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RETAINER FOR A DIRECT-FLOW-PREVENTING FILTER DISC AND METHOD ASSOCIATED

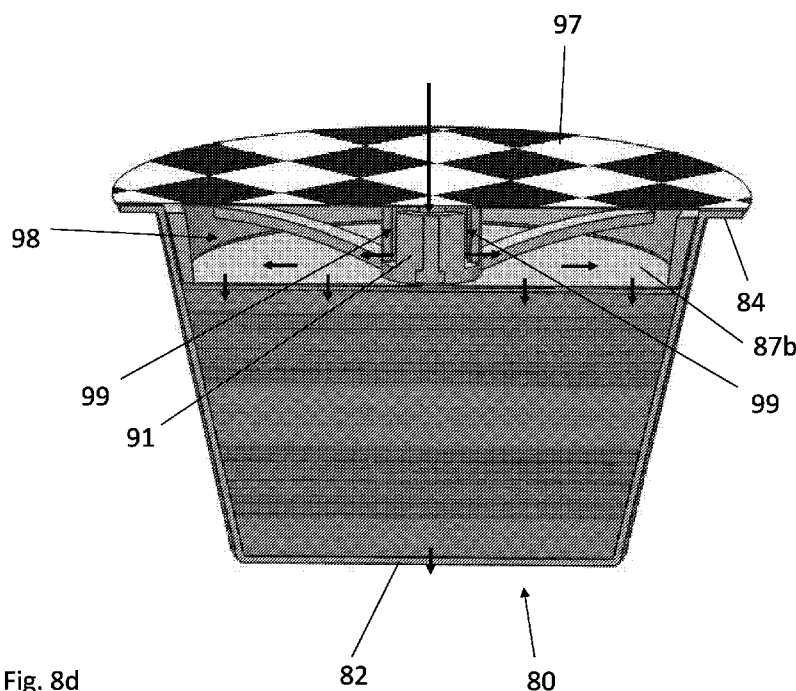


Fig. 8d

(57) Abstract: A capsule for containing a substance (C) from which a beverage can be produced, comprises a capsule body (12) with a side wall (18), and a direct-flow-preventing filter disc (14), wherein the direct-flow-preventing filter disc (14) has a circumferential edge zone which is in contact with the side wall (18). A retainer (16) is provided for securing the direct-flow-preventing filter disc (14) in place in the capsule body (12), wherein the direct-flow-preventing filter disc (14) is of a larger diameter than the retainer (16), and wherein said circumferential edge zone of the direct-flow-preventing filter disc (14) is trapped between said retainer (16) and the side wall (18).

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CAPSULE FOR CONTAINING A SUBSTANCE FROM WHICH A BEVERAGE CAN
BE PRODUCED HAVING A RETAINER
FOR A DIRECT-FLOW-PREVENTING FILTER DISC AND METHOD ASSOCIATED

5 FIELD OF THE INVENTION

This invention relates to capsules for containing a substance from which a beverage can be produced.

10 BACKGROUND TO THE INVENTION

“Dolce Gusto” (Registered Trade Mark) capsules comprise a capsule body having a frustoconical side wall with a transverse closure wall at the smaller diameter end and a radially outwardly protruding flange encircling the wider end.

15

After the substance, which will be assumed to be coffee, is delivered to the capsule body through its open wider end, a filter disc comprising at least a layer of (micro-) perforated weldable plastics material can be inserted into the capsule to keep the coffee in a comprised state. Finally a foil or plastics material disc is secured to the flange to close the filled capsule.

20

The filter disc lies between the charge of coffee and the foil closure disc. To produce the beverage the foil is penetrated by a hollow needle and hot water is forced under pressure into the capsule between the foil and the filter disc. The filter disc has the effect of preventing direct flow of water as a jet from the needle into the coffee. It inhibits flow and causes the hot

25 water to spread out over the whole area of the capsule. This ensures that liquid coffee is extracted from the entire charge.

30

Securing the filter disc in the capsule body is difficult, in view of the flimsy nature and light weight of the disc. It has to be welded to the capsule to ensure that it remains in place.

The filter disc further has the disadvantage that because of the arising fluid pressure inside the charge of substance during extraction, a center portion of the flexible filter disc may start to flex away from the charge of substance, giving opportunity to the substance starting to swirl and fines thereof to settle out.

