

(19)



(11)

EP 4 387 904 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:
25.06.2025 Bulletin 2025/26

(21) Application number: **22754163.8**

(22) Date of filing: **19.07.2022**

(51) International Patent Classification (IPC):
B65D 85/804^(2006.01)

(52) Cooperative Patent Classification (CPC):
B65D 85/8064

(86) International application number:
PCT/IB2022/056629

(87) International publication number:
WO 2023/021342 (23.02.2023 Gazette 2023/08)

(54) SINGLE-DOSE CAPSULE FOR PREPARING INFUSION OR SOLUBLE BEVERAGES

EINZELDOSIS-KAPSEL FÜR DIE ZUBEREITUNG VON INFUSIONEN ODER LÖSLICHEN GETRÄNKEN

CAPSULE MONODOSE POUR LA PRÉPARATION D'INFUSIONS OU DE BOISSONS SOLUBLES

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

(30) Priority: **18.08.2021 IT 202100022040**

(43) Date of publication of application:
26.06.2024 Bulletin 2024/26

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WO-A1-2021/005437

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Description

[0001] It is hereby disclosed a single-dose aluminum capsule for preparing infusion or soluble beverages in an extraction device, comprising an edge provided with an improved sealing profile. The beverage capsule can be for espresso coffee machines, in particular for preparing highpressure espresso coffee.

[0002] As is known, the art offers an extreme variety of automatic machines provided with a preparation and dispensing unit suitable for producing an infusion by passing hot water under pressure through a capsule, containing the food preparation to be infused, placed inside a dedicated infusion chamber. Conventional espresso coffee machines generally have an infusion chamber comprising an inlet side of the pressurized water and a side from which the infused/extracted beverage escapes during the passage of water through the capsule. Perforation means are present on the water inlet side suitable for perforating the bottom of the capsule thus allowing pressurized water to enter the capsule in order to extract the beverage. Such beverage then escapes from the upper part of the capsule at the cover which, subjected to the internal pressure of the water, opens and thus allows the extracted beverage to pass through, which is collected in a dedicated external container. The edge of said upper part of the capsule rests on the side opposite the water inlet side and, by virtue of its profile, seals against the side of the infusion chamber from which the beverage escapes. For the correct operation of the extraction machine it is essential that the infusion chamber closes correctly and seals even under pressure so that there are no significant leaks of hot water outside the infusion chamber itself. The aluminum capsules of the known type therefore comprise a cup provided with a circular perimetral edge suitable for making a seal engagement with a relative abutment edge of the infusion chamber, in such a way as to guarantee the sealing of the water under pressure and make the infusion operation more efficient by forcing the water to pass inside the capsule so as to maximize the effectiveness of the extraction of the beverage. Although aluminum has the considerable advantage of being impermeable to oxygen and water, which means that the coffee in the capsules has a long shelf life, it easily deforms during the filling and packaging step, and is therefore difficult and expensive to implement a reliable seal on the edge of the cup. Considering that conventional espresso coffee machines comprise a heating element suitable for heating the water up to about 95-98 °C, which is then pumped at high pressure (generally with appropriate pumps) into the infusion chamber, obtaining a reliable seal, which avoids significant leaks and forces pressurized water to pass inside the capsule, is one of the most felt problems in the specific sector.

[0003] There is also the problem of making a capsule that may be used in different types of extraction machines, guaranteeing compatibility and reliability on mul-

tipale machine models. In fact, it often happens that a capsule works well on some machines and less well on others, even if the machines are based on the same extraction methodology. This is because the closing of the abutment edge of the infusion chamber on the perimetral edge of the capsule does not always occur reliably due to (even slightly) different operating modes, construction and more or less wide tolerances.

[0004] And again, it is extremely important to be able to create a capsule provided with a perimetral edge capable of guaranteeing an effective seal while maintaining a simple geometry from the constructive point of view, in particular in the case of capsules in which the cup is made of aluminum which, as is known, does not allow for the complex geometries achievable, for example, with the injection molding technology.

[0005] In the prior art, capsules are disclosed in WO 2020/053075 A1 and WO 2016/186496 A1.

[0006] The object of the present invention is to provide a capsule which overcomes the aforementioned drawbacks and therefore guarantees reliable operation.

[0007] Such object is achieved by a capsule according to claim 1. The dependent claims describe embodiment variations.

[0008] The features and the advantages of the capsule according to the present invention will become apparent from the following description, made by way of a non-limiting example with reference to the accompanying figures, in which:

- Figure 1 shows a sectional view of a capsule according to the present invention;
- Figure 2 shows an enlargement of the perimetral edge of the cup of the capsule of Figure 1;
- Figure 3 shows a cross-sectional view of the capsule of Figure 1 when inserted into an infusion chamber of an extraction device, in a first insertion step;
- Figure 4 shows an enlargement of the perimetral edge of the cup of the capsule of Figure 3;
- Figure 5 shows a cross-sectional view of the capsule of Figure 1 when inserted into an infusion chamber of an extraction device, in a second insertion step;
- Figure 6 shows an enlargement of the perimetral edge of the cup of the capsule of Figure 5;
- Figure 7 shows a cross-sectional view of the capsule of Figure 1 when inserted into an infusion chamber of an extraction device, in a third insertion step;
- Figure 8 shows a top view of the capsule of Figure 1;
- Figure 9 shows an enlargement of the upper bottom of the cup of the capsule of Figure 1.

[0009] With reference to the accompanying figures, Figure 3 shows an aluminum capsule 10 according to the invention inserted in an infusion chamber 3 (shown only partially) of an extraction device for preparing beverages.

[0010] Figure 1 instead shows only the aluminum capsule 10, of the single-dose type for preparing a beverage,

for example coffee, infusion, soluble, decoction or the like.

[0011] The capsule 10 comprises a hollow body called cup 1 defining therein a compartment for containing at least one substance to be infused or dissolved or extracted by means of a liquid under pressure, such as for example coffee or tea, typically in granular or powder form.

[0012] The cup 1 comprises an annular side wall 2 extending in height along a central axis X, between a bottom wall 4 and an opposite front end 6 defining an opening 5.

Such opening 5 is covered by a cover 8, perforable or yielding, which closes the capsule 1.

