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

(57) The invention relates to a device (1) and 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 close said cup-shaped body (3) superiorly; the cup-shaped body (3) has an axis of symmetry (A) and comprises an annular flange (6) extending radially from an upper axial end of the cup-shaped body (3); the flange (6) has an upper annular surface (6a) and a lower annular surface (6b); the membrane (4) comprises an annular peripheral portion (4a) protruding radially from the flange (6) when the membrane (4) is superimposed on the upper surface (6a).

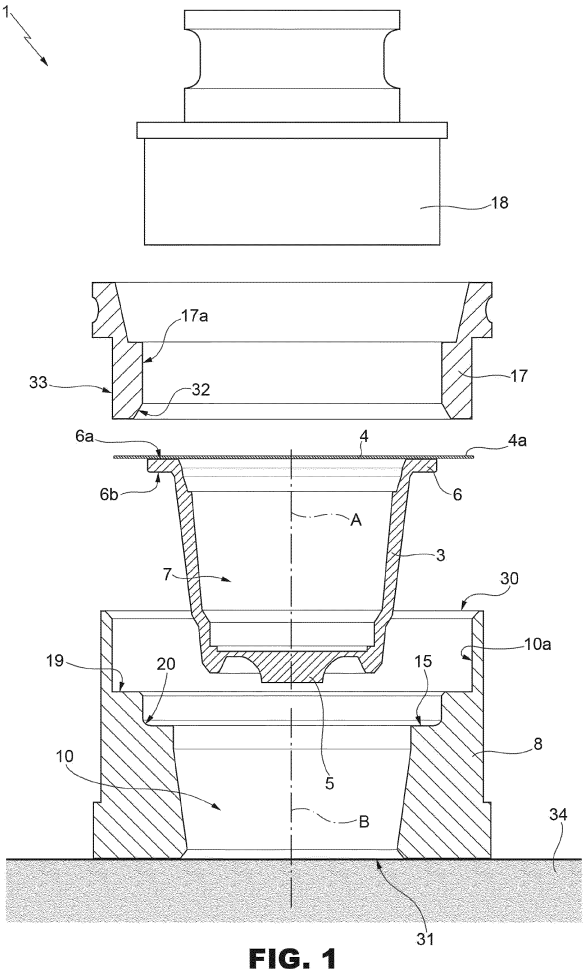

FIG. 1

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority from Italian patent application no. 102020000000694 filed on 16/01/2020.

TECHNICAL FIELD

[0002] 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.

[0003] 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

[0004] 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.

[0005] 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.

[0006] 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.

[0007] 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.

[0008] 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.

[0009] In particular, the cavity has such dimensions that the cup-shaped body can be considered as a thin-walled body.

[0010] 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.

[0011] 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.

[0012] 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.

[0013] 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.

[0014] 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.

[0015] 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.

[0016] In addition, in order to produce different types of beverages, it is necessary to purchase distinct capsules respectively containing anhydrous materials of different types.

[0017] 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

[0018] 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.

[0019] 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.

[0020] 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.

[0021] 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

[0022] 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

[0023] 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.

[0024] 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.

[0025] 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.

[0026] 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.

[0027] 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.

[0028] 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.

[0029] 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.

[0030] Preferably, the cavity 7 has such dimensions that the cup-shaped body 3 can be considered as a thin-walled body.

[0031] 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.

[0032] 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.

[0033] 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.

[0034] 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.

[0035] According to this preferred embodiment, the tubular body 8 has a substantially circular cross-section.

[0036] 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.

[0037] 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.

[0038] 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.

[0039] 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.

[0040] As can be seen in the accompanying drawings, the channel 10 is provided with a shoulder 15 transversal to the axis B.

[0041] 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.

[0042] 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.

[0043] 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.

[0044] 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.

[0045] The shoulder 15 therefore defines an axial abutment for the flange 6, in a manner which will be explained below.

[0046] The device 1 further comprises a folding assem-

bly 16 couplable in a releasable manner to the tubular body 8 and comprising a first folding member and a second folding member.

[0047] 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.

[0048] 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).

[0049] 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.

[0050] 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.

[0051] 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.

[0052] 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.

[0053] 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.

[0054] 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.

[0055] 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.

[0056] 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.

[0057] 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.

[0058] 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).