35

EP 1 784 344 shows in its fig. 2 and 3 that for this welding of the direct-flow-preventing filter disc inside the capsule body, a support and welding die need to be used. The support die is dimensioned to have the filled capsule placed therein. The welding die is dimensioned to fit against the shape of an upper part of the circumferential capsule wall that delimit the non-filled upper free portion of the capsule. After the filled capsule has been placed in the support die, the direct-flow-preventing filter disc needs to get interposed between the support and welding die. The disc is pre-cut at a diameter somewhat larger than the welding die.

Subsequently, the welding die gets lowered into the capsule body in order to drive the disc into a dish-shape with turned-up edges that come to lie against the upper part of the circumferential capsule wall. The welding is obtained by heating the turned-up edges until the surface of a welding layer of the disc in contact with the capsule wall melts.

The welding process brings along a number of disadvantages. First of all it requires the use of an expensive multi-layered filter disc, that needs to have said welding layer on its one side and a non-welding layer on its other side in order to prevent it from sticking to the welding die as the die is withdrawn again. Secondly, the welding process itself is a vulnerable process, particularly because the turned-up edges of the filter disc are prone to comprise some wrinkles that may stand in the way of having the turned-up edges properly welded against the capsule wall along the entire circumference. Non-welded openings may even remain between the filter disc and the capsule wall, which may form free unhindered flowing paths for injected fluid to start flowing along at high speed during extraction. This then may lead to the flow of fluid not getting equally distributed over the surface of the substance and thus not the entire charge of substance getting extracted and/or to a stirring up of the substance underneath the filter disc and/or to fines in the substance settling out. Thirdly, the welding process may lead to the substance locally getting polluted and thus to a deterioration in flavour of extracted beverage. Fourthly, the used materials and the welding process makes the capsule more expensive and requires special expensive equipment that needs maintenance and that may lead to stand-still during manufacturing.

In another embodiment shown in fig. 5-9 of EP 1 784 344 a perforated direct-flow-preventing wall is formed by a bottom plate of a self-supporting plastic dish. The perforated dish has the advantage that it can be placed inside the capsule body without welding, because the standing circumferential wall can be dimensioned such that it gets to abut against the closure disc when it is secured to the flange to close the filled capsule.

A disadvantage hereof however is that the perforated dish itself is an expensive and complex component, particularly since the capsule is a disposable. Furthermore, the number of

openings in the perforated bottom plate of the dish is limited, which brings along limitations to the level of good distribution of the injected fluid over the charge of substance. Another disadvantage of the dish stems from the possibility of solid and/or liquid extract rising back up along the circumferential wall into the space intended for injection. Soiling of this injection space brings the risk of the openings getting blocked, leading to a degradation of the distribution of the stream of fluid through the bed of substance, and therefore to a deterioration in flavour of extracted beverage.

The present invention aims to at least partly overcome these disadvantages or to provide a usable alternative. In particular the invention aims to provide a capsule that can be manufactured cost effective and for which a positioning and securing of a direct-flow-preventing filter disc inside a capsule body can be used for application to various capsule platforms. More in particular, the present invention aims to provide an improved method of securing the filter disc in the capsule body, and also provide a capsule produced by the method of the present invention.

BRIEF DESCRIPTION OF THE INVENTION

According to the invention this aim is achieved by means of the capsule for containing a substance from which a beverage can be produced according to claim 1. The capsule, comprises a capsule body with a side wall and a direct-flow-preventing filter disc, wherein the direct-flow-preventing filter disc has a circumferential edge zone which is in contact with the side wall. According to the inventive thought a retainer is provided for securing the direct-flow-preventing filter disc in place in the capsule body, wherein the direct-flow-preventing filter disc is of a larger diameter than the retainer, and wherein said circumferential edge zone of the direct-flow-preventing filter disc is trapped between said retainer and the side wall of the capsule body.

Thus advantageously a capsule is provided that makes it well possible to reliably secure a flexible micro-perforated filter disc as direct-flow-preventer inside the capsule body without needing to weld the direct-flow-preventing filter disc or the retainer thereto. Having to make use of expensive multi-layered filter discs with weldable and non-weldable layers is no longer necessary. It has now become possible to truly make use of flexible simple, for example single layered filter discs, that preceding their positioning into the capsule body may even be substantially flat. Those flexible filter discs advantageously can comprise a micro-perforation of which the number of openings is almost unlimited, which further helps to improve the level of good distribution of the injected fluid over the charge of substance, and therefore to an

improvement in flavour of extracted beverage. Surprisingly it has appeared that even environmentally friendly paper filter discs can now be used as jet-breakers/distributors.

