains in one piece after opening the capsule.

[0036] Preferably, the step of preparing a beverage further includes the steps of: piercing the bottom wall of the main body for forming an opening in the bottom wall; injecting liquid through the opening formed in the bottom wall whereby liquid is mixed with beverage preparation ingredients contained inside the capsule; and dispensing the beverage through the lid.

[0037] A further aspect of the present invention, which may form an independent aspect of the present invention, relates to a method of producing a capsule and in particular to a method of producing a capsule according to the first aspect and/or embodiments thereof. The method includes the steps of: producing a cup-shaped main body, preferably a cup-shaped main body having a bottom wall and a side wall, preferably wherein producing the cup-shaped main body includes the step of deep drawing a sheet material, preferably a sheet material made of a recyclable aluminum alloy material; inserting beverage preparation ingredients into the main body; sealing an opening of the main body by connecting a lid to the main body; and producing a scoring line on the lid such that the lid is weakened by the scoring line.

[0038] Preferably, the step of producing the scoring line is done prior to or after connecting the lid to the main body.

[0039] Preferably, the scoring line is produced by means of laser scoring and/or mechanical cutting or another suitable technique.

[0040] Further embodiments and aspects of the present invention are explained using the accompanying schematic figures, which are incorporated herein and constitute a part of the specification. These figures are merely exemplary. They are not to be understood as limiting the scope of the present disclosure.

Brief description of the drawings

[0041]

Figure 1 is a schematic view of an example of a capsule with a scoring line.

Figure 2 is a schematic view of the capsule of **Figure 1** after the capsule has been pierced by a piercing plate of a beverage preparation machine.

Figure 3 is a schematic view of the capsule of **Figure 2** opened along the scoring line.

Figure 4 is a schematic view of another example of a capsule with a scoring line.

Figure 5 is a schematic view of the capsule of **Figure 4** after the capsule has been pierced by a piercing plate of a beverage preparation machine.

Figure 6 is a schematic view of the capsule of **Figure 5** opened along the scoring line.

Detailed description

[0042] Within the figures, same components are referenced by the same reference numerals.

[0043] **Figure 1** shows a schematic view of an example of a beverage capsule 10. The beverage capsule 10 is configured for preparing a beverage such as coffee, tea, hot chocolate, or the like upon injecting liquid into the capsule 10. The beverage capsule 10 is particularly suited to be used in connection with a capsule beverage preparation machine such as described in, for example, EP 0 512 470 A1 or EP 2 919 628 A1. The beverage capsule 10 may be a single-serve capsule.

[0044] The capsule 10 includes a cup-shaped main body 12. The main body 12 includes a bottom wall 14 and a side wall 16. The bottom wall 14 and the side wall 16 together form a receptacle. The side wall 16 delimits an opening or mouth. The opening or mouth is closed by a sealing lid 18. The sealing lid 18 is sealingly connected to the side wall 16 such that the sealing lid 18, the side wall 16 and the bottom wall 14 together form a compartment for holding beverage preparation ingredients therein.

[0045] The main body 12 has a generally cylindrical or frusto-conical or domical or frusto-domical shape, in particular a combination of different sections of such shapes. The shape of the main body 12 may be as described in, for example EP 2 919 628 A1, EP 0 919 628 A1, EP 0 512 468 A1, EP 0 512 470 A1, EP 1 646 305 A1, or EP 1 165 398 A1, all of which are incorporated by reference herein in their entirety.

[0046] The bottom wall 14 has a convex or frusto-conical shape with a central portion (not shown), which may be generally flat, concave or convex. The bottom wall 14 is configured to be pierced by an opener of a capsule preparation machine as described in, for example the aforementioned EP 2 919 628 A1.

[0047] The side wall 16 forms a flange 22 proximate to the lid 18. The flange 22 is configured such that the capsule 10 can be clamped into a capsule holder of a capsule beverage preparation machine as described in, for example the aforementioned EP 2 919 628 A1.

[0048] The lid 18 is configured to be pierced by a piercing plate, such as a pyramid plate, which is usually used in the above mentioned capsule beverage preparation machines. The piercing plate or pyramid plate is configured for creating a plurality of openings in the lid 18. The pyramid plate includes a plurality of reliefs and recessed (pyramid-like) elements. These elements are configured to tear open the lid for creating a plurality of openings in the lid under the effect of rising pressure of the liquid injected into the capsule 10. Through these openings in the lid the beverage is dispensed. Pyramid plates are described, for example, in EP 0 512 470 A1.

[0049] As can be seen in **Figure 1,** the capsule 10 further includes a scoring line 24. The scoring line 24 is configured for weakening the material of the lid 18. The scoring line 24 may be produced by means of laser scoring, mechanical cutting or another suitable technique. The scoring line 24 may be produced prior to or after the lid 18 is connected to the side wall 16.