[0013] Preferably, the side wall 2 has an overall substantially truncated cone shape on the outside, for example realized by the succession of truncated cone surfaces having different angular openings.

[0014] The bottom wall 4 is intended to be crossed by the liquid injected by the extraction device for preparing the beverage, typically hot water or other food liquid, such as milk.

[0015] For this purpose, according to an embodiment variant shown in Figure 8, the bottom 4 provides a perforable central portion 41 by specific perforation means of the extraction machine when the capsule is in use, so as to realize passages for the liquid towards the inside of the cup 1. Preferably, the perforable central portion 41 is provided with a reinforcement edge 42 suitable for providing stiffness to the bottom 4 of the cup 1, avoiding the deformation thereof during the perforation step for the injection of the liquid under pressure. Preferably, the reinforcement edge 42 is an inward fold made in the wall of the cup 1. Preferably, the reinforcement edge 42 defines a wavy shape, visible in Figure 8.

[0016] At the front end 6, the cup 1 comprises a collar 7, typically arranged at the free end of the side wall 2, projecting radially externally.

The collar 7 has a front face 7b facing towards the opening 5 of the cup 1, and an opposite rear face 7a.

The front face 7b of the collar 7 is intended for union with the peripheral annular region of the cover 8 which closes the cup 1 at the front end 6.

The rear face 7a of the collar 7, on the other hand, is intended to engage with an abutment edge 31 of the infusion chamber 3 of the extraction device.

[0017] In this regard, with reference to Figure 3, the extraction device comprises an infusion chamber 3 suitable for housing at least part of the cup 1 of the capsule 10 therein.

[0018] The infusion chamber 3 is movable with respect to a receiving plate 38 between an open position, which allows the capsule 10 to be inserted and removed, and a closed position. When the infusion chamber 3 is in the closed position, as shown in Figure 7, it forms a closed chamber around the capsule 10 when the heated and pressurized water is fed into the cup 1 (through the bottom 4) to carry out the beverage infusion and extrac-

tion step.

[0019] The receiving plate 38 is provided with at least one opening (not shown), to allow the beverage to flow into the final container, for example a cup.

[0020] The infusion chamber 3 is provided with a compression edge 31 having an external portion 31a facing the rear face 7a of the collar 7 of the capsule 10.

[0021] In the embodiment described and shown in Figure 3, the compression edge 31 is of the double crown type and comprises two circular crowns (which define an internal edge 32 and an external edge 33) connected by an annular recess 34. It should be noted that only the inner edge 32 is used to perform, abutting against the rear face 7a of the collar 7 of the capsule 10, the sealing of the infusion chamber. The external edge 33 is shorter than the internal edge 32 and does not compress the collar 7 of the capsule or part of it.

[0022] The rear face 7a of the collar 7 is therefore intended to engage with the internal edge 32 of the infusion chamber 3 of the extraction device to seal the infusion chamber. In this regard, the collar 7 is provided with a particular geometry in such a way as to act itself as a sealing ring of the capsule 10. The collar 7 is in fact intended to sealingly engage, at least partially, with the internal edge 32 of the infusion chamber 3 of the extraction device and provides, with the internal edge 32, a head seal.

[0023] The collar 7 of the cup 1, due to features of the material and structural and dimensional features, is at least partially deformable under the action of compression of the internal edge 32 of the machine, so as to provide the seal; the deformation is of a plastic type.

[0024] The collar 7 comprises an end 72, for example a hollow edge obtained by folding back on itself of the terminal portion of the cup 1. In the example of Figure 1, the terminal portion of the cup 1 forms a curl end 72. Such end 72 allows the capsule to be kept in position by virtue of the side arms of the infusion chamber (as seen in Figure 4) until the end of the extraction.

[0025] The collar 7 comprises a flat horizontal portion 71, on whose front face 7b is attached the cover 8 which closes the cup 1 at the front end 6. Preferably, the flat portion 41 extends for about 1 mm. Advantageously, the flat portion 71 is wide to facilitate the welding step of the cover 8.

[0026] The collar 7 comprises a seal step 91 intended to sealingly engage with the internal edge 32 of the infusion chamber 3 of the extraction device.

The seal step 91, clearly visible in Figure 2, is defined by a tilted raised portion 911 (i.e. defined by a truncated cone annular wall) preferably at an angle between 2° and 6°, preferably of 4°, with respect to the central axis X. Preferably, the raised portion 911 extends for about 1 mm. The seal step 91 is also defined by an abutment portion 912 tilted at an angle between 4° and 12°, preferably of 8°, with respect to the horizontal plane. Preferably, the abutment portion 912 extends for about 1 mm.

[0027] As may be seen in Figure 6, the seal step 91,

and in particular the abutment portion 912, is engaged by the internal edge 32 during the closing step of the infusion chamber 3. Continuing in its closing path, the internal edge 32 compresses the seal step 91 as shown by way of example in Figure 7 until it deforms, creating a crease 913 which is inserted at least partially into the annular recess 34 (i.e. between the internal edge 32 and the external edge 33) realizing a seal engagement with the compression edge 31 of the extraction device during the closing step of the infusion chamber. Advantageously, the geometry of the seal step 91 allows the aluminum to deform as a whole when clamped between the compression edge 31 and the receiving plate 38, as in Figure 7. Advantageously, the geometry of the seal step 91 allows a high adaptability of the capsule 10 to the different shapes of the compression edge 31 of the infusion chamber to be obtained. Advantageously, the presence of a raised portion 911 and an abutment portion 912, both tilted, facilitates the deformation of the seal step 91.

[0028] The side wall 2 of the cup 1 comprises a centering step 21 which is arranged above the collar 7. Such centering step 21 is intended to abut against the internal wall of the infusion chamber of the extraction device in order to improve the centering of the capsule 10 inside the infusion chamber to ensure the correct positioning of the seal step 91 in axis with respect to the internal edge 32.

The centering step 21, clearly visible in Figure 2, is defined by a tilted raised portion 211 (i.e. defined by a truncated cone annular wall) preferably at an angle between 5° and 11°, preferably of 8°, with respect to the central axis X. Preferably, the raised portion 211 extends for about 3 mm.

