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(54) **CAPSULE, BEVERAGE PREPARATION SYSTEM COMPRISING SAID CAPSULE, AND METHOD FOR OPERATING SAID SYSTEM**

KAPSEL, SYSTEM ZUR ZUBEREITUNG VON GETRÄNKEN MIT DER KAPSELN UND VERFAHREN ZUR ZUBEREITUNG VON GETRÄNKEN MIT DEM SYSTEM

CAPSULE, SYSTÈME DE PRÉPARATION DE BOISSONS COMPRENANT CETTE CAPSULE ET PROCÉDÉ DE FONCTIONNEMENT DE CE SYSTÈME

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## Description

### Field of the invention

[0001] The present invention refers to the field of capsules for preparing edible products, including aromatic beverages such as for example espresso type coffee, tea and similar.

[0002] The present invention further refers to a system for preparation of beverages and to a process of operation of said system.

### Background of the invention

[0003] The prior art includes several solutions relating to systems for preparing beverages based upon capsules containing a given quantity of at least one edible substance and provided so that they are processed in an extraction device by means of fixating them inside thereof and providing a pressuring fluid flow to cross them, such as for example in a machine for preparing beverages including coffee of the espresso type, tea and similar.

[0004] In particular in the case of capsules provided in a substantially rigid material and construction structure, and despite being fixated by means of pressured engagement inside of a respective extraction device, this type of capsules may displace along a direction transversal to the prevailing flow direction, notably in a rotation movement around its axial axis, in particular in the case of the injection of pressurized water not being made by means of penetrating the envelope of the capsule. In fact, in the case of extraction device with multiple pressurized water injection points, there is a need to ensure that the capsule is fixated in a reliable manner, and eventually positioned in a given angular position, inside of a respective extraction device. Moreover, there is the issue of minimizing the amount of material used without constraining the structural stability of the capsule, in particular in the edge zones submitted to high pressures during the extraction process. Moreover, there is a need to recognize capsules of similar construction and containing different contents by simple and reliable mechanic means.

[0005] Document FR 2905683 A1 discloses a capsule provided with a groove of circular form on the flow entry side that comprises a plurality of entry hole for the pressurized water so as to avoid the deterioration of the container as a result of perforation thereof. The document further discloses a pressurized locking engagement between two construction elements of the capsule, provided in the top face opposing to the one provided with said groove. The groove is thus not provided so as to reinforce the structural resistance of the top wall of the capsule, in particular in view of reducing the wall thickness and, therefore, the amount of material used, without constraining the structural resistance. Moreover, said groove does not provide a plurality of engagement possibilities with external elements provided in a respective extraction device that simultaneously enables to additionally fixate and

to recognize the capsule in said extraction device.

[0006] Document EP 1950150 B1 discloses means for recognizing the contents of a capsule for preparing beverages. In particular, the capsule discloses a plurality of recesses provided in a surface adapted for flow entry and configured to engage with corresponding recognition means provided in the form of mechanic displacement probe. Said mechanic probe means operate based upon a relative displacement, eventually undergoing enhanced wear after a given operation period. This solution does not reinforce the connection between the two main construction elements of the capsule.

[0007] Document WO 2008/090122 A2 discloses a capsule presenting a plurality of circular cavities or recesses in the lid part. Such cavities or recesses are not provided as developing along a distal circumferential alignment centered relative to an axial axis of the capsule, and are not adapted to provide structural reinforcement.

[0008] Document FR 2970242 A1 discloses a reusable capsule comprising a container part presenting spigots and a lid part presenting corresponding spigots enabling a connection between both parts by means of a slight rotation thereof.

[0009] Document EP 2771259 B1 discloses a capsule with reinforcement members associated with a respective lid member, whereby said reinforcement members protrude from the upper wall in axial direction. That is, said reinforcement members are provided as protrusions, not as grooves extending inwards relative to the outwards oriented surface of said lid member. This document also does not disclose a solution to provide a reliable fixation against the possibility of rotation around an axial axis, and eventual positioning of the capsule in a given angular position, inside a respective extraction device. None of the documents in prior art thus discloses an integrated and efficient solution in structural and economic terms for the aforementioned problems.

### General description of the invention

[0010] The goal of the present invention is to provide a capsule in a substantially rigid construction, for collection of at least one edible substance, in particular adapted for preparation of edible products including beverages, inside of a respective extraction device, and that provides a reliable fixation relative to an axial axis, including against the possibility of rotation around said axial axis, and eventually positioning in a give angular position, inside of a respective extraction device, together with enhanced structural resistance of the flow entry zone and of the engagement zone between the main construction elements of the capsule.

[0011] This goal is attained by means of a capsule according to claim 1.

[0012] The capsule according to the invention comprises a first construction element configured in a container-like form, and a second construction element configured in a lid-like form, and adapted for entry of a pressurized

fluid preferentially without rupture or perforation of a respective outside envelope, and adapted for joint assembly so as to provide an interior volume for collection of a dose of at least one edible substance, including coffee, tea and similar, whereby according to a first inventive aspect, said second construction element presents at least one engagement groove in the surface oriented towards the outside of the capsule, wherein said engagement groove presents a distal edge relative to said common axial axis, that develops along at least part of a distal circumferential alignment that is centered relative to said common axial axis, and wherein said distal edge of at least one of said engagement grooves develops along at least most part, preferentially the totality of a circumferential alignment in the proximity of the engagement zone between said first and second construction elements.

**[0013]** In particular, the engagement grooves present an elongated form, including in form of arc of circle or similar, and a substantially similar angular dimension along said circumferential alignment, whereby its radial dimension is preferentially smaller than a third of the radius of said second construction element.

**[0014]** Moreover, as a result of the disposition of the engagement groove in the proximity of the perimeter edge of the lid-like element, the present invention provides a capsule that presents an additional resistance to the pressure forces that it is submitted to in a beverage preparation process, in particular in view of a reduction of the wall thickness at least of the top wall and of a use of mechanical assembly means of said construction elements, optimized so as to enable a manual closure of the capsule.

**[0015]** Another objective of the present invention is to provide a system for preparation of beverages including capsules according to the invention, at least one beverage preparation machine including at least one extraction device configured so as to use capsules according to the invention, and providing several possibilities of fixation and eventually orientation of the capsule in a respective extraction device by mechanic means.

**[0016]** This goal is solved according to claim 9.

**[0017]** An advantage of the system for preparation of beverages according to the present invention is the possibility of using capsules of substantially similar construction and configuration but adapted for use in different extraction devices, eventually provided for production of different types of edible products, whereby said capsules only differ in the format of the engagement grooves in a lid-like construction element and corresponding fixation elements in the extraction device of a respective beverage preparation machine. In particular, according to an inventive aspect, this fixation engage includes no rupture of the outside envelope of the capsule, but rather a structural reinforcement thereof and better fixation and positioning conditions thereof in a respective extraction device.

**[0018]** Another goal of the present invention is to pro-

vide a process of operation of a system for preparation of beverages according to the invention.

**[0019]** This goal is attained according to claim 13.

## 5 Description of the figures

**[0020]** The present invention shall now be explained in greater detail based upon the description of preferred embodiments and of the attached figures.

**[0021]** The Figures show, in simplified schematic representations:

Figure 1: side cut views (top) and plant views (bottom) of two embodiments of a capsule (1) according to prior art;

Figure 2: plant views (top) and respective side cut detail view (bottom) of the exterior face of the second construction element (3) in two embodiments of a capsule (1), one according to the prior art and the second according to the invention;

Figure 3: plant views (top) and respective side cut detail view (bottom) of the exterior face of the second construction element (3) in two other embodiments of a capsule (1) according to the prior art;

Figure 4: plant views (top) and respective side cut detail view (bottom) of the exterior face of the second construction element (3) in two other embodiments of a capsule (1) according to the prior art;

Figure 5: views of an embodiment of assembly of construction elements (2, 3) in side cut (left) and plant views (right) of the interior face of the second construction element (3) of a capsule (1) according to the prior art;

Figure 6: detail view P01 according to Figure 5 of a first embodiment of the assembly zone of the construction elements (2, 3);

Figure 7: detail view P01 according to Figure 5 of a second embodiment of the assembly zone of the construction elements (2, 3);

Figure 8: side cut views of a capsule de (1) engaged by actuation parts (6, 7) in an extraction device (5) of a beverage preparation machine (not represented) of a system according to the invention, in an open position (left) and in a closed position (right);

Figure 9: top views (top) of a capsule (1) presenting a second construction element (3) (on the left) and respective actuation part (6) (on the right), as well as detail side cut views (bottom) of the respective engagement in

an open position (on the left) and in a closed position (on the right), in the system according to the invention;

Figure 10: top views (top) of a capsule (1) presenting another embodiment of the second construction element (3) (on the left) and respective actuation part (6) (on the right), as well as detail side cut views (bottom) of the respective engagement in an open position (on the left) and in a closed position (on the right), in an embodiment of the system according to the invention.

