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(71) Applicant: **NOVO CAPSULE AG** [CH/CH]; Zurichstrasse 63, 8840 Einsiedeln (CH).

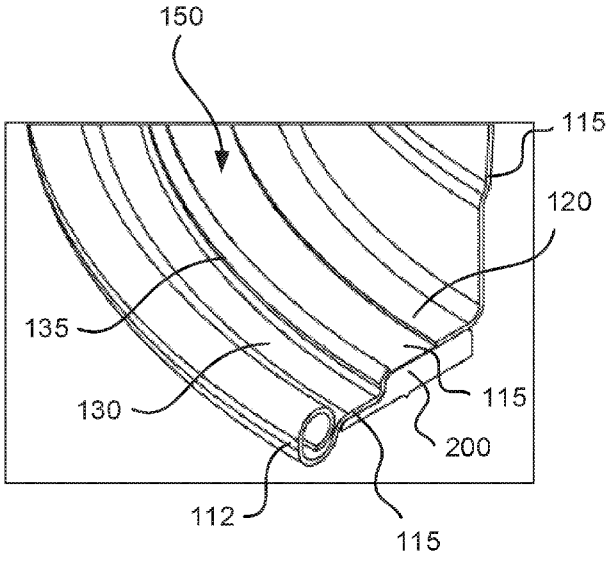
(72) Inventor: **HARIF, Gad**; Kibbutz Metzer, 3882000 Doar-Na Hefer (IL).

(74) Agent: **EHRLICH, Gal** et al.; G. E. EHRLICH (1995) LTD., 11 Menachem Begin Road, 5268104 Ramat Gan (IL).

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(54) Title: CAPSULE FOR PREPARING A BEVERAGE WITH A BEVERAGE PRODUCTION MACHINE



DETAIL B
FIG. 1C

(57) Abstract: A capsule body is adapted for containing one or more beverage ingredients for use in a beverage preparation machine. A base body of the capsule body has side walls defining a cavity for receiving the one or more beverage ingredients, wherein the side walls include an inner surface facing the cavity defined by the side walls and an outer surface facing the beverage preparation machine in use. A flange-like rim of the capsule body extends from the side walls. The base body and the flange-like rim are formed from laminated aluminum sheet including an aluminum layer and a polymer layer. The flange-like rim includes at least one slot in the aluminum layer, wherein the at least one slot in the aluminum layer and the polymer layer covers the at least one slot.

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CAPSULE FOR PREPARING A BEVERAGE WITH A BEVERAGE PRODUCTION MACHINE

FIELD AND BACKGROUND OF THE INVENTION

The present invention, in some embodiments thereof, relates to a single use capsule for preparation of a beverage with a beverage production machine and, more particularly, but not exclusively, to a capsule composed of aluminum sheet.

Single use capsules containing compacted ground coffee, tea and/or other ingredients are known for use in certain coffee preparation machines which are generally termed "espresso" machines. Capsules of this type generally include a capsule body containing the compacted ground coffee and/or other ingredients and a membrane and/or lid such as aluminum foil that seals the capsule body. Typically, the capsule body is shaped as an acute truncated cone with a rim, and the membrane is attached to the rim to seal the capsule. The body of the capsule is typically made from either aluminum or plastic. When aluminum sheet is used, the inside of the capsule is typically coated with a thin layer of a thermoplastic material that is used to thermo-seal the membrane to the rim and to provide a barrier between the aluminum and content of the capsule. Typically, the membrane includes a similar coating and/or lacquer.

During use in an "espresso" machine, the capsule is placed in a chamber where it is typically pierced on two opposing faces and hot water is passed through the capsule at relatively high pressure and temperature, thereby extracting the aromatic constituents from the ingredients to produce the beverage. Typically, during operation of the "espresso" machine, the rim of the capsule is pressed with an enclosing member of the machine chamber against a capsule holder to form a sealed engagement. The sealed engagement with the capsule holder is typically used to insure that all of the hot water is passed through the capsule for preparation of the coffee beverage and to prevent leakage around the capsule.

US Patent Application Publication No. 2018-0105355 describes a capsule body adapted for containing one or more beverage ingredients for use in a beverage preparation machine. It is described that the capsule body includes a base body, a flange-like rim and a sealing member adapted to provide a sealed engagement between the capsule body and the beverage preparation machine. The capsule body is characterized in that the sealing member is positioned on a surface of the flange like rim that extends from an inner surface of side walls of the base body that defines a cavity for receiving the one or more beverage ingredients.

SUMMARY OF THE INVENTION

According to an aspect of some embodiments of the present invention, there is provided a capsule body configured to provide sealed engagement with an enclosing member of the beverage production machine. The capsule body is made with a laminated aluminum sheet and includes a base body, a flange-like rim and an added sealing member adapted to provide a sealed engagement between the capsule body and the beverage preparation machine. According to some example embodiments, the flange-like rim includes one or more slots in the aluminum layer material that does not penetrate through the polymer layer. Slot in the aluminum layer as defined herein may be breaks, gaps or windows formed in the aluminum layer. The polymer layer may be maintained continuous on the flange-like rim and/or may be continuous over the one or more slots formed in the aluminum layer.

In some example embodiments, the capsule is formed so that the polymer layer on the aluminum sheet is the inner surface of the capsule body and provides a barrier between the aluminum and content of the capsule. Alternatively or additionally, a polymer layer (a second polymer layer) may laminate an external surface of the capsule body. For example, the capsule body may be formed with an aluminum sheet that includes a double sided polymer layer. In such configurations at least one of the polymer layers is configured to be continuous on the flange-like rim and/or continuous on the one or more slots formed in the aluminum layer of the flange-like rim.

A lid, e.g. aluminum foil for sealing the capsule may be positioned on the sealing member and may sandwich the sealing member between the polymer layer (in the inner surface of the capsule) and the lid of the capsule. The sealing member may be mounted on the polymer layer so that it overlaps with the one or more slots. The polymer layer may also be used to thermo-seal a lid to the flange-like rim.

In some example embodiments, the aluminum is excluded, e.g. the slots are formed in the portion of the flange-like rim that is configured to be pressed in the beverage production machine chamber. Optionally, the exclusion of the aluminum improves the sealed engagement during use. For example, the polymer layer together with the sealing member and absent the aluminum may be more pliable. Furthermore, by placing the sealing member between a polymer layer and the lid, the sealing member may be protected against potential contamination and mechanical damage, e.g. while the capsule is being handled prior to insertion in the beverage production machine. Optionally, sealing member may be formed with softer material based on its positioning in a more protected environment.

According to an aspect of some example embodiments, there is provided a capsule body adapted for containing one or more beverage ingredients for use in a beverage preparation machine comprising: a base body having side walls defining a cavity for receiving the one or more beverage ingredients, wherein the side walls include an inner surface facing the cavity defined by the side walls and an outer surface facing the beverage preparation machine in use, a flange-like rim extending from the side walls, wherein the base body and the flange-like rim are formed from laminated aluminum sheet including an aluminum layer and a polymer layer; and wherein the flange-like rim includes at least one slot in the aluminum layer, wherein the at least one slot in the aluminum layer and the polymer layer covers the at least one slot.

Optionally, the polymer layer is continuous over the at least one slot.

Optionally, the polymer layer covers at least 50% of the at least one slot.

Optionally, the polymer layer is continuous along the flange-like rim.

Optionally, the polymer layer is a transparent layer.

Optionally, the at least one slot is an annular gap in the aluminum layer that encircles the base body.

Optionally, the annular gap in the aluminum layer is 0.9 mm - 1.6 mm wide.