[0059] 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.

[0060] 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.

[0061] 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.

[0062] 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.

[0063] 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.

[0064] 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.

[0065] 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 non-bulky 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.

[0066] 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.

[0067] 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.

[0068] 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.

[0069] More precisely, in the specific example, the end portion 33 corresponds to the lower end portion of the sleeve 17.

[0070] 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.

[0071] 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.

[0072] The sleeve 17 is also configured to guide the flap 4b during the axial movement of the latter towards the shoulder 15.

[0073] In detail, the sleeve 17 has an inner lateral surface 17a configured to guide the flap 4b.

[0074] 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.

[0075] Conveniently, the frustoconical wall 32 is tapered towards the inner surface 17a. In this way, the centring effect is optimal.

[0076] In particular, the frustoconical wall 32 extends axially from the surface 17a downwards, i.e., it is arranged adjacent to the surface 17a.

[0077] 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°.

[0078] 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.

[0079] 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.

[0080] 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.

[0081] 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°.

[0082] 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.

[0083] 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.

[0084] 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.

[0085] 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.

[0086] 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.

[0087] 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).

[0088] 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.

[0089] Pushed by this axial movement, the flap reach-

es 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).

[0090] After being directed towards the axis B, the flap 4b reaches the shoulder 15. As the lowering of the presser 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.

[0091] At this point, the capsule 2 is assembled and ready to be extracted from the channel 10.

[0092] The advantages enabled by the device 1 manufactured according to the present invention will be apparent from an examination of the features thereof.

[0093] 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.

[0094] 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.

[0095] The correct centring ensures the nominal folding of the membrane 4.

[0096] 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.

[0097] 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.

[0098] 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.

[0099] 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.

[0100] 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).

4. The device as claimed in claim 3, wherein said frustoconical wall (32) extends axially from said inner lateral surface (17a).

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°.

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) .

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:

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);
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) 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).

