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CAPSULE FOR PREPARING A BEVERAGE

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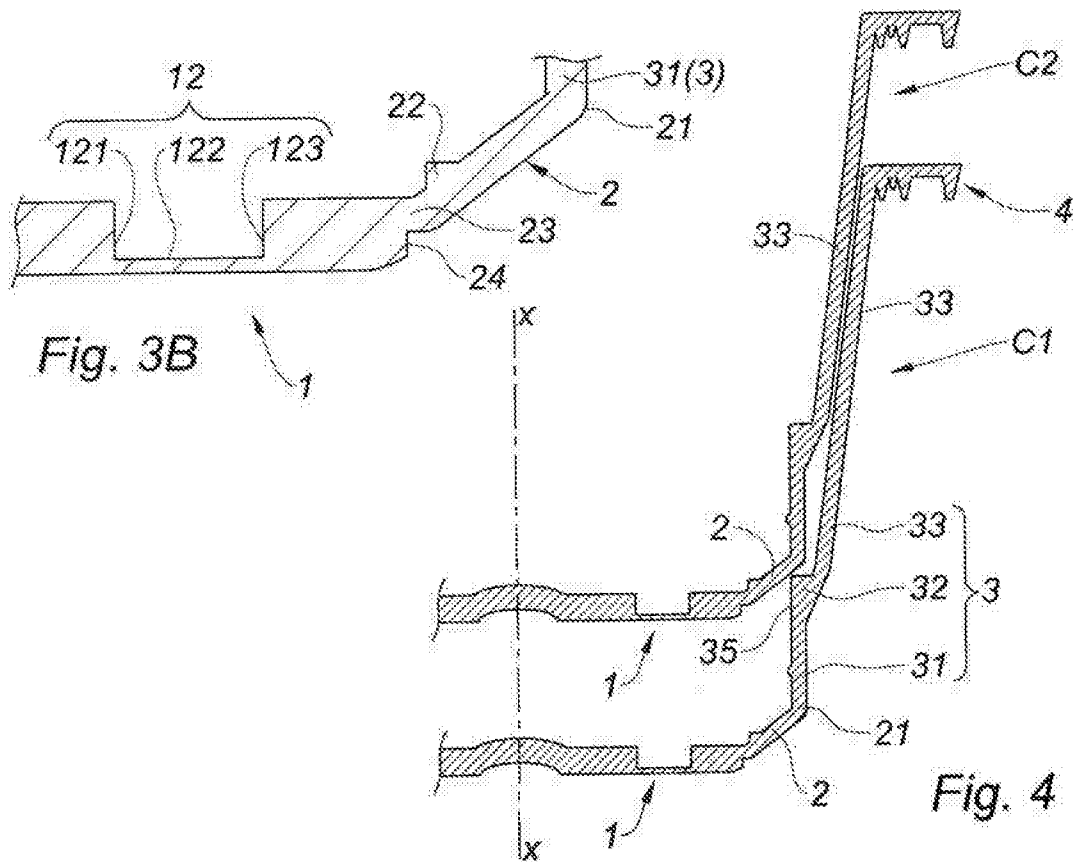
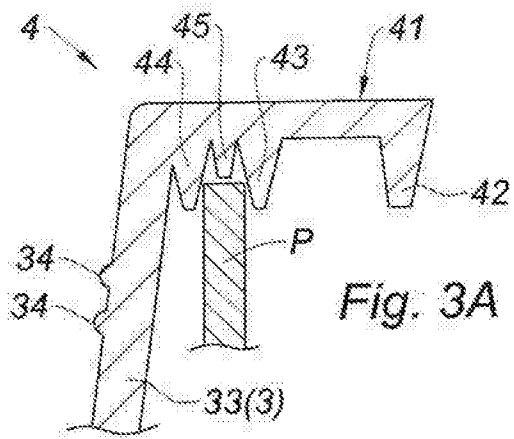
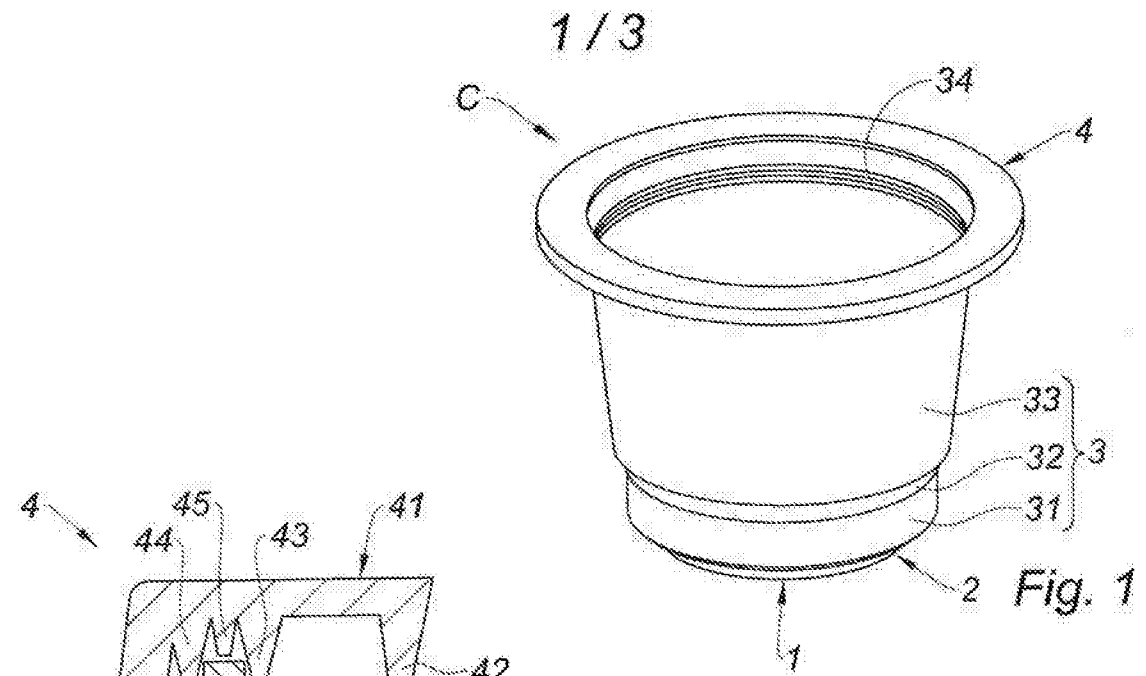
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DESCRIPTIVE ABSTRACT