### Detailed description of the invention

[0022] Figure 1 represents two embodiments of a capsule (1) according to prior art, including a first construction element (2) configured in a container-like form, and a second construction element (3) configured in lid-like form. Said first and second construction elements (2, 3) are substantially rigid and adapted for joint assembly along a common axial axis (XX) of said capsule (1), thereby providing an interior volume adapted for collection of a dose (4) of at least one edible substance, for example roasted ground coffee. Said first construction element (2) includes a sidewall element (22) and, in the case of the embodiment represented on the right, a base wall element (21), eventually provided in a single piece. Said second construction element (3) includes at least one top wall element (31). The exterior envelope of the capsule (1) is thus formed by said wall elements (21, 22, 31), each presenting a respective wall thickness ( $e_{21}$ ,  $e_{22}$ ,  $e_{31}$ ), whereby said base wall element (21) and top wall element (31) provide surfaces adapted so that they can be oriented towards an upstream and downstream flow, respectively, inside of a respective extraction device, as it shall be explained in greater detail further below.

[0023] The assembly engagement between said first and second construction elements (2, 3) is provided along the perimeter of the top free end of the sidewall element (22), whereby in particular in the case of a connection by means of pressure fit mechanic engagement, it is important to consider the structural resistance to the pressure forces that the capsule (1) is submitted to, so as to ensure that the connection reliably provides tightness and so as to reduce the thickness of the main construction elements of the capsule (1).

[0024] Figure 2 presents a first set of two capsules (1, 1'). According to a first aspect, and as one can better observe in the top views presented above, said second construction element (3) presents at least one engagement groove (8) in the surface oriented towards to the exterior of the capsule (1, 1'), whose distal edge (81) develops along a circumferential alignment (A) provided concentric relative to said common axial axis (XX) in the proximity of the perimeter edge, that is to say, in the proximity of the engagement zone between the construction

elements (2, 3), so that it additionally reinforces the structural resistance of said engagement zone, and this despite of an eventually smaller wall thickness of said construction elements (2, 3). Moreover, said engagement groove (8) presents a radial engagement dimension ( $l_g$ ) adapted so as to engage with at least a respective interaction element (9), as explained further below.

[0025] In the case of the embodiment of capsule (1') represented on the right, said engagement groove (8) presents a distal edge (81) that develops along a circumferential alignment (A) centered relative to the axial axis (XX) and a proximal edge (82) that develops along a circumferential alignment (A') decentered relative to the axial axis (XX) so that the engagement groove (8) provides at least two zones of engagement groove presenting a different radial engagement dimension ( $l_g$ ,  $l'_g$ ), whereby said radial engagement dimension varies preferentially in substantially continuous manner along said engagement groove (8).

[0026] A system for preparation of beverages including two capsules (1, 1') according to the invention thus provides different types of fixation engagement adapted for extraction devices configured correspondingly as it shall be explained in greater detail further below, while simultaneously providing a structural reinforcement of the engagement zone between said construction elements (2, 3). A capsule (1) can thus provide an additional fixation engagement along the whole perimeter (on the left) or only in a given relative position thereof (on the right), thereby only varying the configuration of the engagement groove (8) provided on said second construction element (3).

[0027] Moreover, as it can be observed in the cut views of cross section (presented below), the engagement groove (8) is provided with variable depth (on the left), advantageously providing a gradual fixation engagement, or with constant depth (on the right). Moreover, the engagement groove (8) can be produced as a reduction of wall thickness (on the left) or as a variation of form (on the right) of the top wall element (31). In the case of the latter embodiment, the arrangement of the engagement groove (8) in the relative proximity of the perimeter edge leads to a structural reinforcement of such zone and, therefore, of the constructive connection between said construction elements (2, 3). In particular, this aspect advantageously enables the use of a mechanic assembly of said construction elements (2, 3) as it shall be explained in greater detail further below.

[0028] Figure 3 presents a second set of embodiments of capsules (1, 1') according to the invention, in this case each presenting a plurality of engagement grooves (8) configured as curved segments and distributed substantially uniformly along said circumferential alignment (A). As it shall be understood, in this latter case, a fixation engagement by means of positive locking requires placing the capsule (1) in a particular angular position relative to a corresponding fixation element provided on the extraction device (5). In this sense, the fact that the engage-

ment grooves (8) develop in a cumulative extension corresponding to most part of a circumferential alignment (A) should facilitate a respective fixation engagement, regardless of the angular position in which the capsule (1) is introduced in an extraction device (5).

**[0029]** According to a preferred embodiment, an engagement groove (8) presents a cross section of variable dimension along a radial direction and/or along an angular direction relative to said common axial axis (XX), preferentially variable in a substantially progressive manner. In particular, by means of a variation of the cross section along an angular direction, it is thus provided for that the capsule (1) may adjust its position, in particular rotating around its axial axis (XX), so that as the number of fixation elements provided in an extraction device progressively engage in at least part of a given number of engagement grooves (8), or of zones of different radial dimension ( $l_g$ ), it results in an increasing alignment of engagement between the fixation elements (9) and the engagement grooves (8) along a given circumferential alignment (A).

**[0030]** Figure 4 presents a third set of embodiments of capsules (1, 1') according to the invention, presenting engagement grooves (8) disposed along a first circumferential alignment (A) in the proximity of the perimeter edge, and (in the case represented on the right) also along a second circumferential alignment (A) closer to the common axial axis (XX), so that there result zones of fixation engagement at different radial distances. Moreover, said engagement grooves (8) can present different radial dimensions ( $l_g, l'_g$ ), so as to provide different fixation engagement possibilities for different capsules (1, 1') of a beverage preparation system.

**[0031]** Figure 5 presents representative views of a preferred embodiment of the capsule (1) according to the invention, including side cut view (on the left) and inferior side view of the second construction element (3) (on the right). The capsule (1) presents an assembly connection by mechanic engagement between said construction elements (2, 3), in particular by means of engagement indent element (32) provided along the perimeter zone of the top wall element (31).

**[0032]** One of the advantages resulting from a relative position of the engagement groove (8) in the proximity of the perimeter edge of said second construction element (3), in particular in the surface of the top wall element (31) oriented towards the exterior of the capsule (1), is the additional structural reinforcement of the respective perimeter engagement zone between said construction elements (2, 3), as well as the possibility of reducing the wall thickness (e) of the capsule (1), in particular of the top wall element (31). This structural reinforcement further enables considering an assembly of said construction elements (2, 3) by means a positive locking mechanic engagement. According to another advantageous aspect, the top wall element (31) further presents structural reinforcement elements (34) of said perimeter engagement zone, provided in the proximity thereof.

**[0033]** According to a preferred embodiment, said first construction element (2) is provided as a container of cylindrical or frusto-conic form defining an interior volume of at least 20 cm<sup>3</sup> and a form ratio between width and height comprised between 0,5:1 e 4:1.

**[0034]** Figure 6 presents an enlarged view of the detail P01 according to Figure 5, where said first construction element (2) presents a male engagement element (23) in its top edge configured in wedge-like form or similar, adapted so as to engage under pressure in a indent engagement element (32) configured in a recess form or similar, provided in the inferior side of said second construction element (3). As represented, the engagement groove (8) is provided in the proximity of the mechanic assembly engagement of said construction elements (2, 3), thereby structurally reinforcing this engagement zone. According to a preferred embodiment, said at least one engagement groove (8) is provided at a distance between a respective circumferential alignment (A) and the perimeter edge of said second construction element (3) that is smaller than the double, preferentially similar to a respective bigger radial dimension ( $l_g$ ), so as to structurally reinforce as backpressure element the structural connection between said construction elements (2, 3).