[0050] The scoring line 24 may have a width in a range between 100 micrometers and 500 micrometers, preferably between 200 micrometers and 300 micrometers. The width may depend on the manufacturing technique used to produce the scoring line 24. The scoring line 24 may have a depth in a range between about 30% and about 80%, preferably between about 50% and about 70% of a thickness of the lid 18. The scoring line 24 is designed to weaken the lid 18 such that the lid 18 can be torn open at the position of the scoring line 24, preferably without using tools, more preferably by hand.

[0051] In the specific embodiment shown, the scoring line 24 extends 360° around a central point 25 of the lid 18. In other words, the scoring line 24 extends fully or in a complete circle around the central point 25. In other embodiments, this may not be the case. Preferably, the scoring line 24 extends on the lid 18 in a shape that is adapted to the shape of the lid 18. In the specific embodiment shown, the shape of the lid 18 is a generally arcuate, more precisely a circular shape and the shape of the scoring line 24 is adapted to the circular shape.

[0052] In the specific embodiment shown, the scoring line 24 extends in a circle around the central point 25. A circle is one example of a closed and smooth curve. A skilled reader will understand, that in other embodiments not shown, scoring line 24 may extend in any other suitable shape and/or curve on the lid. The shape shown in **Figure 1** shall thus not be understood as limiting the scope of the present disclosure. Preferably, the scoring line 24 extends in a closed curve, more preferably in a closed and smooth curve on the lid 18.

[0053] If desired, the scoring line 24 may be provided such that it does not extend around the entire periphery of the lid 18. In this way, the lid 18 may be configured to remain connected to the main body 12 even after opening of the lid. This may allow the consumer to dispose of the main body 12 and the lid 18 as a single unit.

[0054] In the specific embodiment shown, the scoring line 24 extends closer to the flange 22 and/or closer to an outer edge 26 or rim 27 of the lid 18 than to the central point 25. In other words, the scoring line 24 extends in a region (distal region) that is closer to the outer edge 26 or rim 27 than to the central point 25 of the lid 18. In yet other words, the scoring line 24 extends in a peripherally or radially outer section of the lid 18. The peripherally or radially outer section may also be termed peripheral rim

section of the lid 18. The scoring line 24 may have a distance from the outer edge 26 or rim 27 of the lid 18 of about 5 mm or less, preferably 2 mm or less.

[0055] As can be seen in **Figure 1,** the flange 22 includes a grasping section 28. The grasping section 28 may assist in opening the capsule 10, as will be explained later. The grasping section 28 may be formed as an incision in the flange 22. The skilled reader will understand that the grasping section 28 may be formed by any suitable means or technique. The grasping section 28 is configured for grasping at least a portion of the lid 18 for opening the lid 18 along the scoring line 24. In the specific embodiment shown, the scoring line 24 does not extend to or connect with the grasping section 28. In other embodiments, the scoring line 24 may extend to or connect with the grasping section 28.

[0056] Referring to **Figure 2,** the capsule 10 of **Figure 1** is shown in a state in which the lid 18 has been pierced by a piercing plate as explained earlier on. The piercing plate is configured for creating a plurality of openings 30 on the lid 18 for dispensing the beverage therethrough. In **Figure 2,** the openings 30 are schematically indicated by rectangles. The skilled reader will understand that any shape, number or arrangement of openings 30 may be provided on the lid 18. Thus, the shape, number or arrangement of openings 30 shown in **Figure 2** shall not be understood as limiting the scope of the present disclosure.

[0057] As can be seen in **Figure 2,** the openings 30 may be arranged in a central section of the lid 18. The scoring line 24 may be arranged peripherally outside this central section. The scoring line 24 may be arranged in a peripheral rim section. The scoring line 24 may be arranged such that the scoring line 24 is not damaged upon producing the openings 30 by the piercing plate. In other words, the piercing plate does not interfere with the scoring line 24. In yet other words, the scoring line 24 may be arranged in a region in which the lid 18 remains undamaged or unaltered during piercing by the piercing plate.

[0058] Referring to **Figure 3,** the capsule 10 of **Figures 2** is shown in an opened state. The capsule 10 may be opened by pulling on the grasping section 28 formed on the flange 22. Upon pulling on the grasping section 28, the lid 18 is torn open along the scoring line 24 and the capsule 10 is opened. Opening of the capsule 10 is done manually, preferably without using tools, more preferably by hand. In the specific embodiment shown, the grasping section 28 remains attached to the lid 18. In other embodiments not shown, this may not be the case. In the specific embodiment shown, the lid 18 is detached from the main body 12 after opening of the capsule 10. In other embodiments not shown, the lid 18 may remain attached to the main body 12 such that the capsule 10 remains in one piece after opening.

[0059] Once the capsule 10 is opened, the beverage preparation ingredients contained inside the capsule 10 can be removed and disposed separately from the opened capsule 10 (e.g., composted). The opened capsule 10 together with the lid 18 may be disposed and/or recycled. The main body 12 and/or the lid 18 of the capsule 10 may be made of recyclable material such as a recyclable aluminum alloy material so that the opened capsule 10 and/or the lid 18 may be recycled at a consumer collection station as part of a waste disposal and recycle system.