The centering step 21 is also defined by an abutment portion 212 preferably tilted at an angle between 12° and 18°, preferably of 15°, with respect to the horizontal plane.

Preferably, the abutment portion 212 extends for about 0.5 mm.

[0029] As may be seen in Figure 6, during the closing step of the infusion chamber 3, the internal wall of the compression edge 31 engages the centering step 21, and in particular the raised portion 211 which is configured as an abutment portion for guiding the centering of the capsule 10 in the infusion chamber itself. Advantageously, the centering step 21 provided with a raised portion 211 and an abutment portion 212, both tilted, facilitates centering of the capsule.

[0030] In normal use, the capsule 10 according to the present invention is inserted into the infusion chamber 3 of the extraction machine (Figure 3) and, once the movement of the components of the machine itself is activated, the rear face 7a of the collar 7 of the capsule 10 engages with the compression edge 31 of the infusion chamber 3 to form a closed chamber around the capsule 10 and carry out the step of infusing and extracting the beverage.

[0031] During the handling step of the machine components (Figure 4), it is possible that there is a misalign-

ment of the capsule 10 inside the infusion chamber, and therefore that the seal step 91 of the collar 7 of the capsule 10 is not perfectly coaxial with the compression edge 31 of the machine. However, the internal wall of the compression edge 31 of the machine, in its advancement path, may touch the centering step 21, pushing the capsule 10 to align itself axially in the center of the infusion chamber.

[0032] The compression edge 31 of the machine then ends up in abutment against the seal step 91 (Figure 6) and deforms it (Figure 7) to realize a sealed closing. In the capsule 10 according to the present invention, the seal is achieved by deforming the seal step 91. As shown in Figure 7, when the infusion chamber is closed, the seal step 91 is plastically deformed to provide the necessary seal to prevent any leakage of liquid from the infusion chamber.

[0033] Advantageously, the compression edge 31 deforms the seal step 91 into a wavy crease 913 which allows a plurality of sealing points to be obtained with said compression edge 31 against potential water leaks from the infusion chamber.

[0034] Advantageously, the centering step 92, in addition to acting as a centering of the capsule in its housing in the infusion chamber, is slightly deformed towards the outside, thus contributing to the seal against potential leaks of water from the infusion chamber.

[0035] Advantageously, the deformation of the seal step 91 does not touch the flat portion 71 of the collar 7 thus avoiding risks of compromising the welding of the cover 8.

[0036] Advantageously, also the curl end 72 of the collar 7 is not deformed during the closing step, thus continuing to hold the capsule in position by virtue of the side arms of the extraction chamber (as seen in Figure 4) until the end of the extraction.

[0037] Innovatively, the capsule according to the present invention overcomes the drawbacks mentioned with reference to the prior art, since it allows a reliable seal to be provided while maintaining a geometry that is constructively easy to manufacture.

[0038] Advantageously, in fact, the capsule according to the present invention may be used in different types of extraction machines as it is provided with a seal step 91 and a centering step which compensate for any inaccuracies in closing the abutment edge of the infusion chamber on the capsule collar.

50 Claims

1. A single-dose capsule (10) for preparing infusion or soluble beverages in an extraction device provided with an infusion chamber, said capsule comprising:

- a cup (1) made of aluminum comprising a bottom wall (4), a collar (7) at an opposite end defining an opening (5), an annular side wall (2)

extending in height along a central axis (X) between said bottom wall (4) and said collar (7), the cup defining, therein, a compartment containing at least one food substance;
- a cover (8) sealingly closing said opening (5);

wherein:

- the collar (7) comprises a flat horizontal portion (71), having a front face (7b) to which the cover (8) is fastened;

- the collar (7) comprises, internally with respect to the flat portion (71), a plastically deformable seal step (91) for making a seal with the infusion chamber of the extraction device, said seal step (91) comprising a raised portion (911), which is tilted with respect to the central axis (X);

- the side wall (2) comprises a centering step (21) for centering the cup (1) inside the infusion chamber of the extraction device; said centering step (21) comprising a raised portion (211), which is tilted with respect to the central axis (X); wherein said seal step (91) also comprises an abutment portion (912);

characterised in that

the abutment portion (912) of the seal step (91) is tilted by an angle between 4° and 12° with respect to a horizontal plane defined by the flat portion (71) of the collar (7).

2. A single-dose capsule made of aluminum (10) according to claim 1, wherein said centering step (21) also comprises an abutment portion (212), which is tilted with respect to the horizontal plane defined by the flat portion (71) of the collar (7).
3. A single-dose capsule made of aluminum (10) according to any one of the preceding claims, wherein said raised portion (911) of the seal step (91) is tilted by an angle between 2° and 6°, preferably of 4°, with respect to the central axis (X).
4. A single-dose capsule made of aluminum (10) according to any one of the preceding claims, wherein said raised portion (911) of the seal step (91) extends for about 1 mm.
5. A single-dose capsule made of aluminum (10) according to any one of the preceding claims, wherein said abutment portion (912) of the seal step (91) is tilted by an angle of 8° with respect to the horizontal plane.
6. A single-dose capsule made of aluminum (10) according to any one of the preceding claims, wherein said abutment portion (912) of the seal step (91) extends for about 1 mm.

7. A single-dose capsule made of aluminum (10) according to any one of the preceding claims, wherein said raised portion (211) of the centering step (21) is tilted by an angle between 5° and 11°, preferably of 8°, with respect to the central axis (X).
8. A single-dose capsule made of aluminum (10) according to any one of the preceding claims, wherein said raised portion (211) of the centering step (21) extends for about 3 mm.
9. A single-dose capsule made of aluminum (10) according to any one of the preceding claims, when dependent on claim 2, wherein said abutment portion (212) of the centering step (21) is tilted by an angle between 12° and 18°, preferably of 15°, with respect to the horizontal plane.
10. A single-dose capsule made of aluminum (10) according to any one of the preceding claims, when dependent on claim 2, wherein said abutment portion (212) of the centering step (21) extends for about 0.5 mm.
11. A single-dose capsule made of aluminum (10) according to any one of the preceding claims, wherein said flat portion (71) extends for about 1 mm.
12. A single-dose capsule made of aluminum (10) according to any one of the preceding claims, wherein said bottom (4) comprises a perforable central portion (41) surrounded by a reinforcement edge (42) defining a wavy shape.