**[0035]** As one can observe, said construction elements (2, 3) present a respective assembly engagement zone (23, 33) along at least part of the perimeter, adapted for mutual engagement, preferentially configured as a removable pressure fit locking. According to a preferred embodiment, said construction elements (2, 3) present engagement zones (23, 33) of variable thickness along a respective perimeter, so that the assembly of respective construction elements (2, 3) provides a substantially tight closure of the perimeter surface relative to oxygen transfer.

**[0036]** According to a preferred embodiment, the sidewall and top elements (22, 31) present a respective wall thickness ( $e_{22}, e_{31}$ ) of at most 1,0 mm, preferentially at most 0,5 mm.

**[0037]** Figure 7 presents another embodiment of an assembly engagement of a capsule (1) according to the invention, in an enlarged view of detail P01 similar to Figure 6.

**[0038]** As it can be observed, said second construction element (3) presents a plurality of structural reinforcement elements (34) disposed between the engagement elements (23, 32) and the engagement groove (8) of the capsule (1), in the proximity of the perimeter edge and configured so as to engage by means of pressure engagement with a sidewall element (22) of said first construction element (2).

**[0039]** Figure 8 presents a capsule (1) according to the invention disposed between the actuation parts (6, 7) of an extraction device (5) in two successive conditions - an open condition on the left and a closed condition on the right - comprised in a beverage preparation machine (not represented), and thereby forming a system for preparing beverages according to the invention. The extrac-

tion device (5) and the beverage preparation machine are not represented in detail given that they do not include other elements relevant for the object of the present invention and are known in their main aspects by the expert in the field.

[0040] According to an inventive aspect, the actuation part (6) adapted for injection of a pressurized fluid flow presents at least one fixation element (9) provided as a projection that develops along a respective fixation circumferential alignment (B) of similar diameter to that of the circumferential alignment (A) - as it can be better observed in Figures 9 and 10 -, so as to engage with at least one engagement groove (8) provided on said second construction element (3) of said capsule (1) thereby fixing the latter against the possibility of rotation around an axial axis (XX) thereof.

[0041] The beverage preparation system according to the invention includes a plurality of beverage preparation machines comprising extraction devices (5) presenting fixation elements (9) that are substantially similar or that correspond to respective different configurations of the engagement grooves (8) of different capsules (1, 1').

[0042] As it can be observed, said at least one fixation element (9) is adapted for positive locking with at least part of an engagement groove (8) provided on said second construction element (3) of said capsule (1).

[0043] Figures 9 and 10 represent a system according to the present invention, whereby two types of capsules (1, 1') of similar dimension and configuration present different engagement grooves (8) and the extraction devices (5) of beverages preparation machines present a similar configuration of similar fixation elements (9), in particular in the form of three fixation elements (9) distributed along a fixation circumferential alignment (B) of similar diameter to the circumferential alignment (A) of said engagement grooves (8) of said capsules (1, 1').

[0044] Figure 9 illustrates an embodiment whereby said fixation elements (9) engage in a single engagement groove (8) along part of the extension thereof.

[0045] In the case of the embodiment of Figure 10, said actuation part (6) adapted for injection of a pressurized fluid flow, presents a plurality of successive fixation elements (9) provided in an extension that is substantially smaller than the extension of corresponding successive engagement grooves (8), preferentially bigger than the spaces between successive engagement grooves (8), so that said fixation elements (9) can engage with the latter regardless of the initial relative angular position of said engagement grooves (8) relative to the fixation elements (9). In this embodiment, the extraction device (5) advantageously includes the possibility of rotation of said actuation part (6) that presents fixation elements (9) around an axial axis, so as to enable a fixation engagement with engagement grooves (8) provided on said second construction element (3) of the capsule (1). Moreover, according to another embodiment, the actuation of said extraction device (5) includes the recognition that said fixation elements (9) accomplish a fixation engage-

ment with engagement grooves (8) provided on said second construction element (3) of the capsule (1).

[0046] These two types of capsules (1, 1') might thus be used with this type of extraction device (5), whereas another type of capsules with a different configuration of the engagement grooves (8) might be used with another type of extraction device (5), presenting a corresponding configuration of fixation elements (9) and eventually with other technical processing characteristic in the preparation of an edible product.

## Claims

1. Capsule (1) adapted for preparation of an edible product and presenting:

- a first construction element (2) configured in a container-like form, and
- a second construction element (3) configured in a lid-like form,

whereby said first and second construction elements (2, 3) are adapted for joint assembly along a common axial axis (XX) thereby providing an interior volume adapted for collecting a dose (4) of at least one edible substance, and

whereby said second construction element (3) presents at least one engagement groove (8) in the surface oriented towards the outside of the capsule (1), and said at least one engagement groove (8) presents a distal edge (81) relative to said common axial axis (XX) that develops along at least part of a distal circumferential alignment (A) that is centered relatively to said common axial axis (XX), and in that the distal edge (81) of at least one of said engagement grooves (8) develops along at least most part, preferentially the totality of a distal circumferential alignment (A) in the proximity of the perimeter zone of connection between said first and second construction elements (2, 3) **characterized in that** said at least one engagement groove (8) presents a proximal edge (82) that develops along at least part of a respective proximal circumferential alignment (A') that is decentered relatively to said common axial axis (XX).

2. Capsule (1) according to claim 1, **characterized in that** said at least one engagement groove (8) provides at least two zones of different radial dimension ( $l_g$ ), whereby said radial dimension ( $l_g$ ) varies in a continuous manner along said engagement groove (8) and relatively to a respective distal circumferential alignment (A).

3. Capsule (1) according to claims 1 or 2, **characterized in that** said capsule (1) presents a plurality of engagement grooves (8) developing successively

along a respective, distal circumferential alignment (A), whereby the total extension of said engagement grooves (8) corresponds to at least most part of said distal circumferential alignment (A).

4. Capsule (1) according to any one of previous claims 1 to 3, **characterized in that** said at least one engagement groove (8) is provided at a distance between a respective distal circumferential alignment (A) and the perimeter edge of said second construction element (3) that is inferior to the double, preferentially is similar to the respective larger radial dimension similar ( $l_8$ ), so as to structurally reinforce as backpressure element the structural connection between said construction elements (2, 3).
5. Capsule (1) according to any one of previous claims 1 to 4, **characterized in that** said at least one engagement groove (8) presents a substantially curved triangular or rectangular cross section, presenting a depth between 0,1 e 1 mm relatively to the outside surface of said second construction element (3), and a radial dimension ( $l_8$ ) between 0,1 and 10 mm.
6. Capsule (1) according to any one of previous claims 1 to 5, **characterized in that** said at least one engagement groove (8) presents a cross section of variable dimension along a radial direction and/or along an angular direction relatively to said common axial axis (XX).
7. Capsule (1) according to any one of previous claims 1 to 6, **characterized in that** said at least one engagement groove (8) corresponds to a local variation of form of the wall or to a local variation of the wall thickness ( $e_{31}$ ) of said second construction element (3).
8. Capsule (1) according to any one of previous claims 1 a 7, **characterized in that** said at least one engagement groove (8) is disposed so that it is surrounded by, or surrounds, a zone of said second construction element (3) adapted for the fluid passage.
9. **System** of preparation of beverages including a plurality of capsules (1, 1') according to any of claims 1 to 8, and presenting different configurations of engagement grooves (8), and at least one beverage preparation machine (10) including at least one extraction device (5) that presents two actuation parts (6, 7) whereby one actuation part (6) is adapted for injecting a pressurized fluid flow and at least one can be moved relative to the other so as to engage with the outside envelope, adapted for passage of said pressurized fluid flow, of a second construction element (3) of said capsules (1, 1'), **characterized**

**in that** said actuation part (6) adapted for injection of said pressurized fluid flow, presents at least one fixation element (9) provided as a prominence that develops along a respective fixation circumferential alignment (B) of similar diameter as the distal circumferential alignment (A) of at least one engagement groove (8) provided in said second construction element (3), so as to engage with said engagement groove (8), thereby fixating said capsules (1, 1') against the possibility of rotation around an axial axis (XX) thereof.