[0060] Referring to **Figure 4,** a schematic view of another example of a beverage capsule 32 is shown.

[0061] Capsule 32 includes cup-shaped main body 12 with bottom wall 14 and side wall 16. An opening of the capsule 32 is closed by the sealing lid 18. The sealing lid 18, the side wall 16 and the bottom wall 14 together form a compartment for holding beverage preparation ingredients therein as previously described in connection with capsule 10.

[0062] The shape and size of capsule 32 may be similar to the shape and size of capsule 10. The lid 18 of capsule 32 is configured to be pierced by a piercing plate as previously described. Thus, capsule 32 may be used, for example, in a capsule beverage preparation machine which dispenses beverage through the lid 18. A skilled reader will understand, however, that capsule 32 may be used in any suitable capsule beverage preparation machine.

[0063] As can be seen in **Figure 4,** capsule 32 includes a scoring line 34. The scoring line 34 extends on the lid 18. Compared to the scoring line 24 of capsule 10, the scoring line 34 of capsule 32 does not extend a complete or full circle around the central point 25 of the lid 18. The scoring line 34 extends in a circle of less than 360° around the central point 25. The scoring line 34 extends from the lid 18 onto the flange 22 and connects with the grasping section 28. A connection portion 35 of the scoring line 34 may connect the grasping section 28 with the circular portion of the scoring line 34. In other embodiments, the scoring line 34 may form the grasping section 28 or at least parts of the grasping section 28. The scoring line 34 may be produced by means of laser scoring, mechanical cutting or another suitable technique. A width and/or depth of the scoring line 34 may be similar to a width and/or depth of the scoring line 24. The scoring line 34 is designed to weaken the lid 18 such that the lid 18 can be torn open along the scoring line 34, preferably without using tools, more preferably by hand.

[0064] Similar to scoring line 24, scoring line 34 extends closer to the flange 22 and/or an outer edge 26 or rim 27 of the lid 18 than to the central point 25. The scoring line 34 extends in the peripheral rim section of the lid 18. The arcuate or circular portion of the scoring line 34 may have a distance from the outer edge 26 or rim 27 of the lid 18 of about 5 mm or less, preferably 2 mm or less, similar to the scoring line 24.

[0065] Referring to **Figure 5,** the capsule 32 of **Figure 4** is shown in a state in which the lid 18 has been pierced by a piercing plate as explained earlier on. As schematically indicated in **Figure 5,** a plurality of openings 30 are

formed on a central section of the lid 18. The scoring line 34 is arranged peripherally outside this central section and extends in the peripheral rim section of the lid 18. The scoring line 34 is arranged such that it remains undamaged when the piercing plate produces the openings 30 in the lid 18.

[0066] Referring to **Figure 6,** the capsule 32 of **Figures 5** is shown in an opened state. The capsule 32 may be opened by pulling on the grasping section 28 as already explained in connection with capsule 10. Opening of the capsule 32 is done manually, preferably without using tools, more preferably by hand. In the specific embodiment shown, the lid 18 is detached from the main body 12 after opening of the capsule 32. In other embodiments not shown, the lid 18 may remain attached to the capsule 32 such that the capsule 32 remains in one piece after opening.

[0067] Once the capsule 32 is opened, the beverage preparation ingredients contained inside the capsule 10 can be removed and disposed separately from the opened capsule 32 (e.g., composted). The opened capsule 32 together with the lid 18 may be disposed and/or recycled. The main body 12 and/or the lid 18 of the capsule 32 may be made of recyclable material such as a recyclable aluminum alloy material so that the opened capsule 32 and/or the lid 18 may be recycled at a consumer collection station as part of a waste disposal and recycle system.

[0068] A skilled reader will understand that any of the aforementioned embodiments may be combined in any suitable way.

[0069] A skilled reader will understand that the capsules 10, 32 may include more than one scoring line.

[0070] It should be noted that, in any of the aforementioned embodiments, the scoring line(s) 24, 34 may further be configured to withstand a pressure difference between an outside of the capsule 10, 32 and an inside of the capsule 10, 32 that typically occur during preparation of the beverage in the beverage preparation machine. Specifically, the scoring line(s) 24, 34 may be configured to withstand pressure differences typically used in capsule beverage preparation machines such as the one described in EP 0 512 470 A1. For example, the scoring line(s) 24, 34 may be configured to withstand a pressure difference of at least 4 bar, preferably at least 8 bar, more preferably at least 12 bar.

[0071] It should be noted that, in any of the aforementioned embodiments, the capsule 10, 32 may comprise a coating such as a spray coating or lacquer. The coating may be applied over at least a segment of the scoring line(s) 24, 34. The coating may be used to prevent sharp edges during opening of the capsule 10, 32 along the scoring line(s) 24.

[0072] The following aspects are preferred embodiments of the invention:

1. A capsule (10, 32) configured for preparing a beverage upon injection of liquid into the capsule (10, 32), the capsule (10, 32) comprising:

- a cup-shaped main body (12) including a bottom wall (14) and a side wall (16),
- a sealing lid (18) connected to the side wall (16), wherein the lid (18), the bottom wall (14), and the side wall (16) define a compartment for holding beverage preparation ingredients therein, and
- a scoring line (24, 34) extending on the lid (18) and being configured for weakening the lid (18).