Optionally, the polymer layer is 10-50 μm.

Optionally, a sealing member fixedly mounted on the flange-like rim and adapted to provide a sealed engagement between the capsule body and the beverage preparation machine.

Optionally, the sealing member is adhered or welded to the polymer layer.

Optionally, the sealing member is annular with step shaped cross-section formed with an inner ring portion and an outer ring portion, wherein the inner ring portion is thicker than the outer ring portion.

Optionally, the at least one slot is an annular gap that encircles the base body and the inner ring portion overlaps with the annular gap.

Optionally, the sealing member extends from an edge between the flange-like rim and the side walls to a curl in on outer edge of the flange.

Optionally, the sealing member is formed from a polymer material that is other than the polymer layer that is laminated on the aluminum sheet.

Optionally, the flange-like rim includes an elevated portion configured to receive the sealing member thereunder.

Optionally, the aluminum sheet is folded over at an edge between the flange-like rim and the side walls.

Optionally, the capsule body has a truncated cone shape.

According to an aspect of some example embodiments, there is provided a capsule for use in a beverage preparation machine comprising: a capsule body comprising: a base body having side walls defining a cavity for receiving a beverage ingredient, wherein the side walls include an inner surface facing the cavity defined by the side walls and an outer surface facing the beverage preparation machine in use, a flange-like rim extending from the side walls, wherein the base body and the flange-like rim are formed from aluminum sheet laminated with a polymer layer; and a sealing member adapted to provide a sealed engagement between the capsule body and the beverage preparation machine; wherein the flange-like rim at least one slot in the aluminum sheet, wherein the at least one slot in the aluminum sheet and the polymer layer covers the at least one slot; a lid configured to seal the capsule body; and the beverage ingredient sealed in the capsule body with the lid.

Optionally, the lid is adhered on the sealing member.

Optionally, the at least one slot is an annular gap that 0.9 mm - 1.6 mm wide and encircles the base body.

Optionally, the polymer layer is 10-50 μm thick.

Optionally, the sealing member is annular with step shaped cross-section formed with an inner ring portion and an outer ring portion, wherein the inner ring portion is thicker than the outer ring portion.

Optionally, the at least one slot is an annular gap and wherein the inner ring portion overlaps with the annular gap.

Optionally, the sealing member extends from an edge between the flange-like rim and the side walls to a curl in on outer edge of the flange.

Optionally, the sealing member is formed from a polymer material that is other than the polymer layer that coats the aluminum.

Optionally, the flange-like rim includes an elevated portion configured to receive the sealing member thereunder.

Optionally, the side wall extends to the lid and is folded over at an edge between the flange-like rim and the side walls.

Optionally, the capsule body has a truncated cone shape.

Unless otherwise defined, all technical and/or scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which the invention pertains. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of embodiments of the invention, exemplary methods and/or materials are described below. In case of conflict, the patent specification, including definitions,

will control. In addition, the materials, methods, and examples are illustrative only and are not intended to be necessarily limiting.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

Some embodiments of the invention are herein described, by way of example only, with reference to the accompanying drawings. With specific reference now to the drawings in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of embodiments of the invention. In this regard, the description taken with the drawings makes apparent to those skilled in the art how embodiments of the invention may be practiced.

In the drawings:

FIGs. 1A, 1B and 1C are a perspective view, a cross-sectional view and a detailed cross-sectional view respectively of an exemplary capsule body including an annular gap in the flange in accordance with some embodiments;

FIG. 2A is a cross-sectional view of an exemplary flange and sealing member arrangement of the capsule body in accordance with some embodiments;

FIG. 2B is a top view of the sealing member in accordance with some example embodiments;

FIG. 3 is a detailed cross-sectional view of an enclosing member of a beverage production machine engaging the flange of the capsule in accordance with some example embodiments;

FIG. 4 is a cross-sectional view showing example deformation of the flange and sealing member arrangement after engagement with a beverage production machine in accordance with some embodiments;

FIG. 5 is a cross-sectional view of another example flange and sealing member arrangement including a flat sealing member in accordance with some embodiments;

FIGs. 6A and 6B are a side view and a detailed cross-sectional view respectively of another example flange and sealing member arrangement including an additional fold in the aluminum sheet in accordance with some embodiments;

FIGs. 7A and 7B are a schematic perspective view and a detailed cross-sectional view respectively of an exemplary capsule body including a first pattern of slots in accordance with some embodiments of the present invention; and

FIGs. 8A and 8B are a schematic perspective view and detailed cross-sectional view respectively of an exemplary capsule body including a second pattern of slits in accordance with some embodiments of the present invention.

DESCRIPTION OF SPECIFIC EMBODIMENTS OF THE INVENTION

The present invention, in some embodiments thereof, relates to a single use capsule for preparation of a beverage with a beverage production machine and, more particularly, but not exclusively, to a capsule composed of aluminum sheet.

According to some example embodiments, the capsule body is formed from an aluminum sheet composed of an aluminum layer laminated with at least one polymer layer. In some embodiments, the capsule body includes one or more slots (breaks, gaps or windows) in the aluminum layer at the flange-like rim that is covered with the polymer layer. The polymer layer may include one or more layers of polymer material, e.g. polypropylene and nylon and may be 5-10 μm in thickness. The polymer layer may laminate the inner surface of the capsule body, the outer surface of the capsule body or at least two polymer layers may be provided to cover both inner and outer surfaces of the capsule body.

In some example embodiments, the one or more slots are covered with the polymer layer laminated on the inner surface of the capsule and extend to the flange-like rim. Alternatively, the one or more slots are covered with a polymer layer that coats the outer surface of the capsule body. In some example embodiments, a portion of the polymer layer that covers the one or more slots includes tears or ruptures due to the manufacturing process. Based on the rupturing, a portion of the one or more slots may be exposed (not covered). In some example embodiments, the one or more slots may still be substantially covered by the polymer layer. Substantially covered may be 50%, 70%, 90% or 95% covered. According to some example embodiments, a dimension and position of the one or more slots is configured to substantially correspond with a size and position of an enclosing member of the beverage production machine that is to press against the flange-like rim during operation of the machine. The capsule body may additionally include a sealing member adapted to provide a sealed engagement with the enclosing member. According to some example embodiments, the sealing member is mounted on the flange-like rim under the portion of the polymer layer that covers the one or more slots in the flange-like rim. Optionally, the sealing member is configured to increase the mechanical hold of the outer portion of the flange-like rim to the remainder of the capsule.

In some example embodiments, the slot is annular and divides the flange-like rim into two concentric annular sections that are connected by the polymer layer. Optionally, the slot between the two concentric annular sections of the flange-like rim is between 1-2 mm, e.g. 1.2-1.6 or 1.3 mm in the radial direction.

The annular sealing member may cover the slot between the two concentric annular sections of the flange-like rim and may also extend in a radial direction on either side of the slot

so that it overlaps with both the inner and outer portion of the flange-like rim. In some example embodiments, annular sealing member extends in the radial direction from a side wall of the capsule to an edge of the outer portion of the flange-like rim. The lid may be adhered to the annular sealing member or may be adhered to the polymer layer in the flange-like rim that extends beyond the annular sealing member.

The annular sealing member may be a flat ring, may be formed with a step or may have an L-shaped cross section. According to some example embodiments, the annular sealing member is 0.7-1.1 mm thick, e.g. 0.8 mm. In some example embodiments, sealing member is formed with a material, e.g. a polymer material that has a hardness of SHORE 15A to 70A, e.g. 20A and is mounted on the capsule body.