5 Securing of the flexible direct-flow-preventing filter disc on top of the charge of substance has become truly simple with the retainer, and no longer needs expensive and vulnerable welding equipment. Furthermore it can now be guaranteed that no relative large openings can remain free between the disc and the capsule wall after the securing has taken place. Thus, no low-resistance escape routes arise, neither forward for any injected high-pressurized fluid to start flowing along substantially unhindered at high speed, neither backward for any substance
10 particles and/or liquid extract to rise back up into the space intended for injection. Thus a better distribution of the injected fluid over the surface of the substance shall take place, helping that the entire charge of substance gets extracted. The securing of the filter disc together with the retainer in the upper portion of the capsule body can now be entirely mechanical, which advantageously leaves the charge of substance unhindered. The capsule,
15 including the retainer and filter disc can now be made more economic with simpler equipment that hardly requires maintenance or may lead to stand still during manufacturing.

In a preferred embodiment the retainer may comprise an outer peripheral ring, said ring trapping said circumferential edge zone of the direct-flow-preventing filter disc between itself
20 and the side wall. The outer peripheral ring being circumferentially closed can help to guarantee that the entire circumferential edge of the direct-flow-preventing filter disc gets locked up and reliably sealed against the side wall of the capsule body.

In a preferred embodiment the retainer may comprise radially extending spokes. Those
25 radially extending spokes not only may strengthen the retainer but also come to lie on top of upper surface portions of the direct-flow-preventing filter disc. Thus the direct-flow-preventing filter disc is protected against possible damaging during extraction, for example caused by the injected jet of fluid in the chamber above it or by the rising pressure in the charge of substance underneath it. Yet another advantage of the spokes is that they may provide
30 support for a closure disc that gets secured to the capsule body.

In addition thereto the spokes may join one another at a centre of the retainer. This may further strengthen the retainer and thus as indicated above also the direct-flow-preventing filter disc itself.

35

In addition thereto a central hub can be provided at the centre of the retainer, wherein the spokes extend radially outwardly from the central hub. The central hub advantageously can

form a central blocking wall for the injected jet of fluid during extraction. The blocking wall then prevents a fluid injection needle to accidentally also get pierced through the direct-flow-preventing filter disc when pierced into the capsule body at a start of an extraction process.

Furthermore, the hub may help to prevent that a fluid jet that gets injected via such a needle

5 into a chamber above the direct-flow-preventing filter disc into the capsule body, may get to directly bump against the vulnerable direct-flow-preventing filter disc and for example may cut right through it. Also the hub may help to have the injected fluid spread out equally in all radially outward directions over the direct-flow-preventing filter disc, in particular sideways over those wedge-shaped portions of the direct-flow-preventing filter disc that lie in between
10 the spokes. Yet another advantage of the hub is that it may provide support for a closure disc that gets secured to the capsule body.

In addition thereto the hub can be provided with a hollow. The hollow then can be constructed to have a suitable fluid injection needle fit therein during piercing into the capsule body. This
15 results in an automatic positioning of the injection needle. A circumferential wall delimiting the hollow then can be provided with radially outwardly opening outlet openings, preferably one for each wedge-shaped portion of the direct-flow-preventing filter disc that lies in between the spokes that extend radially outwardly from the central hub.

20 In addition thereto or in the alternative each spoke may have, at an outer end thereof, an element which protrudes in the axial direction from the spoke, wherein the elements trap the circumferential edge zone of the direct-flow-preventing filter disc between themselves and the side wall. Thus the retainer can be made more lightweight, yet strong enough for its purpose of trapping the circumferential edge zone of the direct-flow-preventing filter disc between the
25 retainer and the side wall of the capsule body. At a same time an alternative is obtained for the retainer comprising the above described outer peripheral ring

In a preferred embodiment the retainer and the side wall have one or more ribs and one or more grooves, wherein the one or more ribs fit into the one or more grooves to locate the
30 retainer in the capsule body. Thus a simple and effective securing of the retainer together with the direct-flow-preventing filter disc at an aimed height position inside the capsule body is achieved. Furthermore the provision of the rib-groove connection may help to increase the sealing of the circumferential edge zone of the filter disc against the side wall.