2. The capsule (10, 32) of aspect 1, wherein the scoring line (24, 34) is produced by means of laser scoring and/or mechanical cutting.

3. The capsule (10, 32) of aspect 1 or 2, wherein the lid (18) has a substantially circular shape and the scoring line (24, 34) has a substantially circular shape adapted to the substantially circular shape of the lid (18).

4. The capsule (10, 32) of any one of aspects 1-3, wherein the scoring line (24, 34) extends

- about 360° around a central point (25) of the lid (18), or
- in a range between about 180° and about 360°, preferably in a range between about 310° and about 330° around a central point (25) of the lid (18), or
- 330° or less, preferably 310° or less around a central point (25) of the lid (18).

5. The capsule (10, 32) of any one of aspects 1-4, wherein the scoring line (24) extends on the lid (18) in a closed curve, preferably wherein the scoring line (24) extends on the lid (18) in a closed and smooth curve.

6. The capsule (10, 32) of any one of aspects 1-5, wherein the scoring line (24, 34) extends in a peripheral rim section of the lid (18), the peripheral rim section being arranged peripherally outside of a central section of the lid (18), the central section being configured to be pierced by a pyramid plate configured for creating a plurality of openings (30) in the lid (18) for dispensing the beverage therethrough.

7. The capsule (10, 32) of any one of aspects 1-6, wherein the scoring line (24, 34) has a distance from an outer edge of the lid of about 5 mm or less, preferably of about 2 mm or less.

8. The capsule (10, 32) of any one of aspects 1-7, wherein a depth of the scoring line (24, 34) is in a range between about 30% and about 80%, preferably between about 50% and about 70%, of a thick-

ness of the lid (18).

9. The capsule (10, 32) of any one of aspects 1-8, wherein a width of the scoring line (24, 349 is in a range between100 micrometers and 500 micrometers, preferably between 200 micrometers and 300 micrometers.

10. The capsule (10, 32) of any one of aspects 1-9, further comprising:

- a grasping section (28) for grasping at least a portion of the lid (18) for opening the lid (18) along the scoring line (24, 34).

11. The capsule (10, 32) of aspect 10,
wherein the grasping section (28) is formed as an incision in the lid (18) and/or in a flange (22) of the side wall (16).

12. The capsule (10, 32) of aspect 10 or 11, wherein the scoring line (24, 34) extends onto the flange (22) and connects with the grasping section (28) and/or extends onto the flange (22) for forming the grasping section (28).

13.The capsule (10, 32) of any one of aspects 1-12, wherein the scoring line (24, 34) is arranged at least partially on an interior face of the lid (18), preferably wherein only the grasping section (28) is visible from outside of the capsule (10, 32).

14. The capsule (10, 32) of any one of aspects 1-13, wherein the scoring line (24, 34) is configured such that the lid (18) is openable manually, preferably without using tools, more preferably by hand.

15. The capsule (10, 32) of any one of aspects 1-14, wherein the scoring line (24, 34) is configured to withstand a pressure difference between an outside and an inside of the capsule (10, 32) during preparation of the beverage, preferably wherein the scoring line (24, 3 4) is configured to withstand a pressure difference of at least 4 bar, more preferably of at least 8 bar, more preferably of at least 10 bar, during preparation of the beverage.

16. The capsule (10, 32) of any one of aspects 1-15, further comprising:

- a coating, preferably a spray coating and/or lacquer, applied over at least a segment of the scoring line (24, 34), the coating being configured for preventing sharp edges during opening of the lid (18).

17.The capsule (10, 32) of aspects any one of 1-16, wherein the main body (12) has a cylindrical shape or a frustoconical shape or a domical shape or a frustodomical shape.

18. The capsule (10, 32) of any one of aspects 1 to 17, wherein the side wall (16) has a frustoconical shape and the bottom wall (14) has a flat or domical shape.

19. The capsule (10, 32) of any one of aspects 1-18, wherein the main body (12) and/or the lid (18) are made of a non-compostable material.

20. The capsule (10, 32) of any one of aspects 1-19, wherein the main body (12) and/or the lid (18) are made of a recyclable material, preferably a recyclable aluminum alloy material.

21. Use of a capsule (10, 32) according to any one of aspects 1-20, the method including the steps of:

- inserting the capsule (10, 32) into a beverage machine,
- preparing a beverage by injecting liquid into the capsule (10, 32) whereby liquid is mixed with beverage preparation ingredients contained inside the capsule (10, 32) for forming a beverage that is dispensed through the capsule (10, 32),
- removing the capsule (10, 32) from the beverage machine, and
- manipulating the capsule (10, 32) such that the capsule (10, 32) opens along the scoring line (24, 34).

22. The method of aspect 21, wherein the step of manipulating the capsule (10, 32) is performed manually, preferably without using tools, more preferably by hand.

