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(54) **DEVICE AND METHOD FOR ASSEMBLING A CAPSULE CONTAINING AN ANHYDROUS MATERIAL FOR THE PRODUCTION OF A BEVERAGE**

VORRICHTUNG UND VERFAHREN ZUM ZUSAMMENBAU EINER KAPSEL MIT EINEM ANHYDROUS-MATERIAL ZUR ZUBEREITUNG EINES GETRÄNKES

DISPOSITIF ET PROCÉDÉ D'ASSEMBLAGE D'UNE CAPSULE CONTENANT UN MATERIEL ANHYDRE POUR LA PRODUCTION D'UNE BOISSON

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Description

TECHNICAL FIELD

[0001] The present invention relates to a device configured for assembling a capsule containing an anhydrous material for the production of a beverage, the anhydrous material particularly being in the form of powder, grains or leaves, for example coffee, tea, barley, cocoa, etc.

[0002] The present invention also relates to a method for assembling a capsule containing an anhydrous material for the production of a beverage, the anhydrous material particularly being in the form of powder, grains or leaves, for example coffee, tea, barley, cocoa, etc.

STATE OF THE ART

[0003] In the food sector, it is known to produce beverages by infusion or solution in water, usually heated, of an anhydrous material contained in a capsule, in particular an anhydrous material in the form of powder, grains or leaves, for example coffee, tea, barley, or the like.

[0004] In particular, the capsules intended to contain the above-mentioned anhydrous material are produced in generally automated, manufacturing and assembly plants and comprise a hollow cup-shaped body, which is open at the top and has a substantially frustoconical shape. GB 1247879 A, GB 814241 A, DE 10009878 A1 and DE 1183816 B for instance describe such capsules.

[0005] The cup-shaped body generally has an axis of symmetry and comprises a base, arranged at a lower axial end of the cup-shaped body, and a flange, which extends radially outwards from an upper axial end of the cup-shaped body.

[0006] Typically, the upper end has a larger diameter than the lower end, whereas the flange has a substantially annular shape and is formed integrally with the cup-shaped body at the upper end.

[0007] The cup-shaped body defines, coaxially inside it, a cavity which is open at the top and is intended to house, in use, the anhydrous material, which is pressed for optimum use of the internal space of the cavity itself.

[0008] In particular, the cavity has such dimensions that the cup-shaped body can be considered as a thin-walled body.

[0009] The capsules of the type described above further comprise a membrane configured to close the cup-shaped body at the top, which membrane typically has a circular shape and is applied to the cup-shaped body at the upper end thereof.

[0010] In detail, once the anhydrous material is inserted, the aforesaid cavity is closed by applying the membrane on the upper surface of the annular flange.

[0011] The capsules of the type described above, once assembled, are intended to be used in extractor machines that produce a generally single-serve beverage,

starting from a single capsule.

[0012] In detail, these extractor machines are designed to accommodate one capsule at a time at a respective receiving seat. When the single capsule is inside the receiving seat, the membrane is perforated and, according to a known method not described in detail, heated water is run through the capsule, in order to produce the beverage by infusion or solution of the anhydrous material.

[0013] In some known configurations, the membrane is applied to the annular flange in an automated manner in the aforesaid manufacturing and assembly plants, by using specific glues or adhesive materials or by welding, so that it adheres to the upper surface of the annular flange.

[0014] Moreover, the known capsules are typically of the disposable type: after the one and only use, each capsule cannot be reused and therefore is a waste, which is often not recyclable.

[0015] In addition, in order to produce different types of beverages, it is necessary to purchase distinct capsules respectively containing anhydrous materials of different types.

[0016] Therefore, in this field, there is a need to provide alternative systems for the assembly of the above-mentioned capsules, which have greater versatility of use, are portable and, at the same time, reduce the environmental impact of the said capsules.

OBJECT AND SUMMARY OF THE INVENTION

[0017] The object of the present invention is to provide a device configured for assembling a capsule containing an anhydrous material, which is highly reliable and inexpensive, and allows the requirement specified above and related to the devices for assembling capsules containing an anhydrous material for the production of a known type of beverage to be met.

[0018] According to the invention, this object is achieved by a device configured for assembling a capsule containing an anhydrous material as claimed in claim 1.

[0019] A further object of the present invention is to provide a method for assembling a capsule containing an anhydrous material, which is highly reliable and inexpensive, and allows the requirement specified above and related to the methods for assembling capsules containing an anhydrous material for the production of a known type of beverage to be met.

[0020] According to the invention, this object is achieved by a method for assembling a capsule containing an anhydrous material as claimed in claim 7.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] For a better understanding of the present invention, a preferred, non-limiting embodiment thereof will be described below purely by way of example and with the

aid of the accompanying drawings, wherein:

- Figure 1 is an exploded side view, partially in section and with parts broken away for clarity, of a device configured for assembling a capsule containing an anhydrous material for the production of a beverage made according to the present invention;
- Figure 2 is a partially sectioned, partially exploded side view, with parts broken away for clarity, of the device in Figure 1 in a first operating condition;
- Figures 3a and 4a are partially sectioned side views, with parts broken away for clarity, of the device in Figure 1, according to distinct and successive operating conditions; and
- Figures 3b and 4b show, on an enlarged scale, some details of Figures 3a and 4a, respectively.

DETAILED DESCRIPTION

[0022] With reference to the accompanying drawings, the numeral 1 indicates, as a whole, a device configured for assembling a capsule 2 containing an anhydrous material for the production of a beverage, the anhydrous material particularly being in the form of powder, grains or leaves, for example coffee, tea, barley, cocoa, etc.

[0023] In particular, the capsule 2 is intended for use in extractor machines for the production of a generally single-serve beverage, starting from a single capsule, according to a known method not described in detail.

[0024] According to this preferred, non-limiting embodiment, the device 1 is a portable, manually operated device, intended to be used and manually operated by a user in order to assemble a capsule 2 starting from a hollow cup-shaped body 3, which is open at the top, and from a membrane 4 configured to close the cup-shaped body 3 at the top and preferably substantially circular in shape and made of aluminium.

[0025] In detail, the cup-shaped body 3 has an axis of symmetry A and comprises a support base 5, arranged at a lower axial end of the cup-shaped body 3, and an annular flange 6, which extends radially outwards from an upper axial end of the cup-shaped body 3.

[0026] In greater detail, the flange 6 extends integrally from the cup-shaped body 3 and has an upper axial annular surface 6a and a lower axial annular surface 6b.

[0027] The cup-shaped body 3 has a substantially frustoconical flanged shape, with the upper end having a diameter greater than the diameter of the lower end.

[0028] Moreover, the cup-shaped body 3 defines, coaxially inside it, a cavity 7 which is open at the top at the upper end of the cup-shaped body 3 and is intended to house, in use, the aforesaid anhydrous material.

[0029] Preferably, the cavity 7 has such dimensions that the cup-shaped body 3 can be considered as a thin-walled body.

[0030] The cavity 7 is intended to be closed at the top by the membrane 4, which for this purpose is applied, in use, to the cup-shaped body 3 at the upper end thereof,

as better described below.

[0031] The membrane 4 comprises an annular peripheral portion 4a having a diameter greater than the diameter of the flange 6. In particular, the membrane 4, in a first step of assembling the capsule 2, is superimposed, in particular resting, onto the upper surface 6a of the flange 6.

[0032] When the membrane is superimposed, in particular resting, on the upper surface 6a, the peripheral portion 4a protrudes radially from the outer rim of the flange 6.

[0033] As can be seen in the accompanying drawings, the device 1 comprises a tubular body 8 having a longitudinal, in particular vertical axis B and internally defining a guide channel 10.

[0034] According to this preferred embodiment, the tubular body 8 has a substantially circular cross-section.

[0035] According to an alternative embodiment, not shown, the tubular body 8 could have a cross-section of a different shape, for example polygonal or polygonal with rounded vertices.

[0036] In the specific example, the channel 10 has a substantially circular section and is configured to be at least partially engaged by the cup-shaped body 3.