35 In addition thereto the one or more ribs and grooves may extend in the circumferential direction. The complementary rib-groove connection may then form a circumferentially

symmetrically provided snap fit connection such that it makes no difference in what position the retainer and direct-flow-preventing filter disc get inserted into the capsule body.

In a preferred embodiment the direct-flow-preventing filter disc may comprise filter paper or other microporous material or even a perforated film. The large number of openings in combination with the possibly thin single layered disc construction combines a good level of distribution of the injected fluid over the entire charge of substance without resulting in a big dropping of the injection pressure of the fluid.

According to a further aspect of the present invention there particularly can be provided a capsule comprising a capsule body having a frustoconical side wall, there being a filter disc and a filter disc retainer in the body, the disc having a circumferentially extending edge zone which is in contact with said side wall, said edge zone of the filter disc being between said retainer and said side wall.

Said retainer can comprise a peripheral ring with spokes extending radially inwardly from said ring, the spokes joining one another at the centre of the retainer. There can be a hollow hub at the centre of the retainer, the spokes extending radially from the hub.

In another form said retainer may comprise a hub and a plurality of spokes which extend radially outwardly from the hub, each spoke having, at the outer end thereof, an element which protrudes in the axial direction from the spoke, said elements trapping said edge zone of the filter disc between themselves and said side wall.

The retainer and wall can have one or more ribs and one or more grooves, a rib fitting into a groove to locate the retainer in the capsule body. The groove or grooves can be in the retainer or the capsule body and the rib or ribs can be in the capsule body or the retainer.

Further preferred embodiments are stated in the subclaims.

The invention also relates to a method for manufacturing of the capsule according to claim 14. The method comprises the steps of providing a capsule body that comprises a side wall, filling the capsule body with a charge of a substance from which a beverage can be produced, and placing and securing a direct-flow-preventing filter disc inside the capsule body. According to the inventive thought the securing of the direct-flow-preventing filter disc inside the filled capsule body takes place by means of inserting the direct-flow-preventing filter disc and a retainer into the capsule body, whereby a circumferential edge zone of the

direct-flow-preventing filter disc protrudes outwardly from the retainer, the circumferential edge zone of the direct-flow-preventing filter disc being trapped between the retainer and the side wall.

- 5 Thus advantageously a method is provided that makes it well possible to reliably position and secure a flexible direct-flow-preventing filter disc as described above, preferably of a type being thin-walled, single layered, vulnerable and/or micro-perforated, as a direct-flow-preventer, in one single go inside the capsule body without needing to weld the direct-flow-preventing filter disc or the retainer thereto. Having to make use of expensive multi-layered
- 10 filter discs with weldable and non-weldable layers is no longer necessary. Surprisingly it has appeared that even environmentally friendly paper filter discs can now be used as jet-breakers/distributors. Securing of the flexible direct-flow-preventing filter disc on top of the charge of substance has become truly simple with the retainer, and no longer needs expensive and vulnerable welding equipment. The securing of the filter disc together with the
- 15 retainer in the upper portion of the capsule body can now be entirely mechanical, which advantageously leaves the charge of substance unhindered. The capsule, including the retainer and filter disc can now be made more economic with simpler equipment that hardly requires maintenance or may lead to stand still during manufacturing.
- 20 According to one aspect of the present invention there particularly can be provided a method of securing a filter disc in place in a filled capsule body which has a frustoconical side wall, the method comprising inserting a filter disc and filter disc retainer into the capsule body through its wider end, the filter disc being of larger diameter than the filter disc retainer whereby a circumferential edge zone of the filter disc protrudes outwardly from the retainer,
- 25 the said edge zone of the filter disc being trapped between said retainer and said side wall.