“Capsule for preparing a beverage”

Capsule intended to receive a substance for preparing a beverage when the capsule is installed in a machine of coffee machine type. The capsule has a bottom (1), and a side wall (3) forming overall part of a frustum of a cone and a flange (4) receiving a membrane seal (5) after loading of the capsule with the substance. The flat bottom (1) has a circular inner groove (12), centered on the axis (xx) of the capsule and corresponding to the circle on which the pins of the piston of the extraction machine are located. This groove (12) forms a local reduction of the bottom thickness leaving only a veil of material (123). The generally truncated cone-shaped side wall (3) has a cylindrical wall (33) under the flange (4) and a base cylinder (31) close to the bottom (1), joining the conical wall (33) by a conical junction (32) and the bottom (1) by a base truncated cone (2).

-Figure 3-



Capsule for preparing a beverage

Field of the invention

The present invention relates to a capsule intended to receive a substance for preparing a beverage when the capsule is installed in a machine of coffee or brewing machine type to be held therein by a piston during the passage of the extractor liquid through the capsule and the substance it contains, the symmetric rotating capsule having a bottom and a side wall forming overall part of a frustum of a cone and a flange receiving a membrane seal after loading the capsule with the substance.

State of the art

Capsules having a truncated cone general form and particularly a capsule described in the document FR 12 57 144 are already known. This capsule is pre-drilled with a bottom provided with holes spread over concentric circles. These holes have a form of an outwardly open funnel and the narrowed portion of which leads into the capsule.

The holes spread over the entire surface of the bottom are designed to distribute as regularly as possible hot water (or more generally hot fluid) into the volume of the capsule. For this same reason, the piston pins must be prevented from further drilling the bottom and disturbing the regularity of water distribution over the entire surface of the bottom, through holes bigger than the calibrated holes.

To this end, the bottom comprises a circular rib protruding towards the inside of the capsule to receive the piston pins without them touching the bottom. But this capsule of relatively complex form requires a particular hermetic packaging in the form of a pouch certainly facilitating the handling but having the disadvantage of involving an additional cost.

Purpose of the invention

The present invention is intended to develop a capsule which is simple, easy to package and use, and allowing the containment of all the aroma of the substance in the sole volume of the capsule to avoid a special outer packaging and reduce the cost.

Disclosure and advantages of the invention

The present invention relates to a capsule intended to receive a substance for preparing a beverage when the capsule is installed in a extraction machine such as a coffee machine or brewing machine, the capsule is held therein by a piston and pins of the piston piercing a bottom of the capsule so as to allow the passage of the extractor liquid

through the capsule and the substance contained by the capsule, wherein the capsule has a side wall extending from the bottom wall, the side wall having an overall truncated cone-shaped profile and a flange extending from the side wall to which a membrane seal can be attached after loading the capsule with the substance to hermetically seal the capsule, and wherein

- the bottom of the capsule is flat and has a circular inner groove, centered on the axis of the capsule that can receive the pins of the piston of the extraction machine, the inner groove having a local reduction of the bottom thickness leaving only a veil of material, and
- the side wall has a upper conical wall section under the flange and a base cylinder section that is joined to the upper conical wall section by a conical junction section, and the base cylinder section is joined to the bottom by a base conical section.