23. The method of aspect 22, wherein the capsule (10, 32) includes a grasping section (28) for grasping at least a portion of the lid (18) and the step of manipulating the capsule (10, 32) includes the step of grasping the grasping section (28) and pulling on the grasping section (28) until the capsule (10, 32) opens along the scoring line (24, 34).

24. The method of any one of aspect 21-23, further comprising:

- after opening the capsule (10, 32) along the scoring line (24, 34), separating the beverage preparation ingredients from the capsule (10, 32) for disposing the same.

25. The method of any one of aspects 21-24, wherein the capsule (10, 32) is configured to remain in one piece after opening of the capsule (10, 32).

26. The method of any one of aspects 21-25, wherein the step of preparing a beverage includes the steps of:

- piercing the bottom wall (14) of the main body (12) for forming an opening in the bottom wall (14),
- injecting liquid through the opening whereby liquid is mixed with beverage preparation ingredients contained inside the capsule (10, 32), and
- dispensing the beverage through the lid (18).

27. A method of producing a capsule (10, 32) according to any one of aspects 1-20, the method including the steps of:

- producing a cup-shaped main body (12), preferably wherein producing the cup-shaped main body (12) includes the step of deep drawing a sheet material, preferably a sheet material made of recyclable aluminum alloy material,
- inserting beverage preparation ingredients into the main body (12),
- sealing an opening of the main body (12) by connecting a lid (18) to the main body (12), and
- producing a scoring line (24, 34) on the lid (18) such that the lid (18) is weakened by the scoring line (24, 34).

28. The method of aspect 27, wherein the step of producing the scoring line (24, 34) is done prior to or after connecting the lid (18) to the main body (12).

29. The method of aspect 28, wherein the scoring line (24, 34) is produced by means of laser scoring and/or mechanical cutting.

Claims

1. A capsule (10, 32) configured for preparing a beverage upon injection of liquid into the capsule (10, 32), the capsule (10, 32) comprising:

- a cup-shaped main body (12) including a bottom wall (14) and a side wall (16),
- a sealing lid (18) connected to the side wall (16), wherein the lid (18), the bottom wall (14), and the side wall (16) define a compartment for holding beverage preparation ingredients therein, and
- a scoring line (24, 34) extending on the lid (18) and being configured for weakening the lid (18).

2. The capsule (10, 32) of claim 1, wherein the lid (18) has a substantially circular shape and the scoring line (24, 34) has a substantially circular shape adapted to the substantially circular shape of the lid (18).

3. The capsule (10, 32) of claims 1 or 2, wherein the scoring line (24, 34) extends

- about 360° around a central point (25) of the lid (18), or
- in a range between about 300° and about 360°, preferably in a range between about 310° and about 330° around a central point (25) of the lid (18), or
- 330° or less, preferably 310° or less around a central point (25) of the lid (18);
- and wherein the scoring line (24, 34) extends along an external periphery of the lid (18) between a central section of the lid and a peripheral rim section of the lid (18), wherein the peripheral rim section is attached to a flange (22) of the side wall (16).

4. The capsule (10, 32) of any one of claims 1-3, wherein the scoring line (24, 34) extends in a peripheral rim section of the lid (18), the peripheral rim section being arranged peripherally outside of a central section of the lid (18), the central section being configured to be pierced by a pyramid plate configured for creating a plurality of openings (30) in the lid (18) for dispensing the beverage therethrough.

5. The capsule (10, 32) of any one of claims 1-4, wherein the scoring line (24, 34) has a distance from an outer edge of the lid of about 5 mm or less, preferably of about 2 mm or less.

6. The capsule (10, 32) of any one of claims 1-5, wherein a depth of the scoring line (24, 34) is in a range between about 30% and about 80%, preferably between about 50% and about 70%, of a thickness of the lid (18).

7. The capsule (10, 32) of any one of claims 1-6, wherein a width of the scoring line (24, 349 is in a range between100 micrometers and 500 micrometers, preferably between 200 micrometers and 300 micrometers.

8. The capsule (10, 32) of any one of claims 1-7, further comprising:

- a grasping section (28) for grasping at least a portion of the lid (18) for opening the lid (18) along the scoring line (24, 34).

9. The capsule (10, 32) of claim 8, wherein the scoring line (24, 34) extends onto the flange (22) and connects with the grasping section (28) and/or extends onto the flange (22) for forming the grasping section (28).

10. The capsule (10, 32) of any one of claims 1-9, wherein the scoring line (24, 34) is arranged at least partially on an interior face of the lid (18), preferably wherein only the grasping section (28) is visible from outside of the capsule (10, 32).

11. The capsule (10, 32) of any one of claims 1-10, wherein the scoring line (24, 34) is configured such that the lid (18) is openable manually, preferably without using tools, more preferably by hand.

12. The capsule (10, 32) of any one of claims 1-11, wherein the scoring line (24, 34) is configured to withstand a pressure difference between an outside and an inside of the capsule (10, 32) during preparation of the beverage, preferably wherein the scoring line (24, 3 4) is configured to withstand a pressure difference of at least 4 bar, more preferably of at least 8 bar, more preferably of at least 10 bar, during preparation of the beverage.