BRIEF DESCRIPTION OF THE DRAWINGS

- For a better understanding of the present invention, and to show how the same may be
- 30 carried into effect, reference will now be made, by way of example, to the accompanying drawings in which:

Figure 1 illustrates a filled capsule body, a filter disc and a filter disc retainer;

- 35 Figure 2 is a cut away pictorial view of a capsule in accordance with the present invention;

Figure 3 illustrates the filter disc and filter disc retainer about to be inserted into the capsule body;

Figure 4 illustrates a filter disc and filter disc retainer after having been inserted into the capsule body;

Figures 5, 6 and 7 illustrate three filter disc retainers;

Figures 8a-d schematically show partially cut-open perspective and cross-sectional views of subsequent stages of a manufacturing method according to the invention including steps of pre-positioning, inwards pushing and fixating of a retainer of the type as is shown in Figure 5 together with a direct-flow-preventing filter disc into a capsule body, and finally sealing the capsule body with a closure disc; and

Figures 9a-d show views similar to the ones of fig. 8a-d for a variant retainer that merely comprises an outer peripheral ring.

DETAILED DESCRIPTION OF THE DRAWINGS

The capsule 10 illustrated in Figure 1 comprises a capsule body 12 with a charge of coffee C in it, a filter disc 14 and a filter disc retainer 16. The body 12 includes a frustoconical side wall 18.

The filter disc 14 can comprise filter paper or micro perforated film.

The capsule body 12 and the retainer 16 are shown in Figure 2 but not the filter disc 14. The body 12 comprises an internal circumferentially extending rib 20 and the retainer 16 has a circumferentially extending groove 22. The rib 20 snaps into the groove 22 as the retainer 16 is inserted into the capsule body 12 thereby locating the retainer 16 with respect to the body 12. There can be a number of grooves and / or ribs so that the retainer 16 can be located in a number of discrete locations in the body.

Figure 3 illustrates the filter disc 14 placed over the open end of the body 12 and the retainer 16 placed on the disc 14. The filter disc 14 has a larger diameter than the internal diameter of the body 12. When the retainer 16 is pushed into the capsule body 12, the filter disc 14 is forced into the body (see Figure 4). The peripheral edge zone of the disc bends upwardly with respect to the centre part of the disc to form what can be considered to be a circular wall of

filter paper or microporous material which is trapped between the outer face of the retainer 16 and the inner face of the wall 18 of the capsule body 12.

The retainer can take various forms. In Figures 1 to 4 the retainer 16 comprises an outer ring 24 in which the groove 22 is formed and radial spokes 26 which meet at the centre of the retainer.

The retainer 16.1 shown in Figure 5 has an outer ring 28, three radial spokes 30 and a central hub 32.

In Figure 6 a retainer 16.2 is shown, this comprising a central hub 34 and radial spokes 36 extending from the hub 34. There is no outer ring. Axially extending elements 38 at the outer ends of the spokes 36 grip the wall of filter disc material between themselves and the capsule body. Each element 38 can have part of the grooves or groove 22 in it.

The retainer 16.3 of Figure 7 has spokes 40 radiating from the centre of the retainer and a ring 42 to which the outer ends of the spokes connect. Angled webs 44 connect the ring 42 to arcuate elements 46 which together form a discontinuous outer ring.

When the retainer 16.3 is pushed into the capsule body, the angled position of the webs 44 allows the elements 46 to move both circumferentially and inwardly which movement reduces the overall diameter of the retainer. The elements 46 are in frictional engagement with the wall of the filter disc. Each element 46 can have a section of the groove 22 in it.

In Figure 8a-d four subsequent steps of a manufacturing method for a capsule are shown. The capsule here comprises a capsule body 80 that has a frustoconical side wall 81 with a transverse closure wall 82 at its lower smaller diameter end and with an opening at its upper wider diameter end. A radially outwardly protruding flange 84 encircles the wider diameter end.

In the first step, as shown in Figure 8a, the capsule body 80 is partly filled with a charge of substance C. With this the degree of filling is such that free space having a height H1 remains between the free upper surface of the substance C and the flange 84. A direct-flow-preventing filter disc 87 is placed in a flat shape on top of the flange 84. A retainer 90 of a type comparable to the one as shown in Figure 5 is placed on top of the disc 87. The retainer 90 comprises an outer peripheral ring 91, a hollow central hub 92, and spokes 93 that extend

in radial directions between the hub 92 and the ring 91. The ring 91 has a height H2 that here is somewhat less high than the height H1 of the free space, in particular a few millimetres.