10. System according to claim 9, **characterized in that** said at least one fixation element (9) is adapted for locking engagement, including by positive locking, with at least part of said engagement groove (8) provided in said second construction element (3) of said capsules (1, 1').
11. System according to claims 9 or 10, **characterized in that** one of the actuation parts (6, 7) presents a plurality of successive fixation elements (9) provided with an extension that is substantially smaller than the extension of successive engagement grooves (8), preferentially bigger than the space between successive engagement grooves (8), so that said fixation elements (9) can engage with the latter regardless of the angular position of said engagement grooves (8) relative to said fixation elements (9).
12. System according to any of claims 9 to 11, **characterized in that** said system includes a plurality of machines for preparing beverages (10) comprising extraction devices (5) that present substantially similar fixation elements (9), or comprising different fixation elements (9) corresponding to said different configurations of engagement grooves (8).
13. **Process** for preparing a beverage based upon a capsule (1) according to any of previous claims 1 to 8, in a system for preparing beverages according to any of previous claims 9 to 12, including the steps:
  - providing a machine for preparing beverages (10) comprising at least one extraction device (5) that presents two actuation parts (6, 7),
  - supplying a capsule (1), comprising a second construction element (3) presenting at least one engagement groove (8), eventually in a previously defined orientation and/or angular position, to said extraction device (5) when the latter is in an open position,
  - actuation of said extraction device (5) to a closed position, including locking engagement between at least one of said actuation parts (6, 7) and at least part of the outside envelope of said capsule (1),
  - supplying a pressurized fluid flow through one

upstream actuation part (6) so as to flow across said capsule (1),

#### characterized

in that the actuation of said extraction device (5) includes the blocking engagement of at least one fixation element (9), provided in said upstream actuation part (6) supplying said pressurized fluid flow, with at least part of said at least one engagement groove (8) provided in said second construction element (3) of said capsule (1).

14. Process according to claim 13, **characterized in that** the actuation of said extraction device (5) includes recognizing whether said fixation elements (9) carry out a blocking engagement with said engagement grooves (8) provided in said second construction element (3) of a capsule (1).

#### Patentansprüche

1. Kapsel (1) angepasst zur Zubereitung von einem essbaren Produkt und umfassend:

- ein erstes Bauelement (2) gestaltet in einer behälterartigen Form, und
- ein zweites Bauelement (3) gestaltet in einer deckelartigen Form,

wobei genannte erste und zweite Bauelemente (2, 3) für Baugruppe entlang einer gemeinsamen Axialachse (XX) angepasst sind, in dem ein Inhaltsvolumen angepasst zur Sammlung einer Dosis (4) von mindestens einer essbaren Substanz versorgt ist, und

wobei genanntes zweites Bauelement (3) mindestens eine Verbindungsnute (8) in der Oberfläche darstellt, die nach der Außenseite der Kapsel (1) gerichtet ist, und

die genannte mindestens eine Verbindungsnute (8) eine Fernkante (81) bezüglich genannter gemeinsamer Axialachse (XX) darstellt, die sich entlang mindestens Teil einer fernen Umfangsanpassung (A) erstreckt, die entsprechend inmitten der genannten gemeinsamen Axialachse (XX) steht, und wobei sich die Fernkante (81) von mindestens einer von genannten Verbindungsnuten (8) entlang mindestens einem großen Teil erstreckt, vorzugsweise die Gesamtheit von einer fernen Umfangsanpassung (A) in der Nähe von der Umfangszone der Verbindung zwischen genannten ersten und zweiten Bauelementen (2, 3) **gekennzeichnet**

**dadurch, dass** mindestens eine genannte Verbindungsnute (8) eine nahe Kante (82) darstellt, die sich entlang mindestens einem Teil von einer entsprechenden nahen Umfangsanpassung (A') erstreckt,

die außerhalb der Mitte entsprechend zu genannter gemeinsamen Axialachse (XX) ist.

2. Kapsel (1) gemäß Anspruch 1 **dadurch gekennzeichnet, dass** mindestens eine genannte Verbindungsnute (8) mindestens zwei Zonen von verschiedener radialen Dimension ( $l_8$ ) versorgt, wobei genannte radiale Dimension ( $l_8$ ) in einer fort dauernden Art entlang genannter Verbindungsnute (8) und verhältnismäßig zu einer entsprechenden Fernumfangsanpassung (A) ändert.

3. Kapsel (1) gemäß Ansprüche 1 oder 2 **dadurch gekennzeichnet, dass** genannte Kapsel (1) eine Vielzahl an Verbindungsnuten (8) darstellt, indem sie sich entlang einer entsprechenden fernen Umfangsanpassung (A) erstreckt, wobei die gesamte Erweiterung von genannten Verbindungsnuten (8) von mindestens einem großen Teil von genannter fernen Umfangsanpassung (A) entspricht.

4. Kapsel (1) gemäß einer der vorigen Ansprüche 1 bis 3 **dadurch gekennzeichnet, dass** mindestens eine genannte Verbindungsnute (8) in einem Abstand zwischen einer entsprechenden Fernumfangsanpassung (A) und der Umfangskante von genanntem zweiten Bauelement (3) vorhanden ist, das geringer als das Doppelte ist, vorzugsweise ähnlich der entsprechend breiteren radialen Dimension ( $l_8$ ), so um wie ein Gegendruckelement die Strukturverbindung zwischen genannte Bauelemente (2, 3) strukturell zu verstärken.

5. Kapsel (1) gemäß einer der vorigen Ansprüche 1 bis 4 **dadurch gekennzeichnet, dass** mindestens eine genannte Verbindungsnute (8) einen wesentlich gebogenen dreieckigen oder rechteckigen Querschnitt darstellt, der eine Tiefe zwischen 0,1 und 1 mm verhältnismäßig zur äußeren Oberfläche von genanntem zweiten Bauelement (3) und eine radialen Dimension ( $l_8$ ) zwischen 0,1 und 10 mm darstellt.

6. Kapsel (1) gemäß einer der vorigen Ansprüche 1 bis 5 **dadurch gekennzeichnet, dass** mindestens eine genannte Verbindungsnute (8) einen Querschnitt von wechselhafter Dimension entlang einer radialen Richtung und/oder entlang einer kantigen Richtung verhältnismäßig zur genannten gemeinsamen Axialachse (XX) darstellt.

7. Kapsel (1) gemäß einer der vorigen Ansprüche 1 bis 6 **dadurch gekennzeichnet, dass** mindestens eine genannte Verbindungsnute (8) einer lokalen, wandförmigen Variation oder einer lokalen Variation von der Wanddicke ( $e_{31}$ ) von genanntem zweiten Bauelement (3) entspricht.

8. Kapsel (1) gemäß einer der vorigen Ansprüche 1 bis

7 **dadurch gekennzeichnet, dass** mindestens eine genannte Verbindungsnute (8) so angeordnet ist, von einer Zone von genanntem zweiten Bauelement (3) angepasst für den Flüssigkeitsdurchfluss umgeben zu sein oder umzugeben.

9. System zur Zubereitung von Getränken umfassend einer Vielzahl von Kapseln (1, 1') gemäß einer der Ansprüche 1 bis 8, und das verschiedene Konfigurationen von Verbindungsnuten (8) darstellt, und mindestens einer Getränkezubereitungsmaschine (19) umfassend mindestens einem Anzapfgerät (5), das zwei Betätigungsteile (6, 7) darstellt, wobei ein Betätigungsteil (6) zur Einspritzung eines Druckflüssigkeitsdurchflusses angepasst ist und mindestens ein kann bezüglich dem anderen bewegt werden, so um sich mit der äußerlichen Hülle zu verbinden, angepasst zum Durchgang von genanntem Druckflüssigkeitsdurchfluss, von einem zweiten Bauelement (3) von genannten Kapseln (1, 1'),

**dadurch gekennzeichnet**

**dass** genannter Betätigungsteil (6) angepasst zur Einspritzung von genanntem Druckflüssigkeitsdurchfluss mindestens ein Befestigungselement (9) darstellt, vorhanden als Vorwölbung, die sich entlang einer entsprechenden Befestigungsumfangsanpassung (B) von ähnlichem Durchmesser wie die Fernumfassungsanpassung (A) von mindestens einer Verbindungsnute (8) erstreckt, vorhanden in genanntem Bauelement (3), so um sich mit genannter Verbindungsnute (8) zu verbinden, wobei genannte Kapseln (1, 1') gegen die Drehungsmöglichkeit die Axialachse (XX) davon befestigt werden.