[0037] In particular, the tubular body 8 has a first axial end opening 30, in particular an upper axial opening, configured to allow the cup-shaped body 3 and the membrane 4 to enter the channel 10.

[0038] The tubular body 8 also comprises a second axial end opening 31, in particular a lower axial opening, configured to allow the partial exit of the cup-shaped body 3 in a manner described in greater detail below.

[0039] As can be seen in the accompanying drawings, the channel 10 is provided with a shoulder 15 transversal to the axis B.

[0040] In detail, the shoulder 15 extends radially inwards, i.e., towards the axis B, from an inner surface 10a of the channel 10, has a substantially annular shape and is substantially orthogonal to the axis B.

[0041] In greater detail, the shoulder 15 extends integrally from the inner surface 10a and is arranged in a position axially lower than the flange 6, when the cup-shaped body 3 engages the channel 10.

[0042] In practice, the shoulder 15 defines a narrowing of the passage section of the channel 10, which prevents, in use, the passage of the flange 6.

[0043] In other words, the flange 6 has a diameter such that its passage downstream of the shoulder 15 is prevented by the shoulder 15 itself.

[0044] The shoulder 15 therefore defines an axial abutment for the flange 6, in a manner which will be explained below.

[0045] The device 1 further comprises a folding assembly 16 couplable in a releasable manner to the tubular body 8 and comprising a first folding member and a second folding member.

[0046] According to this preferred, non-limiting embodiment, the first folding member comprises a sleeve 17

which can be inserted coaxially into the channel 10 in a position radially interposed between the annular flange 6 and the inner surface 10a of the channel 10, when the cup-shaped body 3 is housed inside the channel 10.

[0047] In detail, the sleeve 17 can be operated, when the cup-shaped body 3 is housed inside the channel 10 and the membrane 4 is superimposed on the upper surface 6a of the flange 6, to fold the peripheral portion 4a of the membrane 4 with respect to the flange 6 towards the shoulder 15, therefore downwards, so as to obtain an annular flap 4b directed towards the shoulder 15, therefore downwards (Figures 3a-3b).

[0048] In greater detail, the sleeve 17 can be inserted into the channel 10, radially between the flange 6 and the surface 10a, so as to cooperate in contact with the peripheral portion 4a, pushing it downwards and folding it with respect to the flange 6.

[0049] In other words, in use, the user manually performs a first folding of the membrane 4, in particular of the peripheral portion 4a, inserting the sleeve 17 coaxially into the channel 10 through the first axial opening 30, thus obtaining the flap 4b to be directed downwards.

[0050] In the specific example, the channel 10 is also provided with a further shoulder 19 transversal to the axis B, arranged in an axially spaced position, in particular in an axially upper position, with respect to the shoulder 15 and defining an axial abutment for the sleeve 17.

[0051] More precisely, the shoulder 19 extends radially towards the axis B from the surface 10a. Preferably, the shoulder 19 has an annular shape and is parallel to the shoulder 15.

[0052] As can be seen in the accompanying drawings, the second folding member comprises, in particular consists of, a presser 18, which is movable with respect to the sleeve 17, in particular slidable coaxially inside the sleeve 17, and operable to move the cup-shaped body 3 axially downwards.

[0053] More precisely, the presser 18 has a substantially cylindrical shape, is defined by a body separated from the sleeve 17 and is designed to be slidably inserted into the sleeve 17, when the latter is already inserted inside the channel 10 as described above, is in abutment against the shoulder 19 and has already completed the aforesaid first folding of the membrane 4, obtaining the flap 4b.

[0054] Once inserted inside the sleeve 17, the presser 18 is configured to interact with the membrane 4 and the cup-shaped body 3, thereby exerting a thrust force on the cup-shaped body 3 and the folded membrane 4, so as to cause an axial movement of the cup-shaped body 3, and therefore of the flange 6 and the flap 4b, towards the shoulder 15, i.e., downwards.

[0055] In other words, in use, the user manually pushes, by means of the presser 18, the cup-shaped body 3 and the membrane 4 downwards, i.e., the flange 6 and the flap 4b in an axial direction towards the shoulder 15, so that the flap 4b cooperates in contact with the shoulder 15 and is folded towards the lower surface 6b of the flange

6, as the movement of the flange 6 towards the shoulder 15 continues, so as to obtain a substantially U-shaped fold of the peripheral portion 4a around the flange 6 (Figures 5a and 5b), upon completion of the downward movement.

[0056] Thus, the presser 18 is couplable in a releasable manner to the sleeve 17 to axially move the flange 6 and the flap 4b towards the shoulder 15 and cause the flap 4b to cooperate with the shoulder 15 and the fold of the flap 4b.

[0057] In the light of the above description, the operation of the presser 18 and the consequent relative movement between the flap 4b and the shoulder 15 allow a second folding of the membrane 4 to be carried out, thereby obtaining a further flap 4c directed towards the axis B (Figures 4a and 4b).

[0058] According to the preferred embodiment described and illustrated herein, the tubular body 8 is configured to rest, in use, on a support surface 34 during the insertion of the sleeve 17 into the channel 10 and the folding of the peripheral portion 4a of the membrane 4.

[0059] In particular, the tubular body 8 is configured to rest, in use, on the support surface 34 in the manner shown in Figures 1 to 3b, that is, so that the axis B is orthogonal to the support surface 34 and so that the second axial opening 31 is closed.

[0060] Preferably, the tubular body 8 is also configured to rest, in use, on the support surface 34 during the insertion of the cup-shaped body 3 and the membrane 4 into the channel 10.

[0061] Once the first folding of the membrane 4 has been made by means of the sleeve 17 and the flap 4b has been obtained, the tubular body 8 is configured to be lifted from the support surface 34 so as to free the second axial opening 31.

[0062] In this way, the cup-shaped body 3 can partially exit the second axial opening 31 during the axial movement of the flange 6 and the flap 4b towards the shoulder 15, therefore during the application of the pressure on the cup-shaped body 3 and the membrane 4 by means of the presser 18.

[0063] In other words, the cup-shaped body 3 is supported by the support surface 34 during the insertion of the sleeve 17 into the channel 10 and the consequent first folding of the membrane 4.

[0064] The above-described configuration of the device 1 allows a capsule 2 to be assembled starting from a cup-shaped body 3 and a membrane 4, with a limited number of components which are simple to manufacture and have a nonbulky and portable structure. In fact, no support element is required inside the channel 10 to support the cup-shaped body 3 during assembly with the membrane 4.

[0065] Advantageously, the sleeve 17 comprises a frustoconical wall 32 configured to cooperate with the flange 6, when the cup-shaped body 3 is housed inside the channel 10 and the membrane 4 is superimposed on the upper surface 6a, to control a centring of the axis A

with the axis B.

[0066] In particular, the frustoconical wall 32 is configured to cooperate with the flange 6 when the cup-shaped body is supported by the support surface 34, therefore when the tubular body 8 is still resting on said support surface 34.

[0067] More in particular, the frustoconical wall 32 defines an inner wall, in particular an annular inner wall, of the sleeve 17 and is arranged at the end portion 33 of the sleeve 17 and apt to engage first, in use, the channel 10 during the insertion of the sleeve 17 into the channel 10 itself, so that the aforesaid centring is controlled before the flap 4b is obtained.

[0068] More precisely, in the specific example, the end portion 33 corresponds to the lower end portion of the sleeve 17.

[0069] In practice, the frustoconical portion 32 cooperates in a substantially sliding manner (in particular, by means of the membrane 4 interposed between the sleeve 17 and the flange 6) with the flange 6, causing a radial movement of the flange 6 with respect to the axis B, until the axis A is centred, i.e., coaxial, with the axis B.

[0070] It should be noted that the verb "to control", as referred to the centring of the axis A with the axis B, is to be understood as "to cause" or "to bring about" said centring.

[0071] The sleeve 17 is also configured to guide the flap 4b during the axial movement of the latter towards the shoulder 15.

[0072] In detail, the sleeve 17 has an inner lateral surface 17a configured to guide the flap 4b.