The ring 91 is shaped frusto-conical complementary to an upper portion of the frustoconical side wall 81 of the capsule body 80, that is to say the upper portion that circumvents the free space above the substance C. With this, the gradually upwardly increasing outer diameter of the ring 91 is smaller than or equal to the gradually upwardly increasing inner diameter of the wider end of the frustoconical side wall 81 such that it can narrowly fit therein.

According to the invention an outer diameter D1 of the filter disc 87 is at least larger than a lower smallest outer diameter D2 of the ring 91, and here even is larger than or equal to an outer diameter D3 of the flange 84. A circumferential ring-shaped edge zone 87a of the filter disc 87 that protrudes outwardly from the retainer 90 thus lies between the diameters D1 and D2, whereas a round center zone 87b of the filter disc 87 covers the entire opening.

In the second step, as shown in Figure 8b and 8c, the retainer 90 is pushed downwards into the free space above the substance C. With this it takes the filter disc 87 along with it into the capsule body 80. During this insertion, the circumferential edge zone 87a of the initially flat filter disc 87 angles itself around the circumferential wall of the ring 91. Owing to the decreasing inner diameter of the frustoconical side wall 81, the upwardly folded circumferential edge zone 87a then gets more and more pushed against an inner face of the side wall 81. The inward pushing goes on until the retainer 90 has lowered into the capsule body 80 over at least the height H2 of the ring 91, and maximum over the height H1 of the free space. This causes the upwardly folded circumferential edge zone 87a to get reliably trapped in a sealing manner between the retainer 90 and the side wall 81. At a same time this causes the center portion 87b of the filter disc 87 to delimit an upper side of the charge of substance C.

It is noted that in the view of Figure 8b an exploded intermediate position is shown during the insertion of the filter disc 87, that is to say the retainer 90 is shown there as being lifted somewhat upwardly again such that a clear view of the filter disc 87 with its upwardly folded circumferential edge zone 87a relative to its still flat center portion 87b.

As can be seen in Figure 8c, the hub 92 in this mounted position delimits the center portion 87b of the filter disc 87 in an upwards direction, whereas the spokes 93 add strength to the retainer 90 while lying spaced from the center portion 87b of the filter disc 87, such that they

leave the center portion 87b of the filter disc 87 substantially free for having injected fluid to start flowing through it during extraction.

Finally, in the third step, as shown in Figure 8d, a closure disc 97 is secured to the flange 84 of the capsule body 80 to close it. An injection chamber 98 is then delimited between the closure disc 97 on the one side and the filter disc 87 respectively the retainer 90 on the other side.

As soon as the closure disc 97 is secured in place, it also delimits the filter disc 87 and retainer 90 from moving upward again. Thus the narrow fit and sealing of the filter disc against the capsule side wall 82 can even simply be maintained without having to provide additional connection means, like the before mentioned rib-grooves or other suitable kinds of mechanical snap-fit connections or the like.

Advantageously, the hub 92 forms a centre support for the closure disc 97, such that a risk for premature damaging thereof is minimized.

During extraction, a fluid injection needle (not shown), can be pierced at a center position through the closure disc 97 such that a free end of the needle automatically is delimited in the insertion direction by a bottom wall of the central hub 92 while also coming to lie in a somewhat shielded position inside a circumferential wall of the hollow central hub 92. After that, pressurized fluid can be forcedly injected through the needle into the capsule body 80. With this the jet of fluid first gets to bump against the bottom wall of the hollow central hub 92, to then get to flow radially outward via outlet openings 99 that are provided in the circumferential wall of the hub 92, and all over the central portion 87b of the filter disc 87. The injected fluid then shall start to flow through (micro-)perforations in the filter disc 87 and then further towards the transverse closure wall 82 at the smaller diameter end, while thoroughly extracting substantially the entire charge of substance C. At the side of the closure wall 82, an outlet opening (not shown) can be created, for example by means of the fluid pressure causing a frangible element that is provided there to break. The beverage then can flow out of the capsule, for example into a cup, and is ready for consumption. This flow pattern is indicated schematically with small arrows in Figure 8d.

Owing to the invention, during this extraction, the filter disc 87 truly prevents a direct flow of the forcedly injected fluid against the substance C, whereas the retainer 90 construction prevents a direct flow of forcedly injected fluid against the filter disc 87 itself and keeps it firmly in a sealed position against the side wall 82.