The capsule has the advantage of avoiding the packaging outer shell since it is hermetically sealed which not only simplifies the packaging, reduces the cost and volume of wastes thereof, but also has the advantage of containing coffee and its aromas in the narrow volume of the sole capsule and this until the time of drilling of the capsule and the arrival of the hot fluid. The quality of coffee thus prepared or more generally the beverage, depending on the substance packaged in the capsule, is better for the same amount of substance, although the arrival of the hot fluid into the capsule is achieved through the only holes formed by the piston pins and not according to a set of several regularly distributed small holes.

In addition, the bottom of the capsule being flat, it reduces dimensions of the inner volume of the capsule since it does not comprise any deep slot coming in protrusion in the inner space of the capsule. This allows increasing the amount of substance placed in the capsule while not increasing the outer volume of the capsule, imposed by the uniform cavity of the various machines used in the preparation of a beverage with such capsules.

The inner groove defining the veil which locally weakens the bottom facilitates perforation of the bottom by the pins of the machine piston, pins which correspond to a similar distribution in the various machines using such capsules. The perforation of the bottom performed with the pins produces no deformation of the bottom since the pins can easily cross the veil of the inner groove without the bottom being weakened since this veil only extends over a ring of reduced width and, moreover, as the bottom is reinforced, the capsule is not likely to be crushed; it is rigidly held by the side wall thanks to its junction with the base cone and the base cylinder. In addition, the substance, in

particular the coffee contained in the capsule, is better compressed into the capsule which allows a better extraction.

According to another advantageous feature, the junction cone above the cylindrical portion of the wall comprises, on its inner surface, interlocking brackets having a rising side and an upper side intersecting thus forming a bearing edge which forms, along with the upper side, a peripheral bearing surface on which the stiffening cone of the nested empty capsule rests.

According to another advantageous feature, the edge at the meeting zone of the base cone and the cylinder is offset with respect to the extension of the geometric cone frustum of the conical wall.

The interlocking brackets on the inner periphery of the cylindrical portion form a particularly stable bearing receiving the stiffening cone such that the bearing between the cone and the brackets is almost limited to a point contact of this conical surface slightly tilted with respect to the bottom and consequently with respect to the bearing surface formed by the upper rims of the different brackets.

There is no risk of jamming of the capsule nested in another capsule but a simple bearing that facilitates the disengagement of the capsules from the stack in the filling machine.

In addition, bearing brackets stiffen this area of the wall at the junction between the cylindrical portion and the conical portion.

According to another feature, the inner surface of the cylindrical portion has a peripheral stiffening rib, which strengthens the cylindrical portion against crushing by the fluid under pressure, during the injection of liquid in the capsule, being exerted on the entire peripheral surface and not only on the bottom.

According to another feature, the bottom has an increased thickness compared to the thickness of the side wall.

According to an advantageous feature, the bottom has a thickness of about 1 mm and the veil of the inner groove has a thickness of about $1/5^{\text{th}}$ of the bottom thickness.

According to another advantageous feature, the inner groove has a rectangular cross-section facilitating the manufacture by injection molding.

Depending on the shape and the generally uniform distribution of the pins of the pistons of machine using capsules, the groove has an inner side which corresponds to a radius of 5 mm and the outer side of the groove has a radius of about 7 mm such that the groove has a width of about 2 mm.

According to another advantageous feature, the underside of the flange receiving the rim of the machine piston comprises a stiffening ring and an outer ring defining with an inner ring close to the side wall and in the gap, a sealing lip forming the surface

for receiving the rim of the piston. This receiving surface thus allows receiving, in a very tightly sealed manner, the rim of the piston so as to improve the passage of the pressurized fluid through the product contained in the capsule to avoid that this liquid, i.e. water, gets round the junction between the piston and the capsule without passing through the product contained in the capsule.

This sealing is perfectly achieved thanks to the significant sealing lip which occupies the whole gap between the inner ring and the outer ring which enables to give it a certain height against which the rim of the piston rests, which piston, at the same time, is guided by the inner ring and the outer ring and also ensures sealing with respect to these two rings.

According to a particularly advantageous feature, the outer ring, the inner ring and the lip have a triangular cross-section with an angle at the vertex of about 40°.

According to another advantageous feature, the base cone comprises, near its junction with the bottom, a lower rib particularly of rectangular cross-section. This rib interestingly stiffens the bottom.

According to another advantageous feature, the junction of the base cone and the bottom comprises a peripheral groove which also reinforces the capsule especially at the bottom, avoiding its crushing when the piston pins cross the bottom.

Drawings

The present invention will be described below in a more detailed manner using an embodiment of a capsule shown in the accompanying drawings in which:

- figure 1 is an isometric view of the capsule shown in upright position, the lower portion constituting the bottom through which the hot fluid for the preparation of the beverage arrives and the top shown without its membrane seal being the outgoing side of the brewed preparation,
- figure 2, in the parts 2A, 2B, 2C thereof, respectively shows the side view of the capsule, an axial sectional view and a top view of the capsule,
- figure 3 is a partial enlarged scale view of the axial section of the capsule,
- figure 3A is an enlarged view of detail I in figure 2B,
- figure 3B is an enlarged view of detail II in figure 2B,
- figure 4 is a half section of the nesting of two capsules.

