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(54) **CAPSULE FOR THE PREPARATION OF INFUSED BEVERAGES WITH IMPROVED EXTRACTION**

KAPSEL ZUR ZUBEREITUNG VON GETRÄNKEN

CAPSULE POUR LA PREPARATION DE BOISSONS

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**WO-A1-2011/154666 WO-A1-2011/154672
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Description

[0001] The subject-matter of the present invention is a single-dose capsule for the preparation of infusion or soluble beverages in an extraction device, comprising in particular infusion holes for the optimal infusion of water to the substance to be infused.

[0002] As is known, in the art is proposed a wide variety of automatic or semi-automatic machines equipped with a preparation and dispensing group capable of producing an infusion by passing water through a capsule containing the food substance to be infused, arranged within a suitable infusion chamber.

[0003] In particular, the known type of capsules comprise a cup, usually made of plastic material, equipped with a circular perimeter edge adapted to obtain a sealed engagement with a relevant abutment edge of the infusion chamber so as to avoid the leakage of hot water outside of the same infusion chamber. Examples of known capsules are disclosed in documents WO2011/154672 A1, WO2011/154666 A1 and WO2012/079959 A1.

[0004] The water is injected into the inner cavity of the capsule through special injection nozzles of the machine that dispense an adequate amount of water at a given pressure and temperature.

[0005] Obtaining an adequate perfusion of water throughout the food substance to be infused, contained in the inner cavity of the capsule, is one of the most significant problems in the specific sector.

[0006] In effect, some of the parameters that particularly influence the aroma and organoleptic properties of the infused beverage reside precisely in the timing and in the way the water flows through the food substance from the moment it is dispensed by the nozzles of the extraction machine to the moment it exits through the outlet opening of the capsule.

[0007] In particular, an excessively fast flow of water through the substance does not allow the water to optimally collect the aroma from the substance, generating a beverage with a less intense flavor; conversely, an excessively slow flow of water in the substance may generate a beverage flavor that is too intense or a failure to dispense the beverage in the desired timing.

[0008] In particular, in the field of coffee dispensing, the aforesaid problems are particularly significant, since, in the case of extraction machines with predetermined dispensing parameters (times and temperatures) (and therefore not variable at will), the need is felt to be able to obtain suitable timing and modes of passage of water through the food product so as to obtain an extracted beverage with the optimal desired flavor.

[0009] Furthermore, it is extremely important to be able to create a capsule that allows an optimal extraction of the food substance to be obtained while maintaining a simple geometry from the manufacturing perspective, especially for capsules wherein the cup is made through a process of thermoforming, which, as is known, does not

allow complex geometries to be achieved and often requires additional processing steps following thermoforming.

[0010] The object of the present invention is to make a capsule that overcomes the drawbacks mentioned above.

[0011] This object is obtained with a capsule and a method of manufacture in accordance with the accompanying independent claims; the claims dependent thereon describe preferred variant embodiments.

[0012] The features and advantages of the capsule and of the method according to the present invention will be apparent from the description given below, provided by way of non-limiting example, in accordance with the accompanying figures, wherein:

- Figure 1 shows an axonometric perspective view of a capsule according to the present invention;
- Figure 2 shows an axonometric perspective view of the capsule according to the present invention, without a bottom cover;
- Figure 3 shows a plan view from above of the capsule of Figure 2;
- Figure 3a shows a sectional view of the capsule in Figure 3 along the sectional plane A-A, including the bottom cover and the dispensing cover;
- Figure 3b shows a sectional view of the capsule in Figure 3 along the sectional plane B-B, including the bottom cover and the dispensing cover;
- Figure 4 shows an enlarged detail of Figure 3b, without the bottom cover;
- Figure 5 shows a section of an enlarged detail of a variant embodiment of the capsule according to the present invention;
- Figure 6 shows a manufacturing step of the capsule according to a variant embodiment of the present invention, wherein the capsule is inserted between a punch and a punching head of a bottom wall of the cup for the creation of holes;
- Figure 7 shows an axonometric perspective view in partial section of a cup of a capsule according to a variant embodiment of the present invention;
- Figure 7a shows an enlargement of a detail of Figure 7 near the bottom wall;
- Figure 8 shows a capsule manufacturing step according to a variant embodiment of the present invention, wherein the capsule is inserted between a punch and a cutting and folding head of a portion of the bottom wall of the cup for the creation of holes and respective cup fins.

[0013] With reference to the accompanying figures, a single-dose capsule of the type for the preparation of a beverage, for example coffee, infusion, decoction or the like, typically by means of extraction inside an extraction device, is indicated collectively at the reference number 10.

[0014] The capsule 10 comprises a hollow body called

a cup 1, which contains therein an inner cavity 11 for the containment of at least one food substance to be infused or extracted by means of a liquid under pressure, such as coffee or tea, typically in granular or powder form.

[0015] The cup comprises a bottom wall 4, intended to be penetrated by a liquid injected by the extraction device, typically hot water or other liquid food (e.g. milk), and a front end 6, opposite the bottom wall 4, defining a dispensing opening 5, intended to be penetrated by the extracted beverage.

[0016] The cup 1 comprises a side wall 2, extending around a central axis X and in height along said central axis X between the bottom wall 4 and the front end 6.

[0017] The front end 6 comprises a collar 7, projecting radially outwardly from the side wall 2, typically arranged at the free end of the side wall 2, with a rear face 7a facing the bottom wall 4 and suitable to create a seal when the capsule 10 is inserted in the extraction device.

[0018] The bottom wall 4 comprises a recessed region 41 towards the inner cavity 3. In particular, the recessed region is accommodated at least partially or totally in the inner cavity 3 of the capsule.

[0019] The capsule 10 further comprises a pierceable or yielding bottom cover 9 which closes the recessed region 41 and a pierceable or yielding dispensing cover 8 which closes the dispensing opening 5.

[0020] The central axis X is perpendicular to this bottom cover 9.

[0021] Preferably, the central axis X coincides with the axis of symmetry of the cup 1 and extends in the dispensing direction of the beverage. For example, when the cup has the form of a solid of rotation, the central axis X is the rotation axis of the solid of rotation.

[0022] The recessed region 41 is defined by at least one first wall 420 and a second wall 430 facing each other and spaced along a radial direction Y perpendicular to the central axis X. This first wall 420 and this second wall 430 are joined by a connecting wall 410 that does not cross the central axis X. Moreover, defining an imaginary plane P1 tangent to at least one portion of the first wall 420 and a second imaginary plane P2 tangent to at least one portion of the second wall 430, this first imaginary plane P1 and this second imaginary plane P2 are inclined so as to intersect the central axis X.

[0023] Furthermore, on said first wall 420 and on the second wall 430 first wall holes 421 and second wall holes 431 are formed respectively for the passage of the liquid injected by the extraction device into the inner cavity 11 of the capsule 10.

[0024] It is clear that the term "holes" or "hole" means any type of opening, of any shape, for example also a gap, a cut, a notch, or in any case a perforation of any kind, suitable to allow the passage of the liquid injected into the inner cavity 11.

[0025] Preferably, the side wall 2 has on the outside a substantially frusto-conical shape, for example formed by the succession of frusto-conical surfaces having various angular openings.

[0026] According to a variant embodiment, the bottom cover 9 is a thin film, preferably a thin film of aluminum or a plastic material, for example, a multilayer plastic material. According to a further variant embodiment, the bottom cover is a wall yielding under the action of the dispensing nozzles of the extraction device so as to create passages for the water to the recessed region 41.

[0027] At the front end 6, the cup 1 comprises a collar 7, typically arranged at the free end of side wall 2, projecting radially outwardly.

[0028] The collar 7 has a front face 7b facing the opening 5 of the cup 1, opposite to the rear face 7a.

[0029] The front face 7b of the collar 7 is intended to be joined with the annular peripheral region of the dispensing cover 8 which closes the cup 1 at the front end 6.

[0030] The rear face 7a of the collar 7 is, on the other hand, intended to engage with an abutment edge of the infusion chamber of the extraction device.

[0031] In this regard, for the extraction of the beverage, the capsule 10 is inserted into the extraction device in an infusion chamber adapted to house therein at least part of the cup 1 of the capsule 10.

[0032] The infusion chamber is movable between an open position, which allows the insertion and removal of the capsule 10, and a closed position. When the infusion chamber is in the closed position, it forms a closed chamber around the capsule 10 when the pressurized water is fed into said capsule 10 (through the bottom 4 and the recessed region 41) to carry out the step of infusing and extracting the beverage.

[0033] The infusion chamber has at least one opening to allow the beverage to flow into the final container, for example a coffee cup.

[0034] The watertight seal in the infusion chamber is obtained on the collar 7 of the capsule 10 by a compression edge of the extraction device that rests in sealed abutment against the rear face 7a of the collar 7 of the capsule 10.

[0035] Due to the simultaneous presence of first wall holes 421 and second wall holes 431, an adequate distribution of the infusion liquid (water) is assured within the inner cavity 11, and thus through the food product contained.

[0036] A preferred variant embodiment of the cup 1 provides that, being defined as an imaginary horizontal plane P3 tangent to at least one portion of the connecting wall 410, this imaginary horizontal plane is perpendicular to the central axis X; moreover, in this connecting wall 410 there are holes formed at the bottom 411 for the passage of the liquid injected by the extraction device into the inner cavity 11. The additional presence of the bottom holes 411 further contributes to an improved diffusion of the infusion liquid in the inner cavity.

[0037] Preferably, the recessed region 41 is an annular groove, arranged annularly to the central axis X, as for example shown in Figures 1 to 8.

[0038] In this variant, this annular groove is at least partially or totally defined by the first wall 420 and by the

second wall 430.

[0039] In one variant embodiment, for example shown in Figures 2 to 4 and 6 to 8, the first wall 420 is an annular inclined flat wall so that an imaginary extension thereof forms an acute angle of intersection α with a plane parallel to and passing through the central axis X. The second wall 430 is an annular inclined flat wall so that the angle of intersection α' , which an imaginary extension thereof forms with the plane parallel to and passing through the central axis X, is an obtuse angle. The angle of intersection α' is understood as measured in the same direction of measurement as the angle of intersection α .

[0040] The first wall 420 and the second wall 430 being flat walls, it is clear that the first imaginary plane P1 and the second imaginary plane P2 lie respectively on the first wall 420 and on the second wall 430.