10. System gemäß Anspruch 9 **dadurch gekennzeichnet, dass** mindestens ein Befestigungselement (9) zur Verriegelungsverbindung angepasst ist, einschließlich durch formschlüssige Verriegelung, mit mindestens einem Teil von genannter Verbindungsnute (8) vorhanden in genanntem zweiten Bauelement (3) von genannten Kapseln (1, 1').

11. System gemäß Ansprüche 9 oder 10 **dadurch gekennzeichnet, dass** ein der Betätigungsteile (6, 7) eine Vielzahl von aufeinanderfolgenden Befestigungselementen (9) darstellt, vorhanden mit einer Erweiterung vorzugsweise kleiner als die Erweiterung von aufeinanderfolgenden Verbindungsnuten (8), vorzugsweise größer als die Lücke zwischen aufeinanderfolgenden Verbindungsnuten (8), so dass sich genannte Befestigungselemente (9) mit den letzten ohne Bezug auf die Winkelposition von genannten Verbindungsnuten (8) bezüglich der genannten Befestigungselementen (9) verbinden können.

12. System gemäß einer der Ansprüche 9 bis 11 **dadurch gekennzeichnet, dass** genanntes System

eine Vielzahl von Maschinen zur Getränkezubereitung (10) enthält die Anzapfgeräte (5) umfassen, die wesentlich ähnliche Befestigungselemente (9) darstellen, oder die verschiedene Befestigungselemente (9) umfassen, die genannte verschiedene Konfigurationen von Verbindungsnuten (8) entsprechen.

13. Vorgang zur Zubereitung von Getränken, die sich nach einer Kapsel (1) gemäß einer der vorigen Ansprüche 1 bis 8 richten, in einem System zur Zubereitung von Getränken gemäß einer der vorigen Ansprüche 9 bis 12, umfassend die folgenden Schritte:

- Versorgung einer Maschine zur Getränkezubereitung (10), die mindestens ein Anzapfgerät (5) umfasst, das zwei Betätigungsteile (6, 7) darstellt,
- Versorgung von einer Kapsel (1), die ein zweites Bauelement (3) umfasst, in dem mindestens eine Verbindungsnute (8) dargestellt wird, möglicherweise in einer vorig definierten Richtung und/oder kantigen Position, zu genanntem Anzapfgerät (5), wenn der letzte in einer offenen Position ist,
- Betätigung von genanntem Anzapfgerät (5) zu einer geschlossenen Position, einschließlich Verriegelungsverbindung zwischen mindestens einem genannten Teil (6, 7) und mindestens einem Teil von der äußerlichen Hülle von genannter Kapsel (1),
- Versorgung von einem Druckflüssigkeitsdurchfluss durch ein Betätigungsteil (6) stromaufwärts, um quer genannter Kapsel (1) zu fließen,

**dadurch gekennzeichnet,**

**dass** die Betätigung von genanntem Anzapfgerät (5) die Verriegelungsverbindung von mindestens einem Befestigungselement (9) einschließt, vorhanden in genanntem Betätigungsteil (6) stromaufwärts, in dem Druckflüssigkeitsdurchfluss versorgt wird, mit mindestens Teil von genannter Verbindungsnute (8), vorhanden in genanntem zweiten Bauelement (3) von genannter Kapsel (1).

14. Vorgang gemäß Anspruch 13 **dadurch gekennzeichnet, dass** die Betätigung von genanntem Anzapfgerät (5) Wiedererkennung einschließt, ob genannte Befestigungselemente (9) eine Verriegelungsverbindung mit genannten Verbindungsnuten (8) durchführen, vorhanden in genanntem zweiten Bauelement (3) von einer Kapsel (1).

## Revendications

1. Capsule (1) adaptée à la préparation d'un produit

consommable et présentant:

- un premier élément de construction (2), configuré sous forme de type de récipient, et
- un second élément de construction (3) configuré sous forme de type de couvercle,

où lesdits premier et second élément de construction (2, 3) sont adaptés à l'assemblage en jonction le long d'un axe axial commun (XX), fournissant ainsi un volume interne adapté au recueil d'une dose (4) d'au moins une substance consommable et

où ledit second élément de construction (3) présente au moins une rainure d'engagement (8) sur la surface orientée vers l'extérieur de la capsule (1), et au moins l'une des dites rainures d'engagement (8) présente un bord distal (81) relatif au dit axe axial commun (XX) qui se développe le long d'au moins une partie de l'alignement circonférentiel distal (A), centré relativement au dit axe axial commun (XX) et où le bord distal (81) d'au moins une des dites rainures d'engagement (8) se développe le long d'au moins la plupart, et de préférence la totalité de l'alignement circonférentiel distal (A), à proximité de la zone du périmètre de la connexion entre lesdits premier et second éléments de construction (2, 3), **caractérisés par**

**le fait qu'au moins l'une des rainures d'engagement (8) présente un bord proximal (82) qui se développe le long d'au moins une partie de l'alignement circonférentiel proximal respectif (A') qui est décentrée relativement au dit axe axial commun (XX).**

2. Capsule (1) selon la revendication 1, **caractérisée par le fait qu'au moins une rainure d'engagement (8) fournit au moins deux zones de dimension radiale différentes ( $l_g$ ), où ladite dimension radiale ( $l_g$ ) varie de forme continue le long de ladite rainure d'engagement (8) et relativement à un alignement circonférentiel distal respectif (A).**
3. Capsule (1) selon les revendications 1 ou 2, **caractérisée par** ladite capsule (1) qui présente une pluralité de rainures d'engagement (8) se développant successivement le long de l'alignement circonférentiel distal respectif (A), où l'extension totale des dites rainures d'engagement (8) correspond à au moins une partie dudit alignement circonférentiel distal (A).
4. Capsule (1) selon une quelconque revendication antérieure entre 1 et 3, **caractérisée par le fait qu'au moins une rainure d'engagement (8) est prévue à une distance entre l'alignement circonférentiel distal respectif (A) et le bord du périmètre dudit second élément de construction (3), qui est inférieure au double, et de préférence égale à la dimension radiale respective et similaire plus grande ( $l_g$ ), afin de renforcer structurellement en tant qu'élément de contre-**

pression, la connexion structurelle entre lesdits éléments de construction (2, 3).

5. Capsule (1) selon une quelconque revendication antérieure entre 1 et 4, **caractérisée par le fait qu'au moins une rainure d'engagement (8) présente une section en croix rectangulaire ou triangulaire et substantiellement courbée, présentant une profondeur comprise entre 0,1 et 1 mm relativement à la surface externe dudit second élément de construction (3) et une dimension radiale ( $l_g$ ) comprise entre 0,1 et 10 mm.**
6. Capsule (1) selon une quelconque revendication antérieure entre 1 et 5, **caractérisée par le fait qu'au moins une rainure d'engagement (8) présente une section en croix d'une dimension variable le long d'une direction radiale et/ou le long d'une direction angulaire relativement au dit axe axial commun (XX).**
7. Capsule (1) selon une quelconque revendication antérieure entre 1 et 6, **caractérisée par le fait qu'au moins une rainure d'engagement (8) correspond à la variation locale de la forme de la paroi ou à la variation locale de l'épaisseur de la paroi ( $e_{31}$ ) dudit second élément de construction (3)**
8. Capsule (1) selon une quelconque revendication antérieure, entre 1 et 7, **caractérisée par le fait qu'au moins une des dites rainures d'engagement (8) est disposée afin qu'elle soit entourée ou qu'elle entoure, la zone dudit second élément de construction (3), adaptée au passage du fluide.**
9. **Système de préparation de breuvages, comprenant une pluralité de capsules (1, 1'), selon une quelconque revendication entre 1 et 8 et présentant des configurations différentes des rainures d'engagement (8) et au moins une machine de préparation de breuvages (10), comprenant au moins un dispositif d'extraction (5) qui présente deux parties d'actionnement (6, 7) où l'une des parties d'actionnement (6) est adaptée à l'injection de l'écoulement du fluide pressurisé et au moins l'une des deux peut être déplacée relativement à l'autre afin d'engager dans l'enveloppe externe, adaptée au passage dudit écoulement du fluide pressurisé du second élément de construction (3) des dites capsules (1, 1'),**  
**caractérisé par le fait que** ladite partie d'actionnement (6) adaptée à l'injection dudit écoulement du fluide pressurisé, présente au moins un élément de fixation (9), fourni en tant que proéminence qui se développe le long d'un alignement circonférentiel respectif de fixation (B) d'un diamètre similaire à celui de l'alignement circonférentiel distal (A) d'au moins une rainure d'engagement (8), disposée dans ledit second élément de construction (3), afin d'engager dans ladite rainure d'engagement (8), fixant

ainsi lesdites capsules (1, 1') contre la possibilité de rotation autour de l'axe axial (XX) de celui-ci.