Patentansprüche

1. Einzeldosiskapsel (10) zum Zubereiten von Aufgüssen oder löslichen Getränken in einer Extraktionsvorrichtung, die mit einer Aufgusskammer versehen ist, wobei die Kapsel umfasst:
 - einen Becher (1) aus Aluminium, umfassend eine Bodenwand (4), einen Kragen (7) an einem gegenüberliegenden bzw. entgegengesetzten Ende, der bzw. das eine Öffnung (5) definiert, eine ringförmige Seitenwand (2), die sich höhenmäßig entlang einer Mittelachse (X) zwischen der Bodenwand (4) und dem Kragen (7) erstreckt, wobei der Becher in sich ein Fach definiert, das zumindest eine Lebensmittelsubstanz enthält;
 - einen Deckel (8), der die Öffnung (5) dichtend verschließt;

wobei:

- der Kragen (7) einen flachen horizontalen Ab-

- schnitt (71) umfasst, der eine vordere Seite bzw. Fläche (7b) aufweist, an welcher der Deckel (8) befestigt ist;
- der Kragen (7) innen in Bezug auf den flachen Abschnitt (71) eine plastisch verformbare Dichtungsstufe (91) zum Herstellen einer Dichtung mit der Aufgusskammer der Extraktionsvorrichtung umfasst, wobei die Dichtungsstufe (91) einen erhabenen Abschnitt (911) aufweist, der in Bezug auf die Mittelachse (X) geneigt ist;
 - die Seitenwand (2) eine Zentrierstufe (21) zum Zentrieren des Bechers (1) innerhalb der Aufgusskammer der Extraktionsvorrichtung umfasst, wobei die Zentrierstufe (21) einen erhabenen Abschnitt (211) aufweist, der in Bezug auf die Mittelachse (X) geneigt ist;
- wobei die Dichtungsstufe (91) zudem einen Anlageabschnitt (912) umfasst;
- dadurch gekennzeichnet, dass** der Anlageabschnitt (912) der Dichtungsstufe (91) in Bezug auf eine durch den flachen Abschnitt (71) des Kragens (7) definierte horizontale Ebene um einen Winkel zwischen 4° und 12° geneigt ist.
2. Einzeldosiskapsel aus Aluminium (10) nach Anspruch 1, wobei die Zentrierstufe (21) zudem einen Anlageabschnitt (212) umfasst, der in Bezug auf die durch den flachen Abschnitt (71) des Kragens (7) definierte horizontale Ebene geneigt ist.
 3. Einzeldosiskapsel aus Aluminium (10) nach einem der vorhergehenden Ansprüche, wobei der erhabene Abschnitt (911) der Dichtungsstufe (91) um einen Winkel zwischen 2° und 6°, vorzugsweise 4°, in Bezug auf die Mittelachse (X) geneigt ist.
 4. Einzeldosiskapsel aus Aluminium (10) nach einem der vorhergehenden Ansprüche, wobei sich der erhabene Abschnitt (911) der Dichtungsstufe (91) etwa 1 mm erstreckt.
 5. Einzeldosiskapsel aus Aluminium (10) nach einem der vorhergehenden Ansprüche, wobei der Anlageabschnitt (912) der Dichtungsstufe (91) um einen Winkel von 8° in Bezug auf die horizontale Ebene geneigt ist.
 6. Einzeldosiskapsel aus Aluminium (10) nach einem der vorhergehenden Ansprüche, wobei sich der Anlageabschnitt (912) der Dichtungsstufe (91) etwa 1 mm erstreckt.
 7. Einzeldosiskapsel aus Aluminium (10) nach einem der vorhergehenden Ansprüche, wobei der erhabene Abschnitt (211) der Zentrierstufe (21) um einen Winkel zwischen 5° und 11°, vorzugsweise 8°, in Bezug auf die Mittelachse (X) geneigt ist.

8. Einzeldosiskapsel aus Aluminium (10) nach einem der vorhergehenden Ansprüche, wobei sich der erhabene Abschnitt (211) der Zentrierstufe (21) etwa 3 mm erstreckt.
9. Einzeldosiskapsel aus Aluminium (10) nach einem der vorhergehenden Ansprüche, wenn abhängig von Anspruch 2, wobei der Anlageabschnitt (212) der Zentrierstufe (21) um einen Winkel zwischen 12° und 18°, vorzugsweise 15°, in Bezug auf die horizontale Ebene geneigt ist.
10. Einzeldosiskapsel aus Aluminium (10) nach einem der vorhergehenden Ansprüche, wenn abhängig von Anspruch 2, wobei sich der Anlageabschnitt (212) der Zentrierstufe (21) etwa 0,5 mm erstreckt.
11. Einzeldosiskapsel aus Aluminium (10) nach einem der vorhergehenden Ansprüche, wobei sich der flache Abschnitt (71) etwa 1 mm erstreckt.
12. Einzeldosiskapsel aus Aluminium (10) nach einem der vorhergehenden Ansprüche, wobei der Boden (4) einen perforierbaren Mittelabschnitt (41) umfasst, der von einem Verstärkungsrand (42) umgeben ist, der eine Wellenform definiert.