As can be seen best in Figure 8d, the substance C does not get compacted by the filter disc 87 nor delimited with a tight fit by the filter disc 87. Thus the substance C can remain loosely packed inside the capsule 80 and the substance C can be given some freedom to expand during extraction.

In Figure 9a-d a similar set of method steps are shown. This time however the retainer 90 merely comprises an outer peripheral ring 91, and thus mainly serves the purpose of helping to position the filter disc 87 at its aimed position in the capsule body 80 and there keeping its circumferential edge zone 87a trapped against the side wall 81 of the capsule body 80 in a sealing manner without additional measures like welding, gluing, or the like need to be taken.

Besides the embodiments shown numerous variants are possible. For example the dimensions and shapes of the various parts can be altered. Also it is possible to make combinations between advantageous aspects of the shown embodiments. Instead of using ribs-grooves as snap-fit connection for the retainer, or having the retainer kept in its aimed position by means of on the one side the closure disc, and on the other side the charge of substance, it is also possible to provide a suitable inwardly projecting rim, edge or the like that in the side wall of the capsule body. All kinds of materials can be used for making the capsule body, the filter disc and the retainer. Preferably those materials are biodegradable and/or recyclable.

It should be understood that various changes and modifications to the presently preferred embodiments can be made without departing from the scope of the invention, and therefore will be apparent to those skilled in the art. It is therefore intended that such changes and modifications be covered by the appended claims.

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CLAIMS

1. A capsule for containing a substance (C) from which a beverage can be produced, comprising:

5 - a capsule body (12) that comprises:

o a side wall (18)

- a direct-flow-preventing filter disc (14),

wherein the direct-flow-preventing filter disc (14) has a circumferential edge zone which is in contact with the side wall (18),

10 **characterized in that,**

a retainer (16) is provided for securing the direct-flow-preventing filter disc (14) in place in the capsule body (12),

wherein the direct-flow-preventing filter disc (14) is of a larger diameter than the retainer (16), and

15 wherein said circumferential edge zone of the direct-flow-preventing filter disc (14) is trapped between said retainer (16) and the side wall (18).

2. Capsule according to claim 1, wherein the retainer (16) comprises an outer peripheral ring (24), said ring (24) trapping said circumferential edge zone of the direct-flow-preventing
20 filter disc (14) between itself and the side wall (18).

3. Capsule according to claim 1 or 2, wherein the retainer (16) comprises radially extending spokes (30).

25 4. Capsule according to claim 3, wherein the spokes (30) join one another at a centre of the retainer (16).

5. Capsule according to claim 4, wherein a central hub (32) is provided at the centre of the retainer (16), the spokes (30) extending radially outwardly from the central hub (32).

30

6. Capsule according to claim 5, wherein the hub (32) is hollow.

7. Capsule according to one of the preceding claims 3-6, wherein each spoke (30) has, at an outer end thereof, an element which protrudes in the axial direction from the spoke (30),
35 said elements trapping said circumferential edge zone of the direct-flow-preventing filter disc (14) between themselves and the side wall (18).

8. Capsule according to one of the preceding claims, wherein the retainer (16) and the side wall have one or more ribs (20) and one or more grooves (22), the one or more ribs (20) fitting into the one or more grooves (22) to locate the retainer (16) in the capsule body (12).

9. Capsule according to claim 8, wherein the one or more ribs (20) and grooves (22) extend in the circumferential direction.

10. Capsule according to one of the preceding claims, wherein the direct-flow-preventing filter disc (14) comprises filter paper or microporous material or perforated film.

11. Capsule according to one of the preceding claims, wherein the capsule body (12) has a frustoconical side wall (18) with a transverse closure wall at a smaller diameter end, and a radially outwardly protruding flange encircling a wider diameter end.

12. Capsule according to one of the preceding claims, wherein the capsule body (12) has a charge of the substance (C) in it, wherein the direct-flow-preventing filter disc (14) delimits an upper side of the charge of substance (C).

13. Capsule according to claim 12, wherein a closure disc is secured to the capsule body (12) to close it, wherein the direct-flow-preventing filter disc (14) lies between the charge of substance (C) and the closure disc.