[0073] More precisely, the inner surface 17a, after the sleeve 17 has been inserted into the channel 10, has controlled the centring of the axis A with the axis B by means of the frustoconical wall 32, has abutted against the shoulder 19 and has completed the aforesaid first folding of the membrane 4, serves as an axial guide for the flap 4b during the movement thereof towards the shoulder 15.

[0074] Conveniently, the frustoconical wall 32 is tapered towards the inner surface 17a. In this way, the centring effect is optimal.

[0075] In particular, the frustoconical wall 32 extends axially from the surface 17a downwards, i.e., it is arranged adjacent to the surface 17a.

[0076] More particularly, the frustoconical wall 32 delimits, with the extension of the inner lateral surface 17a arranged in a position facing the frustoconical wall 32 itself, an internal angle α (Figures 3b and 4b) having a width comprised between 20° and 40°, preferably comprised between 30° and 35°, more preferably equal to 32.4°.

[0077] The Applicant noticed that these width values of the angle α define the optimal inclination that results in the frustoconical wall 32 producing the best effects of centring the axis A with the axis B for the device 1 described above, at the same time favouring an optimal first folding of the membrane 4 around the flange 6.

[0078] With particular reference to Figures 4a and 4b, the channel 10 is further provided with a portion with a variable section 20 arranged in an axially spaced position, in particular in an axially upper position, with respect to the shoulder 15 and tapered towards the shoulder 15, in particular downwards.

[0079] In detail, the variable-section portion 20 is arranged in an axially lower position with respect to the shoulder 19 and is configured to interact with the flap 4b, during its movement towards the shoulder 15, so as to direct the flap 4b towards the axis B, before the flap 4b cooperates in contact with the shoulder 15.

[0080] In practice, the variable-section portion 20 causes the flap 4b to come into contact with the shoulder 15 with an angle of incidence between the flap 4b and the shoulder 15 other than 90°.

[0081] In this way, the flap 4b is deflected towards the axis B prior to the interaction with the shoulder 15, thus preventing the flap 4b from crumpling up.

[0082] Once the peripheral portion 4a is completely folded into a "U" shape around the flange 6, the cup-shaped body 3 is closed at the top and the capsule 2 is assembled.

[0083] The operation of the device 1 according to the present invention will be described below, with particular reference to an initial condition in which the tubular body 8 is resting on the support surface 34, so as to prevent the cup-shaped body 3 from coming out of the second axial opening 31.

[0084] In this condition, the user, after inserting the desired anhydrous material into the cavity 7, places the membrane 4 on the upper surface 6a of the flange 6. As specified above, during this step, the peripheral portion 4a of the membrane 4 protrudes radially from the flange 6.

[0085] Subsequently, the user inserts the sleeve 17 into the channel 10 through the first axial opening 30. In this condition, the frustoconical wall 32 cooperates with the flange 6 so as to radially move the cup-shaped body 3 and cause the centring of the axis A with the axis B.

[0086] After the centring, the further insertion of the sleeve 17 inside the channel 10, radially between the flange 6 and the surface 10a, causes the peripheral portion 4a to be folded and the flap 4b to be directed downwards (Figures 3a and 3b).

[0087] At this point, the user lifts the tubular body 8 from the support surface 34, so as to allow the cup-shaped body 3 to slide freely through the second axial opening 31. At the same time, he/she inserts the presser 18 into the sleeve 17 and pushes it axially downwards, so as to axially move the cup-shaped body 3, the membrane 4, the flange 6 and the flap 4b towards the shoulder 15.

[0088] Pushed by this axial movement, the flap reaches the variable-section portion 20 and is directed (deflected) towards the axis B by interaction in contact with the variable-section portion 20 (Figures 4a and 4b).

[0089] After being directed towards the axis B, the flap 4b reaches the shoulder 15. As the lowering of the press-

er 18, and therefore the downward movement of the flange 6, continues, the flap 4b is folded towards the lower surface 6b of the flange 6, so as to obtain, once the downward movement has been completed, a U-shaped fold of the peripheral portion 4a around the flange 6.

[0090] At this point, the capsule 2 is assembled and ready to be extracted from the channel 10.

[0091] The advantages enabled by the device 1 manufactured according to the present invention will be apparent from an examination of the features thereof.

[0092] In particular, the device 1 allows a capsule 2 containing an anhydrous material for the preparation of a beverage to be assembled manually, without using any kind of specific glue or adhesive to fix the membrane 4 to the cup-shaped body 3.

[0093] Moreover, the presence of the frustoconical wall 32 provides a simple and effective system for centring the cup-shaped body 3 inside the channel 10, without the need for further support components inside the channel 10 itself.

[0094] The correct centring ensures the nominal folding of the membrane 4.

[0095] This is further favoured by the presence of the second axial opening 31, which allows a support surface 34 outside (below) the device 1 to serve as a (bottom) support for the cup-shaped body 3 during some of the assembly steps (centring and first folding). Therefore, no further elements are required inside the channel 10 to support the cup-shaped body during the folding, and the device 1 is easy to manufacture and simple in structure.

[0096] Moreover, after each use, the capsule 2 can be conveniently cleaned and reused, simply by refilling the cup-shaped body 3 with the desired anhydrous material and applying a new membrane 4, as described above.

[0097] In addition, the type of anhydrous material inside the capsule 2 can be changed each time, without having to purchase several capsules containing different anhydrous materials.

[0098] It is clear that the device 1 described and illustrated herein can be subject to modifications and variations without however departing from the scope of protection defined by the claims.

[0099] In particular, by means of appropriate modifications, the device 1 could be operated in an automated manner and not manually by a user.

Claims

1. A device (1) configured for assembling a capsule (2) containing an anhydrous material for the production of a beverage starting from a cup-shaped body (3) open at the top and from a membrane (4) configured to superiorly close said cup-shaped body (3); said cup-shaped body (3) having an axis of symmetry (A) and comprising an annular flange (6) extending radially from an upper axial end of the cup-shaped body (3); said flange (6) having an upper annular surface

(6a) and a lower annular surface (6b); said membrane (4) comprising an annular peripheral portion (4a) protruding radially from said flange (6) when said membrane (4) is superimposed on said upper surface (6a);

said device (1) comprising a tubular body (8) having a longitudinal axis (B), internally defining a guide channel (10) coaxial to said longitudinal axis (B) and configured to be engaged by said cup-shaped body (3);

said channel (10) being provided with a shoulder (15) transversal to said longitudinal axis (B) extending integrally in one single piece from an inner surface (10a) of said channel towards said longitudinal axis (B);

said device (1) further comprising a folding assembly (16) couplable in a releasable manner to said tubular body (8) and comprising a first folding member (17) and a second folding member (18);

said first folding member (17) being operable, when said cup-shaped body (3) is at least partially housed inside said channel (10) and said membrane (4) is superimposed on said upper surface (6a), to fold said peripheral portion (4a) with respect to said flange (6) towards said shoulder (15), so as to obtain an annular flap (4b), directed towards said shoulder (15);

said second folding member (18) being couplable in a releasable manner to said first folding member (17) to axially move said flange (6) and said flap (4b) towards said shoulder (15), so that said flap (4b) cooperates in contact with said shoulder (15) and is folded towards said lower surface (6b) by means of interaction with said shoulder (15) as the movement of said flange (6) towards said shoulder (15) continues, so as to obtain a substantially U-shaped fold of said peripheral portion (4a) around said flange (6); wherein said first folding member (17) comprises a frustoconical wall (32) configured to cooperate with said flange (6), when said cup-shaped body (3) is at least partially housed inside said channel (10) and said membrane (4) is superimposed on said upper surface (6a), to control a centring of said axis of symmetry (A) with said longitudinal axis (B).

2. The device as claimed in claim 1, wherein said first folding member comprises a sleeve (17) insertable coaxially into said channel (10) in a position radially interposed between said flange (6) and said inner surface (10a); and wherein said frustoconical wall (32) defines an inner wall of said sleeve (17) and is arranged at the end portion (33) of said sleeve (17) apt to engage first, in use, said channel (10) during the insertion of

the sleeve (17) into the channel (10) itself, so that said centring is controlled before said flap (4b) is obtained.