According to some example embodiments, the side walls of the base body of the capsule extends to a height or level of the lid that seals the capsule body and then is folded back to form a step under which the annular seal may be mounted. Extending the side walls to the height of the lid may provide improved protection against penetration of oxygen and moisture into the capsule body. Optionally, the fold may also better fixate the annular sealing member in place.

Reference is now made to FIGs. 1A, 1B and 1C showing a schematic perspective view and a cross-sectional view and a detailed cross-sectional view respectively of an exemplary capsule body including an annular gap in the flange in accordance with some embodiments. Typically, capsule body 100 is shaped as an acute truncated cone that includes a base 105, side walls 110 extending from base 105 and a flange 160 extending from the side walls 110. Optionally, capsule body 100 is formed from aluminum sheet, e.g. with about 70-120 μm thickness. Flange 160 may include a curled rim 112 formed by rolling the aluminum sheet. Optionally, the aluminum sheet is laminated with a polymer layer 115 on at least one surface that forms an inner surface 111 of capsule body 100. In some example embodiments, polymer layer 115 has a thickness of 10-50 μm, e.g. 30 μm. Polymer layer 115 may provide a physical separation between the aluminum sheet material forming capsule body 100 and the beverage ingredients stored in the capsule. Inner surface 111 of capsule 100 is opposite an outer surface 113 of capsule 100.

According to some example embodiments, flange 160 includes a slot or gap 150 in the aluminum layer of the aluminum sheet material. Gap 150 separates an inner annular portion 120 of flange 160 that is connected to side walls 110 from an outer annular portion 130 of flange 160 that includes curled rim 112. Gap 150 may be annular and may be 0.9-1.6 mm wide.

In some example embodiments, the break or gap is only in the aluminum layer and not in the polymer layer 115 (or not in at least one polymer layer 115 when capsule body 100 includes a

polymer layer on both sides of the aluminum layer). Polymer layer 115 may extend across gap 150 and may be continuous on the entire capsule body. In some example embodiments, polymer layer 115 may optionally provide structural support for maintaining outer annular flange portion 130 connected to the capsule body 100.

According to some embodiments of the present invention, an annular sealing member 200 is fitted and/or positioned under flange 160, e.g. on the surface of flange 160 extending from inner surface 111 of side walls 110. Sealing member 200 may be sized to extend between side walls 110 and a curled rim 112. In some example embodiments, sealing member 200 is positioned to overlap with gap 150. Polymer layer 115 may cover sealing member 200 so that it is not physically exposed through gap 150. Optionally, polymer layer 115 is transparent and sealing member 200 is visibly exposed through polymer layer 115. According to some example embodiments, annular sealing member 200 has a cross-section that is thicker in the vicinity of gap 150 and thinner toward curled rim 112. In some example embodiments, flange 160 includes an elevation 135 to accommodate the step shaped cross-section annular sealing member 200 fitted thereunder. Elevation 135 provides a volume in which sealing member 200 may be mounted on flange 160 while providing a flat surface on which a lid may be added to seal contents of capsule body 100.

Sealing member 200 may be a polymer defined to have hardness and/or elasticity suitable for forming a sealed connection with the enclosing member of the beverage production machine in response to force and/or pressure. According to some embodiments, sealing member 200 is formed with a material that has a hardness of around SHORE 15A to 70A, e.g. 20A. Sealing member may be formed from plastics, rubber, or silicone and optionally by injection molding.

Reference is now made to FIG. 2A showing a cross-sectional view of an exemplary flange and sealing member arrangement of the capsule body and to FIG. 2B showing a top view of the sealing member, both in accordance with some embodiments. Polymer layer 115 that coats an inner layer of capsule body 100 may extend under a surface of flange 160 and may cover gap 150. Sealing member 200 may fill a volume under an elevation formed in flange 160. Sealing member 200 may include a first annular portion that is thicker than a second annular portion 200B of sealing member 200. First annular portion 200A may overlap with gap 150. Optionally, flange 160 may include elevation 135 sized to fit annular portion 200A of sealing member 200. In some example embodiments, lid 190 may be sealed on sealing member 200. Sealing member 200 may be sized and shaped to fill a volume between elevated portions of flange 160 and lid 190. In some example embodiments, first annular portion 200A may be 300-800 μm thick and second annular portion 200B may be 100-200 μm thick.

In some example embodiments, sealing member 200 may be fixedly mounted on flange 160 with an adhesive or welding. Welding may include injection molding, in-mold labeling and thermoforming. The adhesive may be a liquid adhesive or fusible solid adhesive such as a thermo-fusible film. Optionally, polymer layer 115 may take part in welding (i.e. melting) and may be partially mixed or compounded with sealing member 200. Optionally, the mixed portion may be a layer that is between 10-50 μm.

Alternatively, an additional polymer layer may cover an outer surface of capsule body 100, this additional polymer layer may stay intact when gap 150 is formed and sealing member 200 may have physical contact with the polymer layer on the outer surface through gap 150. In this case, polymer layer 115 may optionally also include gap 150.

Reference is now made to FIG. 3 showing a detailed cross-sectional view of an enclosing member of a beverage production machine engaging the flange of the capsule in accordance with some embodiments. According to some embodiments of the present invention, an enclosing member 300 of a beverage machine is operative to press a surface 310 of enclosing member 300 against flange 160 to form a sealed engagement. The sealed engagement with enclosing member 300 is typically used to insure that all of the hot water introduced through the base of capsule body 100 is passed through the capsule body for preparation of the coffee beverage and to prevent leakage of the hot water around the capsule body. Enclosing member 300 also provides for pressing the capsule toward a capsule holder 320.

Typically, a ring shaped surface 310 of enclosing member engages flange 160 of the capsule and optionally, penetrates through gap 150. In some exemplary embodiments, a width of gap 150 is defined to accommodate surface 310 and/or to provide substantial and/or adequate engagement of surface 310 with polymer layer 115 and sealing element 200. Typically, sealing member 200 has a width that exceeds width of gap 150. Typically, a thickness of first portion 200A of sealing element 200 is also defined to provide adequate sealing between surface 310 and sealing element 200 in response to pressure applied by surface 310. Optionally, first portion 200A of sealing member 200 is 300-800 μm thick.

Typically, lid 190 is composed of an aluminum foil that is between 30 and 60 micrometers thick. In some exemplary embodiments, an inner surface membrane 190 is coated with a polymer coating or lacquer, e.g. a thermoplastic lacquer. Typically, polymer coating or lacquer provides for thermo-sealing membrane 190 to sealing member 200. Typically, membrane 190 extends toward a flange curl 112 and covers sealing membrane 200. Alternatively, sealing member 200 extends beyond membrane 190 so that sealing member 200 is visible once capsule body 100 is enclosed.

FIG. 4 shows a cross-sectional view of an example deformation of the flange and sealing member arrangement after engagement with a beverage production machine in accordance with some embodiments. According to some example embodiments, both polymer layer 115 and sealing member 200 may be depressed by 0.1 -0.2 mm based on surface 310 of enclosing member 300 (FIG. 3) pressing against flange 160 to form a sealed engagement. In some example embodiments, elastic properties of polymer layer 115 maintain the polymer layer 115 intact (without breaks) while pressed with enclosing member 300. Optionally, sealing member 200 and polymer layer 115 may undergo plastic deformation based on being pressed with enclosing member 300.

FIG. 5 is a cross-sectional view of another example flange and sealing member arrangement including a flat sealing member in accordance with some embodiments. In some example embodiments, a sealing member 201 may be shaped as a flat annular element that extends substantially from side walls 110 to flange curl 112. Flange 160 may be shaped to accommodate shape of sealing member 201.