Revendications

1. Capsule monodose (10) pour préparer une infusion ou des boissons solubles dans un dispositif d'extraction pourvu d'une chambre d'infusion, ladite capsule comprenant :
 - un gobelet (1) fait en aluminium, comprenant une paroi de fond (4) un bord (7) à une extrémité opposée définissant une ouverture (5), une paroi latérale annulaire (2) s'étendant en hauteur le long d'un axe central (X) entre ladite paroi de fond (4) et ledit bord (7), le gobelet définissant en son intérieur un compartiment contenant au moins une substance de nourriture ;
 - une couverture (8) fermant de façon étanche ladite ouverture (5) ;

dans laquelle :

 - le bord (7) comprend une partie horizontale plate (71) ayant une face avant (7b) à laquelle la couverture (8) est fixée ;
 - le bord (7) comprend, à l'intérieur par rapport à la partie plate (71), un étagement de jonction étanche (91) plastiquement déformable pour former une jonction étanche avec la chambre d'infusion du dispositif d'extraction, ledit étagement de jonction étanche (91) comprenant une partie élevée (911) qui est inclinée par rapport à

- l'axe central (X) ;
 - la paroi latérale (2) comprend un étage central (21) pour centrer le gobelet (1) à l'intérieur de la chambre d'infusion du dispositif d'extraction ; ledit étage central (21) comprenant une partie élevée (211) qui est inclinée par rapport à l'axe central (X) ; dans laquelle ledit étage de jonction étanche (91) comprend aussi une partie de butée (912) ;
caractérisée en ce que la partie de butée (912) de l'étage de jonction étanche (91) est inclinée d'un angle entre 4° et 12° par rapport au plan horizontal défini par la partie plate (71) du bord (7).
2. Capsule monodose (10) faite en aluminium selon la revendication 1, dans laquelle ledit étage central (21) comprend aussi une partie de butée (212) qui est inclinée par rapport au plan horizontal définie par la partie plate (71) du bord (7). 5
 3. Capsule monodose (10) faite en aluminium selon l'une des revendications précédentes, dans laquelle ladite portion élevée (911) de l'étage de jonction étanche (91) est inclinée avec un angle compris entre 2° et 6°, de préférence 4°, par rapport à l'axe central (X). 10
 4. Capsule monodose (10) faite en aluminium selon l'une des revendications précédentes, dans laquelle ladite portion élevée (911) de l'étage de jonction étanche (91) s'étend sur environ 1 mm. 15
 5. Capsule monodose (10) faite en aluminium selon l'une des revendications précédentes, dans laquelle ladite partie de butée (912) de l'étage de jonction étanche (91) est inclinée avec un angle de 8° par rapport au plan horizontal. 20
 6. Capsule monodose (10) faite en aluminium selon l'une des revendications précédentes, dans laquelle ladite partie de butée (912) de l'étage de jonction étanche (91) s'étend sur environ 1 mm. 25
 7. Capsule monodose (10) faite en aluminium selon l'une des revendications précédentes, dans laquelle ladite partie élevée (211) de l'étage central (21) est inclinée avec un angle compris entre 5° et 11°, de préférence 8°, par rapport à l'axe central (X). 30
 8. Capsule monodose (10) faite en aluminium selon l'une des revendications précédentes, dans laquelle ladite partie élevée (211) de l'étage central (21) s'étend sur environ 3 mm. 35
 9. Capsule monodose (10) faite en aluminium selon l'une des revendications précédentes si elle dépend de la revendication 2, dans laquelle ladite partie de butée (212) de l'étage central (21) est inclinée avec un angle compris entre 12° et 18°, de préférence 15°, par rapport au plan horizontal. 40
 10. Capsule monodose (10) faite en aluminium selon l'une des revendications précédentes si elle dépend de la revendication 2, dans laquelle ladite partie de butée (21) de l'étage central (21) s'étend sur environ 0,5 mm. 45
 11. Capsule monodose (10) faite en aluminium selon l'une des revendications précédentes, dans laquelle ladite partie plate (71) s'étend sur environ 1 mm. 50
 12. Capsule monodose (10) faite en aluminium selon l'une des revendications précédentes, dans laquelle ledit fond (4) comprend une partie centrale (41) pouvant être perforée, entourée d'un bord de renforcement (42) définissant une forme onduleuse. 55