[0041] Preferably, "annular inclined flat wall" means not only flat walls, but also means that this inclined flat wall, in a sectional view thereof along a plane passing through the central axis X, is a straight segment. In other words, for example, in a preferred embodiment shown in Figures 2 to 4 and 7, 7a, the first wall 420 has a frusto-conical shape that develops around the central axis X and the second wall 430 has a frusto-conical shape that develops around the central axis X at a distance from the first wall 420 and preferably with inverted taper.

[0042] In a variant embodiment, for example shown in Figure 5, the first wall 420 and the second wall 430, while not being annular walls, are not flat walls, but rather are curved walls or are curved walls at times or flat at times. In this case, therefore, as is clarified in Figure 5, there will be at least one point or region of the first wall 420 or of the second wall 430, wherein the first imaginary plane P1 or the second imaginary plane P2 will each be tangent to such point or region of the first wall 420 or the second wall 430. In this variant, therefore, the extension of the first imaginary plane P1 forms an acute angle of intersection α with a plane parallel to and passing through the central axis X, while the extension of the second imaginary plane P2 forms with the plane parallel to and passing through the central axis X an obtuse angle of intersection α' . As already mentioned, angle of intersection α' means measured in the same direction of measurement as the angle of intersection α .

[0043] In a preferred embodiment, the connecting wall 410 is a flat annular wall perpendicular to the central axis X and forming the bottom of the annular groove.

[0044] Preferably, each hole of the first wall holes 421 is arranged in front of a respective second wall hole 431, preferably in such a way that an imaginary plane P4 parallel to the central axis X and passing through the center of each first wall hole 421 and the center of a second wall hole 431 also passes through the central axis X, as, for example, shown in Figures 2 and 3.

[0045] With reference by way of example to Figure 3, in an advantageous variant embodiment, the first wall holes 421 are arranged along a first imaginary circumference C3 around the central axis X and are circumfer-

entially equidistant from each other, and the second wall holes 431 are arranged along a second imaginary circumference C1 around the central axis X and are circumferentially equidistant from each other. In particular, preferably, the circumference C1 is spaced from and coaxial to the circumference C2 around the axis X.

[0046] Preferably, the bottom holes 411 are arranged interspersed with respect to the first wall holes 421 and the second wall holes 431. In other words, by drawing an imaginary line I joining the center of a first wall hole 421 and the center of a second wall hole 431, this imaginary line I does not intersect the center of a bottom hole 411 and, preferably, does not intersect the entire bottom hole 411, and even more preferably does not intersect any bottom hole 411.

[0047] In a variant embodiment, the bottom holes 411 are arranged along a third imaginary circumference C2, which is concentric and interposed between the first C3 and the second imaginary circumference C1, as for example shown in Figure XX.

[0048] Preferably, the bottom holes 411 are circumferentially equidistant from each other by an angle at the center β equal to the angle at the center γ of which the first wall holes 421 and/or the second wall holes 431 are circumferentially spaced from each other.

[0049] In one embodiment, all the first wall holes 421, the second wall holes 431 and the bottom holes 411 have a circular shape. This embodiment is preferred for cups 1 made by thermoforming.

[0050] In another variant embodiment, the holes on the first wall 421 and the holes on the second wall 431 have a square shape, while the holes on the bottom 411 have a circular shape. This embodiment is preferred for cups 1 made by injection molding.

[0051] A particularly advantageous variant embodiment provides that the cup 1 comprises at least six bottom holes 411, at least six first wall holes 421 and at least six second wall holes 431.

[0052] A further variant embodiment of the capsule 10 comprises at least one fin 50, 51 near at least one first wall hole 421 and/or at least one second wall hole 431.

[0053] In particular, from an edge 421', 431' of at least one first wall hole 421 and/or at least one second wall hole 431, a fin 50, 51 protrudes towards the inside of the inner cavity 11.

[0054] This fin is made by folding along the edge 421', 431' of the first wall hole 421 and/or the second wall hole 431. In other words, the edge 421', 431' is the only anchoring region of the fin 50, 51 to the first wall 420 or to the second wall 430.

[0055] In particular, since the fin is obtained by partial cutting of the first wall 420 or the second wall 430, this fin 50, 51 has a shape complementary to the shape of the first wall hole 421 or of the second wall hole 431.

[0056] Preferably, the fin 50, 51 is inclined at an angle between 80 and 100° with respect to the first imaginary plane P1 if it projects from the first wall 420 or to the second imaginary plane P2 if it projects from the second

wall 430.

[0057] In one embodiment, the cup 1 is obtained by thermoforming starting from a multilayer sheet comprising an inner barrier-like layer arranged between two outer layers.

[0058] Preferably, the multilayer sheet is of the PP/EVOH/PP type, i.e., the barrier layer is made of ethylene vinyl alcohol (EVOH) material arranged between two outer layers of polypropylene (PP).

[0059] It is likewise the subject-matter of the present invention a method of manufacturing a cup 1 of a capsule 10 described in the present document, for example as shown in Figures 6 and 8.

[0060] The method comprises the steps of:

- molding a cup 1 made of plastic material in one piece, preferably by thermoforming, as described in the preceding paragraphs,
- inserting the cup 1 into a cutting or punching machine comprising a punch 100 resting on the bottom wall 4 on the side of the inner cavity 11 of the cup 1;
- by means of a cutting or punching head 101, cutting or punching, preferably simultaneously, the first wall 420 and the second wall 431 to create first wall holes 421 on said first wall 420 and second wall holes 431 on said second wall 430.

[0061] In a variant embodiment, in the step of cutting or punching the first wall 420 and the second wall 431 a portion of said first wall 421 and/or of said second wall 431 is folded in a manner that at least one fin 50, 51 protrudes from said first 420 and/or second wall 430 towards the inner cavity 11.

[0062] This is achieved by a cutting head comprising cutting or punching elements 101', 101" suitable for cutting the first or second wall 420, 430 to create the first or second wall holes 421, 431 and at the same time folding a portion of this first or second wall towards the inside of the cup 1 in the inner cavity 11 and obtaining the fin 50, 51.

[0063] In particular, each cutting or punching element 101', 101", comprises an inclined wall 101b, lying on an inclined plane intersecting the central axis X of the cup 1, so that this inclined wall 101b, in its movement of approaching and crossing the bottom wall 4 of the cup 1, folds a portion of the first 420 or the second wall 430 of the cup so as to create the fin 50, 51 and guide it towards the final position of inclination.

[0064] Moreover, each cutting or punching element 101', 101", preferably also comprises at least one vertical wall, substantially parallel to the central axis X of the cup, joined to the inclined wall 101b, so as to form a tip in the joint region suitable to cut the first 420 or the second wall 430 to make the first wall hole 421 or the second wall hole 431.

[0065] Preferably, whether a first wall hole 421 or a second wall hole 431 is made provided with a fin 50, 51 or without a fin 50, 51, i.e. a simple through hole, in the cutting or punching step, the cutting elements 101', 101",

in their movement through the bottom wall 4 of the cup 1, are each accommodated at least partially in a punch seat 100a, 100b, 100c, obtained in the punch 100. In this way, one ensures that the punch performs its function of supporting the bottom wall 4 of the cup during punching adequately while at the same time ensuring an adequate stroke of the cutting and punching elements within the cup.

[0066] Preferably, the cup 1 of the capsule 10 is obtained by thermoforming. In particular, the cup is made from a multilayer sheet comprising an inner barrier-type layer. Preferably, this barrier layer is fully wrapped within the adjacent layers of the multilayer sheet. In other words, the inner barrier-like layer never comes in contact with the outside.

[0067] Preferably, the inner layer is an oxygen barrier layer and is made of ethylene vinyl alcohol (EVOH) material.

[0068] For example, the multilayer sheet is of the PP/EVOH/PP type wherein polypropylene (PP) forms the outer layers of the sheet, i.e. the layers that wrap around and contain the inner barrier layer.

[0069] In a further example embodiment, at least one outer layer of the multilayer sheet is made of polyethylene (PE), and this layer forms the rear face 7a of the collar 7, which is intended to engage with an abutment edge of the infusion chamber of the extraction device. Advantageously, this technical solution improves the seal of the collar 7.

[0070] For example, the multilayer sheet is of the PP/EVOH/PP/PE type.

[0071] In a variant embodiment, the cup is obtained by injection molding of a plastic material, for example made of PBT.

[0072] Innovatively, the capsule according to the present invention overcomes the drawbacks mentioned with reference to the prior art, as it allows one to create a capsule that, due to the presence of holes arranged on both the first wall 420 and the second wall 430, allows the infusion water to be distributed in an optimal way in the food product to be infused and thus allows a beverage to be obtained with improved flavor with respect to the capsules of the prior art without this solution.

[0073] In particular, surprisingly, comparative taste tests conducted with respect to capsules of the prior art for making espresso coffee have shown that a capsule having holes arranged on both the first 420 and the second inclined wall 430, allows an improved quality and persistence of the flavor to be obtained, especially for the variant embodiments comprising also the bottom holes 411.

[0074] Moreover, in an innovative and advantageous way, the solution according to the present invention maintains a constructive geometry that is easy to obtain. In effect, the plurality of holes obtained directly on the cup with the surprising effect of improved the quality of the extracted beverage, especially with regards to coffee, does not require additional components to the cup (such

as filters or micro-perforated shower elements) and does not require special measures during the molding step of the cup.

[0075] Advantageously, therefore, the capsule according to the present invention may be used in different types of extraction machines ensuring an improved quality of the extracted beverage, regardless of the type of extraction machine.

[0076] Advantageously, the capsule according to the present invention is easily obtainable through a thermoforming process.

[0077] Furthermore, in an advantageous way, a variant embodiment provides for the presence of fins able to direct at will, according to the inclination of the fin, the flow of liquid within the cavity inside the cup and further improve the diffusion of the liquid. This variant is also simple to implement and does not require additional components to the cup or additional material. Furthermore, in an advantageous way, the fins are made in the same step as making the holes, thus allowing an improved production efficiency of the single capsule in terms of production time.