Description of an embodiment of the invention

According to figure 1, the invention relates to a hermetic capsule C, i.e. which is not pre-drilled, intended to receive a substance to prepare a beverage such as coffee or

infusion. This capsule C, according to the orientation in figure 1, has a bottom 1 through which the hot fluid (hot water or hot water and steam mixture) arrives for the preparation of the beverage. The bottom 1 is connected to the side wall 3 by a conical base 2. The side wall 3 consists of a base cylinder 31 joining a conical wall 33 through a conical junction 32. The conical wall 33 is prolonged by a flange 4. Internally, the top of the conical wall 33 has peripheral ribs 34 serving as gripping ribs to extract the capsule from the injection mold. These ribs 34 are not involved in the subsequent operation of the capsule, that is to say, the filling thereof with a substance powder (coffee, tea) or during the installation and use of the capsule in a machine for the preparation of beverages.

Figures 2A, 2B, 2C show in more detail the different elements of the structure of the symmetric capsule rotating relative to its axis (xx). The side view and the axial sectional view (figs. 2A, 2B) show, in particular, the shape of the flat bottom 1 having a stiffening inwardly protruding dome 11 in its center (axis xx). The flat bottom 1 is prolonged upwards by the base cone 2 which forms an angle in the range of 30 to 45° with the bottom 1.

The base cone 2 joins the base cylinder 31 stiffening the capsule near the bottom. The cylinder 31 is connected through the conical junction 32 to the conical wall 33. The conical junction 32 has a steep taper as compared to the conical wall 33 to absorb, over a short height, the difference in diameter with respect to the cylinder 31 which allows the nesting while remaining, by the side wall 3, in a truncated cone-shaped shell. Internally, the junction 32 of the base cylinder 31 and the conical wall 33 is provided with interlocking brackets 35 the rising side 351 of which extends the inner surface of the cylinder 31 and the upper side 352 forms an interlocking bearing surface.

The inner surface of the cylinder 31 is provided with a stiffening rib 311. Figure 2C particularly shows the inner groove 11 with the sides 121, 123 thereof and the veil 122. This figure also highlights the distribution of the interlocking brackets 34.

As shown in more details in figures 3, 3A, 3B, the top 41 of the flange 4 is flat in order to receive the membrane seal 5 and the underside is bordered by a stiffening ring 42. Near the junction of the flange 4 and the wall 3, the underside has an outer ring 43 having a triangular cross-section and an inner ring 44 also having a triangular cross-section between which there is a sealing lip 45. This space between the outer ring 43 and the inner ring 44 receives the rim P, systematically shown, of the cylindrical chamber of the piston of the machine. The flange 4 of the capsule is thus guided to appropriately receive the peripheral rim of the piston which is positioned between the outer ring 43 and the inner ring 44 by crushing the sealing lip 45, the assembly forming a laby-

rinth seal. The outer ring has a truncated triangular cross-section or a trapezoid cross-section with an angle at the vertex of about 40° .

The inner ring 44 also has a triangular cross-section having a rounded vertex with an angle of about 40° and the gap between the two rings 43, 44 is occupied by the sealing lip 45 which also has a triangular cross-section having an acute vertex with an angle of about 40° such that this relatively high sealing lip 45 can be crushed with a good contact against the rim P which is furthermore resting against the rings 43, 44.

According to figures 2B, 3, 3B, the inner groove 12 of the bottom 1 has a rectangular cross-section delimited by an inner side 121, an outer side 123 and a lower wall 122 in the form of a veil of very low thickness, sufficient to ensure tight closure resisting to handling of the capsule while facilitating its drilling by the piston pins, causing at this time the deformation of the bottom 1. The wall in the form of veil 12 is externally at the same level as the rest of the bottom 1 of the capsule C. By way of example, the inner side 121 and the outer side 123 have radiuses with respect to the axis of revolution xx of the capsule, for example, of a length of 5 mm for the inner side and 7 mm for the outer side so as to leave a groove 12 having a width 4 of about 2 mm corresponding to the width of the envelope ring of the piston pins of the machines receiving such capsules. The veil 122 has a thickness of about $1/5^{\text{th}}$ of the thickness of the bottom 1. By way of example, the bottom 1, thicker than the wall 3, has a thickness of about 1 mm and the veil 122 has a thickness of about 0.2 mm.

Figure 3 shows more explicitly the different constitutive parts of the capsule C already described, in particular the meeting line 321 between the conical junction 32 and the conical wall 33 as well as the form of the brackets 35 having a rising side 351 that is to say parallel to the axis xx and in the extension of the inner wall of the cylinder 31 and an upper side 352 in a plane perpendicular to the axis xx; both sides form at the intersection thereof a bearing edge 353. The upper side 352 of the brackets 35 also forms a peripheral bearing surface.

According to figures 3, 3B, the junction of the flat bottom 1 and the side wall 3 is reinforced by the widely open form of the base cone 2 the wall of which has substantially the thickness of the side wall 3. This base cone 2 is provided with an inner rib 22 of a rectangular cross-section near the junction 23 with the bottom 1. This junction 23 is stiffened by the peripheral groove 24.