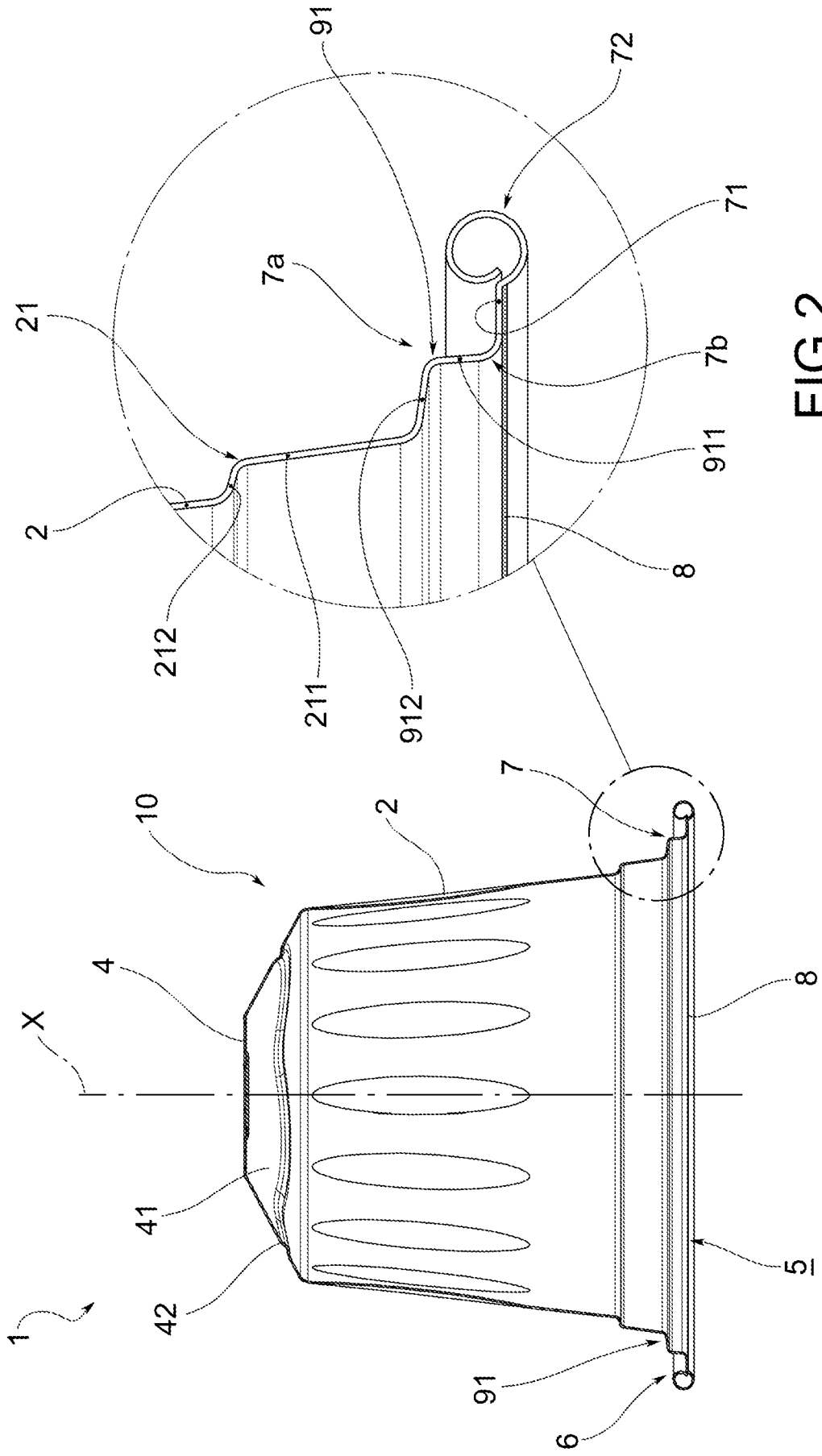


FIG. 2

FIG. 1

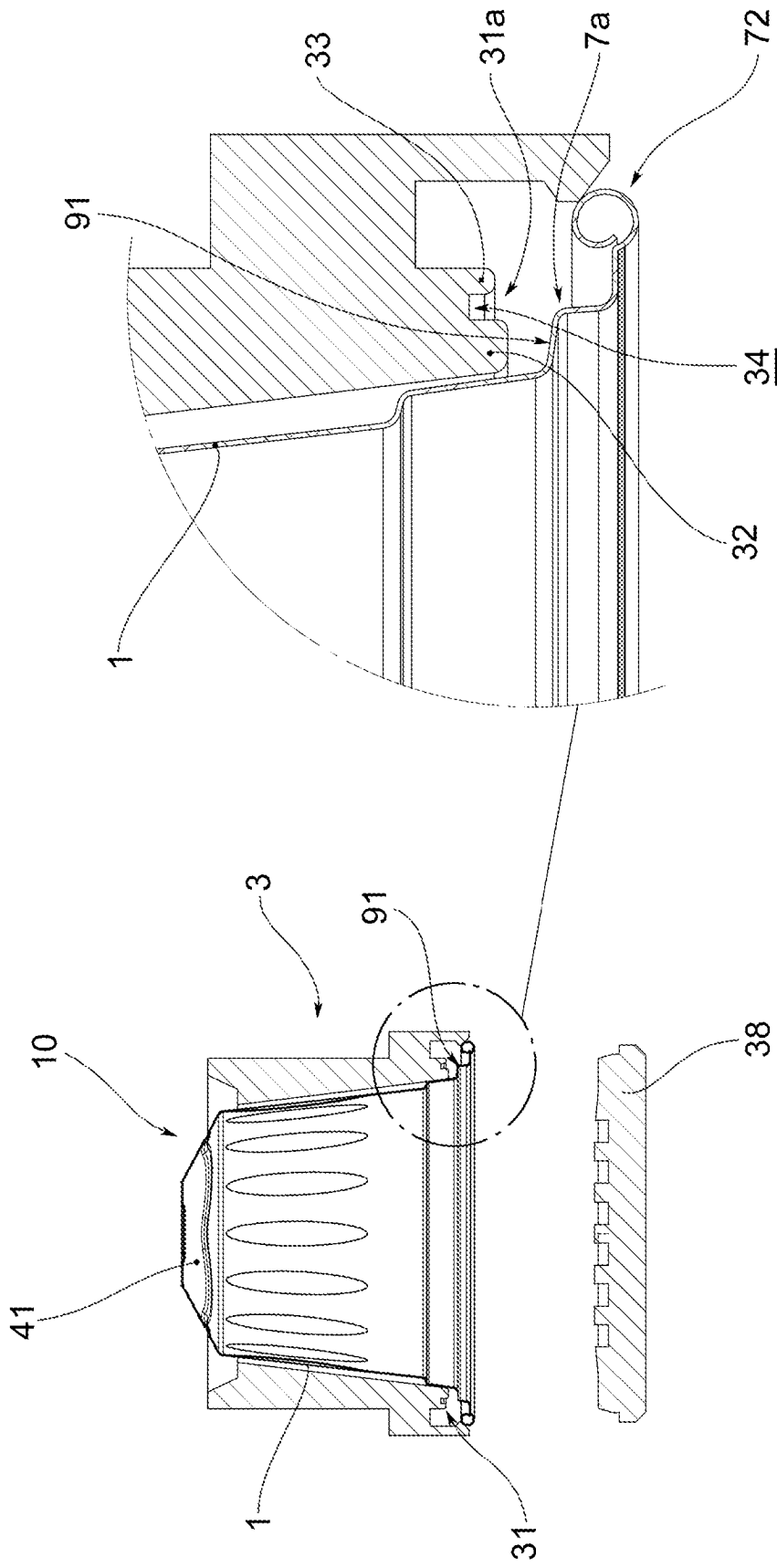


FIG.4

FIG.3

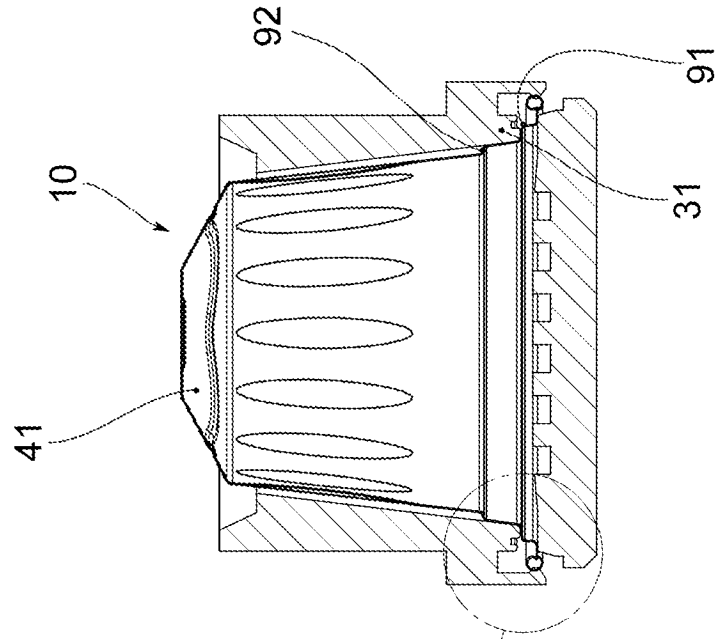