Claims

1. Capsule (10) for preparing a beverage in an extraction device, said capsule (10) comprising a cup (1) which houses an inner cavity (11) for containing a food substance,

said cup (1) comprising:

- a bottom wall (4) intended to be penetrated by a liquid injected by the extraction device,
- a front end (6), opposite the bottom wall (4), defining a dispensing opening (5) intended to be penetrated by the extracted beverage,
- a side wall (2) extending around a central axis (X) and in height along said central axis (X) between the bottom wall (4) and the front end (6);

said front end (6) comprising a collar (7) projecting radially outwardly from the side wall (2);

said collar (7) being provided with a rear face (7a) facing the bottom wall and adapted to provide a seal when the capsule (10) is inserted in the extraction device; said bottom wall (4) comprising a recessed region (41) towards the inner cavity (3);

said capsule (10) comprising a bottom cover (9) which closes the recessed region (41) and a dispensing cover (8) which closes the dispensing opening (5),

said central axis (X) being perpendicular to the bottom cover (9),

said capsule (10) being **characterized in that** the recessed region (41) is defined at least by a first wall (420) and a second wall (430) facing each other and spaced along a radial direction (Y) perpendicular to the central axis (X), said first wall (420) and said second wall (430) being joined together by a connecting wall (410) which does not cross the central axis (X),

wherein, being defined a first imaginary plane (P1) tangent to at least a portion of the first wall (420) and a second imaginary plane (P2) tangent to at least a portion of the second wall (430), said first imaginary plane (P1) and said second imaginary plane (P2) is inclined so as to intersect the central axis (X),

and wherein on said first wall (420) and on said second wall (430) first wall holes (421) and second wall holes (431) are formed, respectively, for the passage of the liquid injected by the extraction device into the inner cavity (11).

2. Capsule (1) according to claim 1, wherein a horizontal imaginary plane (P3) is defined tangent to at least a portion of the connecting wall (410), said horizontal imaginary plane is perpendicular to the central axis (X), and wherein bottom holes (411) are formed in said connecting wall (410) for the passage of the liquid injected by the extraction device into the inner cavity (11).
3. Capsule (10) according to claim 1 or 2, wherein the recessed region (41) is an annular groove, arranged annularly to the central axis (X).
4. Capsule (10) according to claim 3, wherein the annular groove is at least partially or totally defined by the first wall (420) and the second wall (430), wherein said first wall (420) is a flat annular inclined wall in a manner such that an imaginary extension thereof forms an acute intersection angle (α) with a parallel plane passing through the central axis (X) and wherein said second wall (430) is an annular inclined plane wall in such a way that the intersection angle (α) that an imaginary extension thereof forms with the plane parallel to and passing through the central axis (X) is an obtuse angle.
5. Capsule (10) according to claim 3, wherein the first wall (420) has a frusto-conical shape which develops around the central axis (X) and the second wall (430) has a frusto-conical shape which develops around the central axis (X) at a distance with respect to the first wall (420), preferably with inverted taper.
6. Capsule (10) according to claim 4 or 5, wherein the connecting wall (410) is an annular flat wall perpendicular to the central axis (X) and forming the bottom of the annular groove.

7. Capsule (10) according to any one of the preceding claims, wherein each hole of the first wall holes (421) is arranged in front of a respective second wall hole (431), preferably in such a way that an imaginary plane (P4) parallel to the central axis (X) passing through the center of each first wall hole (421) and the center of a second wall hole (431) also passes through the central axis (X). 5
8. Capsule (10) according to any one of the preceding claims, wherein the first wall holes (421) are arranged along a first imaginary circumference (C3) about the central axis (X) and are circumferentially spaced from each other and the second wall holes (431) are arranged along a second imaginary circumference (C1) around the central axis (X) and are circumferentially spaced from each other. 10 15
9. Capsule (10) according to any one of claims 2 to 8, wherein the bottom holes (411) are arranged in a manner interspersed with respect to the first wall holes (421) and to the second wall holes (431). 20
10. Capsule (10) according to claim 9, wherein the bottom holes (411) are arranged along a third imaginary circumference (C2), concentric and interposed between the first (C3) and the second imaginary circumference (C1). 25
11. Capsule (10) according to any one of claims 2 to 10, comprising at least six bottom holes (411), at least six first wall holes (421) and at least six second wall holes (431). 30
12. Capsule (10) according to any one of the preceding claims, wherein from an edge (421', 431') of at least one first wall hole (421) and/or at least one second wall hole (431) protrudes a fin (50, 51) towards the inside of the inner cavity (11). 35 40
13. Capsule (10) according to any one of the preceding claims, wherein the cup (1) is obtained by thermoforming starting from a multilayer sheet comprising an inner barrier-like layer arranged between two outer layers. 45
14. Method of manufacturing a cup (1) of a capsule (10) according to any one of the preceding claims, comprising the steps of: 50
- molding a cup (1) made of plastic material in one piece, said molded cup comprising a bottom wall (4), a front end (6), opposite the bottom wall (4), defining a dispensing opening (5) intended to be traversed by the extracted beverage, a side wall (2) extending around a central axis (X) and in height along said central axis (X) between the bottom wall (4) and the front end (6); said front end (6) comprising a collar (7) projecting radially outwardly from the side wall (2); said collar (7) being provided with a rear face (7a) facing the bottom wall and adapted to provide a seal when the capsule (10) is inserted in the extraction device; said bottom wall (4) comprising a recessed region (41) towards the inner cavity (11), wherein the recessed region (41) is defined at least by a first wall (420) and a second wall (430) facing each other and spaced along a radial direction (Y) perpendicular to the central axis (X), said first wall (420) and said second wall (430) being joined together by a connecting wall (410) which does not cross the central axis (X), wherein, being defined a first imaginary plane (P1) tangent to at least a portion of the first wall (420) and a second imaginary plane (P2) tangent to at least a portion of the second wall (430), said first imaginary plane (P1) and said second imaginary plane (P2) is inclined so as to intersect the central axis (X);
 - inserting the cup (1) into a cutting or punching machine comprising a punch (100) resting on the bottom wall (4) on the side of the inner cavity (3);
 - by means of a cutting or punching head (101), cutting or punching, preferably simultaneously, said first wall (420) and said second wall (431) to create first wall holes (421) on said first wall (420) and second wall holes (431) on said second wall (430).
15. Method according to claim 14, wherein in the step of cutting or punching said first wall (420) and said second wall (431) a portion of said first wall (421) and/or of said second wall (431) is folded in a manner that at least one fin (50, 51) protrudes from said first and/or second wall (420, 430) towards the inner cavity (11). 55

Patentansprüche

1. Eine Kapsel (10) für die Zubereitung eines Getränks in einer Extraktionsvorrichtung, wobei die genannte Kapsel (10) einen Becher (1) umfasst, der einen inneren Hohlraum (11) zur Aufnahme einer Nahrungsmittelsubstanz umschließt,

wobei der genannte Becher (1) Folgendes umfasst:

- eine Bodenwand (4), die dazu bestimmt ist, von einer durch die Extraktionsvorrichtung eingespritzten Flüssigkeit durchdrungen zu werden,

- ein frontales Ende (6), das der Bodenwand (4) gegenüberliegt und eine Ausgabeöffnung (5) definiert, die dazu bestimmt ist, vom extrahierten Getränk durchquert zu werden,
- eine Seitenwand (2), die sich um eine Mittelachse (X) und in der Höhe entlang dieser Mittelachse (X) zwischen der Bodenwand (4) und dem frontalen Ende (6) erstreckt;

wobei das genannte frontale Ende (6) einen Kragen (7) umfasst, der von der Seitenwand (2) radial nach außen ragt;

wobei der genannte Kragen (7) mit einer hinteren Fläche (7a) versehen ist, die der Bodenwand zugewandt ist und dazu angepasst ist, eine Dichtung zu bilden, wenn die Kapsel (10) in die Extraktionsvorrichtung eingeführt wird;

wobei die genannte Bodenwand (4) einen vertieften Bereich (41) zum inneren Hohlraum (3) hin umfasst;

wobei die genannte Kapsel (10) einen Bodendeckel (9) umfasst, der den vertieften Bereich (41) verschließt, und einen Ausgabedeckel (8), der die Ausgabeöffnung (5) verschließt,

wobei die genannte Mittelachse (X) senkrecht zum Bodendeckel (9) verläuft,

wobei die genannte Kapsel (10) **dadurch gekennzeichnet ist, dass** der vertiefte Bereich (41) zumindest durch eine erste Wand (420) und eine zweite Wand (430) definiert ist, die einander gegenüberliegen und entlang einer radialen Richtung (Y) senkrecht zur Mittelachse (X) beabstandet sind, wobei die genannte erste Wand (420) und die genannte zweite Wand (430) durch eine Verbindungswand (410) miteinander verbunden sind, die die Mittelachse (X) nicht kreuzt,

wobei, wenn eine erste imaginäre Ebene (P1), die zumindest einen Abschnitt der ersten Wand (420) tangiert, und eine zweite imaginäre Ebene (P2), die zumindest einen Abschnitt der zweiten Wand (430) tangiert, definiert sind, die genannte erste imaginäre Ebene (P1) und die genannte zweite imaginäre Ebene (P2) so geneigt sind, dass sie die Mittelachse (X) schneiden,

und wobei an der genannten ersten Wand (420) und an der genannten zweiten Wand (430) erste Wandlöcher (421) bzw. zweite Wandlöcher (431) für den Durchgang der von der Extraktionsvorrichtung in den inneren Hohlraum (11) eingespritzten Flüssigkeit ausgebildet sind.

2. Die Kapsel (1) nach Anspruch 1, wobei eine horizontale imaginäre Ebene (P3) tangential zu mindestens einem Abschnitt der Verbindungswand (410) definiert ist, wobei die genannte horizontale imaginäre Ebene senkrecht zur Mittelachse (X) ist, und wobei

in der genannten Verbindungswand (410) Bodenlöcher (411) für den Durchgang der von der Extraktionsvorrichtung in den inneren Hohlraum (11) eingespritzten Flüssigkeit ausgebildet sind.

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3. Die Kapsel (10) nach Anspruch 1 oder 2, wobei der vertiefte Bereich (41) eine ringförmige Nut ist, die ringförmig zur Mittelachse (X) angeordnet ist.

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4. Die Kapsel (10) nach Anspruch 3, wobei die ringförmige Nut zumindest teilweise oder vollständig durch die erste Wand (420) und die zweite Wand (430) definiert ist, wobei die genannte erste Wand (420) eine flache, ringförmige, geneigte Wand ist, derart, dass eine imaginäre Verlängerung derselben einen spitzen Schnittwinkel (α) mit einer parallelen, durch die Mittelachse (X) verlaufenden Ebene bildet, und wobei die genannte zweite Wand (430) eine ringförmige, geneigte, ebene Wand ist, derart, dass der Schnittwinkel (α), den eine imaginäre Verlängerung derselben mit der zur Mittelachse (X) parallelen und durch diese verlaufenden Ebene bildet, ein stumpfer Winkel ist.