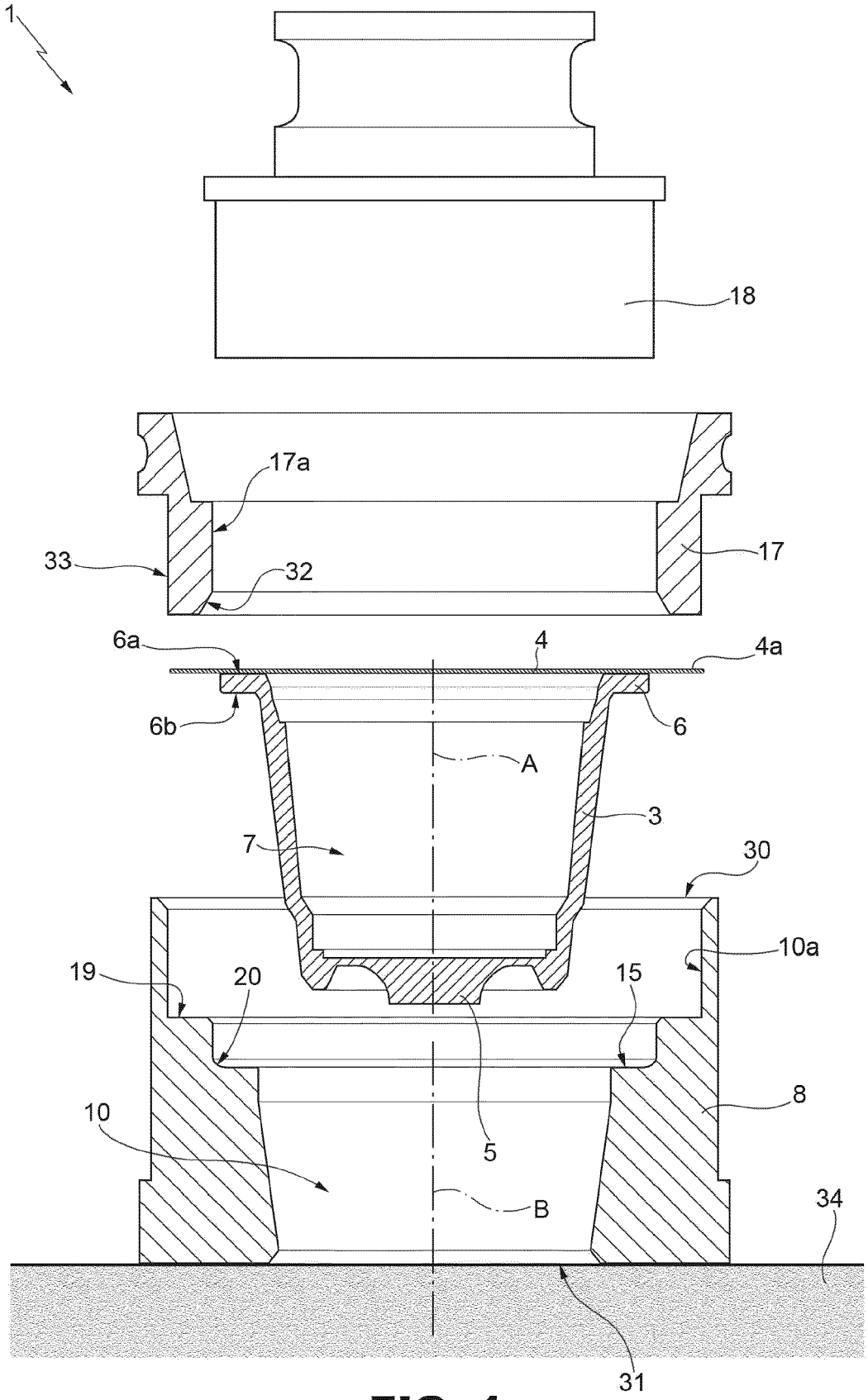

FIG. 1

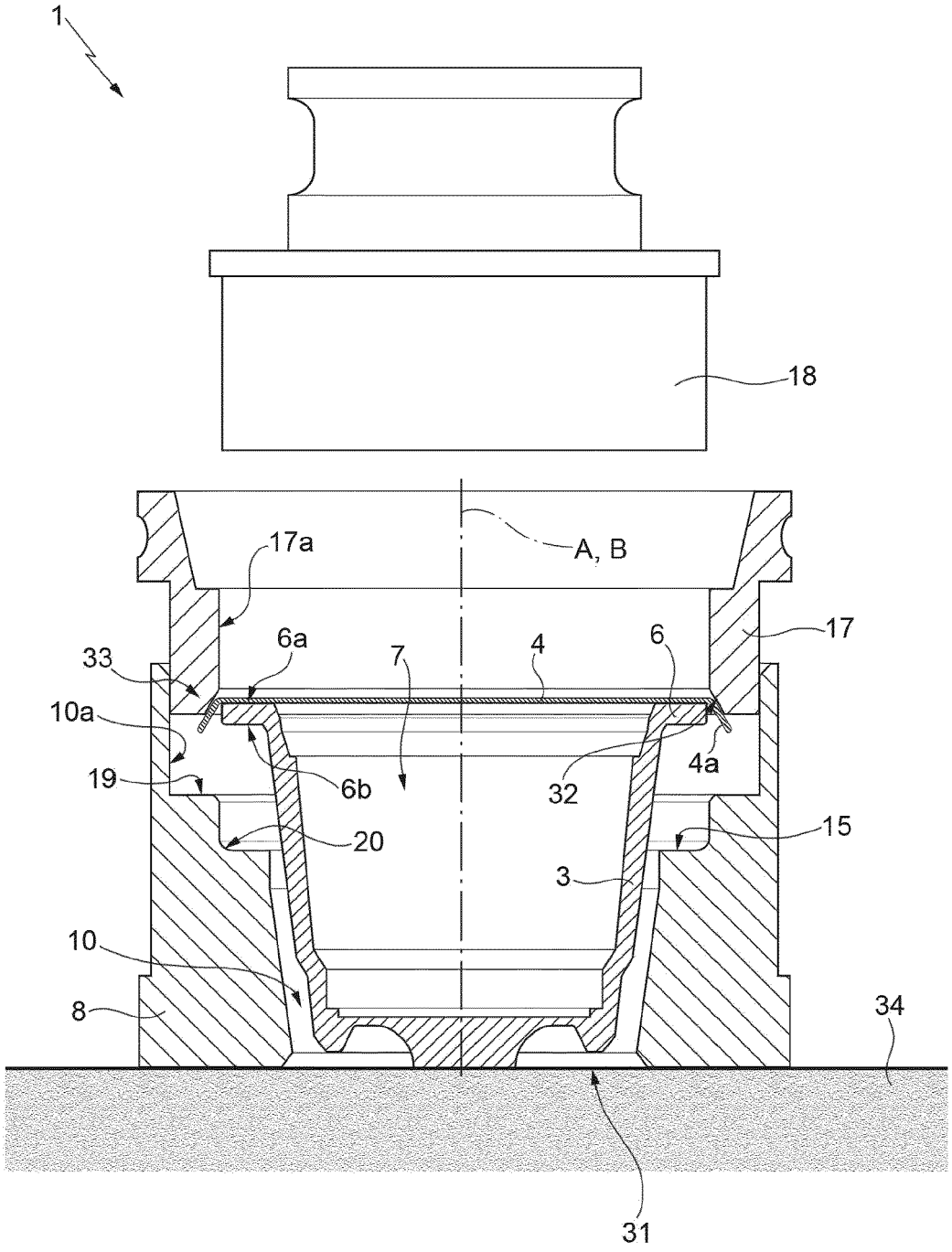