3. The device as claimed in claim 2, wherein said sleeve (17) has a cylindrical inner lateral surface (17a) configured to guide said flap (4b) during said axial movement of said flap (4b) towards said shoulder (15); said frustoconical wall (32) being tapered towards said inner lateral surface (17a). 5 10
4. The device as claimed in claim 3, wherein said frustoconical wall (32) extends axially from said inner lateral surface (17a). 15
5. The device as claimed in claim 4, wherein said frustoconical wall (32) delimits, together with the extension of said inner lateral surface (17a) arranged in a position facing the frustoconical wall (32) itself, an internal angle (α) having a width comprised between 20° and 40°, preferably comprised between 30° and 35°, more preferably equal to 32.4°. 20
6. The device as claimed in any one of the preceding claims, wherein said tubular body (8) has a first axial end opening (30) for allowing the insertion of said cup-shaped body (3) into said channel (10) and a second axial end opening (31), opposite to the first axial opening (30) and configured to allow the partial exit of said cup-shaped body (3) from said channel (10) when said second folding member (18) axially moves said flange (6) and said flap (4b) towards said shoulder (15). 25 30
7. A method for assembling a capsule (2) containing an anhydrous material for the production of a beverage starting from a cup-shaped body (3) open at the top and from a membrane (4) configured to superiorly close said cup-shaped body (3); said cup-shaped body (3) having an axis of symmetry (A) and comprising an annular flange (6) extending radially from an upper axial end of the cup-shaped body (3); said flange (6) having an upper annular surface (6a) and a lower annular surface (6b); said method comprising the steps of: 35 40 45
 - i) providing a guide channel (10) having a longitudinal axis (B) and provided with a shoulder (15) transversal to said longitudinal axis (B) and extending integrally in a single piece from an inner surface (10a) of said channel (10) towards said longitudinal axis (B); 50
 - ii) at least partially inserting said cup-shaped body (3) coaxially into said channel (10);
 - iii) superimposing said membrane (4) onto said upper surface (6a) of said flange (6); said membrane (4) comprising an annular peripheral portion (4a) protruding radially from said flange (6) 55

when said membrane (4) is superimposed on said upper surface (6a);

iv) controlling a centring of said axis of symmetry (A) with said longitudinal axis (B) when said cup-shaped body (3) is inserted inside said channel (10);

v) folding said peripheral portion (4a) with respect to said flange (6) towards said shoulder (15), so as to obtain an annular flap (4b) directed towards said shoulder (15), subsequently to the step iv) of controlling; and

vi) axially moving said flange (6) and said flap (4b) towards said shoulder (15), so that said flap (4b) cooperates in contact with said shoulder (15) and is folded towards said lower surface (6b) by means of interaction with said shoulder (15) as the movement of said flange (6) continues, so as to obtain a substantially U-shaped fold of said peripheral portion (4a) around said flange (6).

8. The method as claimed in claim 7, wherein the step v) of folding is carried out by coaxially inserting a sleeve (17) into said channel (10), in a position radially interposed between said flange (6) and said inner surface (10a) of said channel (10);

said sleeve (17) comprising an internal frustoconical wall (32) arranged at the end portion (33) of said sleeve (17) apt to engage first said channel (10) during the insertion of the sleeve (17) into the channel (10) itself;

and wherein the step iv) of controlling is carried out by means of the cooperation of said frustoconical wall (32) with said flange (6).

9. The method as claimed in claim 8, wherein said step iv) of controlling comprises the step of:
 - vii) radially moving, with respect to said longitudinal axis (B), said flange (6) by means of the cooperation of said frustoconical wall (32) with said flange (6).

10. The method as claimed in any one of the claims from 7 to 9, wherein said channel (10) comprises a first axial end opening (30) for the insertion of said cup-shaped body (3) and a second axial end opening (31) opposite to the first axial opening (30); said method further comprising the steps of:

viii) providing a tubular body (8) internally defining said channel (10);

ix) placing said tubular body (8) on a support surface (34) so as to close said second axial opening (31) at least during the steps iv) of controlling and v) of folding; and

x) lifting said tubular body (8) from said support surface (34) during the step vi) of moving, so as to allow the partial exit of said cup-shaped body

(3) from said second axial opening (31).

Patentansprüche

1. Vorrichtung (1), ausgestaltet zum Zusammenbau einer Kapsel (2), die ein anhydrisches Material zur Zubereitung eines Getränks enthält, beginnend mit einem becherförmigen Körper (3), der an der Oberseite offen ist, und mit einer Membran (4), die so ausgestaltet ist, dass sie den becherförmigen Körper (3) oben verschließt; wobei der becherförmige Körper (3) eine Symmetrieachse (A) aufweist und einen ringförmigen Flansch (6) umfasst, der sich von einem oberen axialen Ende des becherförmigen Körpers (3) radial erstreckt; wobei der Flansch (6) eine obere ringförmige Fläche (6a) und eine untere ringförmige Fläche (6b) aufweist; wobei die Membran (4) einen ringförmigen Umfangsabschnitt (4a) umfasst, der von dem Flansch (6) radial vorsteht, wenn die Membran (4) die obere Fläche (6a) überlagert;

wobei die Vorrichtung (1) einen rohrförmigen Körper (8), der eine Längsachse (B) aufweist, umfasst, der im Inneren einen Führungskanal (10) definiert, der coaxial zu der Längsachse (B) ist und so ausgestaltet ist, dass er von dem becherförmigen Körper (3) in Eingriff genommen wird;

wobei der Kanal (10) mit einer Schulter (15) quer zu der Längsachse (B) versehen ist, die sich ganzheitlich in einem Stück von einer Innenfläche (10a) des Kanals hin zu der Längsachse (B) erstreckt;

wobei die Vorrichtung (1) ferner eine Faltanordnung (16) umfasst, die in einer lösbaren Weise mit dem rohrförmigen Körper (8) verbindbar ist und ein erstes Faltelement (17) und ein zweites Faltelement (18) umfasst;

wobei das erste Faltelement (17), wenn der becherförmige Körper (3) zumindest teilweise innerhalb des Kanals (10) aufgenommen ist und die Membran (4) die obere Fläche (6a) überlagert, dazu dient, den Umfangsabschnitt (4a) in Bezug auf den Flansch (6) hin zu der Schulter (15) zu falten, um eine ringförmige Lasche (4b) zu erhalten, die hin zu der Schulter (15) gerichtet ist;

wobei das zweite Faltelement (18) in einer lösbaren Weise mit dem ersten Faltelement (17) verbindbar ist, um den Flansch (6) und die Lasche (4b) axial hin zu der Schulter (15) zu bewegen, sodass die Lasche (4b) mit der Schulter (15) kontaktierend zusammenwirkt und mittels Interaktion mit der Schulter (15), wenn die Bewegung des Flanschs (6) hin zu der Schulter (15) fortgeführt wird, hin zu der unteren Fläche (6b) gefaltet wird, um einen im Wesentlichen U-

förmigen Falz des Umfangsabschnitts (4a) um den Flansch (6) zu erhalten;

wobei das erste Faltelement (17) eine kegelmantelförmige Wand (32) umfasst, die so ausgestaltet ist, dass sie mit dem Flansch (6) zusammenwirkt, wenn der becherförmige Körper (3) zumindest teilweise innerhalb des Kanals (10) aufgenommen ist und die Membran (4) die obere Fläche (6a) überlagert, um eine Zentrierung der Symmetrieachse (A) mit der Längsachse (B) zu steuern.