FIGs. 6A and 6B are a side view and a detailed cross-sectional view respectively of another example flange and sealing member arrangement including an additional fold in the aluminum sheet in accordance with some embodiments. According to some example embodiments, side walls 110 of capsule body 101 extend to a height or level of lid 190 and then is folded with fold 125 to form an elevation 135 under which the annular sealing member 200 may be mounted. Extending side walls 110 to lid 190 may provide an improved barrier against penetration of oxygen and moisture into volume 260 of capsule 101. The aluminum sheet forming side walls 110 may optionally prevent penetration of oxygen and moisture that may occur through sealing member 200. Optionally, lid 190 may be adhered to the capsule at fold 125. Optionally, fold 125 may also better fixate annular sealing member 200 in place.

Reference is now made to FIGs. 7A and 7B showing a schematic perspective view and a detailed cross-sectional view respectively of an exemplary capsule body including an exemplary pattern of slots in accordance with some embodiments of the present invention. According to some embodiments of the present invention, capsule body 300 includes one or more slots 351 formed in the aluminum layer on flange 315 from which sealing member 200 is exposed. According to some example embodiments, slots 351 are covered with a polymer layer 115 that is part of layers laminated on the aluminum sheet. In some example embodiments, slots 351 penetrate through the aluminum layer but do not penetrate polymer layer 115 that is laminated on the aluminum sheet. Slots 351 are shown more clearly in detailed view 30 (FIG. 7B). According to some embodiments, slots 351 are elongated slots extending along a circumferential direction of

flange 315. In some exemplary embodiments, width of slots 351 are defined to fully accommodate a surface with which sealing member 200 is to form a seal, e.g. width of slots 351 are defined to be wide enough to fit within the rim of the beverage production machine that contacts the flange. Optionally, width of slots 351 is between 0.3 mm - 1 mm, e.g. 0.4 mm.

Reference is now made to FIGs. 8A and 8B showing a schematic perspective view and detailed cross-sectional view respectively of an exemplary capsule body including an exemplary pattern of slits in accordance with some embodiments of the present invention. According to some embodiments of the present invention, capsule body 301 includes one or more slits 352 in the aluminum layer formed on flange 315 through which sealing member 200 may be visually exposed. According to some example embodiments, slots 352 are covered with a polymer layer 115 that is part of the layer laminated on the aluminum sheet. The polymer layer may be transparent thereby visually exposing the sealing member through the slots. In some example embodiments, slots 352 penetrate through the aluminum but do not penetrate polymer layer 115 that is laminated on the aluminum sheet. Slits 352 are shown more clearly in detailed view 32 (FIG. 8B). Optionally slits 352 are arranged on flange 315 in a radial direction. Optionally, flange 315 includes both slits 352 and slots 351. Optionally, slits 352 extend in a different direction than shown, for example in a circumferential direction or at an angle.

It is noted that although most of the embodiments of the present invention, refer to a capsule that is shaped as an acute truncated cone with a rim, the invention is not limited in this respect and the present invention can be applied for producing capsule bodies that are round, rounded and/or have dome or alternate shapes.

It is noted that although most of the embodiments of the present invention, refer to a capsule that is formed from aluminum sheet and enclosed with an aluminum membrane, the invention is not limited in this respect and the present invention can be applied for producing capsule bodies from alternate and/or additional material. It is noted that although most of the embodiments of the present invention refer to a capsule used for preparation of a hot beverage such as coffee, tea and hot chocolate, the capsule as described herein is not limited in this respect and can also be used and/or adapted for the preparation of cold beverage including carbonated beverages and/or alcoholic beverages.

The terms "comprises", "comprising", "includes", "including", “having” and their conjugates mean "including but not limited to".

The term “consisting of” means “including and limited to”.

The term "consisting essentially of" means that the composition, method or structure may include additional ingredients, steps and/or parts, but only if the additional ingredients, steps

and/or parts do not materially alter the basic and novel characteristics of the claimed composition, method or structure.

It is appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features of the invention, which are, for brevity, described in the context of a single embodiment, may also be provided separately or in any suitable sub-combination or as suitable in any other described embodiment of the invention. For example, materials and shapes of sealing elements, slots and slits described for one embodiment may be used with other embodiments described. Certain features described in the context of various embodiments are not to be considered essential features of those embodiments, unless the embodiment is inoperative without those elements.

WHAT IS CLAIMED IS:

1. A capsule body adapted for containing one or more beverage ingredients for use in a beverage preparation machine comprising:

a base body having side walls defining a cavity for receiving the one or more beverage ingredients, wherein the side walls include an inner surface facing the cavity defined by the side walls and an outer surface facing the beverage preparation machine in use,

a flange-like rim extending from the side walls, wherein the base body and the flange-like rim are formed from laminated aluminum sheet including an aluminum layer and a polymer layer; and

wherein the flange-like rim includes at least one slot in the aluminum layer, wherein the at least one slot in the aluminum layer and the polymer layer covers the at least one slot.

2. The capsule body according to claim 1 wherein the polymer layer is continuous over the at least one slot.

3. The capsule body according to claim 1 wherein the polymer layer covers at least 50% of the at least one slot.

4. The capsule body according to any one of claims 1-3, wherein the polymer layer is continuous along the flange-like rim.

5. The capsule body according to any one of claims 1-4, wherein the polymer layer is a transparent layer.

6. The capsule body according to any one of claims 1-5, wherein the at least one slot is an annular gap in the aluminum layer that encircles the base body.

7. The capsule body according to claim 6, wherein the annular gap in the aluminum layer is 0.9 mm - 1.6 mm wide.

8. The capsule body according to any one of claims 1-7, wherein the polymer layer is 10-50 μm.

9. The capsule body according to any one of claims 1-8, comprising a sealing member fixedly mounted on the flange-like rim and adapted to provide a sealed engagement between the capsule body and the beverage preparation machine.

10. The capsule body according to claim 9, wherein the sealing member is adhered or welded to the polymer layer.

11. The capsule body according to claim 9 or claim 10, wherein the sealing member is annular with step shaped cross-section formed with an inner ring portion and an outer ring portion, wherein the inner ring portion is thicker than the outer ring portion.

12. The capsule body according to claim 11, wherein the at least one slot is an annular gap that encircles the base body and the inner ring portion overlaps with the annular gap.

13. The capsule body according to any one of claims 9-12, wherein the sealing member extends from an edge between the flange-like rim and the side walls to a curl in on outer edge of the flange.

14. The capsule body according to any one of claims 9-13, wherein the sealing member is formed from a polymer material that is other than the polymer layer that is laminated on the aluminum sheet.

15. The capsule body according to any one of claims 9-14, wherein the flange-like rim includes an elevated portion configured to receive the sealing member thereunder.

16. The capsule body according to any one of claims 1-15, wherein the aluminum sheet is folded over at an edge between the flange-like rim and the side walls.

17. The capsule body according to any one of claims 1-16, wherein the capsule body has a truncated cone shape.

18. A capsule for use in a beverage preparation machine comprising:

a capsule body comprising:

a base body having side walls defining a cavity for receiving a beverage ingredient, wherein the side walls include an inner surface facing the cavity defined by the side walls and an outer surface facing the beverage preparation machine in use,

a flange-like rim extending from the side walls, wherein the base body and the flange-like rim are formed from aluminum sheet laminated with a polymer layer; and

a sealing member adapted to provide a sealed engagement between the capsule body and the beverage preparation machine;

wherein the flange-like rim at least one slot in the aluminum sheet, wherein the at least one slot in the aluminum sheet and the polymer layer covers the at least one slot;

a lid configured to seal the capsule body; and

the beverage ingredient sealed in the capsule body with the lid.