FIG. 2

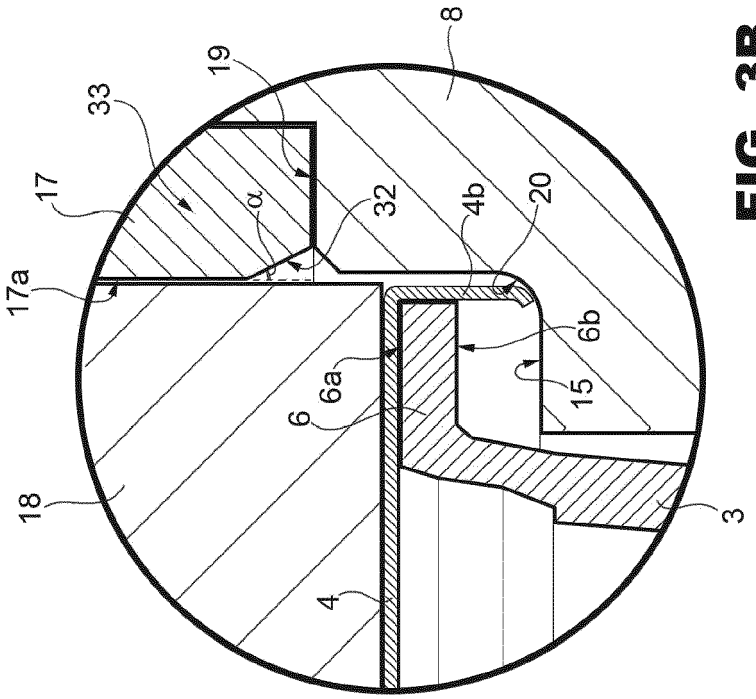
8
19
33
17
α
32
4b
20
17a
6b
6a
15
6
18
3
4