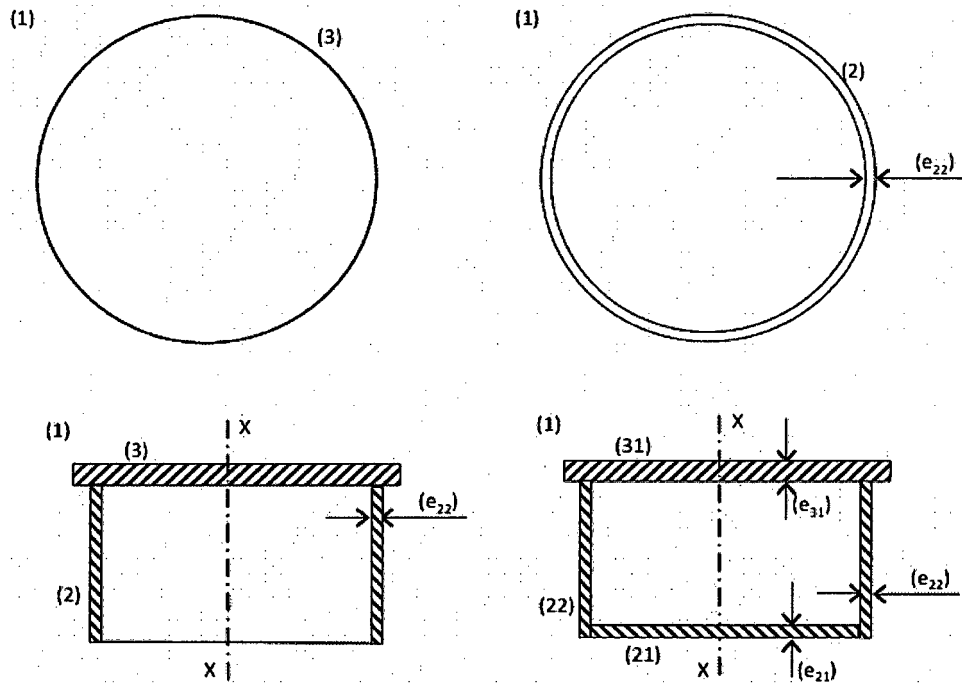
10. Système selon la revendication 9, **caractérisé par le fait qu'**au moins un élément de fixation (9) est adapté à l'engagement du verrouillage, y compris du verrouillage positif, avec au moins une partie de la dite rainure d'engagement (8) disposée dans ledit second élément de construction (3) des dites capsules (1, 1').
11. Système selon les revendications 9 ou 10, **caractérisé par le fait que** l'une des parties d'actionnement (6, 7) présente une pluralité d'éléments de fixation successifs (9), fournis avec une extension, substantiellement plus petite que l'extension des rainures d'engagement successives (8), de préférence plus grandes que l'espace entre les rainures d'engagement successives (8), afin que les dits éléments de fixation (9) puissent s'engager avec lesdites rainures d'engagement (8) relativement aux dits éléments de fixation (9).
12. Système selon une quelconque revendication entre 9 et 11, **caractérisé par le fait que** ledit système inclut une pluralité de machines pour la préparation de breuvages (10), comprenant des dispositifs d'extraction (5) se présentant substantiellement similaires aux éléments de fixation (9), ou comprenant des éléments de fixation différents (9), correspondant aux configurations différentes des rainures d'engagement (8).
13. **Processus** de préparation de breuvage fondé sur une capsule (1) selon une quelconque revendication antérieure entre 1 et 8, dans un système de préparation de breuvages selon une quelconque revendication antérieure entre 9 et 12, comprenant les étapes suivantes :
- Fournir une machine pour la préparation des breuvages (10) comprenant au moins un dispositif d'extraction (5) présentant deux parties d'actionnement (6, 7),
  - pourvoyant une capsule (1), comprenant un second élément de construction (3) présentant au moins une rainure d'engagement (8), éventuellement selon une orientation précédemment définie et/ou selon une position angulaire, relativement au dit dispositif d'extraction (5) lorsque ce dernier est en position ouverte,
  - actionnement dudit dispositif d'extraction (5) en position fermée, y compris un engagement de verrouillage entre au moins l'une des parties d'actionnement (6, 7) et au moins l'une des parties de l'enveloppe externe de ladite capsule (1),
  - pourvoyant un écoulement du fluide pressurisé à travers l'une des parties d'actionnement en

amont (6) afin de circuler à travers ladite capsule (1),

#### **caractérisée**

**par le fait que** l'actionnement dudit dispositif d'extraction (5) inclut un engagement de blocage d'au moins un des éléments de fixation (9), fournissant dans la dite partie d'actionnement en amont (6), pourvoyant ledit écoulement de fluide pressurisé avec au moins une partie de ladite rainure d'engagement (8), disposée dans ledit second élément de construction (3) de ladite capsule (1).

14. **Processus** selon la revendication 13, **caractérisé par le fait que** l'actionnement dudit dispositif d'extraction (5) inclut reconnaître si les éléments de fixation (9) effectuent l'engagement du blocage avec lesdites rainures d'engagement (8), disposées dans ledit second élément de construction (3) de la capsule (1).