19. The capsule of claim 18, wherein the lid is adhered on the sealing member.

20. The capsule according to claim 18 or claim 19, wherein the at least one slot is an annular gap that 0.9 mm - 1.6 mm wide and encircles the base body.

21. The capsule according to any one of claims 18-20, wherein the polymer layer is 10-50 μm thick.

22. The capsule according to any one of claims 18-21, wherein the sealing member is annular with step shaped cross-section formed with an inner ring portion and an outer ring portion, wherein the inner ring portion is thicker than the outer ring portion.

23. The capsule according to claim 22, wherein the at least one slot is an annular gap and wherein the inner ring portion overlaps with the annular gap.

24. The capsule according to any one of claims 18-23, wherein the sealing member extends from an edge between the flange-like rim and the side walls to a curl in on outer edge of the flange.

25. The capsule according to any one of claims 18-24, wherein the sealing member is formed from a polymer material that is other than the polymer layer that coats the aluminum.

26. The capsule according to any one of claims 18-25, wherein the flange-like rim includes an elevated portion configured to receive the sealing member thereunder.

27. The capsule according to any one of claims 18-26, wherein the side wall extends to the lid and is folded over at an edge between the flange-like rim and the side walls.

28. The capsule according to any one of claims 18-27, wherein the capsule body has a truncated cone shape.

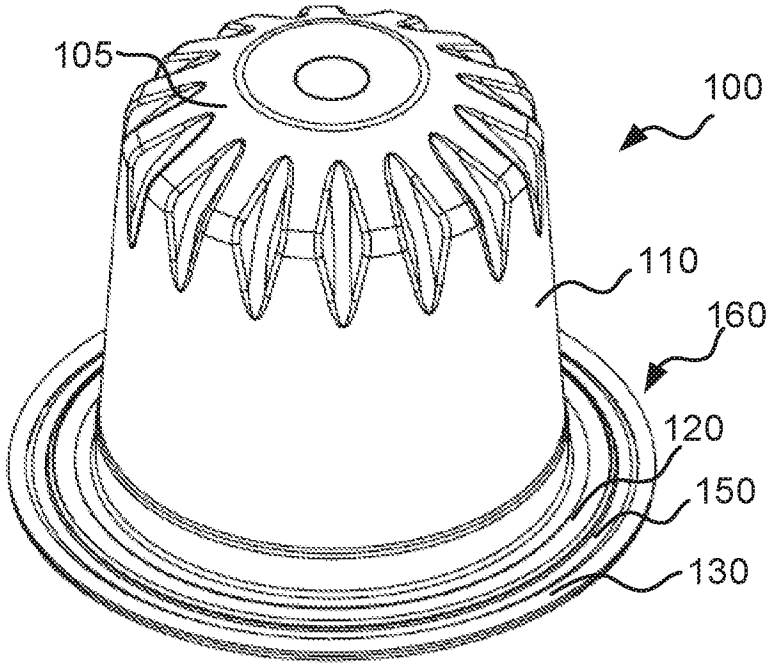


FIG. 1A

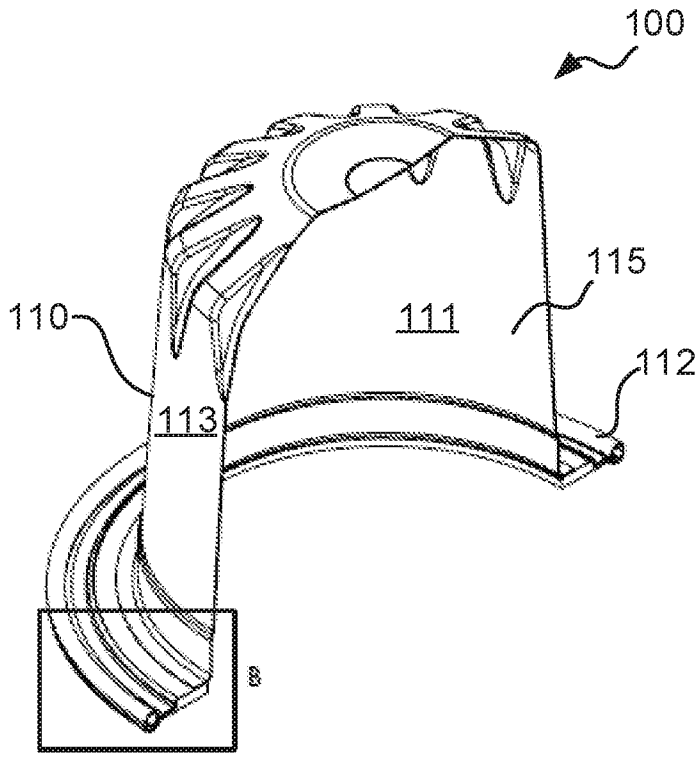
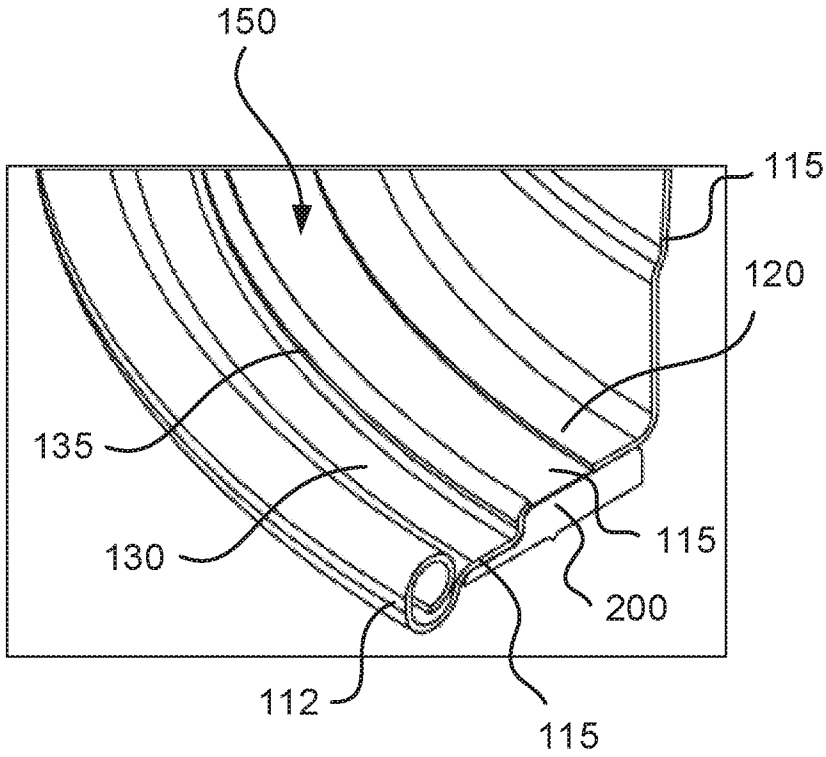