Thanks to these different forms of reinforcements, the capsule is stiffened and the bottom 1 resists the thrust of the piston spindles and is not deformed, avoiding crushing of the capsule, promoting its drilling by the piston pins and allowing a better compression of the coffee, i.e. no loss of pressure, and thus a better extraction.

Finally, the flat bottom 1 facilitates standing of the capsule in an upright position on its bottom.

5 The half section of figure 4 shows the nesting of two empty capsules C1, C2 highlighting net bearing of the base cone 2 on the brackets 35 and more particularly on the edge 352 or the upper rim 352. This view also shows a slight offset of the edge 21 between the base cone 2 and the cylinder 31 with respect to the inner surface of the cylinder 31 above the bracket 35. Under these conditions, the capsule C2 rests, by the base cone 2 thereof, partly on the edge 353 and partly on the upper side 352 of the brackets 35; its conical wall 33 is held without jamming by the inner surface of the conical wall 10 33 of the capsule C1. Thanks to this geometry of the capsules, the edge 21 cannot get jammed at the meeting 321 of the junction 32 and the conical wall 33 such that the capsules C1 and C2 are easily released from one another.

In the claims which follow and in the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, 15 the word “comprise” or variations such as “comprises” or “comprising” is used in an inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments of the invention.

It is to be understood that, if any prior art publication is referred to herein, such reference does not constitute an admission that the publication forms a part of the common general knowledge in the art, in Australia or any other country. 20

NOMENCLATURE

	1	Bottom
	11	Dome
5	12	Inner groove
	121	Inner wall
	122	Bottom of the groove
	123	Outer wall
	2	Base cone
10	21	Edge
	22	Inner rib
	23	Junction
	24	Peripheral groove
	3	Side wall
15	31	Base cylinder
	311	Peripheral rib
	32	Conical junction
	321	Meeting line
	33	Conical wall
20	34	Peripheral rib
	35	Bracket
	351	Rising side
	352	Upper side
	353	Bearing edge
25	4	Flange
	41	Upper surface
	42	Stiffening ring
	43	Outer ring
	44	Inner ring
30	45	Sealing lip
	5	Membrane seal
	C	Capsule
	P	Rim of the piston
	XX	Axis of the capsule
35		

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A capsule intended to receive a substance for preparing a beverage when the capsule is installed in a extraction machine such as a coffee machine or brewing machine, the capsule is held therein by a piston and pins of the piston piercing a bottom of the capsule so as to allow the passage of the extractor liquid through the capsule and the substance contained by the capsule, wherein the capsule has a side wall extending from the bottom wall, the side wall having an overall truncated cone-shaped profile and a flange extending from the side wall to which a membrane seal can be attached after loading the capsule with the substance to hermetically seal the capsule, and wherein
- the bottom of the capsule is flat and has a circular inner groove, centered on the axis of the capsule that can receive the pins of the piston of the extraction machine, the inner groove having a local reduction of the bottom thickness leaving only a veil of material, and
 - the side wall has a upper conical wall section under the flange and a base cylinder section that is joined to the upper conical wall section by a conical junction section, and the base cylinder section is joined to the bottom by a base conical section.
2. The capsule according to claim 1, wherein an inner surface of the conical junction section comprises interlocking brackets having a rising side and an upper side intersecting, thus forming a bearing edge constituting, along with the upper side, a peripheral bearing surface on which the base conical section of another of the capsules can rest when located in nested relationship.
3. The capsule according to claim 1 or 2, wherein the edge at the meeting of the base cone and the cylinder is offset with respect to the extension of the geometric frustum of cone of the upper conical wall section.
4. The capsule according to any one of claims 1 to 3, wherein an inner surface of the base cylinder has a peripheral stiffening rib.
5. The capsule according to any one of claims 1 to 4, wherein the bottom has an increased thickness compared to that of the side wall in particular a thickness of 1 mm and the veil of the inner groove has a thickness of about $1/5^{\text{th}}$ of the bottom thickness.

6. The capsule according to any one of claims 1 to 5, wherein the inner groove of the bottom has a rectangular cross-section.