13. Use of a capsule (10, 32) according to any one of claims 1-12, the method including the steps of:

- inserting the capsule (10, 32) into a beverage machine,
- preparing a beverage by injecting liquid into the capsule (10, 32) whereby liquid is mixed with beverage preparation ingredients contained inside the capsule (10, 32) for forming a beverage that is dispensed through the capsule (10, 32),
- removing the capsule (10, 32) from the beverage machine, and
- manipulating the capsule (10, 32) such that the capsule (10, 32) opens along the scoring line (24, 34).

14. A method of producing a capsule (10, 32) according to any one of claims 1-12, the method including the steps of:

- producing a cup-shaped main body (12), preferably wherein producing the cup-shaped main body (12) includes the step of deep drawing a sheet material, preferably a sheet material made of recyclable aluminum alloy material,
- inserting beverage preparation ingredients into the main body (12),
- sealing an opening of the main body (12) by connecting a lid (18) to the main body (12), and
- producing a scoring line (24, 34) on the lid (18) such that the lid (18) is weakened by the scoring line (24, 34).

15. The method of claim 14, wherein the step of producing the scoring line (24, 34) is done prior to or after connecting the lid (18) to the main body (12).

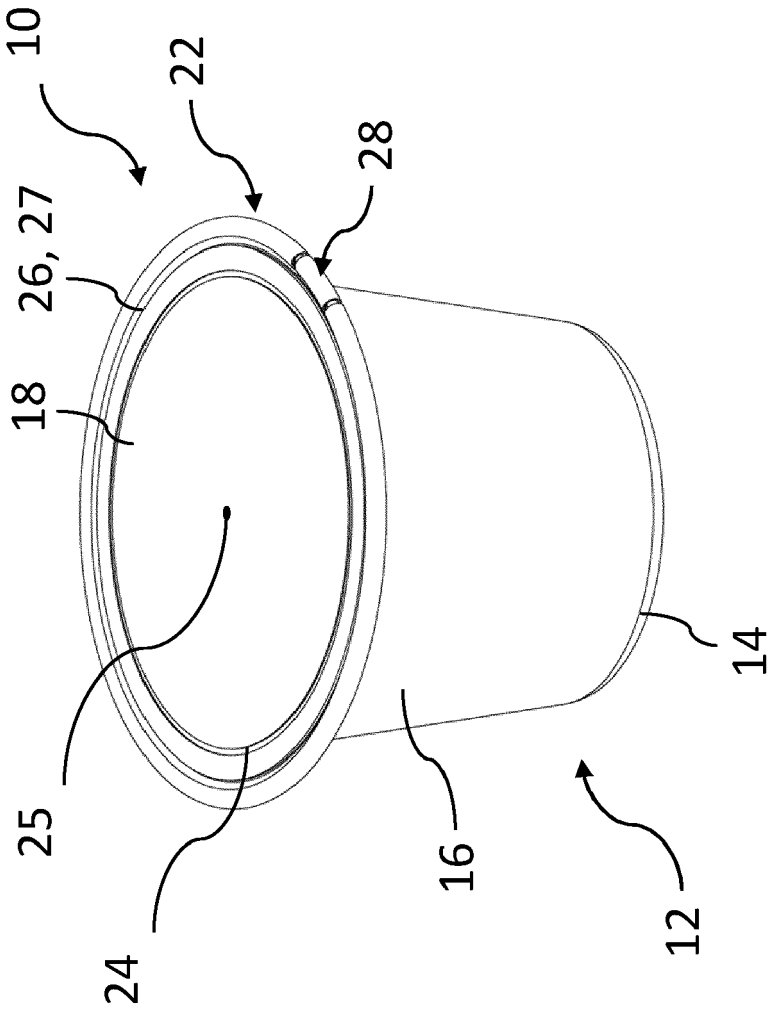