FIG. 1B



DETAIL B
FIG. 1C

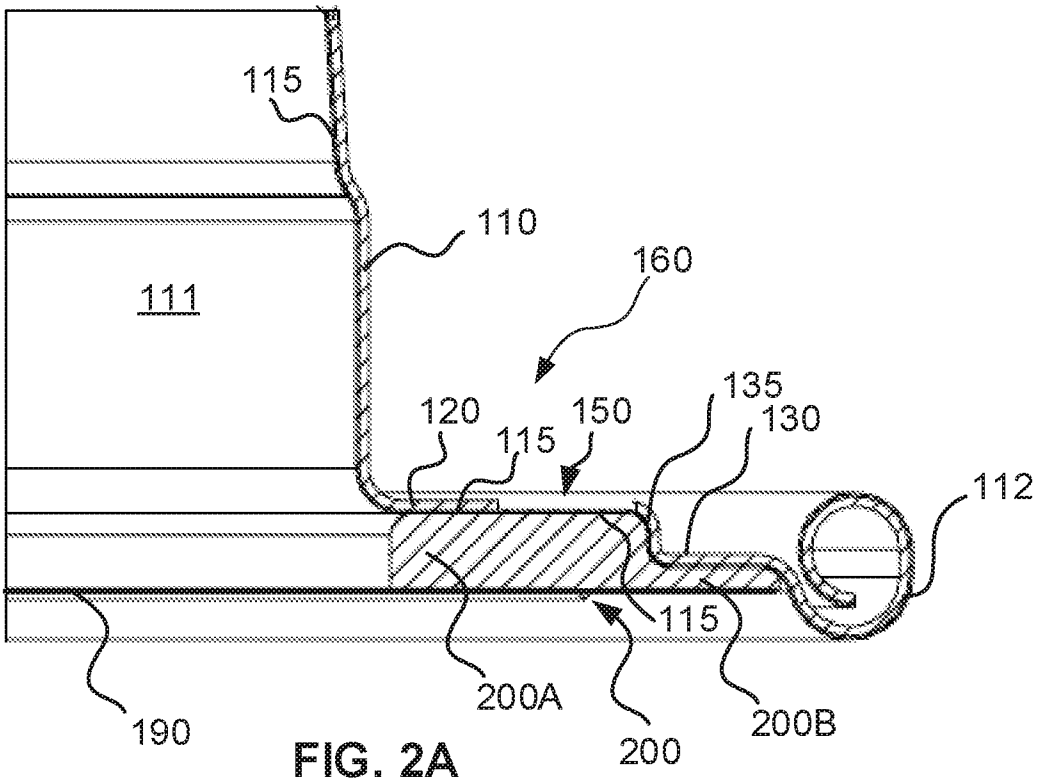

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FIG. 2A

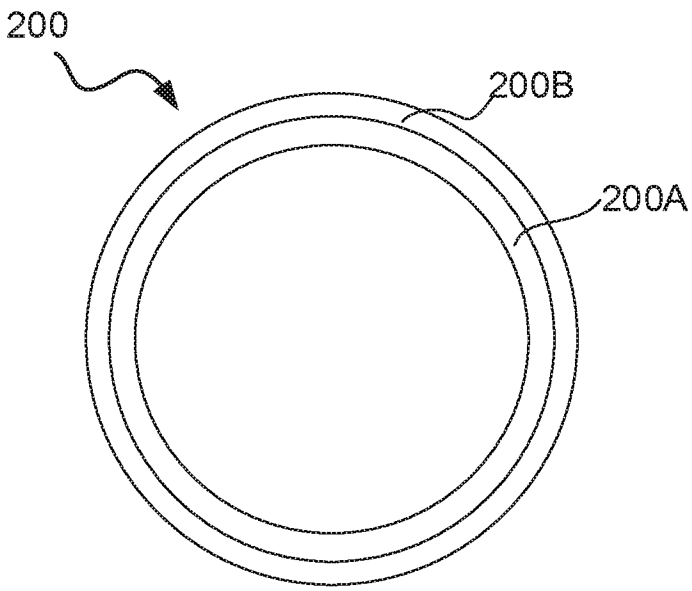

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FIG. 2B

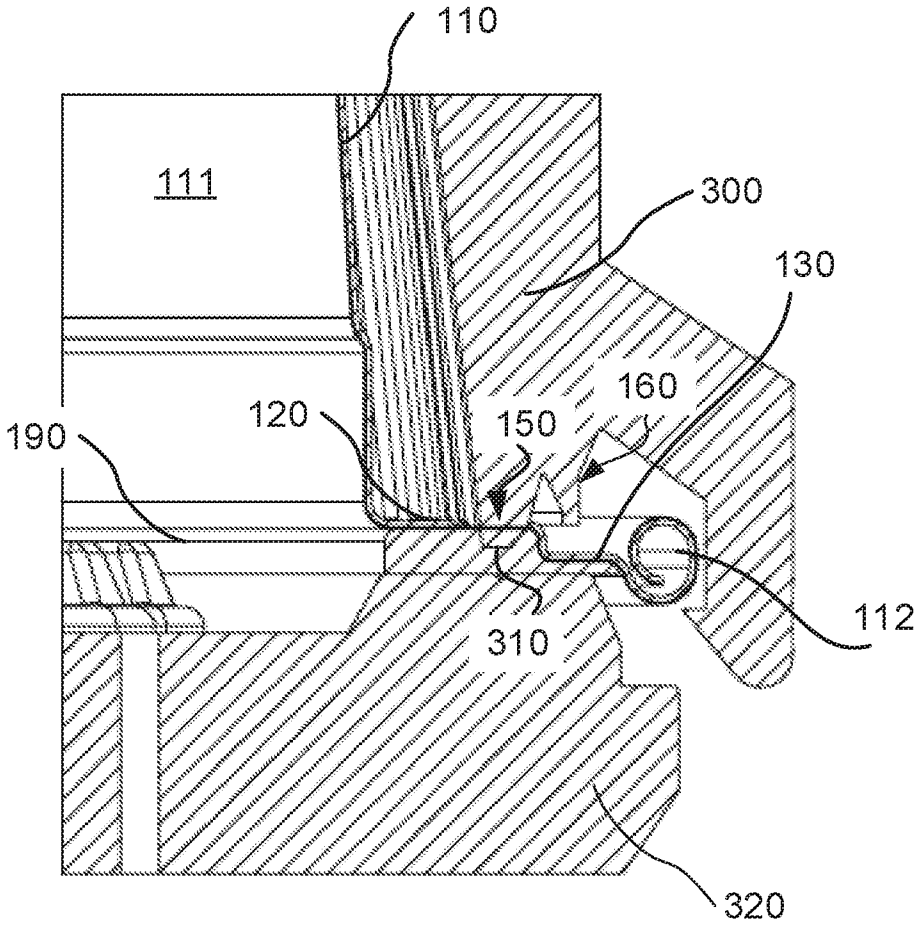


FIG. 3