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5. Die Kapsel (10) nach Anspruch 3, wobei die erste Wand (420) eine kegelstumpfförmige Form aufweist, die sich um die Mittelachse (X) herum entwickelt, und die zweite Wand (430) eine kegelstumpfförmige Form aufweist, die sich um die Mittelachse (X) herum in einem Abstand zur ersten Wand (420) entwickelt, vorzugsweise mit umgekehrter Konizität.

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6. Die Kapsel (10) nach Anspruch 4 oder 5, wobei die Verbindungswand (410) eine ringförmige ebene Wand ist, die senkrecht zur Mittelachse (X) steht und den Boden der ringförmigen Nut bildet.

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7. Die Kapsel (10) nach irgendeinem der vorstehenden Ansprüche, wobei jedes Loch der ersten Wandlöcher (421) vor einem jeweiligen zweiten Wandloch (431) angeordnet ist, vorzugsweise so, dass eine zur Mittelachse (X) parallele imaginäre Ebene (P4), die durch den Mittelpunkt jedes ersten Wandlochs (421) und den Mittelpunkt eines zweiten Wandlochs (431) geht, auch durch die Mittelachse (X) geht.

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8. Die Kapsel (10) nach irgendeinem der vorstehenden Ansprüche, wobei die ersten Wandlöcher (421) entlang eines ersten imaginären Umfangs (C3) um die Mittelachse (X) angeordnet sind und voneinander in Umfangsrichtung beabstandet sind und wobei die zweiten Wandlöcher (431) entlang eines zweiten imaginären Umfangs (C1) um die Mittelachse (X) angeordnet sind und voneinander in Umfangsrichtung beabstandet sind.

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9. Die Kapsel (10) nach irgendeinem der Ansprüche von 2 bis 8, wobei die Bodenlöcher (411) relativ zu

den ersten Wandlöchern (421) und den zweiten Wandlöchern (431) eingestreut (*interspersed*) angeordnet sind.

10. Die Kapsel (10) nach Anspruch 9, wobei die Bodenlöcher (411) entlang eines dritten imaginären Umfangs (C2) angeordnet sind, der konzentrisch und zwischen dem ersten (C3) und dem zweiten imaginären Umfang (C1) angeordnet ist. 5
11. Die Kapsel (10) nach irgendeinem der Ansprüche von 2 bis 10, die mindestens sechs Bodenlöcher (411), mindestens sechs erste Wandlöcher (421) und mindestens sechs zweite Wandlöcher (431) umfasst. 10
12. Die Kapsel (10) nach irgendeinem der vorstehenden Ansprüche, wobei von einer Kante (421', 431') mindestens eines ersten Wandlochs (421) und/oder mindestens eines zweiten Wandlochs (431) eine Rippe (50, 51) in Richtung der Innenseite des inneren Hohlraums (11) vorsteht. 20
13. Die Kapsel (10) nach irgendeinem der vorstehenden Ansprüche, wobei der Becher (1) durch Thermoformen ausgehend von einer mehrschichtigen Folie erhalten wird, die eine zwischen zwei Außenschichten angeordnete innere barriereartige Schicht umfasst. 25
14. Ein Verfahren zur Herstellung eines Bechers (1) einer Kapsel (10) nach irgendeinem der vorstehenden Ansprüche, das die folgenden Schritte umfasst: 30
 - Formen eines Bechers (1) aus Kunststoff in einem Stück, wobei der genannte geformte Becher eine Bodenwand (4), ein frontales Ende (6), das der Bodenwand (4) gegenüberliegt und eine Ausgabeöffnung (5) definiert, die dazu bestimmt ist, vom extrahierten Getränk durchquert zu werden, und eine Seitenwand (2) umfasst, die sich um eine Mittelachse (X) und in der Höhe entlang der Mittelachse (X) zwischen der Bodenwand (4) und dem frontalen Ende (6) erstreckt; wobei das genannte frontale Ende (6) einen Kragen (7) umfasst, der von der Seitenwand (2) radial nach außen ragt; 35
 - wobei der genannte Kragen (7) mit einer hinteren Fläche (7a) versehen ist, die der Bodenwand zugewandt ist und dazu angepasst ist, eine Dichtung zu bilden, wenn die Kapsel (10) in die Extraktionsvorrichtung eingeführt ist; 40
 - wobei die genannte Bodenwand (4) einen vertieften Bereich (41) zum inneren Hohlraum (11) hin umfasst, 45
 - wobei der vertiefte Bereich (41) zumindest durch eine erste Wand (420) und eine zweite Wand (430) definiert ist, die einander gegenüberliegen und entlang einer radialen Richtung

(Y) senkrecht zur Mittelachse (X) beabstandet sind, wobei die genannte erste Wand (420) und die genannte zweite Wand (430) durch eine Verbindungswand (410) miteinander verbunden sind, die die Mittelachse (X) nicht kreuzt, wobei, wenn eine erste imaginäre Ebene (P1), die zumindest einen Abschnitt der ersten Wand (420) tangiert, und eine zweite imaginäre Ebene (P2), die zumindest einen Abschnitt der zweiten Wand (430) tangiert, definiert sind, die genannte erste imaginäre Ebene (P1) und die genannte zweite imaginäre Ebene (P2) so geneigt sind, dass sie die Mittelachse (X) schneiden,

- Einsetzen des Bechers (1) in eine Schneid- oder Stanzmaschine, die einen Stempel (100) umfasst, der auf der Bodenwand (4) auf der Seite des inneren Hohlraums (3) aufliegt;
- mittels eines Schneid- oder Stanzkopfes (101), Schneiden oder Stanzen, vorzugsweise gleichzeitig, der genannten ersten Wand (420) und der genannten zweiten Wand (431) um erste Wandlöcher (421) an der genannten ersten Wand (420) und zweite Wandlöcher (431) an der genannten zweiten Wand (430) zu erzeugen.

15. Das Verfahren nach Anspruch 14, wobei im Schritt des Schneidens oder Stanzens der genannten ersten Wand (420) und der genannten zweiten Wand (431) ein Abschnitt der genannten ersten Wand (421) und/oder der genannten zweiten Wand (431) so gefaltet wird, dass mindestens eine Rippe (50, 51) von der genannten ersten und/oder der genannten zweiten Wand (420, 430) in Richtung des inneren Hohlraums (11) vorsteht. 30

Revendications 40

1. Capsule (10) pour la préparation d'une boisson dans un dispositif d'extraction, ladite capsule (10) comprenant une coupelle (1) qui héberge une cavité interne (11) prévue pour contenir une substance alimentaire, ladite coupelle (1) comprenant : 45
 - une paroi inférieure (4) destinée à être pénétrée par un liquide injecté par le dispositif d'extraction,
 - une extrémité avant (6), opposée à la paroi inférieure (4), définissant une ouverture de distribution (5) destinée à être pénétrée par la boisson extraite,
 - une paroi latérale (2) s'étendant autour d'un axe central (X) et en hauteur le long dudit axe central (X) entre la paroi inférieure (4) et l'extrémité avant (6) ; 50

- ladite extrémité avant (6) comprenant un rebord (7) faisant saillie radialement vers l'extérieur à partir de la paroi latérale (2) ;
 ledit rebord (7) étant muni d'une face arrière (7a) faisant face à la paroi inférieure et adaptée pour fournir un joint d'étanchéité lorsque la capsule (10) est insérée dans le dispositif d'extraction ;
 ladite paroi inférieure (4) comprenant une région en retrait (41) vers la cavité interne (3) ;
 ladite capsule (10) comprenant un couvercle inférieur (9) qui ferme la région en retrait (41) et un couvercle de distribution (8) qui ferme l'ouverture de distribution (5),
 ledit axe central (X) étant perpendiculaire au couvercle inférieur (9),
 ladite capsule (10) étant **caractérisée en ce que** la région en retrait (41) est définie au moins par une première paroi (420) et une seconde paroi (430) se faisant face et espacées le long d'une direction radiale (Y) perpendiculaire à l'axe central (X), ladite première paroi (420) et ladite seconde paroi (430) étant réunies par une paroi de liaison (410) qui ne croise pas l'axe central (X),
 dans lequel, étant définis un premier plan imaginaire (P1) tangent à au moins une partie de la première paroi (420) et un second plan imaginaire (P2) tangent à au moins une partie de la seconde paroi (430), ledit premier plan imaginaire (P1) et ledit second plan imaginaire (P2) sont inclinés de façon à faire intersection avec l'axe central (X),
 et dans lequel sur ladite première paroi (420) et sur ladite seconde paroi (430), des trous de première paroi (421) et des trous de seconde paroi (431) sont formés, respectivement, pour le passage du liquide injecté par le dispositif d'extraction dans la cavité interne (11).
2. Capsule (1) selon la revendication 1, dans laquelle un plan imaginaire horizontal (P3) est défini de manière tangente à au moins une partie de la paroi de liaison (410), ledit plan imaginaire horizontal est perpendiculaire à l'axe central (X), et dans lequel des trous inférieurs (411) sont formés dans ladite paroi de liaison (410) pour le passage du liquide injecté par le dispositif d'extraction dans la cavité interne (11).
 3. Capsule (10) selon la revendication 1 ou 2, dans laquelle la région en retrait (41) est une rainure annulaire, agencée de manière annulaire par rapport à l'axe central (X).
 4. Capsule (10) selon la revendication 3, dans laquelle la rainure annulaire est au moins partiellement ou totalement définie par la première paroi (420) et la seconde paroi (430), dans laquelle ladite première paroi (420) est une paroi inclinée annulaire plate d'une manière telle qu'une extension imaginaire de celle-ci forme un angle d'intersection (α) aigu avec un plan parallèle passant par l'axe central (X) et dans laquelle ladite seconde paroi (430) est une paroi plane inclinée annulaire d'une manière telle que l'angle d'intersection (α) qu'une extension imaginaire de celle-ci forme avec le plan parallèle à et passant par l'axe central (X) est un angle obtus.
 5. Capsule (10) selon la revendication 3, dans laquelle la première paroi (420) possède une forme tronconique qui se développe autour de l'axe central (X) et la seconde paroi (430) possède une forme tronconique qui se développe autour de l'axe central (X) à une certaine distance par rapport à la première paroi (420), de préférence à cône renversé.
 6. Capsule (10) selon la revendication 4 ou 5, dans laquelle la paroi de liaison (410) est une paroi plate annulaire perpendiculaire à l'axe central (X) et formant le fond de la rainure annulaire.
 7. Capsule (10) selon l'une quelconque des revendications précédentes, dans laquelle chaque trou des trous de première paroi (421) est agencé devant un trou de seconde paroi (431) respectif, de préférence d'une manière telle qu'un plan imaginaire (P4) parallèle à l'axe central (X) passant par le centre de chaque trou de première paroi (421) et le centre d'un trou de seconde paroi (431) passe également par l'axe central (X).
 8. Capsule (10) selon l'une quelconque des revendications précédentes, dans laquelle les trous de première paroi (421) sont agencés le long d'une première circonférence imaginaire (C3) autour de l'axe central (X) et sont espacés de manière circonférentielle les uns des autres et les trous de seconde paroi (431) sont agencés le long d'une deuxième circonférence imaginaire (C1) autour de l'axe central (X) et sont espacés de manière circonférentielle les uns des autres.
 9. Capsule (10) selon l'une quelconque des revendications 2 à 8, dans laquelle les trous inférieurs (411) sont agencés d'une manière alternés par rapport aux trous de première paroi (421) et aux trous de seconde paroi (431).
 10. Capsule (10) selon la revendication 9, dans laquelle les trous inférieurs (411) sont agencés le long d'une troisième circonférence imaginaire (C2), concentrique et interposée entre la première (C3) et la deuxième circonférence imaginaire (C1).
 11. Capsule (10) selon l'une quelconque des revendications 2 à 10, comprenant au moins six trous inférieurs