PRIOR ART

Figure 1

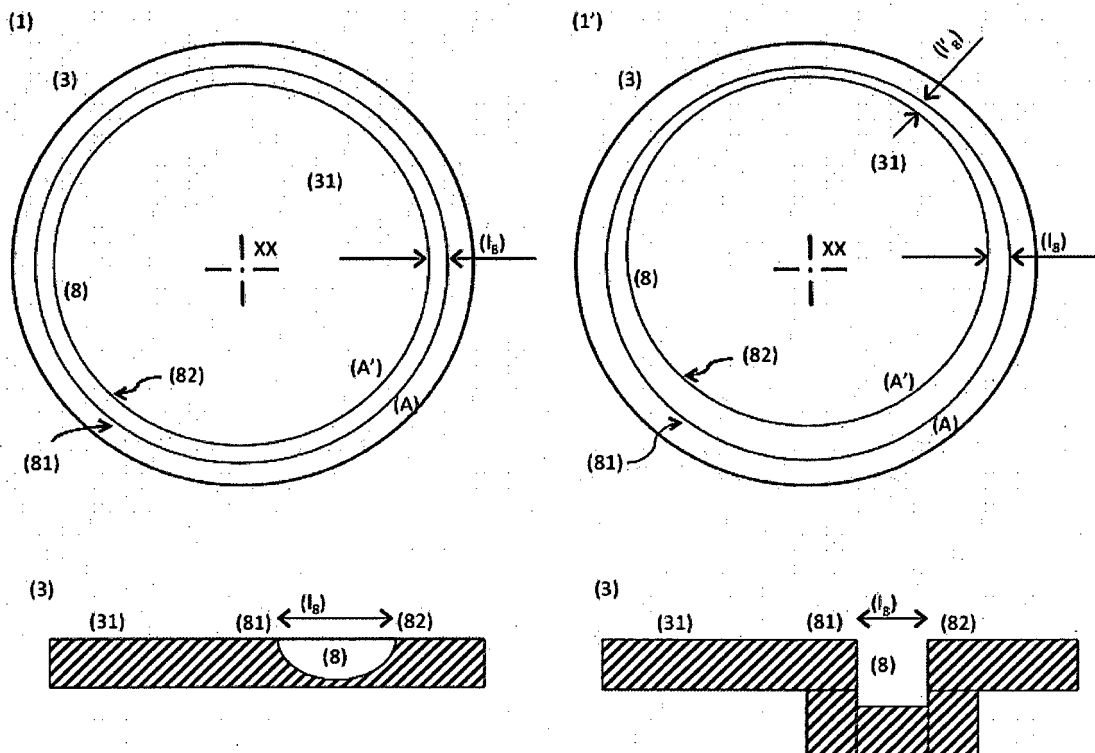


Figure 2

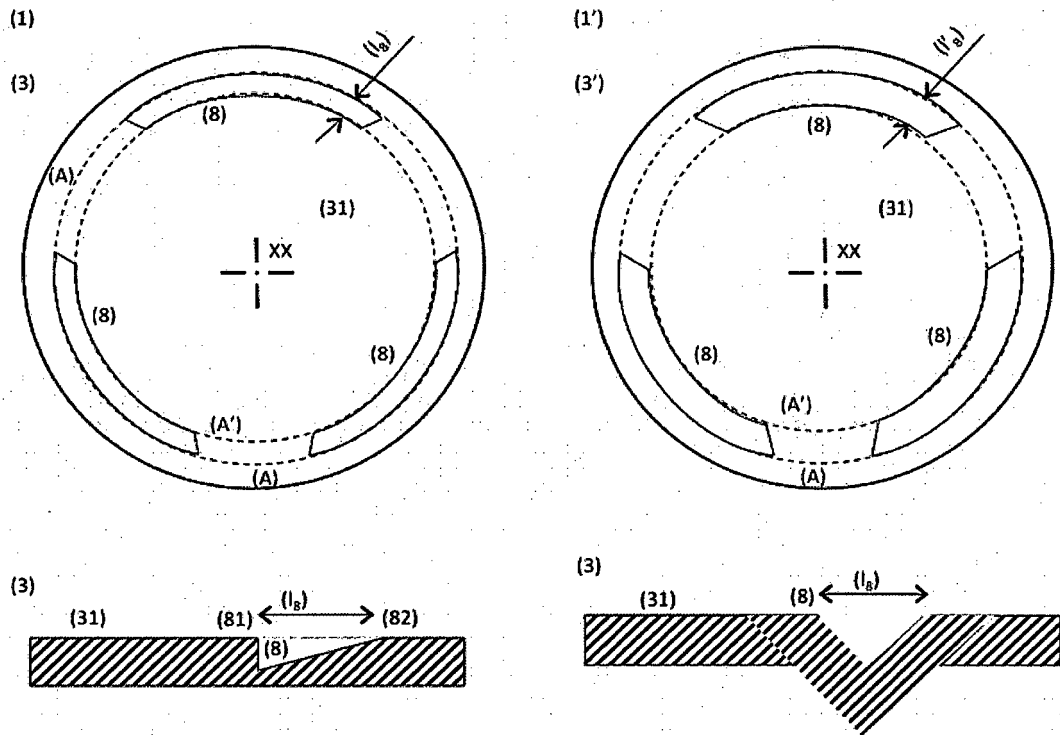


Figure 3

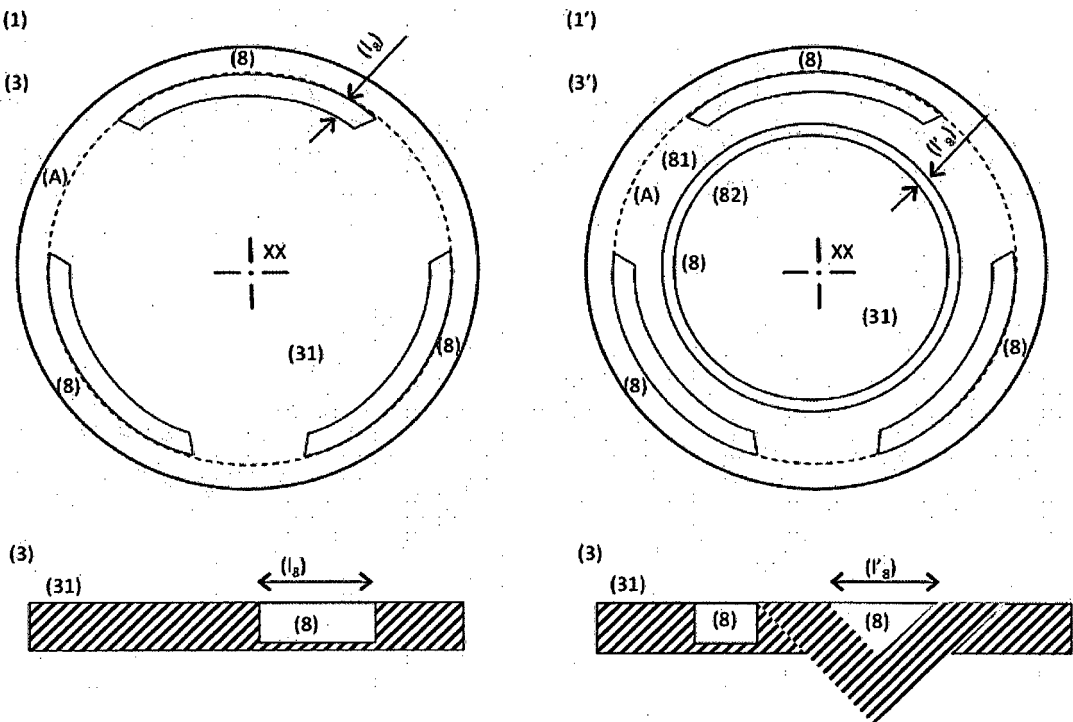


Figure 4

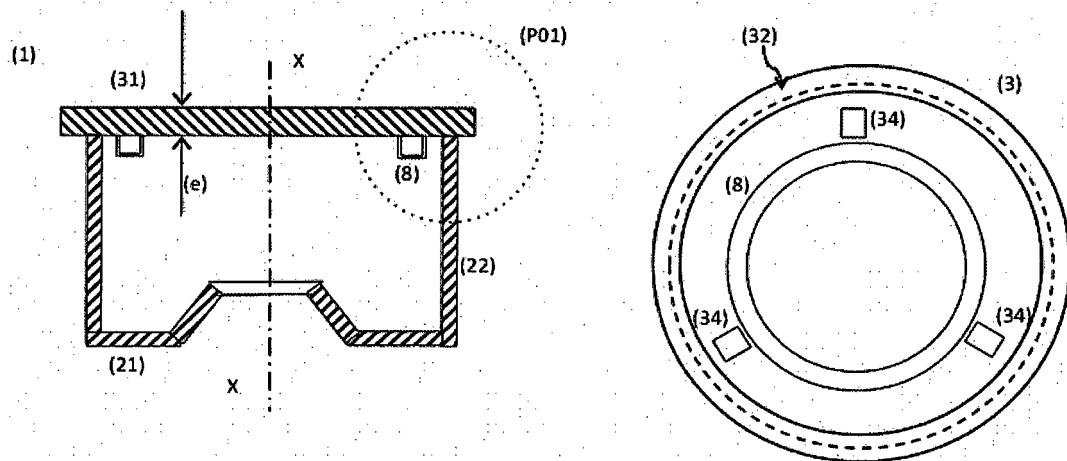


Figure 5

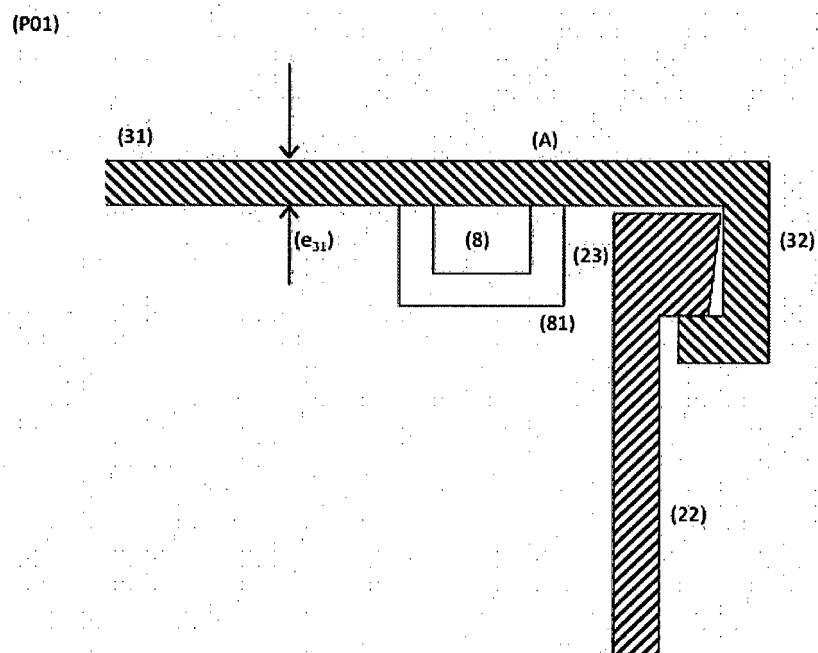


Figure 6