2. Vorrichtung nach Anspruch 1, wobei das erste Faltelement eine Hülse (17) umfasst, die an einer Stelle, die radial zwischen dem Flansch (6) und der Innenfläche (10a) liegt, coaxial in den Kanal (10) einsetzbar ist;

und wobei die kegelmantelförmige Wand (32) eine innere Wand der Hülse (17) definiert und an dem Endabschnitt (33) der Hülse (17) so angeordnet ist, dass sie, im Gebrauch, dazu geeignet ist, während des Einsetzens der Hülse (17) in den Kanal (10) selbst zuerst den Kanal (10) in Eingriff zu nehmen, sodass die Zentrierung gesteuert wird, bevor die Lasche (4b) erhalten wird.

3. Vorrichtung nach Anspruch 2, wobei die Hülse (17) eine zylindrische innere Seitenfläche (17a) aufweist, die so ausgestaltet ist, dass sie die Lasche (4b) während der axialen Bewegung der Lasche (4b) hin zu der Schulter (15) führt; wobei die kegelmantelförmige Wand (32) hin zu der inneren Seitenfläche (17a) verjüngt ist.

4. Vorrichtung nach Anspruch 3, wobei sich die kegelmantelförmige Wand (32) axial von der inneren Seitenfläche (17a) erstreckt.

5. Vorrichtung nach Anspruch 4, wobei die kegelmantelförmige Wand (32), zusammen mit der Erstreckung der inneren Seitenfläche (17a), die in einer der kegelmantelförmigen Wand (32) selbst zugewandten Position angeordnet ist, einen Innenwinkel (a) begrenzt, der eine Breite zwischen 20° und 40°, vorzugsweise zwischen 30° und 35°, noch bevorzugter von gleich 32,4°, aufweist.

6. Vorrichtung nach einem beliebigen der vorhergehenden Ansprüche, wobei der rohrförmige Körper (8) eine erste axiale Endöffnung (30) zum Ermöglichen des Einsetzens des becherförmigen Körpers (3) in den Kanal (10), und eine zweite axiale Endöffnung (31) aufweist, die der ersten axialen Öffnung (30) gegenüberliegt und so ausgestaltet ist, dass sie den teilweisen Austritt des becherförmigen Körpers (3) aus dem Kanal (10) ermöglicht, wenn das zweite Faltelement (18) den Flansch (6) und die Lasche (4b) axial hin zu der Schulter (15) bewegt.

7. Verfahren zum Zusammenbau einer Kapsel (2), die ein anhydriertes Material zur Zubereitung eines Getränks enthält, beginnend mit einem becherförmigen Körper (3), der an der Oberseite offen ist, und mit einer Membran (4), die so ausgestaltet ist, dass sie den becherförmigen Körper (3) oben verschließt; wobei der becherförmige Körper (3) eine Symmetrieachse (A) aufweist und einen ringförmigen Flansch (6) umfasst, der sich von einem oberen axialen Ende des becherförmigen Körpers (3) radial erstreckt; wobei der Flansch (6) eine obere ringförmige Fläche (6a) und eine untere ringförmige Fläche (6b) aufweist; wobei das Verfahren die folgenden Schritte umfasst:

i) Vorsehen eines Führungskanals (10), der eine Längsachse (B) aufweist und mit einer Schulter (15) versehen ist, die quer zu der Längsachse (B) ist und sich ganzheitlich in einem Stück von einer Innenfläche (10a) des Kanals (10) hin zu der Längsachse (B) erstreckt;
 ii) zumindest teilweises Einsetzen des becherförmigen Körpers (3) coaxial in den Kanal (10);
 iii) Aufbringen der Membran (4) auf die obere Fläche (6a) des Flanschs (6); wobei die Membran (4) einen ringförmigen Umfangsabschnitt (4a) umfasst, der von dem Flansch (6) radial vorsteht, wenn die Membran (4) die obere Fläche (6a) überlagert;
 iv) Steuern einer Zentrierung der Symmetrieachse (A) mit der Längsachse (B), wenn der becherförmige Körper (3) in den Kanal (10) eingesetzt wird;
 v) Falten, im Anschluss an den Schritt iv) des Steuerns, des Umfangsabschnitts (4a) in Bezug auf den Flansch (6) hin zu der Schulter (15), um eine ringförmige Lasche (4b) zu erhalten, die hin zu der Schulter (15) gerichtet ist; und
 vi) axiales Bewegen des Flanschs (6) und der Lasche (4b) hin zu der Schulter (15), sodass die Lasche (4b) mit der Schulter (15) kontaktierend zusammenwirkt und mittels Interaktion mit der Schulter (15), wenn die Bewegung des Flanschs (6) fortgeführt wird, hin zu der unteren Fläche (6b) gefaltet wird, um einen im Wesentlichen U-förmigen Falz des Umfangsabschnitts (4a) um den Flansch (6) zu erhalten.

8. Verfahren nach Anspruch 7, wobei der Schritt v) des Faltens durch koaxiales Einsetzen einer Hülse (17) in einen Kanal (10), an einer Stelle, die radial zwischen dem Flansch (6) und der Innenfläche (10a) des Kanals (10) liegt, durchgeführt wird;

wobei die Hülse (17) eine an dem Endabschnitt (33) der Hülse (17) angeordnete innere kegelförmige Wand (32) umfasst, die dazu geeignet ist, während des Einsetzens der Hülse

(17) in den Kanal (10) selbst zuerst den Kanal (10) in Eingriff zu nehmen; und wobei der Schritt iv) des Steuerns mittels des Zusammenwirkens der kegelförmigen Wand (32) mit dem Flansch (6) durchgeführt wird.

9. Verfahren nach Anspruch 8, wobei der Schritt iv) des Steuerns den folgenden Schritt umfasst:
 vii) radiales Bewegen, in Bezug auf die Längsachse (B), des Flanschs (6) mittels des Zusammenwirkens der kegelförmigen Wand (32) mit dem Flansch (6).

10. Verfahren nach einem beliebigen der Ansprüche 7 bis 9, wobei der Kanal (10) eine erste axiale Endöffnung (30) zum Einsetzen des becherförmigen Körpers (3) und eine zweite axiale Endöffnung (31) gegenüber der ersten axialen Endöffnung (30) umfasst; wobei das Verfahren ferner die folgenden Schritte umfasst:

viii) Vorsehen eines rohrförmigen Körpers (8), der im Inneren den Kanal (10) definiert;
 ix) Platzieren des rohrförmigen Körpers (8) auf einer Stützfläche (34), um die zweite axiale Öffnung (31) zumindest während der Schritte iv) des Steuerns und v) des Faltens zu schließen; und
 x) Anheben des rohrförmigen Körpers (8) von der Stützfläche (34) während des Schritts vi) des Bewegens, um den teilweisen Austritt des becherförmigen Körpers (3) aus der zweiten axialen Öffnung (31) zu ermöglichen.

Revendications

1. Dispositif (1) configuré pour assembler une capsule (2) contenant un matériau anhydre pour la production d'une boisson à partir d'un corps en forme de coupe (3) ouvert au sommet et d'une membrane (4) configurée pour fermer supérieurement ledit corps en forme de coupe (3); ledit corps en forme de coupe (3) ayant un axe de symétrie (A) et comprenant une bride annulaire (6) s'étendant radialement à partir d'une extrémité axiale supérieure du corps en forme de coupe (3); ladite bride (6) ayant une surface annulaire supérieure (6a) et une surface annulaire inférieure (6b); ladite membrane (4) comprenant une partie périphérique annulaire (4a) faisant saillie radialement depuis ladite bride (6) lorsque ladite membrane (4) est superposée sur ladite surface supérieure (6a);

ledit dispositif (1) comprenant un corps tubulaire (3) ayant un axe longitudinal (B), définissant in-