(411), au moins six trous de première paroi (421) et au moins six trous de seconde paroi (431).

- 12.** Capsule (10) selon l'une quelconque des revendications précédentes, dans laquelle à partir d'un bord (421', 431') d'au moins un trou de première paroi (421) et/ou d'au moins un trou de seconde paroi (431), fait saillie une ailette (50, 51) vers l'intérieur de la cavité interne (11).

- 13.** Capsule (10) selon l'une quelconque des revendications précédentes, dans laquelle la coupelle (1) est obtenue par thermoformage en partant d'une feuille multicouche comprenant une couche interne de type barrière agencée entre deux couches externes.

- 14.** Procédé de fabrication d'une coupelle (1) d'une capsule (10) selon l'une quelconque des revendications précédentes, comprenant les étapes de :

- le moulage d'une coupelle (1) constituée de matière plastique d'un seul tenant, ladite coupelle moulée comprenant une paroi inférieure (4), une extrémité avant (6), opposée à la paroi inférieure (4), définissant une ouverture de distribution (5) destinée à être traversée par la boisson extraite, une paroi latérale (2) s'étendant autour d'un axe central (X) et en hauteur le long dudit axe central (X) entre la paroi inférieure (4) et l'extrémité avant (6) ;
 ladite extrémité avant (6) comprenant un rebord (7) faisant saillie radialement vers l'extérieur à partir de la paroi latérale (2) ;
 ledit rebord (7) étant muni d'une face arrière (7a) faisant face à la paroi inférieure et adaptée pour fournir un joint d'étanchéité lorsque la capsule (10) est insérée dans le dispositif d'extraction ;
 ladite paroi inférieure (4) comprenant une région en retrait (41) vers la cavité interne (11), dans lequel la région en retrait (41) est définie au moins par une première paroi (420) et une seconde paroi (430) se faisant face et espacées le long d'une direction radiale (Y) perpendiculaire à l'axe central (X), ladite première paroi (420) et ladite seconde paroi (430) étant réunies par une paroi de liaison (410) qui ne croise pas l'axe central (X),
 dans lequel, étant définis un premier plan imaginaire (P1) tangent à au moins une partie de la première paroi (420) et un second plan imaginaire (P2) tangent à au moins une partie de la seconde paroi (430), ledit premier plan imaginaire (P1) et ledit second plan imaginaire (P2) sont inclinés de façon à faire intersection avec l'axe central (X) ;

- l'insertion de la coupelle (1) dans une machine de découpe ou de poinçonnage com-

prenant un poinçon (100) reposant sur la paroi inférieure (4) sur le côté de la cavité interne (3) ;

- au moyen d'une tête de découpe ou de poinçonnage (101), la découpe ou le poinçonnage, de préférence simultanément, de ladite première paroi (420) et de ladite seconde paroi (431) pour créer des trous de première paroi (421) sur ladite première paroi (420) et des trous de seconde paroi (431) sur ladite seconde paroi (430).

- 15.** Procédé selon la revendication 14, dans lequel à l'étape de découpe ou de poinçonnage de ladite première paroi (420) et de ladite seconde paroi (431), une partie de ladite première paroi (421) et/ou de ladite seconde paroi (431) est pliée d'une manière telle qu'au moins une ailette (50, 51) fasse saillie à partir de ladite première et/ou seconde paroi (420, 430) vers la cavité interne (11).