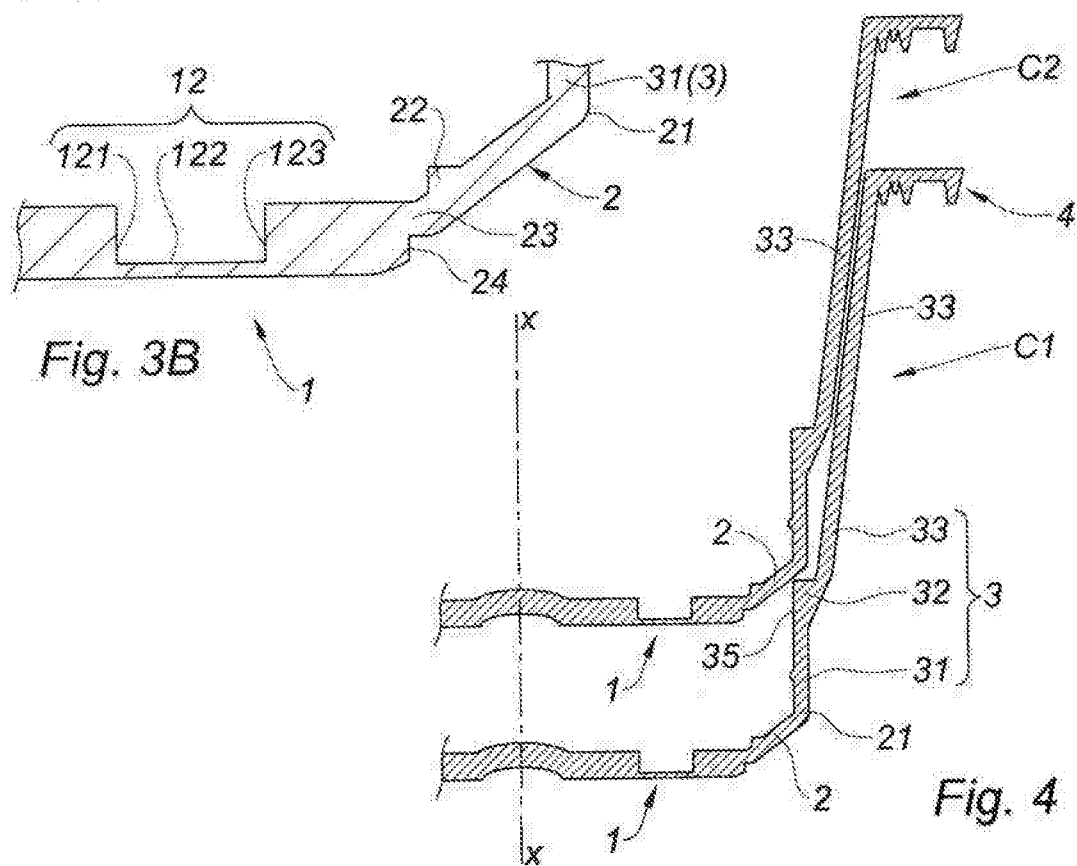
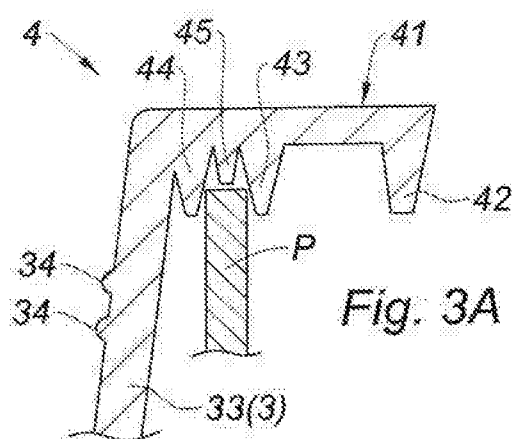
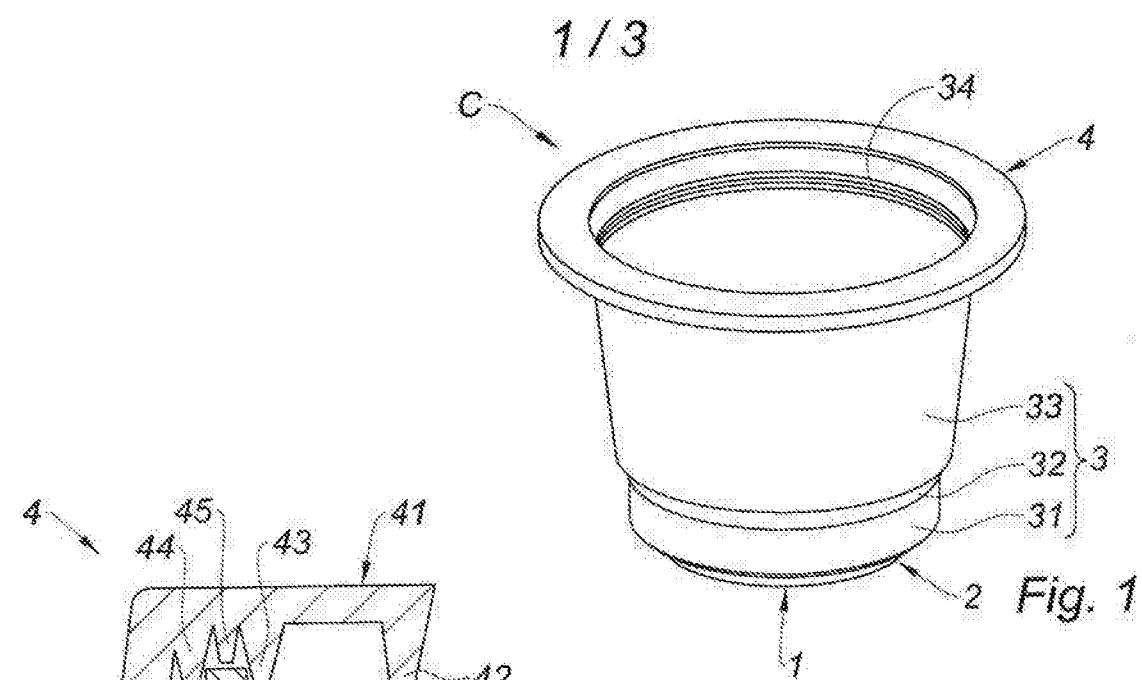
5 7. The capsule according to claim 6, wherein the inner groove has an inner wall located at a inner radius of 5 mm and an outer wall located at an outer radius of 7 mm, the inner wall and the outer wall of the groove being connected by the veil.