- térieurement un canal de guidage (10) coaxial audit axe longitudinal (B) et configuré pour être engagé par ledit corps en forme de coupe (3) ; ledit canal (10) étant pourvu d'un épaulement (15) transversal audit axe longitudinal (B) s'étendant intégralement en une seule pièce depuis une surface intérieure (10a) dudit canal vers ledit axe longitudinal (B) ;
- ledit dispositif (1) comprenant en outre un ensemble de pliage (16) pouvant être couplé de manière amovible audit corps tubulaire (8) et comprenant un premier élément de pliage (17) et un second élément de pliage (18) ;
- ledit premier élément de pliage (17) étant utilisable, lorsque ledit corps en forme de coupe (3) est au moins partiellement logé à l'intérieur dudit canal (10) et que ladite membrane (4) est superposée sur ladite surface supérieure (6a), pour plier ladite partie périphérique (4a) par rapport à ladite bride (6) vers ledit épaulement (15), de manière à obtenir un rabat annulaire (4b), dirigé vers ledit épaulement (15) ;
- ledit second élément de pliage (18) pouvant être couplé de manière libérable audit premier élément de pliage (17) pour déplacer axialement ladite bride (6) et ledit rabat (4b) vers ledit épaulement (15), de sorte que ledit rabat (4b) coopère en contact avec ledit épaulement (15) et est plié vers ladite surface inférieure (6b) au moyen d'une interaction avec ledit épaulement (15) lorsque le mouvement de ladite bride (6) vers ledit épaulement (15) continue, de manière à obtenir un pli sensiblement en forme de U de ladite partie périphérique (4a) autour de ladite bride (6) ;
- dans lequel ledit premier élément de pliage (17) comprend une paroi tronconique (32) configurée pour coopérer avec ladite bride (6), lorsque ledit corps en forme de coupe (3) est au moins partiellement logé à l'intérieur dudit canal (10) et que ladite membrane (4) est superposée sur ladite surface supérieure (6a), pour contrôler un centrage dudit axe de symétrie (A) avec ledit axe longitudinal (B).
2. Dispositif selon la revendication 1, dans lequel ledit premier élément de pliage comprend un manchon (17) insérable coaxialement dans ledit canal (10) dans une position radialement interposée entre ladite bride (6) et ladite surface intérieure (10a) ; et dans lequel ladite paroi tronconique (32) définit une paroi intérieure dudit manchon (17) et est disposée au niveau de la partie d'extrémité (33) dudit manchon (17) apte à s'engager en premier, en utilisation, dans ledit canal (10) pendant l'insertion du manchon (17) dans le canal (10) lui-même, de sorte que ledit centrage est contrôlé avant l'obtention dudit rabat (4b).
3. Dispositif selon la revendication 2, dans lequel ledit manchon (17) a une surface latérale interne cylindrique (17a) configurée pour guider ledit rabat (4b) pendant ledit mouvement axial dudit rabat (4b) vers ledit épaulement (15) ; ladite paroi tronconique (32) étant effilée vers ladite surface latérale interne (17a).
4. Dispositif selon la revendication 3, dans lequel ladite paroi tronconique (32) s'étend axialement depuis ladite surface latérale interne (17a).
5. Dispositif selon la revendication 4, dans lequel ladite paroi tronconique (32) délimite, conjointement avec le prolongement de ladite surface latérale interne (17a) disposée dans une position faisant face à la paroi tronconique (32) elle-même, un angle interne (α) ayant une largeur comprise entre 20° et 40°, de préférence comprise entre 30° et 35°, plus préférentiellement égale à 32,4°.
6. Dispositif selon l'une quelconque des revendications précédentes, dans lequel ledit corps tubulaire (8) présente une première ouverture d'extrémité axiale (30) pour permettre l'insertion dudit corps en forme de coupe (3) dans ledit canal (10) et une seconde ouverture d'extrémité axiale (31), opposée à la première ouverture axiale (30) et configurée pour permettre la sortie partielle dudit corps en forme de coupe (3) dudit canal (10) lorsque ledit second élément de pliage (18) déplace axialement ladite bride (6) et ledit volet (4b) vers ledit épaulement (15).
7. Procédé d'assemblage d'une capsule (2) contenant un matériau anhydre pour la production d'une boisson à partir d'un corps en forme de coupe (3) ouvert au sommet et d'une membrane (4) configurée pour fermer supérieurement ledit corps en forme de coupe (3) ; ledit corps en forme de coupe (3) ayant un axe de symétrie (A) et comprenant une bride annulaire (6) s'étendant radialement depuis une extrémité axiale supérieure du corps en forme de coupe (3) ; ladite bride (6) ayant une surface annulaire supérieure (6a) et une surface annulaire inférieure (6b) ; ledit procédé comprenant les étapes :
- i) fournir un canal de guidage (10) ayant un axe longitudinal (B) et pourvu d'un épaulement (15) transversal audit axe longitudinal (B) et s'étendant intégralement en une seule pièce depuis une surface intérieure (10a) dudit canal (10) vers ledit axe longitudinal (B) ;
 - ii) insérer au moins partiellement ledit corps en forme de coupe (3) coaxialement dans ledit canal (10) ;
 - iii) superposer ladite membrane (4) sur ladite surface supérieure (6a) de ladite bride (6) ; ladite membrane (4) comprenant une partie périphé-

- rique annulaire (4a) faisant saillie radialement de ladite bride (6) lorsque ladite membrane (4) est superposée sur ladite surface supérieure (6a) ;
- iv) contrôler un centrage dudit axe de symétrie (A) avec ledit axe longitudinal (B) lorsque ledit corps en forme de coupe (3) est inséré à l'intérieur dudit canal (10) ; 5
- v) plier ladite partie périphérique (4a) par rapport à ladite bride (6) vers ledit épaulement (15), de manière à obtenir un rabat annulaire (4b) dirigé vers ledit épaulement (15), après l'étape iv) de contrôle ; et 10
- vi) déplacer axialement ladite bride (6) et ledit rabat (4b) vers ledit épaulement (15), de sorte que ledit rabat (4b) coopère en contact avec ledit épaulement (15) et est plié vers ladite surface inférieure (6b) par interaction avec ledit épaulement (15) lorsque le mouvement de ladite bride (6) se poursuit, de manière à obtenir un pli sensiblement en forme de U de ladite partie périphérique (4a) autour de ladite bride (6). 15 20
8. Procédé selon la revendication 7, dans lequel l'étape v) de pliage est réalisée en insérant coaxialement un manchon (17) dans ledit canal (10), dans une position radialement interposée entre ladite bride (6) et ladite surface interne (10a) dudit canal (10) ; 25
- ledit manchon (17) comprenant une paroi tronconique interne (32) disposée au niveau de la partie d'extrémité (33) dudit manchon (17) apte à s'engager en premier dans ledit canal (10) pendant l'insertion du manchon (17) dans le canal (10) lui-même ; 30 35
- et dans lequel l'étape iv) de contrôle est réalisée au moyen de la coopération de ladite paroi tronconique (32) avec ladite bride (6).
9. Procédé selon la revendication 8, dans lequel ladite étape iv) de contrôle comprend l'étape : 40
- vii) déplacer radialement, par rapport audit axe longitudinal (B), ladite bride (6) au moyen de la coopération de ladite paroi tronconique (32) avec ladite bride (6). 45
10. Procédé selon l'une quelconque des revendications 7 à 9, dans lequel ledit canal (10) comprend une première ouverture d'extrémité axiale (30) pour l'insertion dudit corps en forme de coupe (3) et une seconde ouverture d'extrémité axiale (31) opposée à la première ouverture axiale (30) ; 50
- ledit procédé comprenant en outre les étapes :
- viii) fournir un corps tubulaire (8) définissant intérieurement ledit canal (10) ; 55
- ix) placer ledit corps tubulaire (8) sur une surface de support (34) de manière à fermer ladite se-

conde ouverture axiale (31) au moins pendant les étapes iv) de contrôle et v) de pliage ; et x) soulever ledit corps tubulaire (8) de ladite surface de support (34) pendant l'étape vi) de déplacement, de façon à permettre la sortie partielle dudit corps en forme de coupe (3) de ladite seconde ouverture axiale (31).