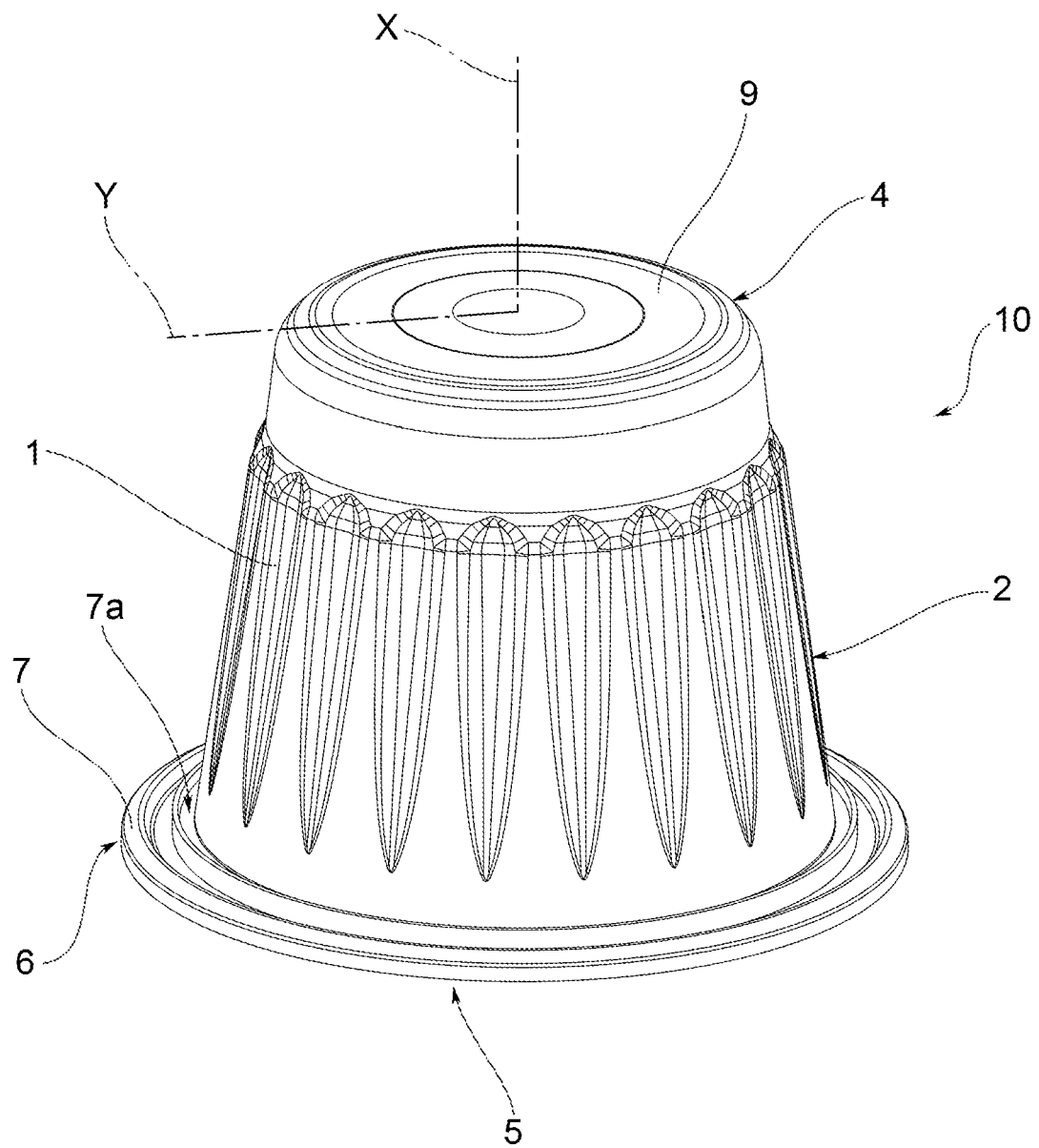


FIG.1

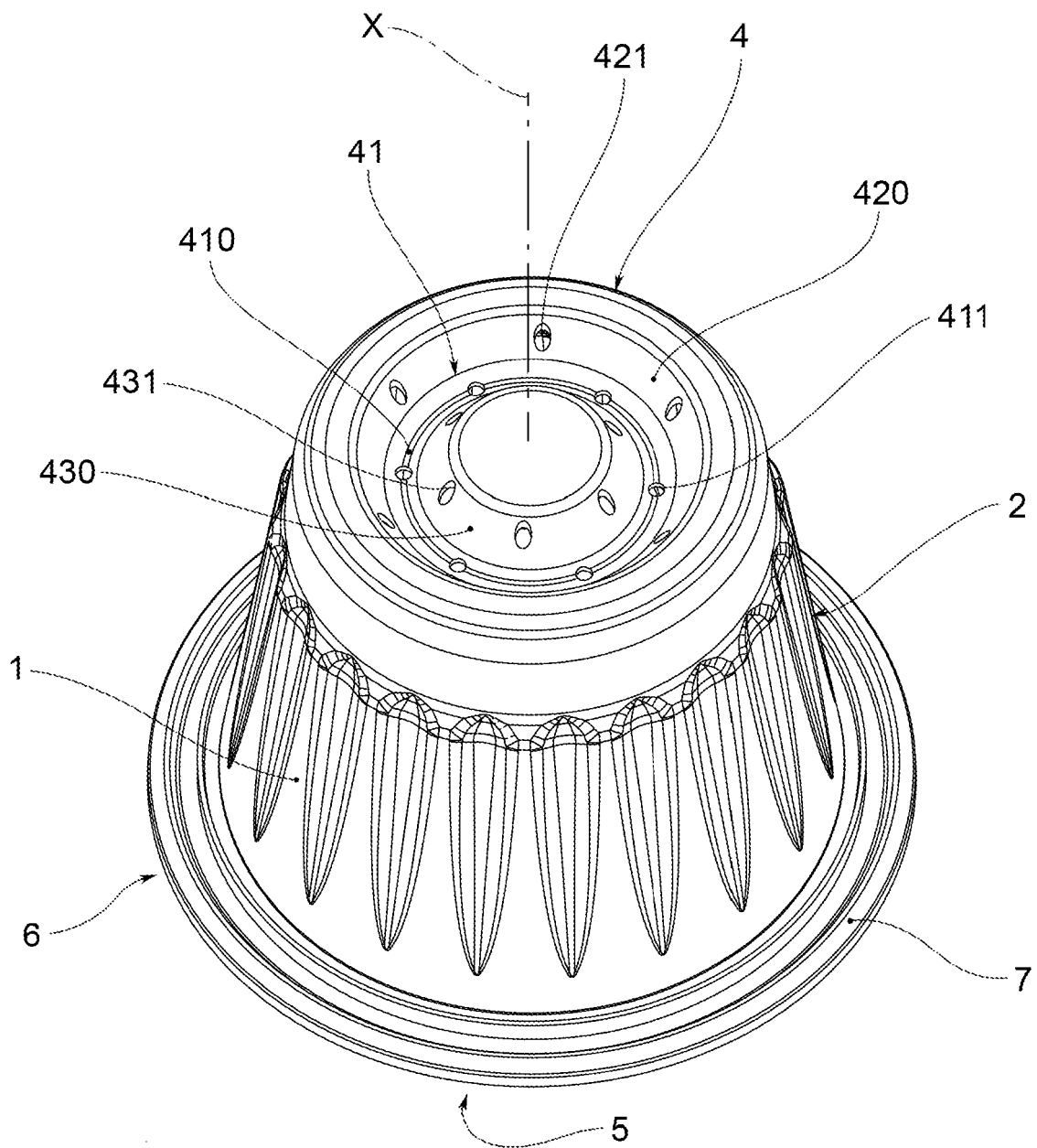


FIG.2

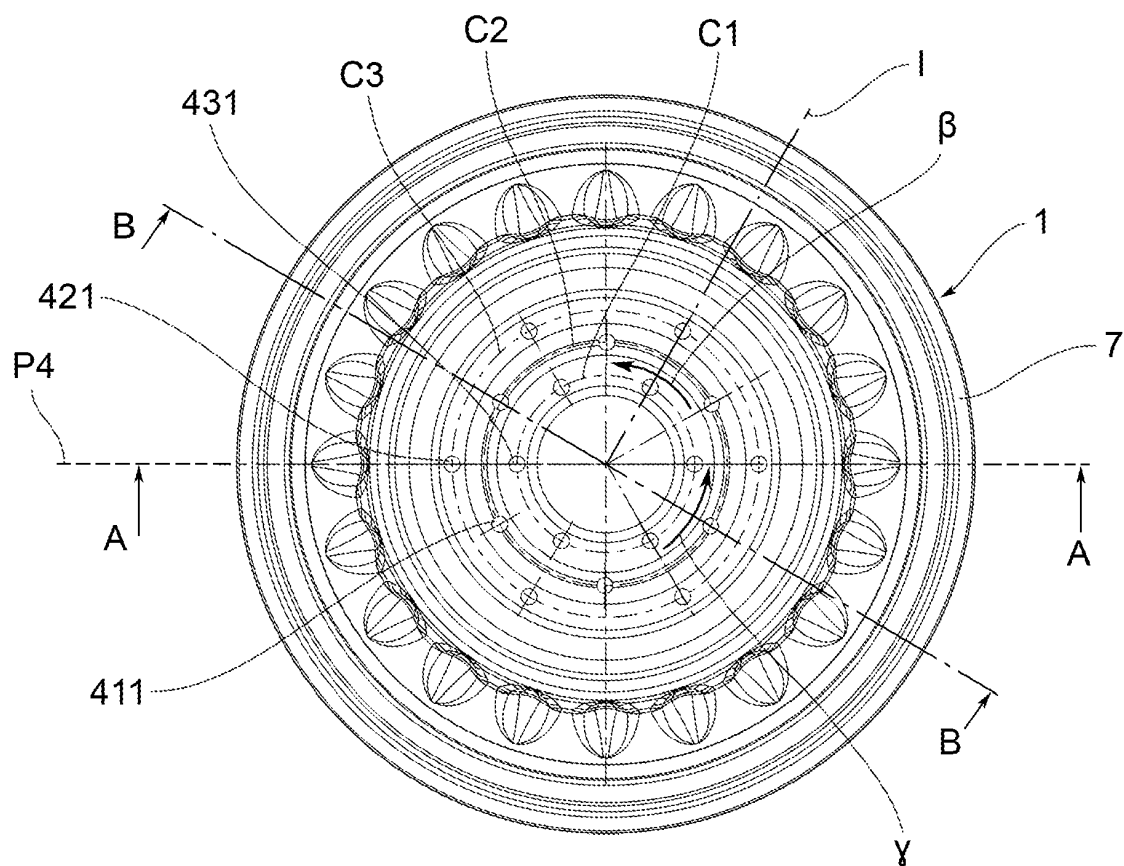