FIG. 1

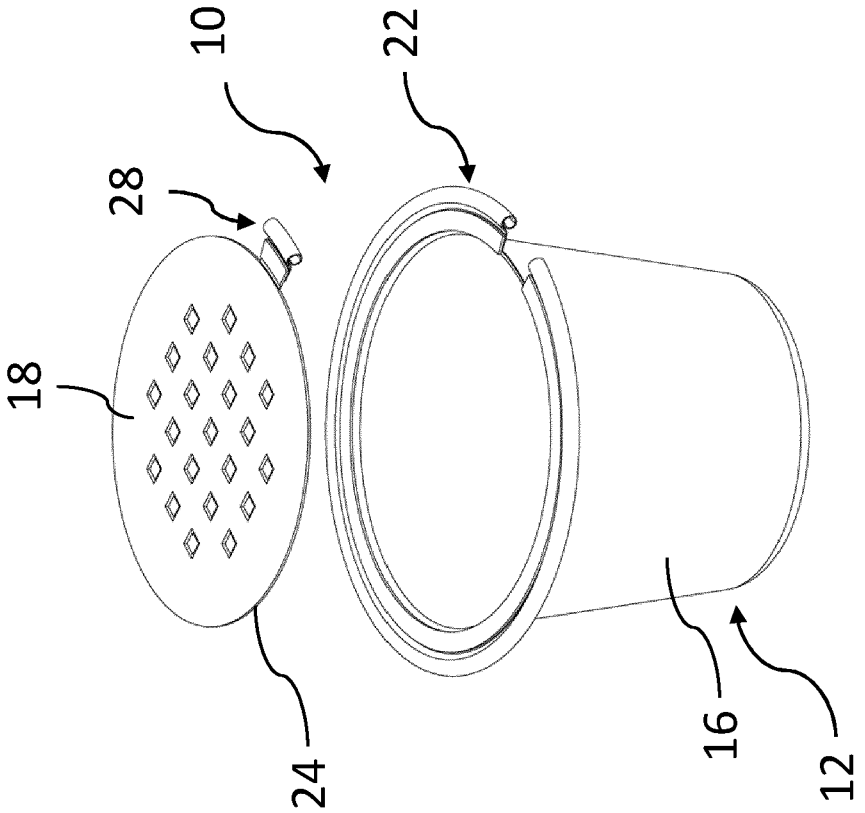

FIG. 3

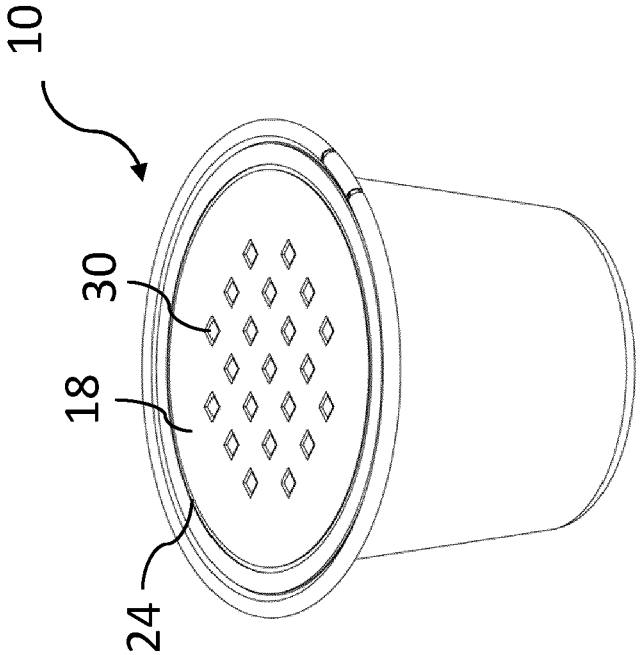

FIG. 2

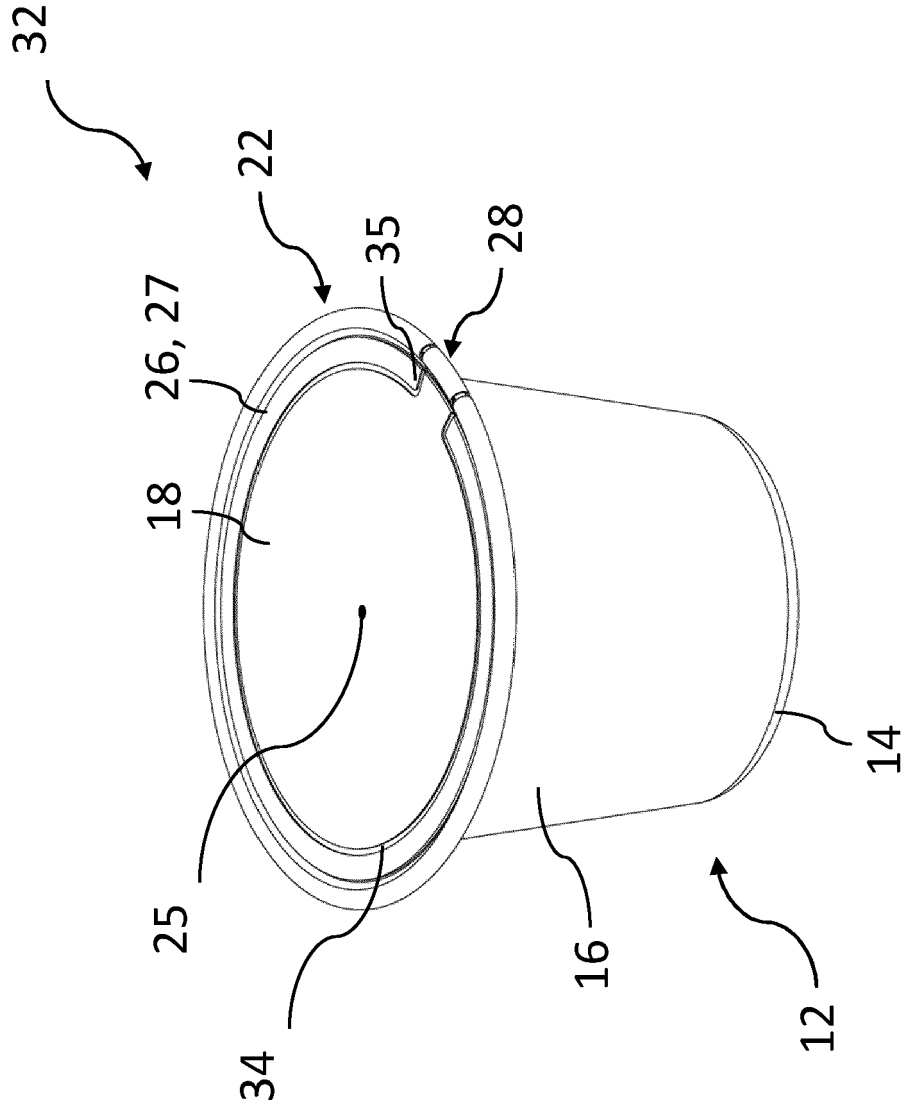

FIG. 4

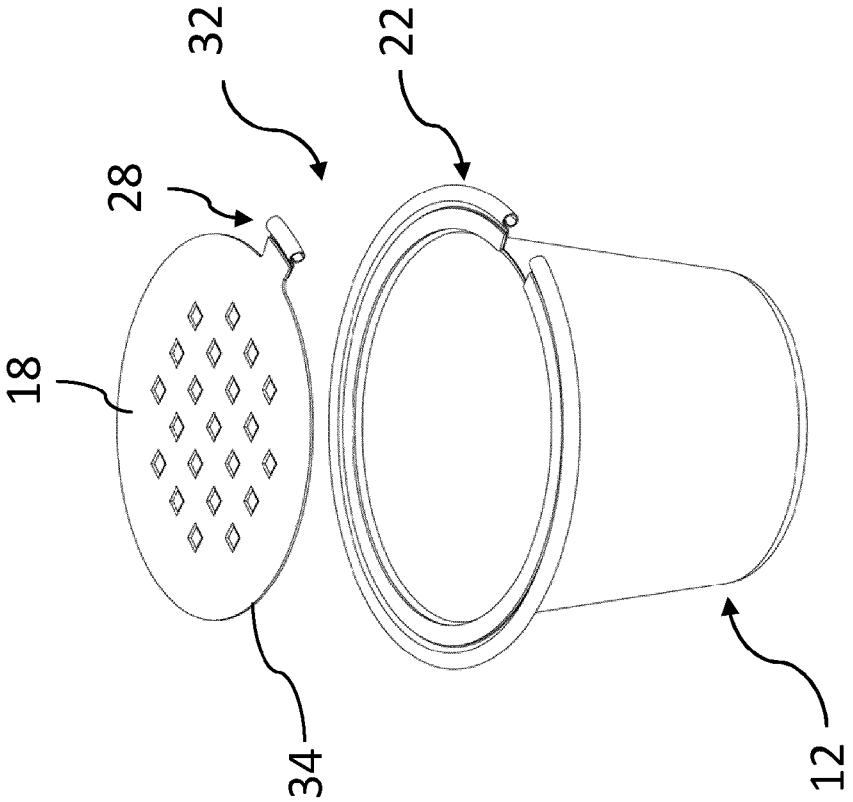

FIG. 6

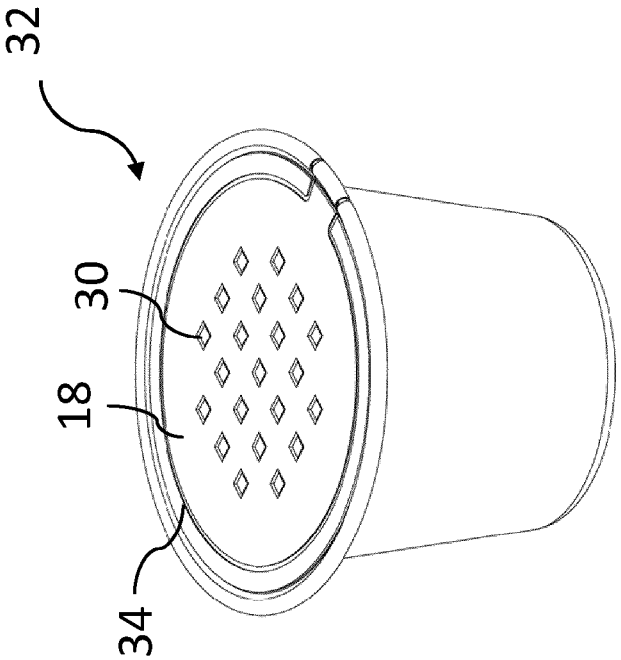

FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 23 20 4227

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X	WO 2008/017608 A1 (EUROPA 93 S R L [IT]; DALLA RIVA SERGIO [IT]) 14 February 2008 (2008-02-14) * claims 1-9; figures 1,3,6 *	1-15	
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B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	22 July 2024	Brochado Garganta, M

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