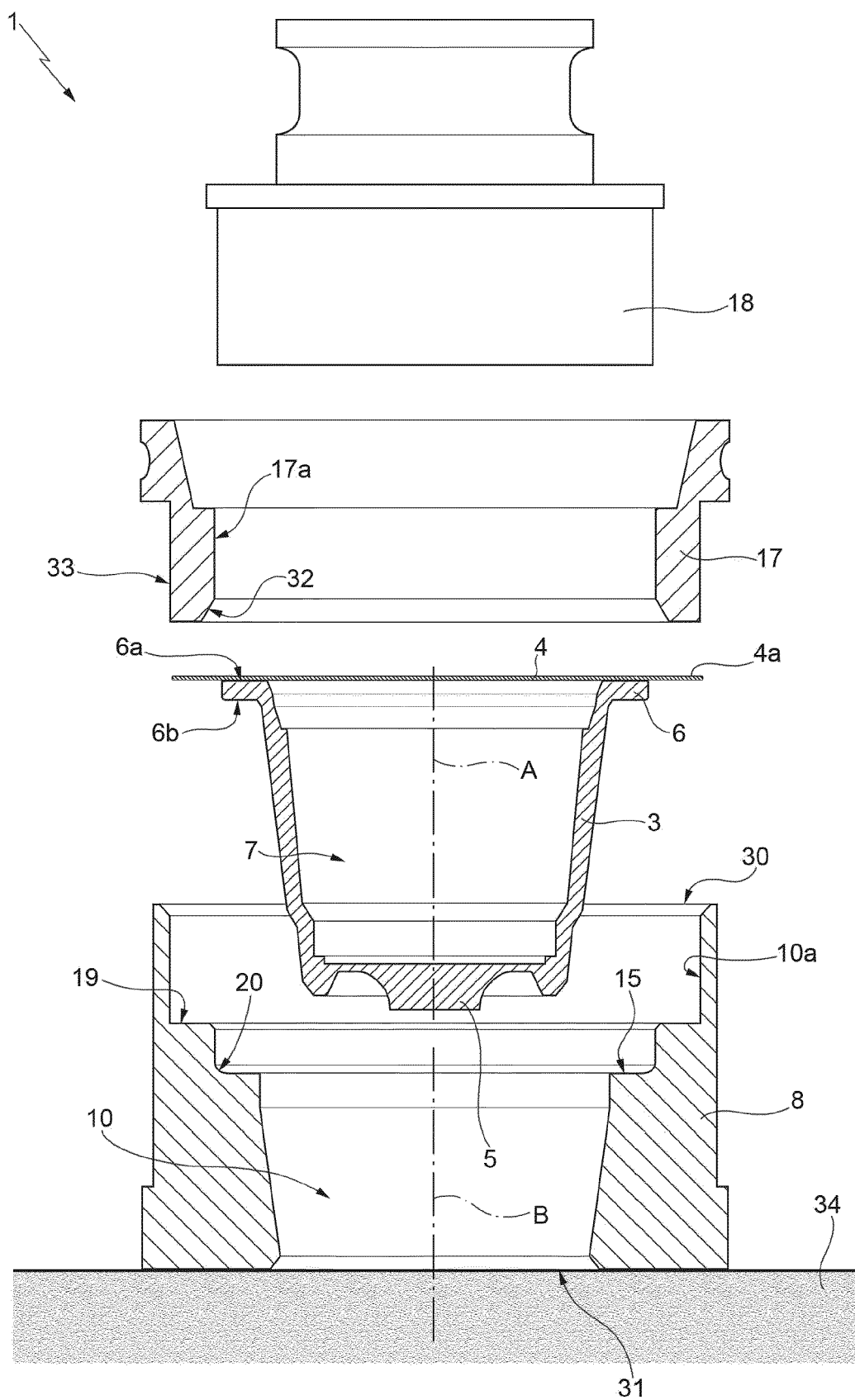


FIG. 1

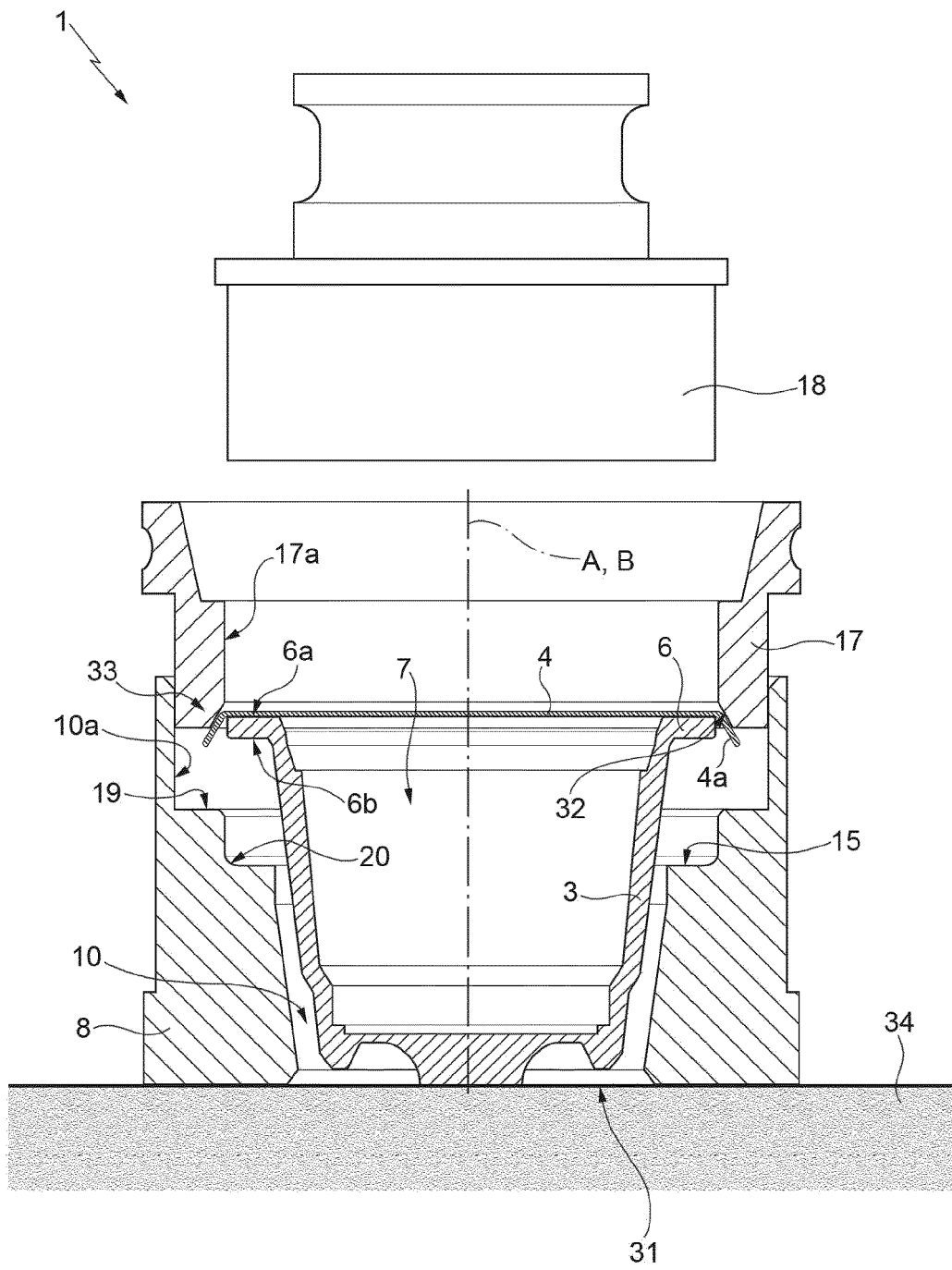


FIG. 2

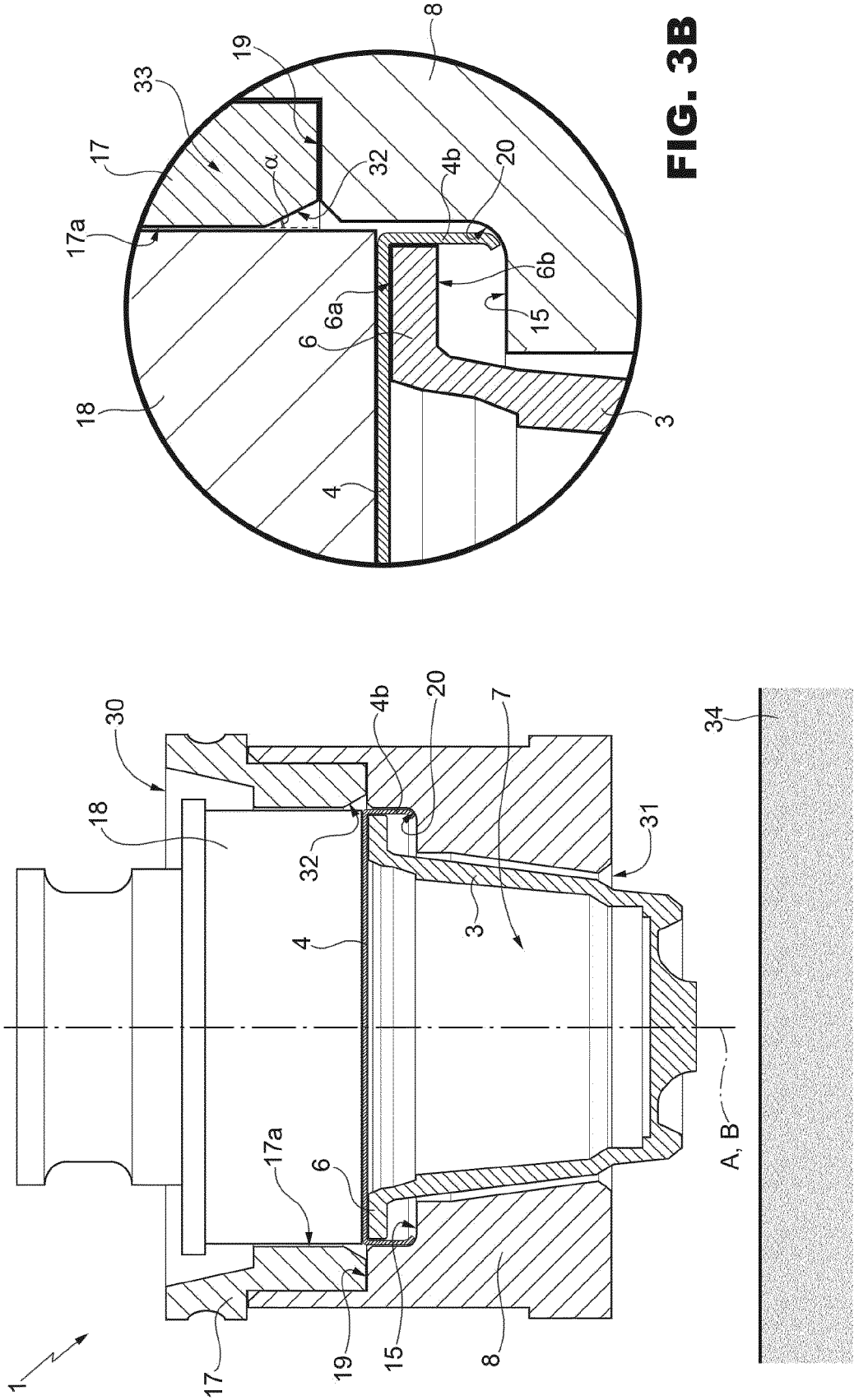


FIG. 3A

FIG. 3B