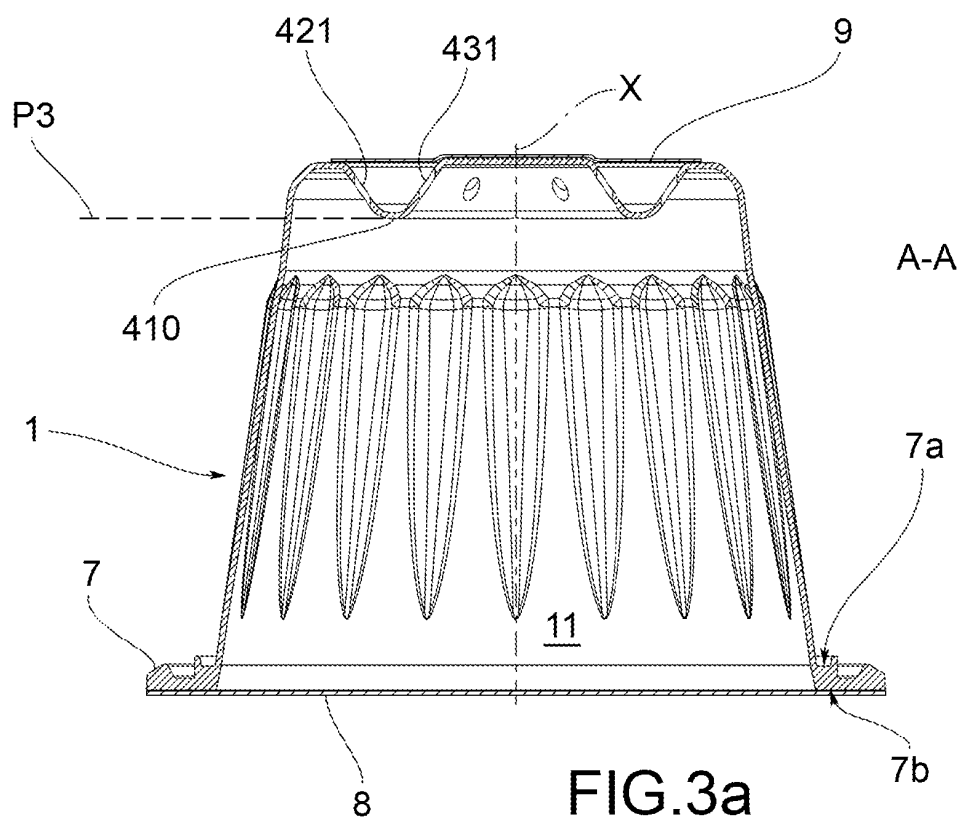
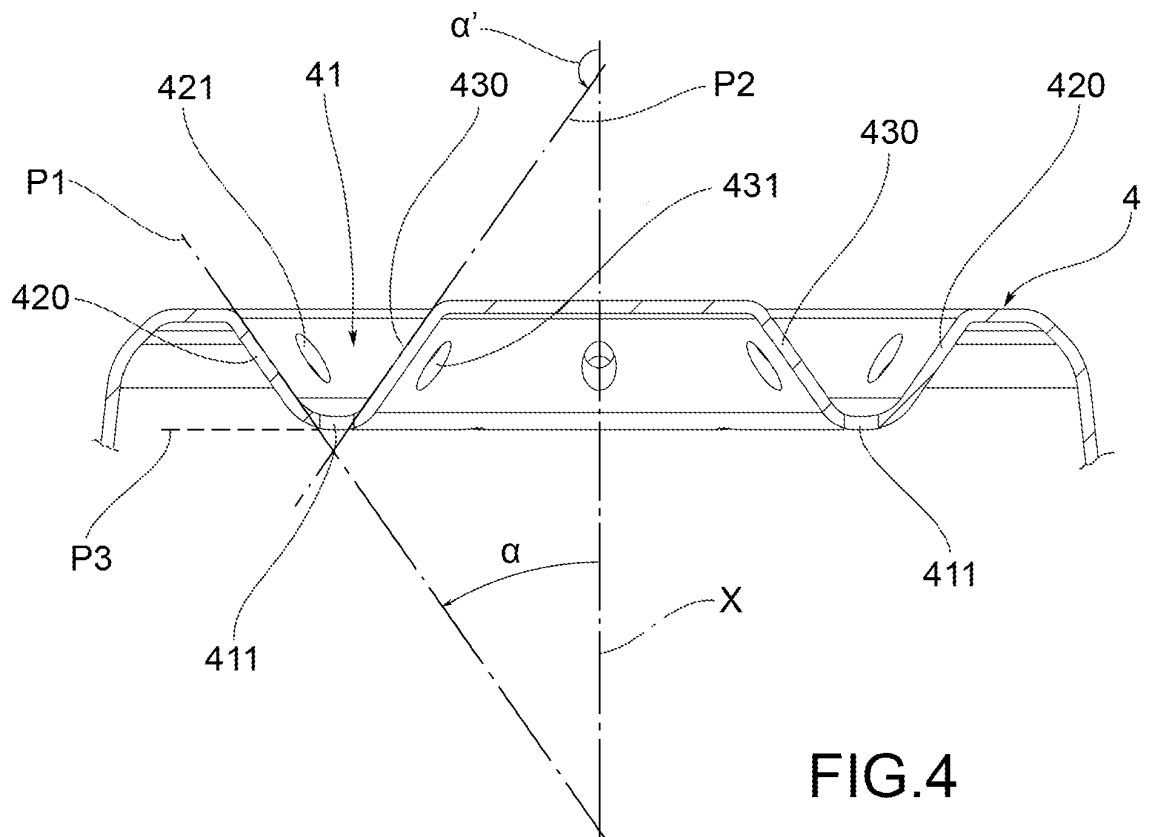
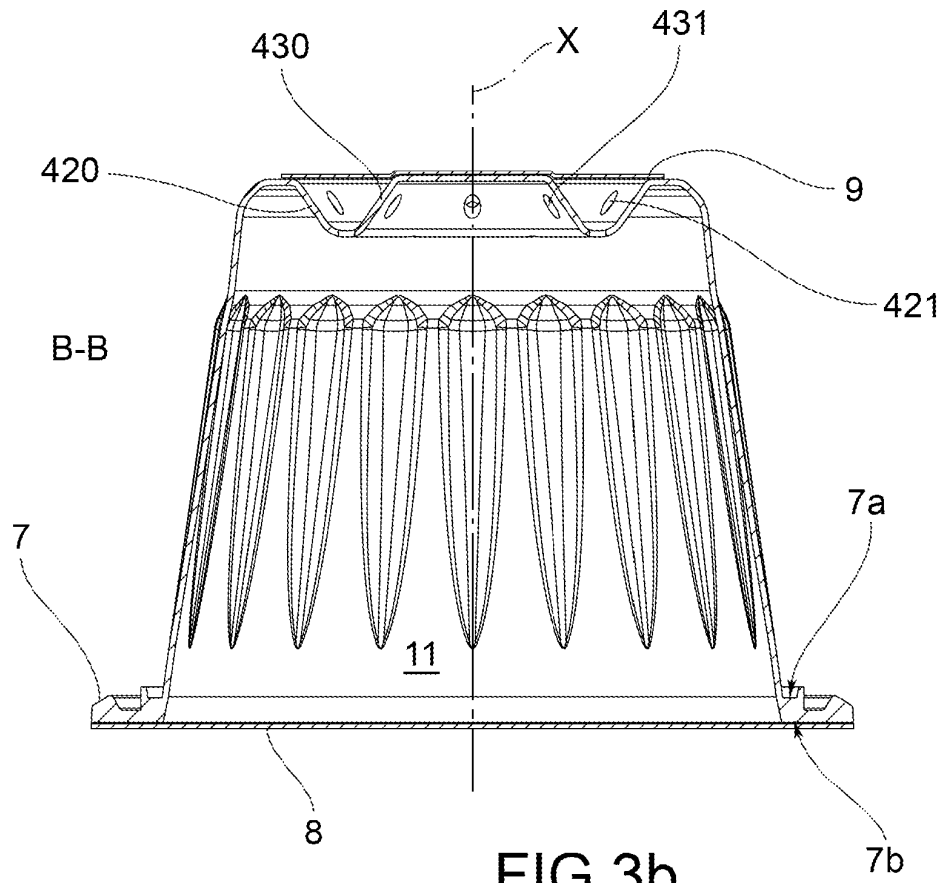