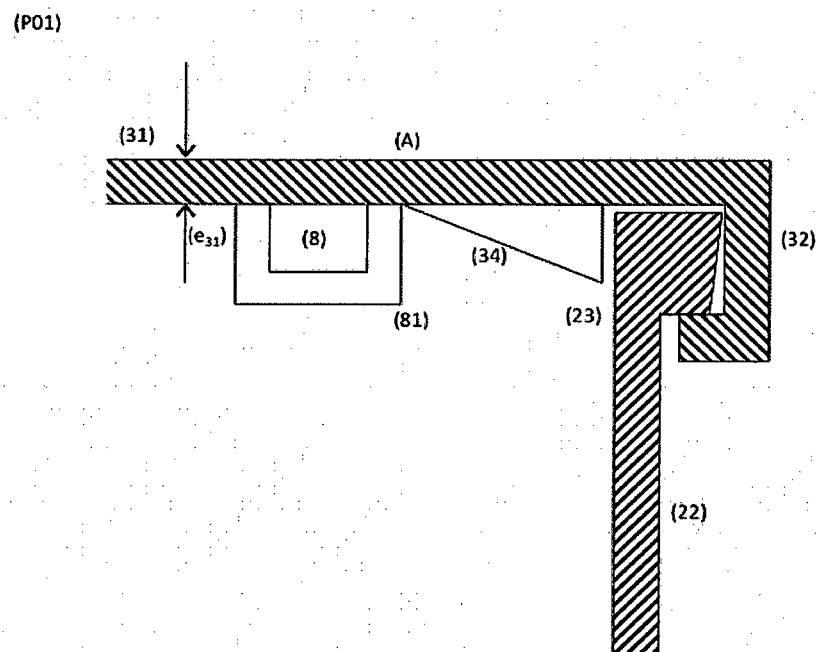


Figure 7

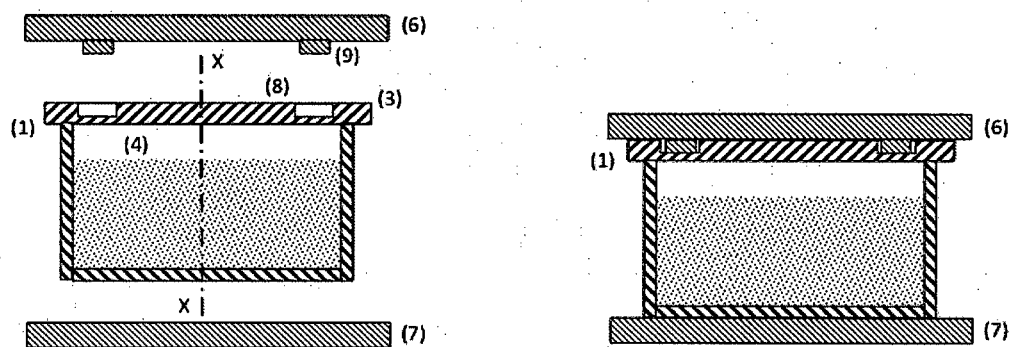


Figure 8

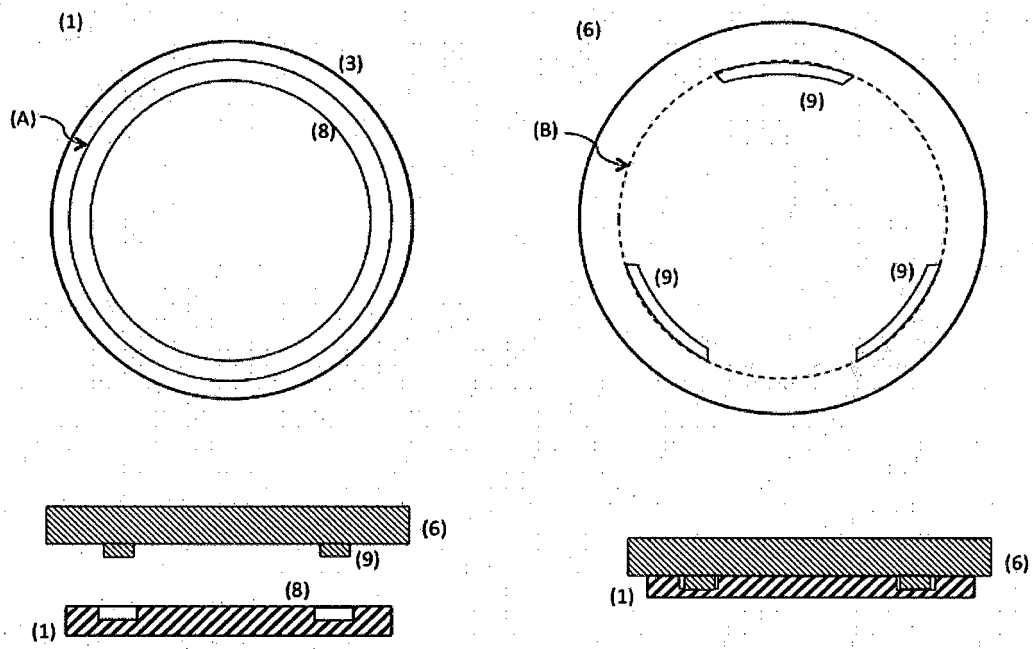


Figure 9

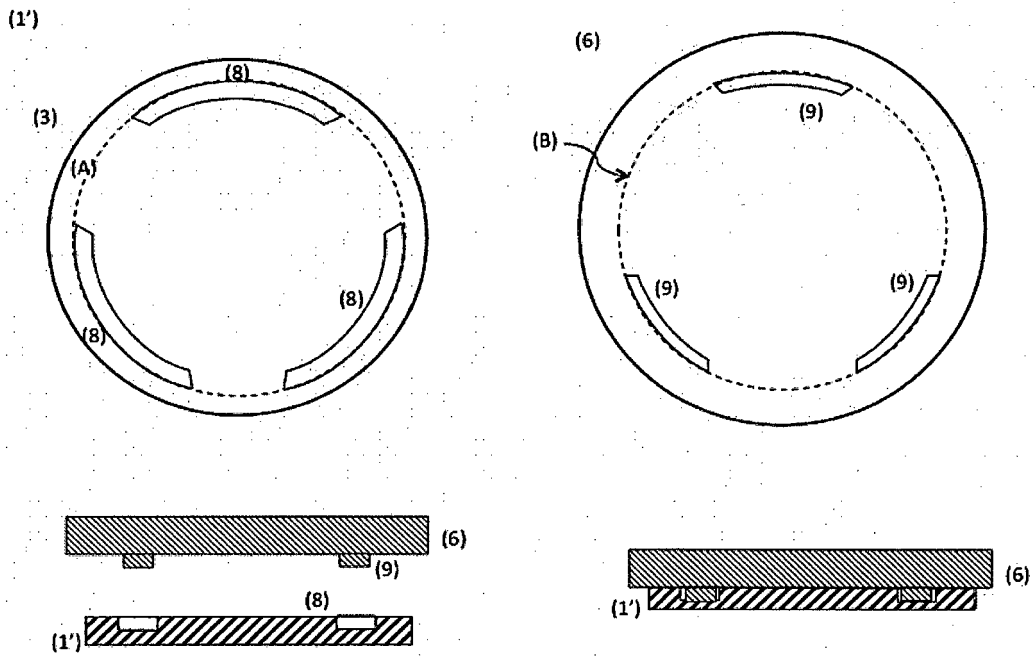


Figure 10

**REFERENCES CITED IN THE DESCRIPTION**

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