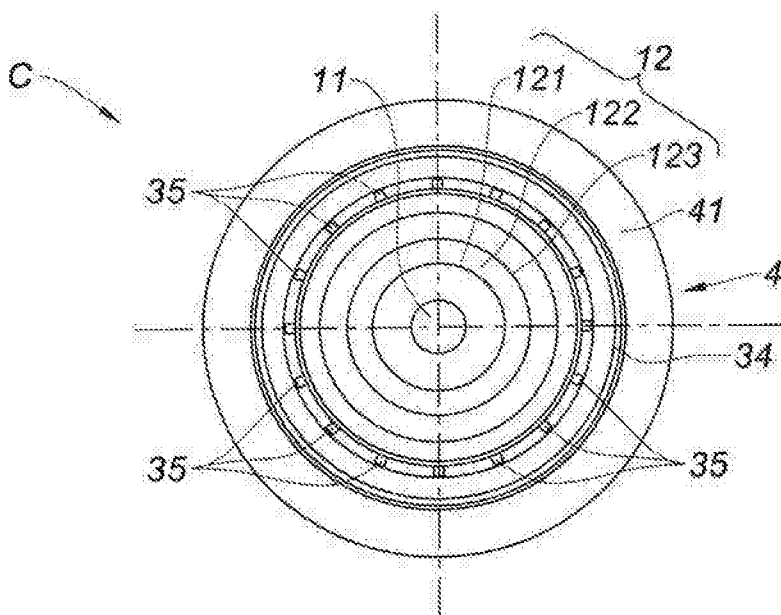
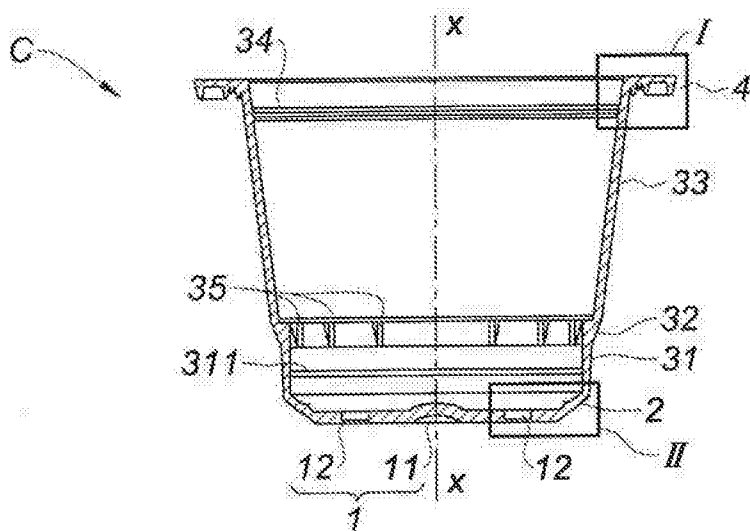
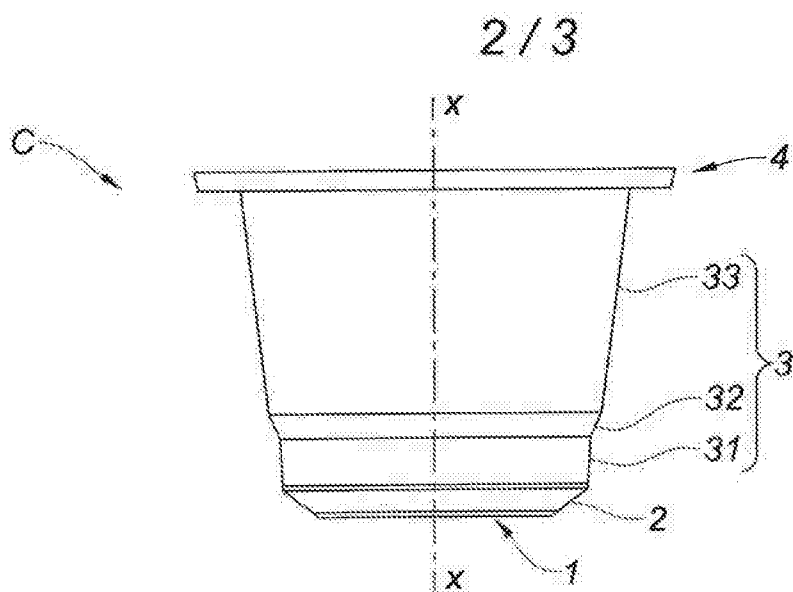
10 8. The capsule according to claim 1, wherein an underside of the flange has a peripheral stiffening ring and is configured to receive a rim of the piston of the extractor machine by having inner ring located near the side wall and an outer ring and a gap between the inner ring and the outer ring having sealing lip having a a triangular cross-section, to form the receiving surface of the rim of the piston.