FIG. 5

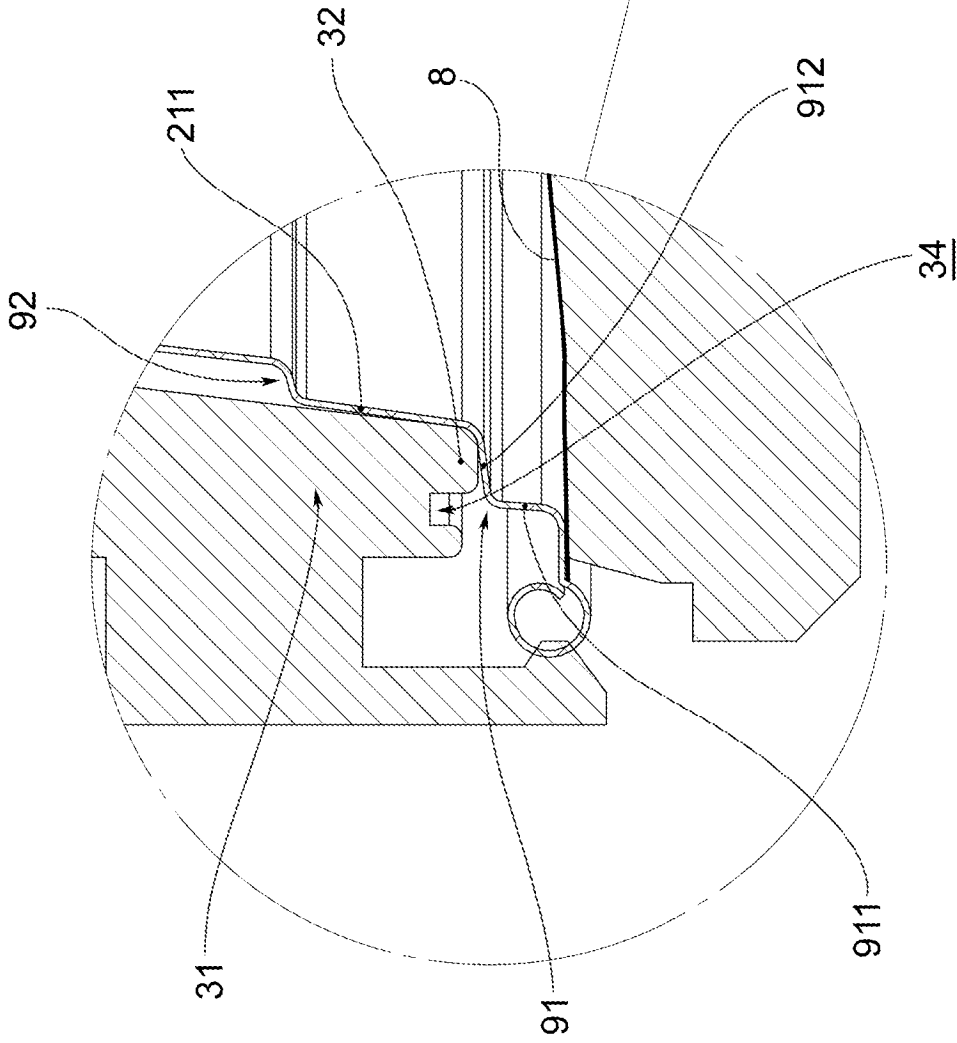


FIG. 6

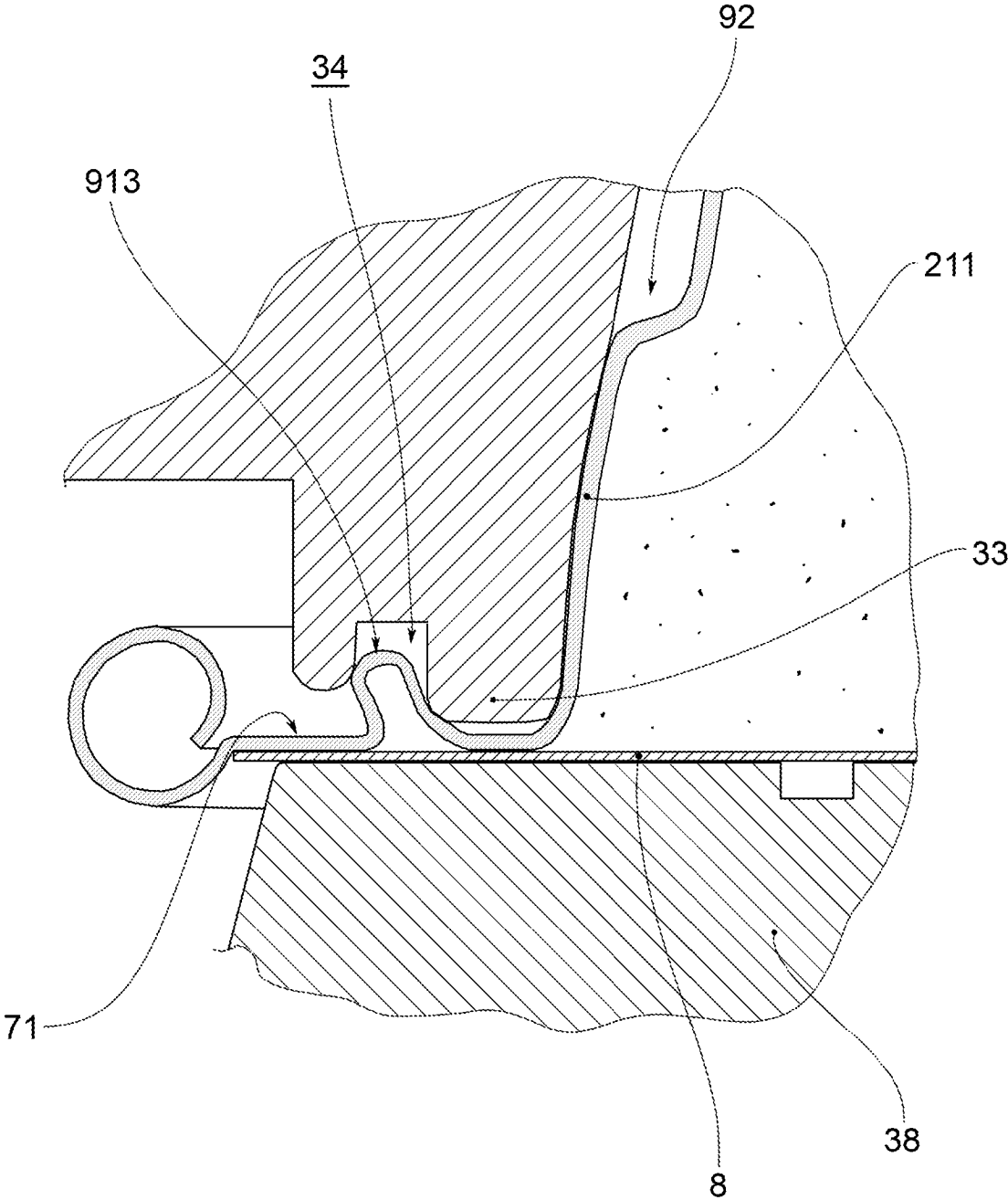


FIG.7

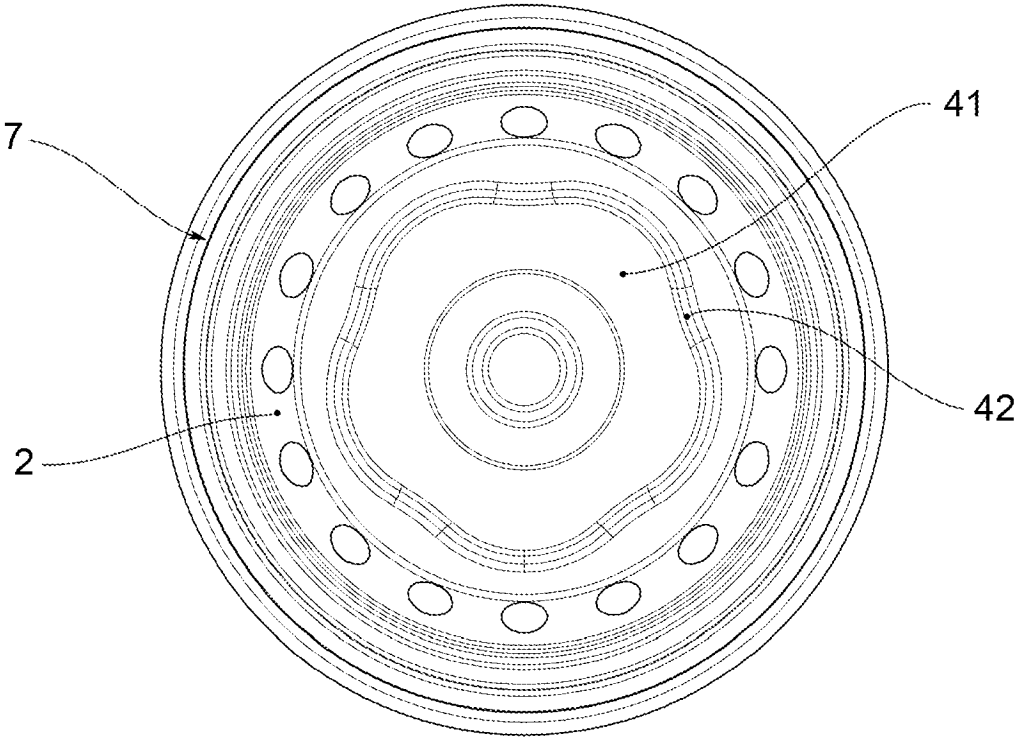