FIG. 3B

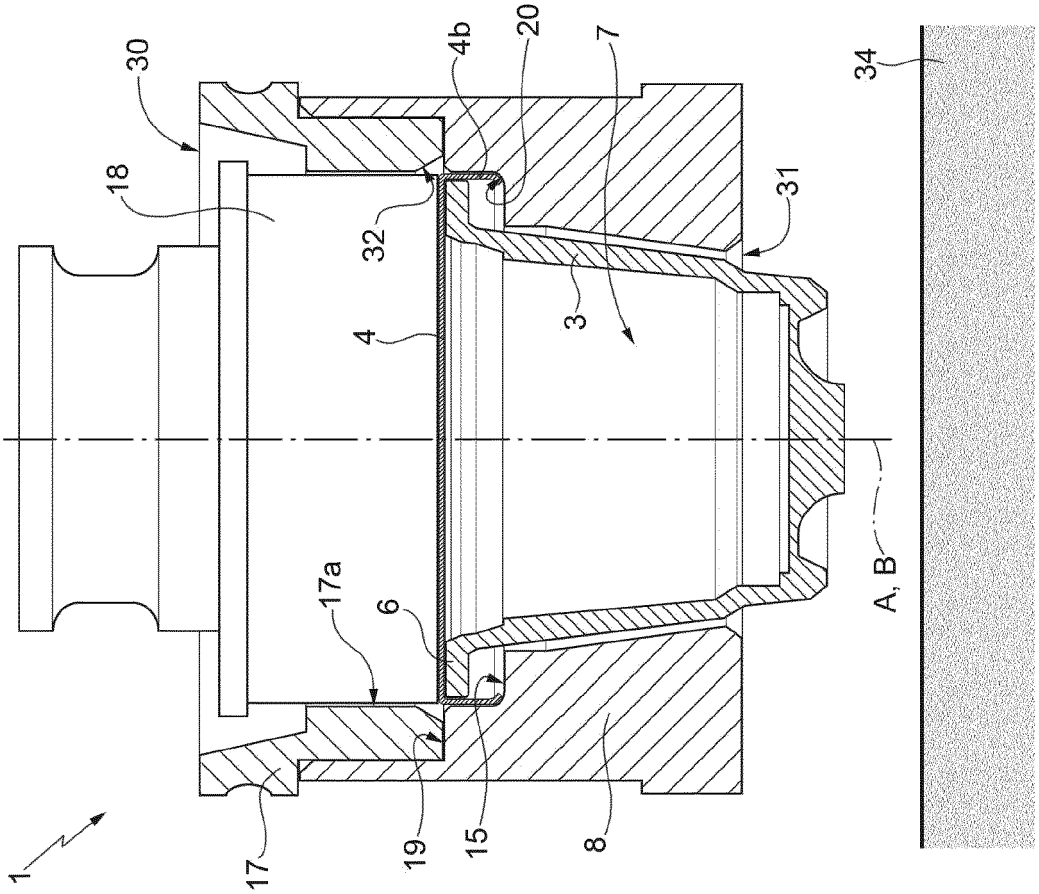
30
4b
20
7
34
18
32
31
3
4
17a
6
A, B
1
17
19
15
8

FIG. 3A

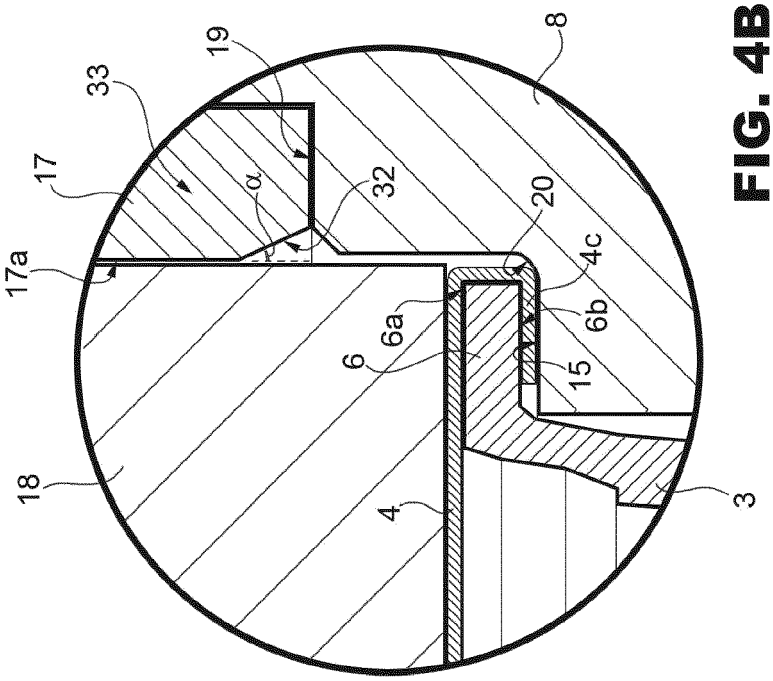
8
19
33
17
α
32
20
4c
17a
6b
6a
6
15
18
4
3