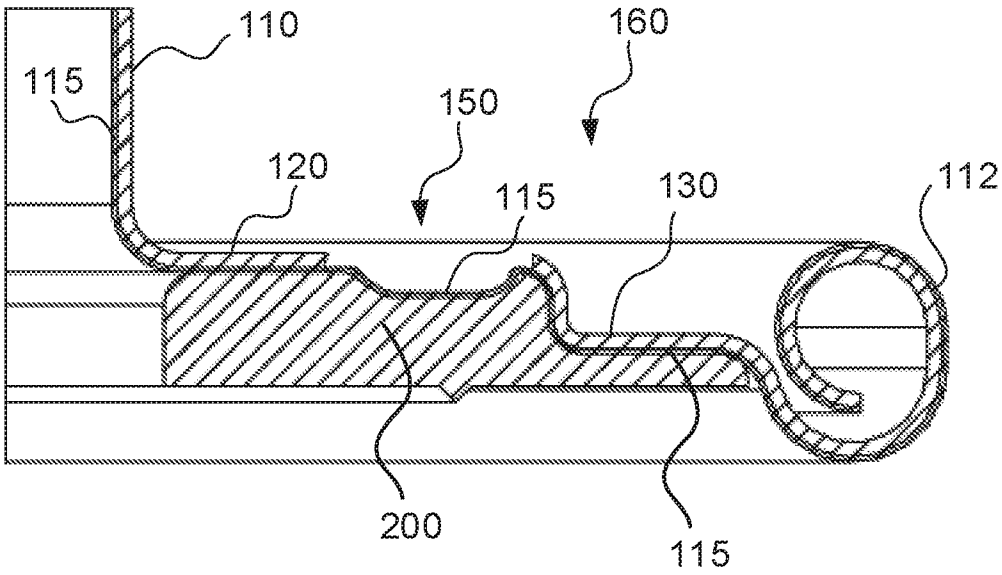

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FIG. 4

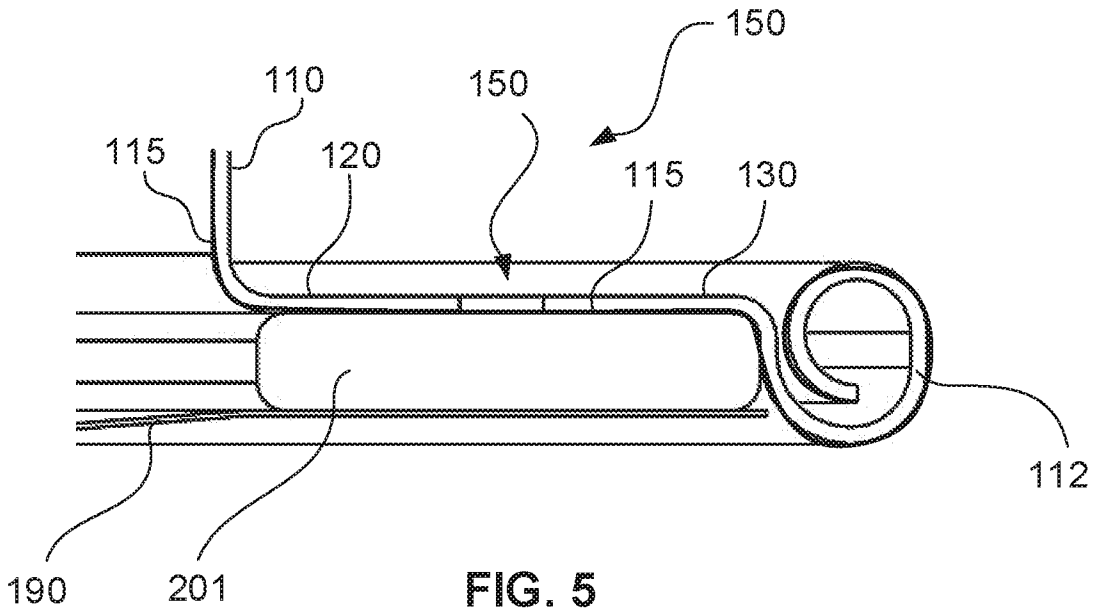

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FIG. 5

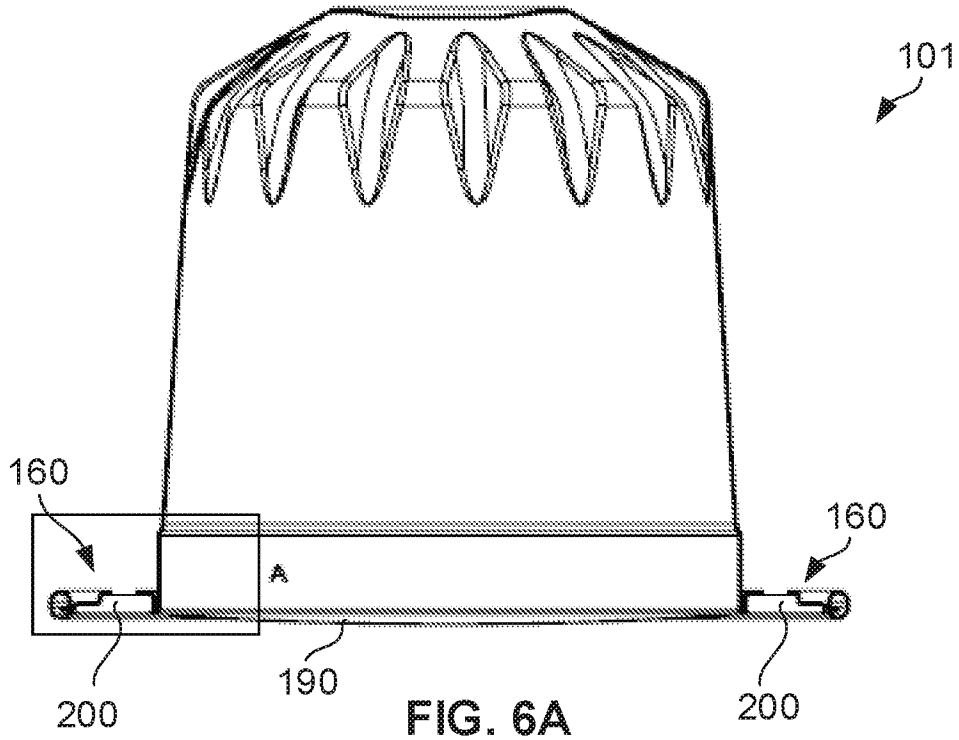
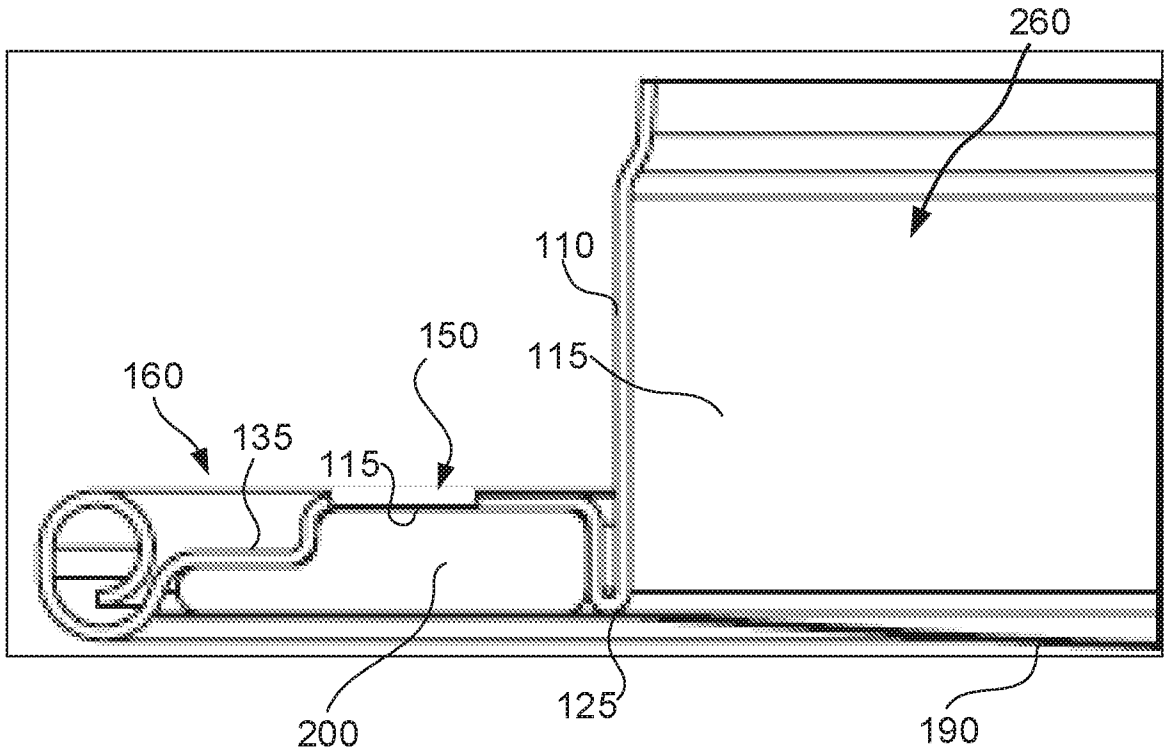