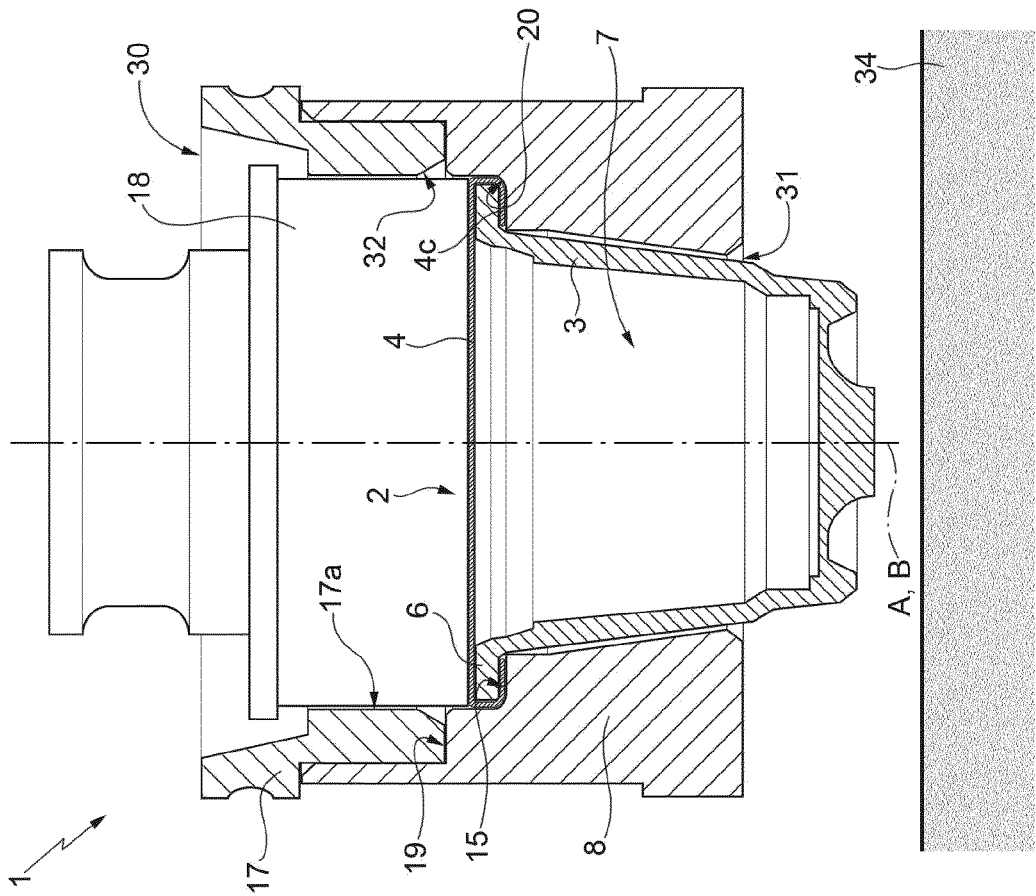


FIG. 4A

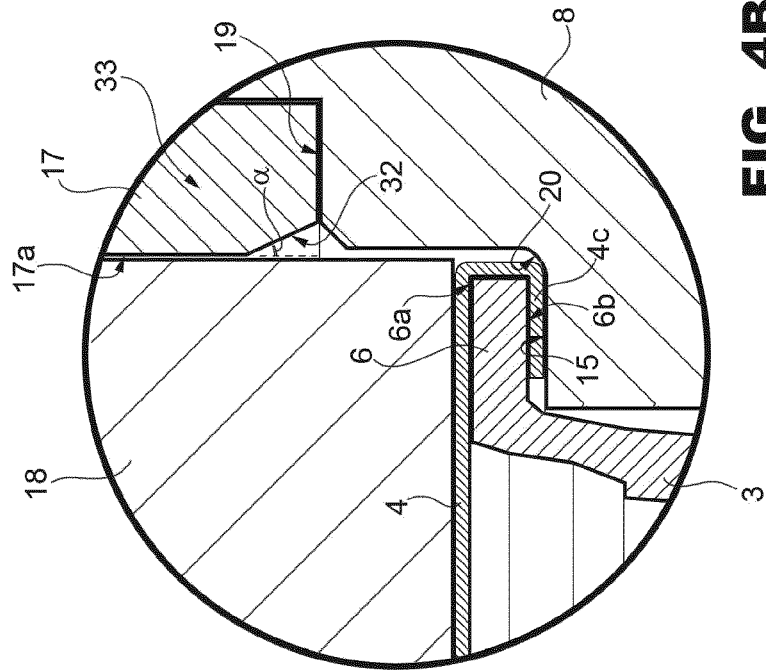


FIG. 4B

REFERENCES CITED IN THE DESCRIPTION

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