FIG. 4B

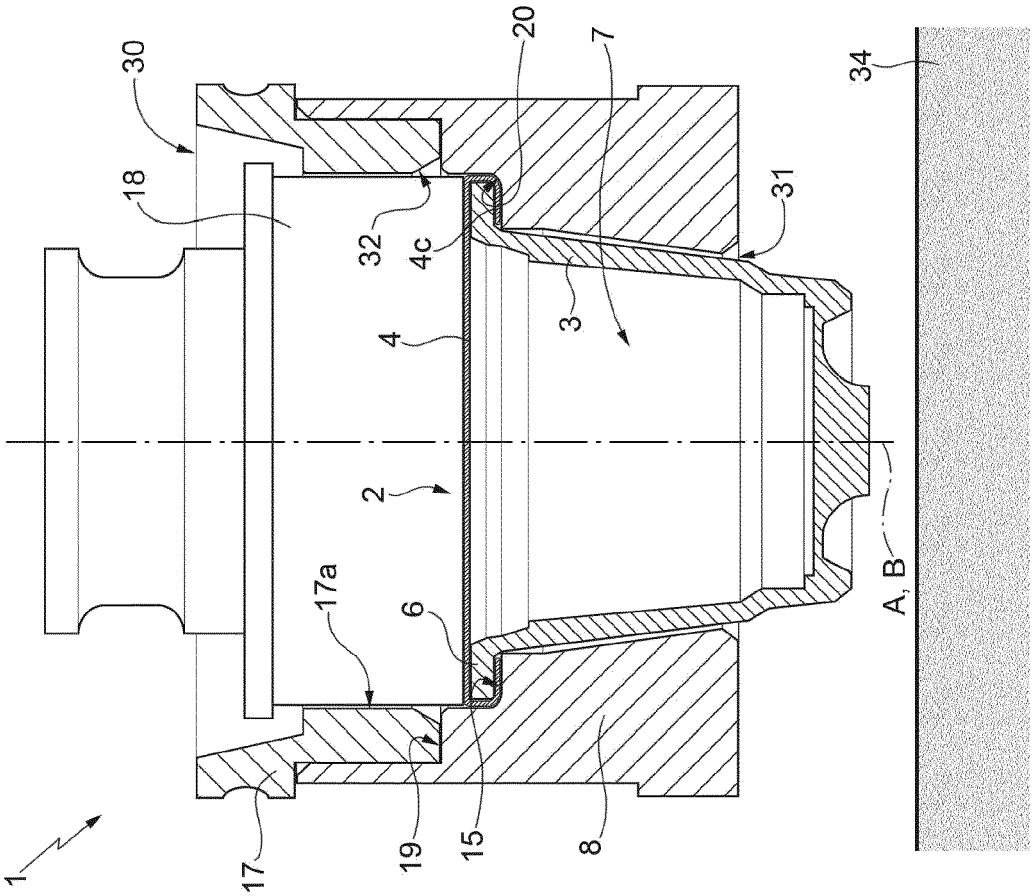
30
20
7
34
18
31
32
4c
3
4
2
17a
6
A, B
1
17
19
15
8

FIG. 4A

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EUROPEAN SEARCH REPORT

Application Number
EP 21 15 1934

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	GB 1 247 879 A (OHLER EKCO VERPACKUNGEN1 GMBH [DE]; EUGEN SCHIERLE [DE]) 29 September 1971 (1971-09-29) * Figures and description thereof *	1-10	INV. B65B7/28
A	GB 814 241 A (DAIRY SUPPLY CO LTD) 3 June 1959 (1959-06-03) * Figures and description thereof *	1-10	
A	DE 100 09 878 A1 (ALCAN GMBH [DE]) 20 September 2001 (2001-09-20) * Figures and description thereof *	1-10	
A	DE 11 83 816 B (FRIEDRICH BRUEMMER) 17 December 1964 (1964-12-17) * Figures and description thereof *	1-10	
			TECHNICAL FIELDS SEARCHED (IPC) B65B B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 May 2021	Ngo Si Xuyen, G

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18-05-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 1247879 A	29-09-1971	AT 294700 B	15-10-1971
		BE 721014 A	03-03-1969
		CH 487760 A	31-03-1970
		DE 1586221 B1	13-05-1971
		FR 1587382 A	20-03-1970
		GB 1247879 A	29-09-1971
		LU 56911 A1	03-01-1969
		NL 6813853 A	01-04-1969
GB 814241 A	03-06-1959	NONE	
DE 10009878 A1	20-09-2001	NONE	
DE 1183816 B	17-12-1964	BE 575376 A	04-08-1959
		DE 1183816 B	17-12-1964
		ES 247013 A1	01-04-1960
		GB 910469 A	14-11-1962

EPO FORM P0459

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Patent documents cited in the description

- IT 102020000000694 **[0001]**