FIG. 6A



DETAIL A
FIG. 6B

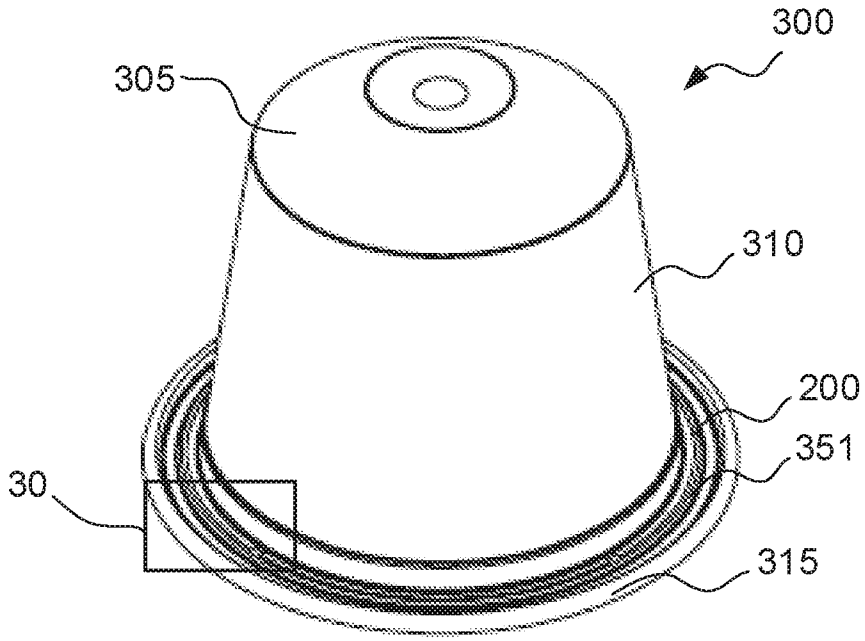


FIG. 7A

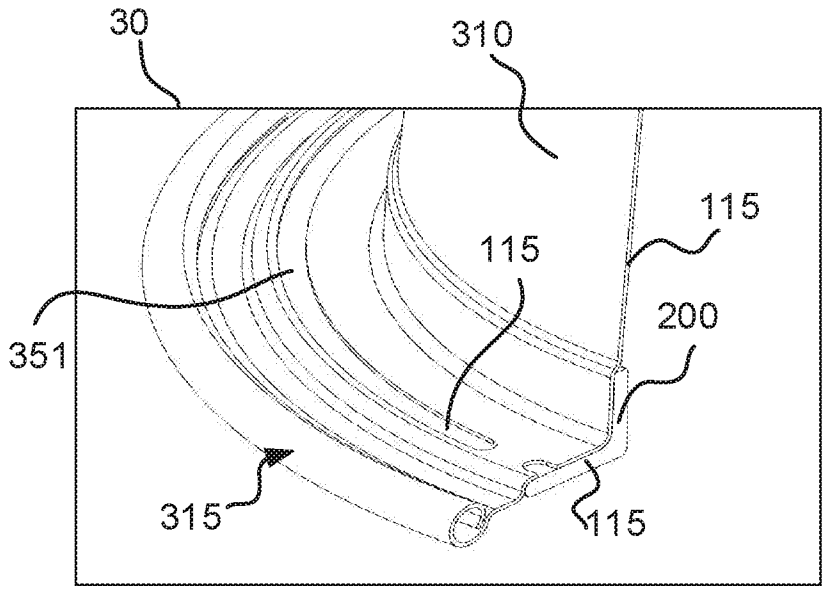


FIG. 7B

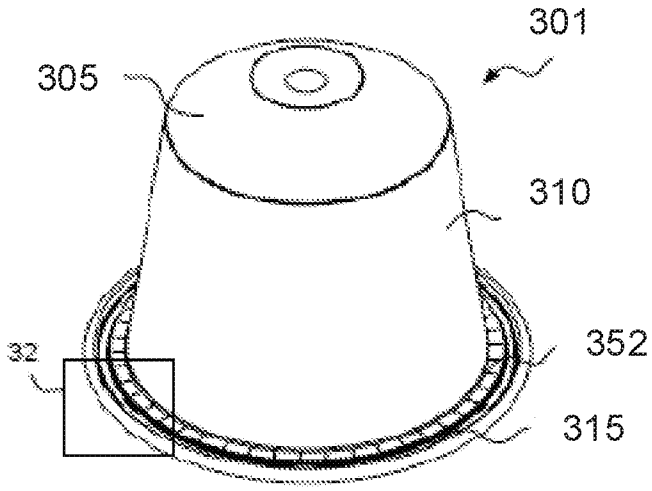


FIG. 8A

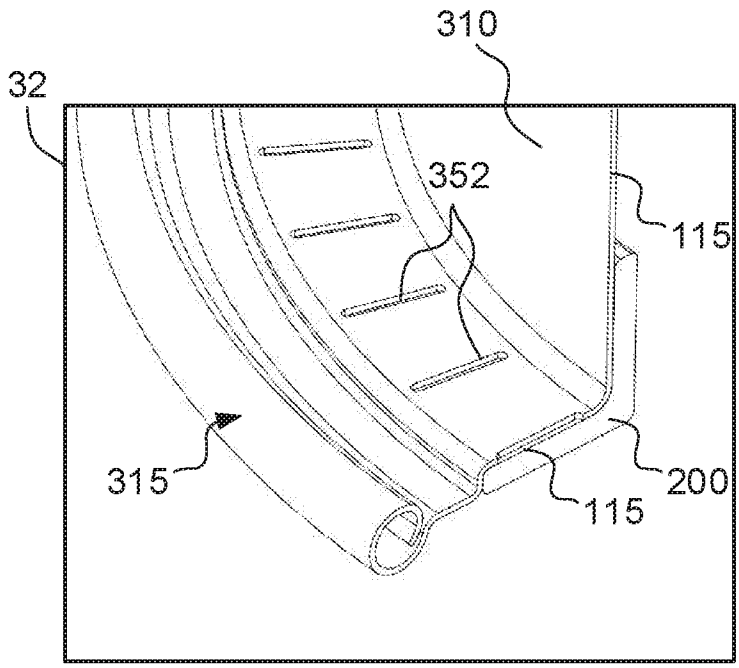


FIG. 8B

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2018/050878

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65D85/804
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2016/174671 A1 (SPRESSO NOVO CAP LTD [IL]) 3 November 2016 (2016-11-03) page 6, line 21 - page 11, line 9; figures 1-9	1-28
A	WO 2016/193842 A1 (BACON BRIAN [ZA]) 8 December 2016 (2016-12-08) page 4, line 18 - page 7, line 9; figures 1-5	1-28

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
6 May 2019	16/05/2019

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Derrien, Yannick

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IL2018/050878

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2016174671 A1	03-11-2016	AU 2016254691 A1	02-11-2017
		CA 2981764 A1	03-11-2016
		EP 3288864 A1	07-03-2018
		US 2018105355 A1	19-04-2018
		WO 2016174671 A1	03-11-2016
WO 2016193842 A1	08-12-2016	EP 3303160 A1	11-04-2018
		US 2018148251 A1	31-05-2018
		WO 2016193842 A1	08-12-2016