15 9. The capsule according to claim 8, wherein the outer ring, the inner ring and the lip have a triangular cross-section with an angle at the vertex of 40°.

20 10. The capsule according to claim 1, wherein the base conical section comprises an inner rib having a rectangular cross-section near the junction between the base cone and the bottom.

11. The capsule according to any one of claims 1 to 10, wherein the junction of the base conical section and the bottom comprises an outer peripheral groove.





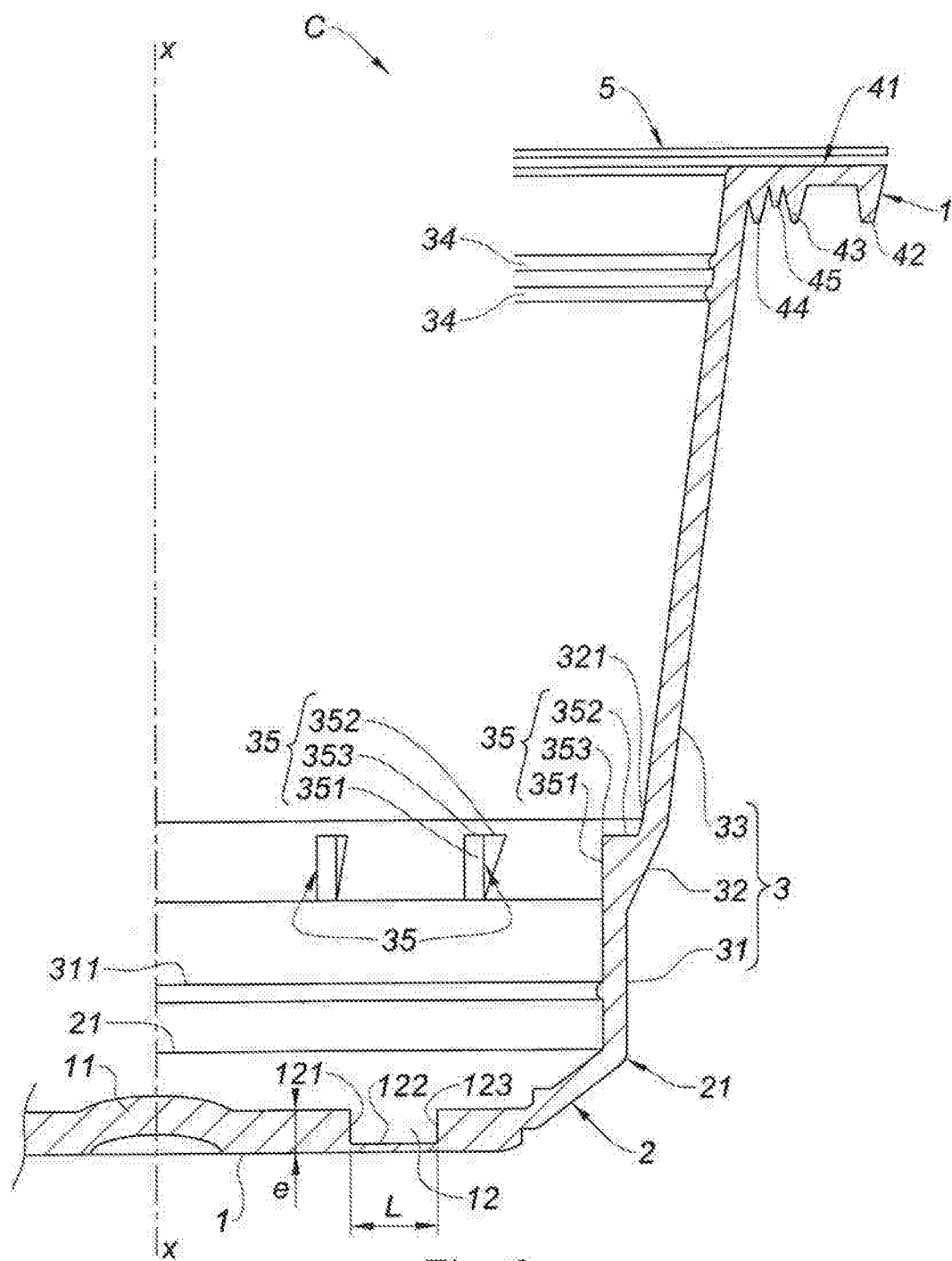


Fig. 3