FIG. 8

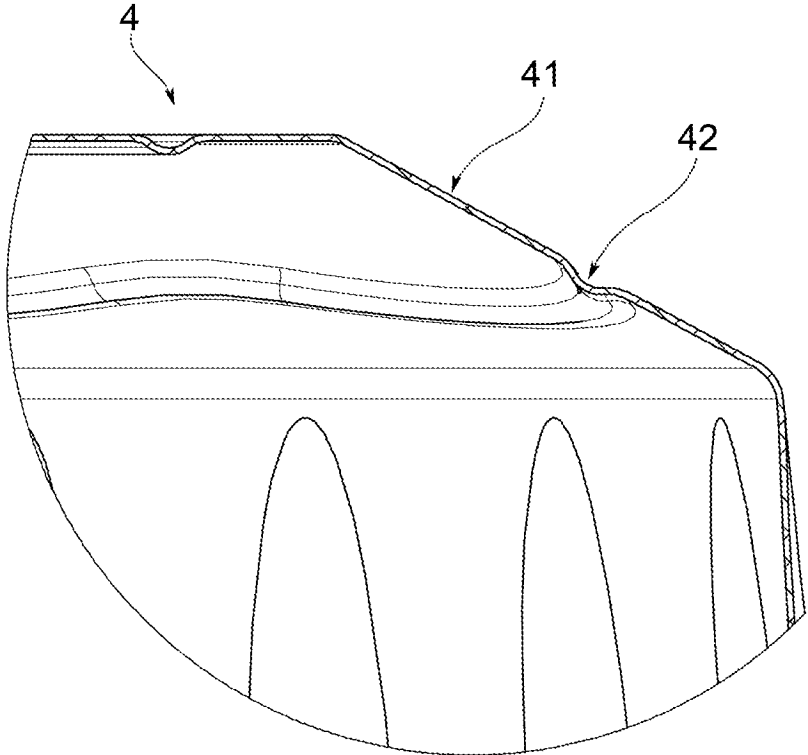


FIG. 9

REFERENCES CITED IN THE DESCRIPTION

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