FIG.3





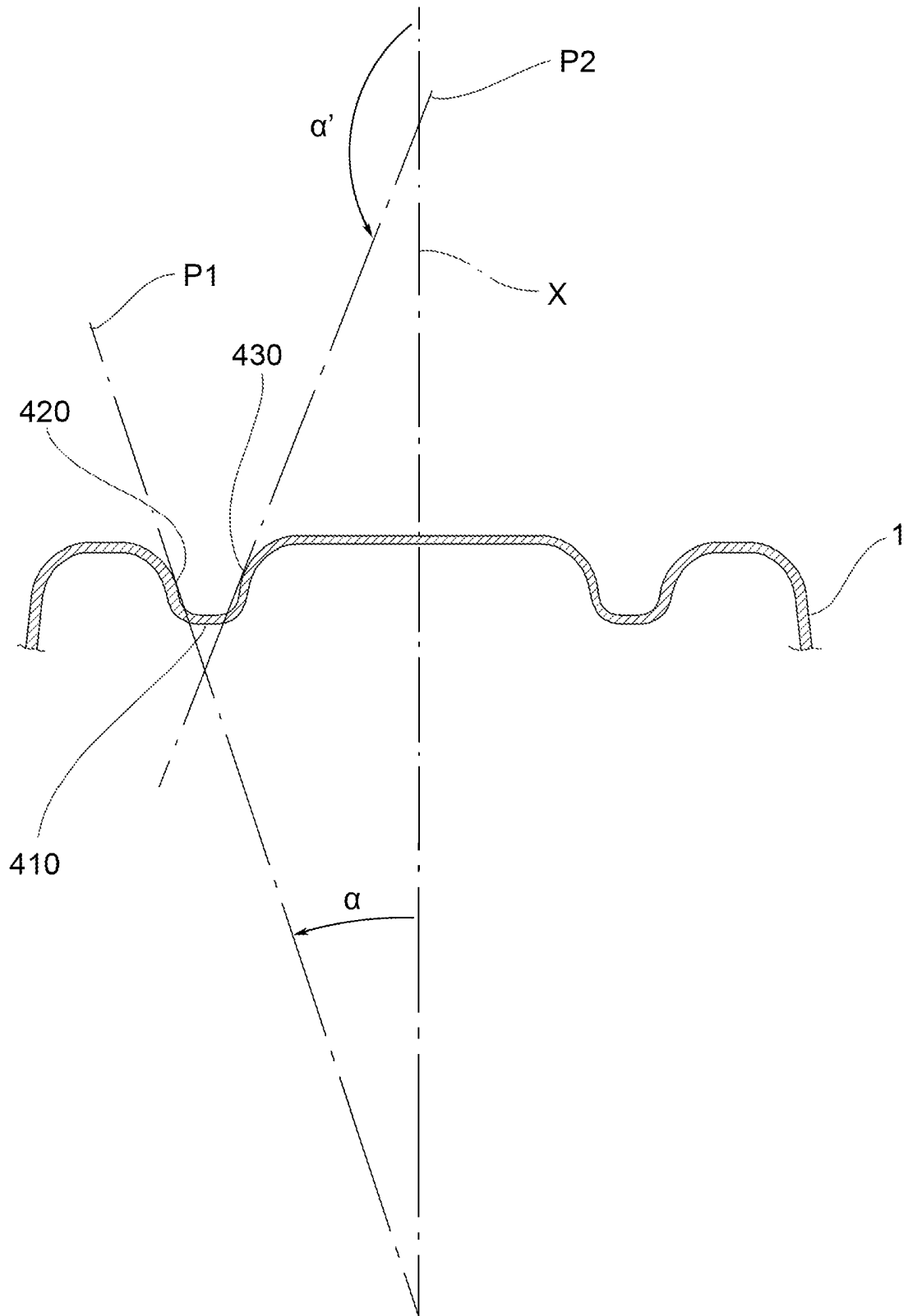


FIG.5

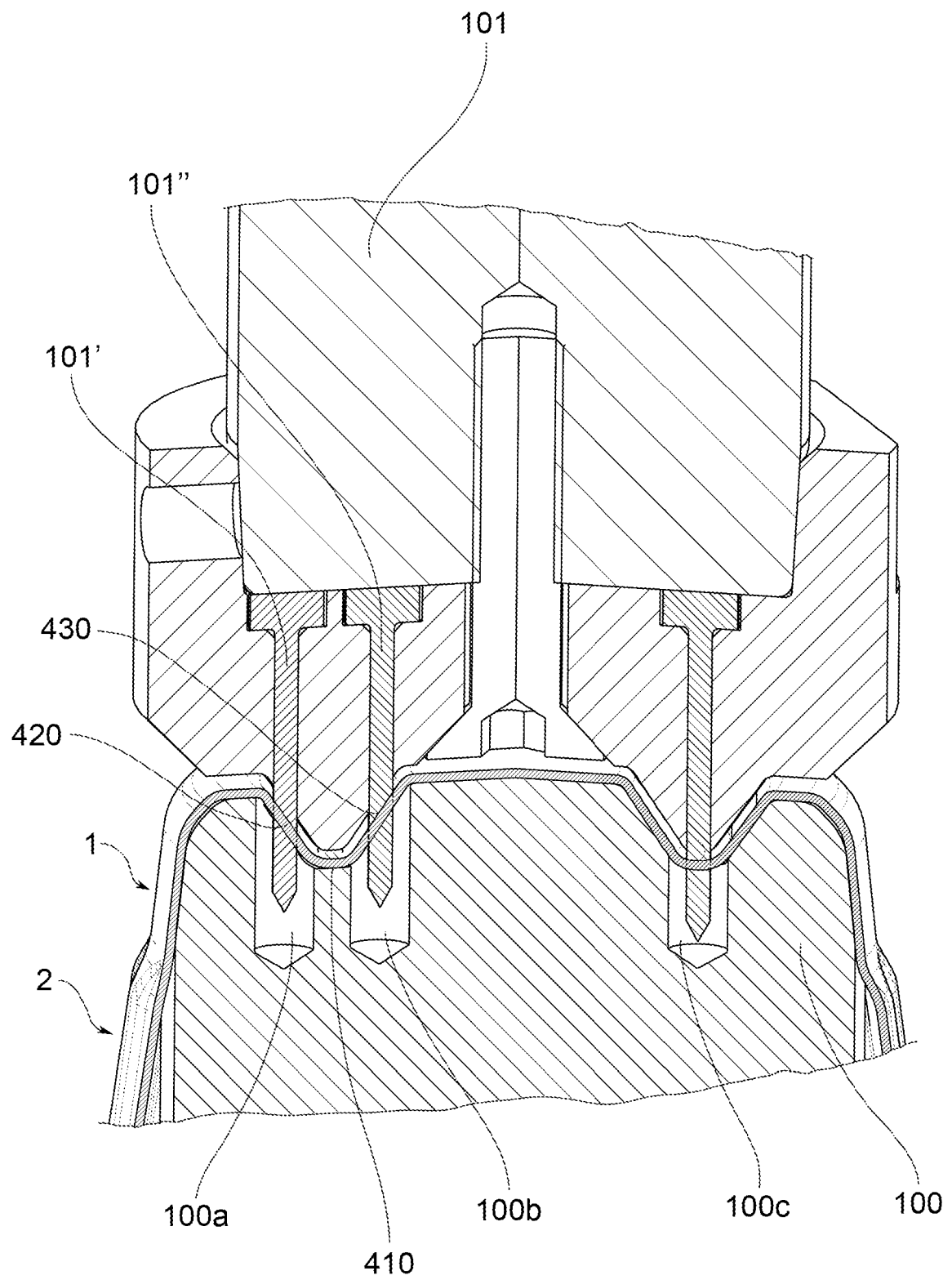
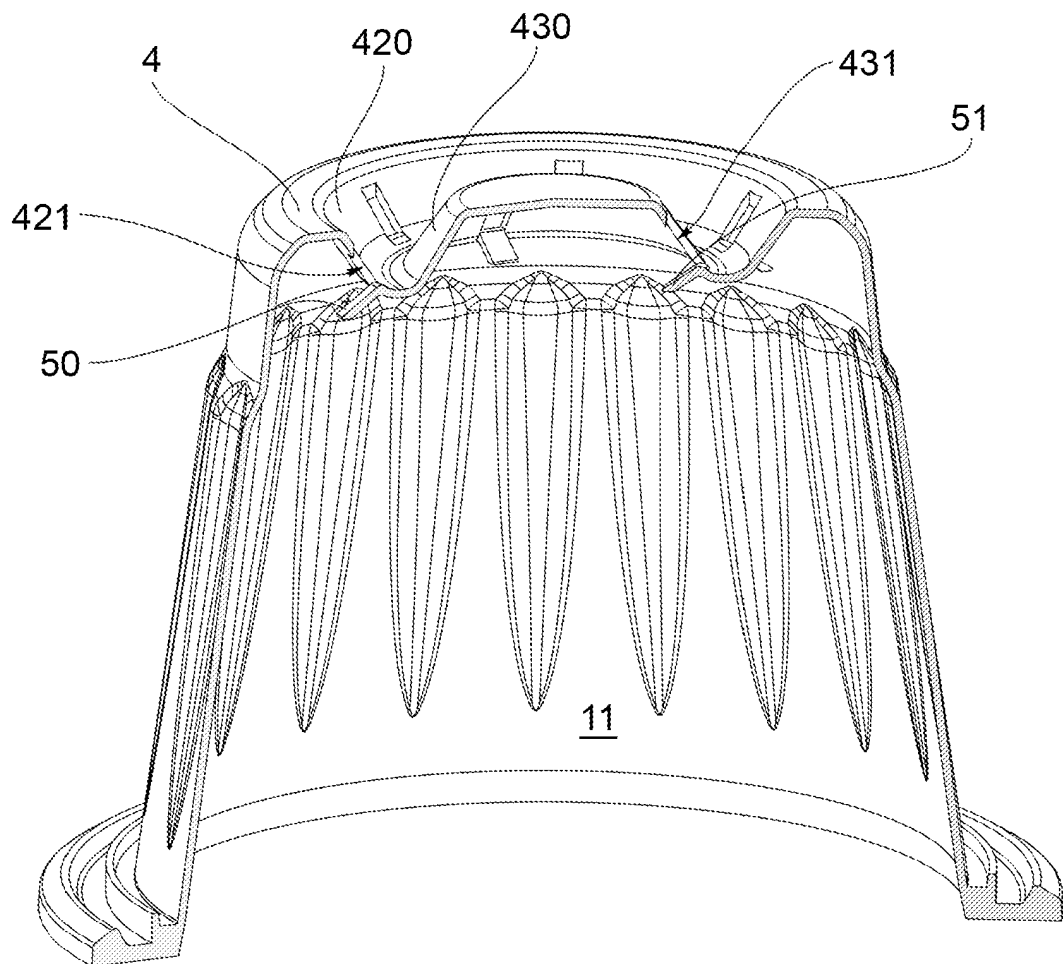
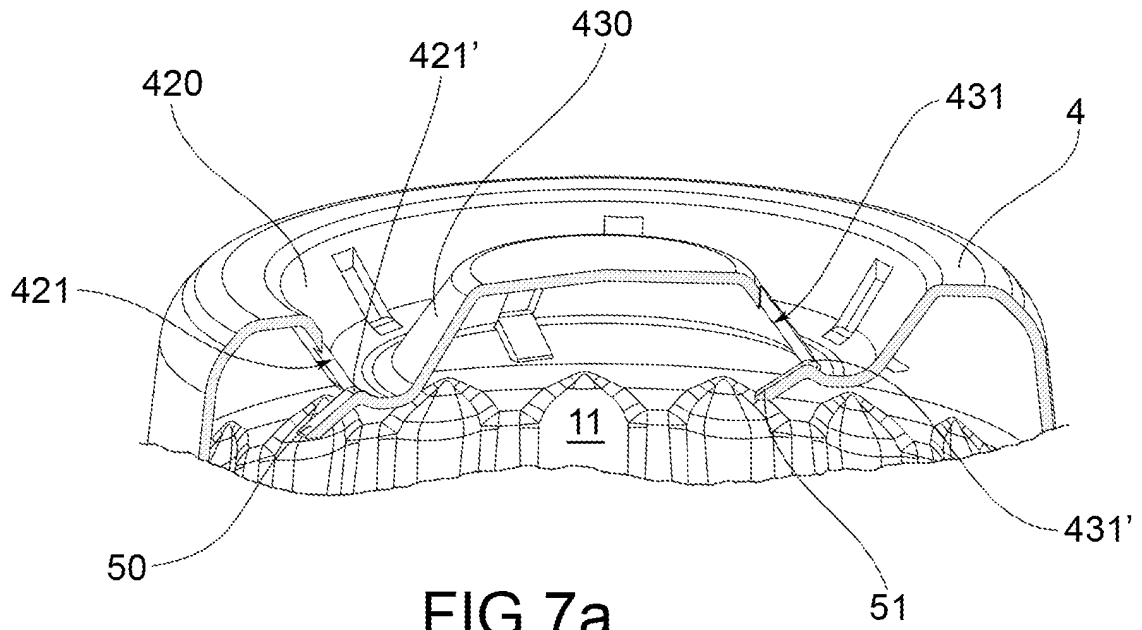


FIG.6



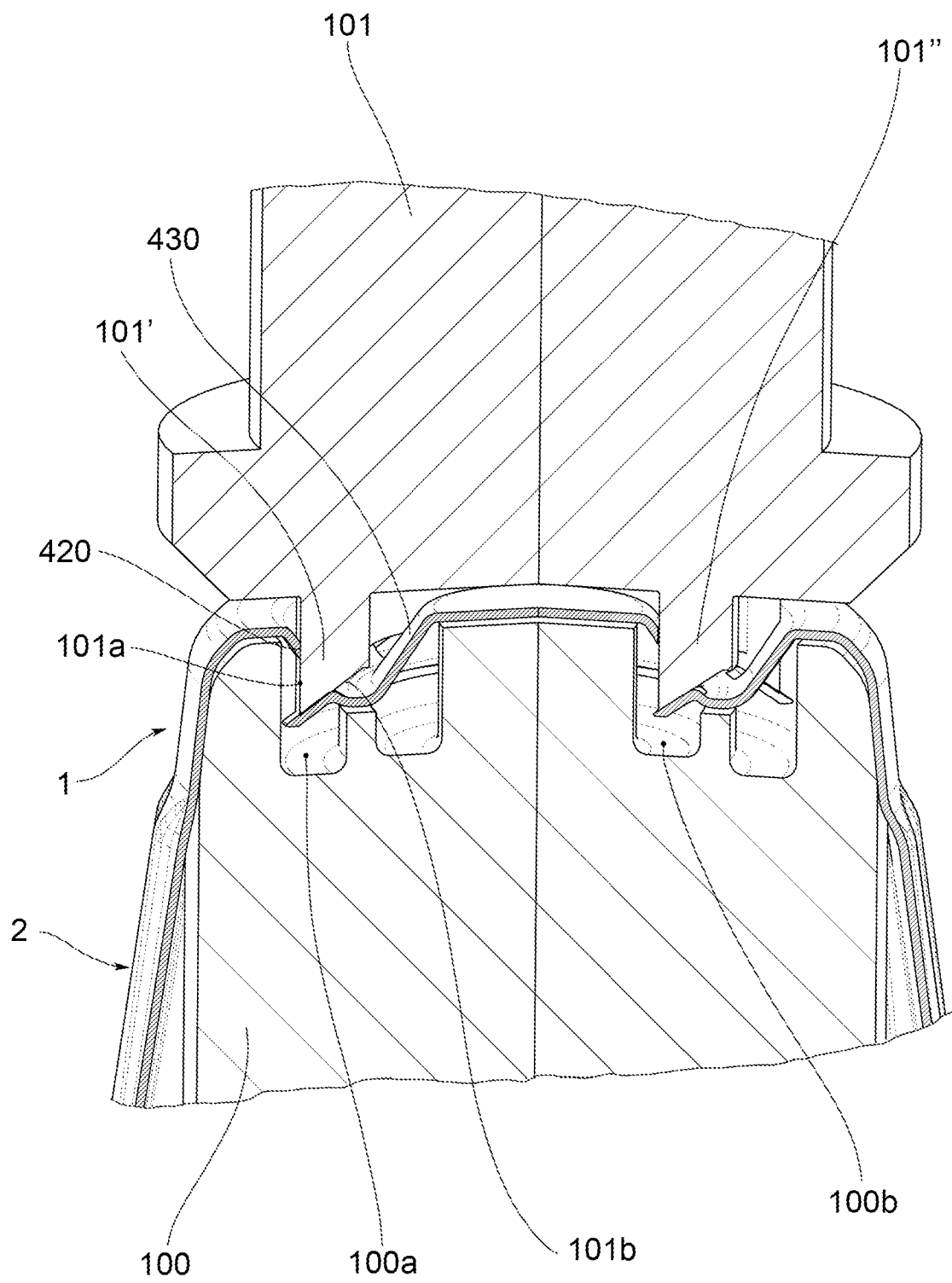


FIG.8

REFERENCES CITED IN THE DESCRIPTION

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