14. A method for manufacturing of a capsule, in particular according to one of the preceding claims, comprising the steps of:

- providing a capsule body (12) that comprises a side wall (18);
- filling the capsule body (12) with a charge of a substance (C) from which a beverage can be produced;
- placing and securing a direct-flow-preventing filter disc (14) inside the capsule body (12),

characterized in that,

the securing of the direct-flow-preventing filter disc (14) inside the filled capsule body (12) takes place by means of inserting the direct-flow-preventing filter disc (14) and a retainer (16) into the capsule body (12), whereby a circumferential edge zone of the direct-flow-preventing filter disc (14) protrudes outwardly from the retainer (16), the circumferential edge zone of the direct-flow-preventing filter disc (14) being trapped between the retainer (16) and the side wall (18).

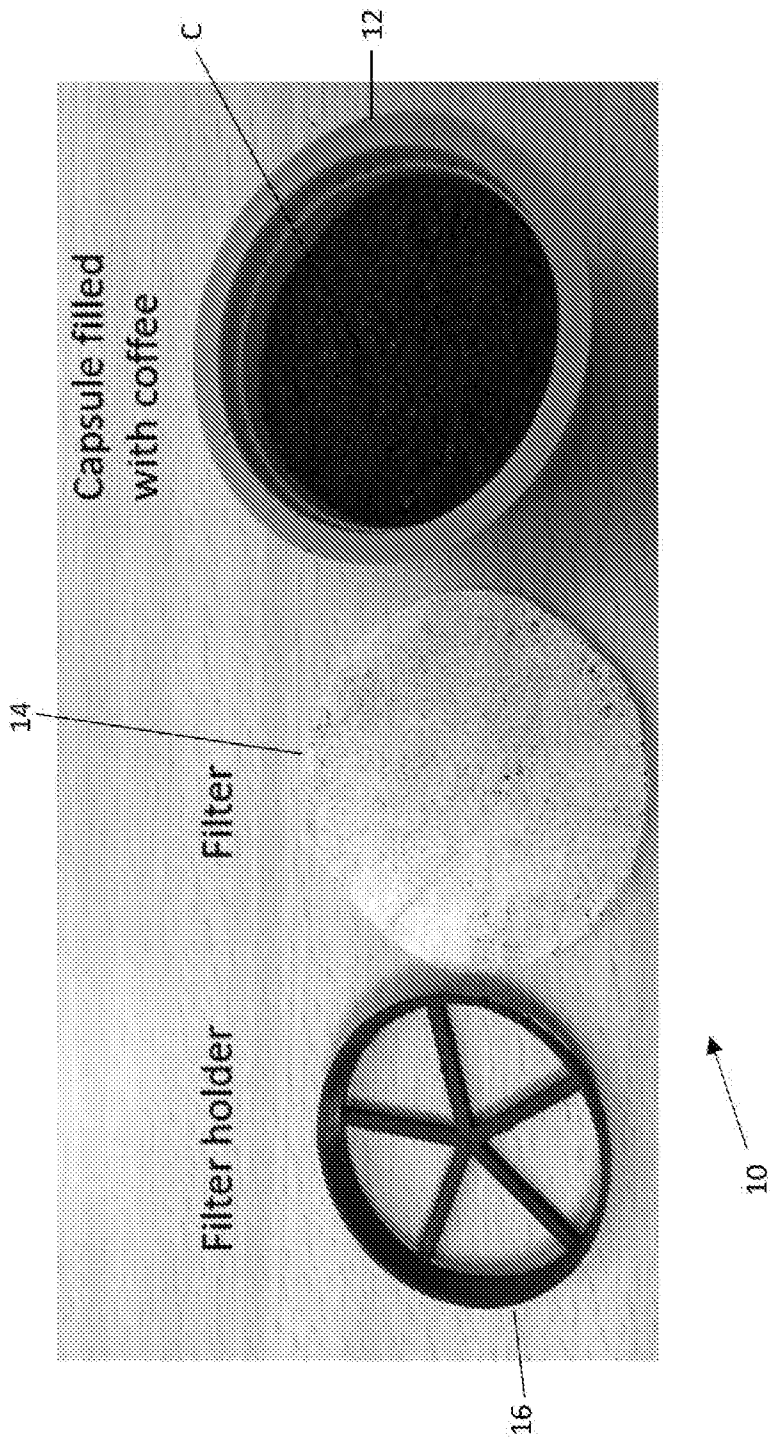


Fig. 1

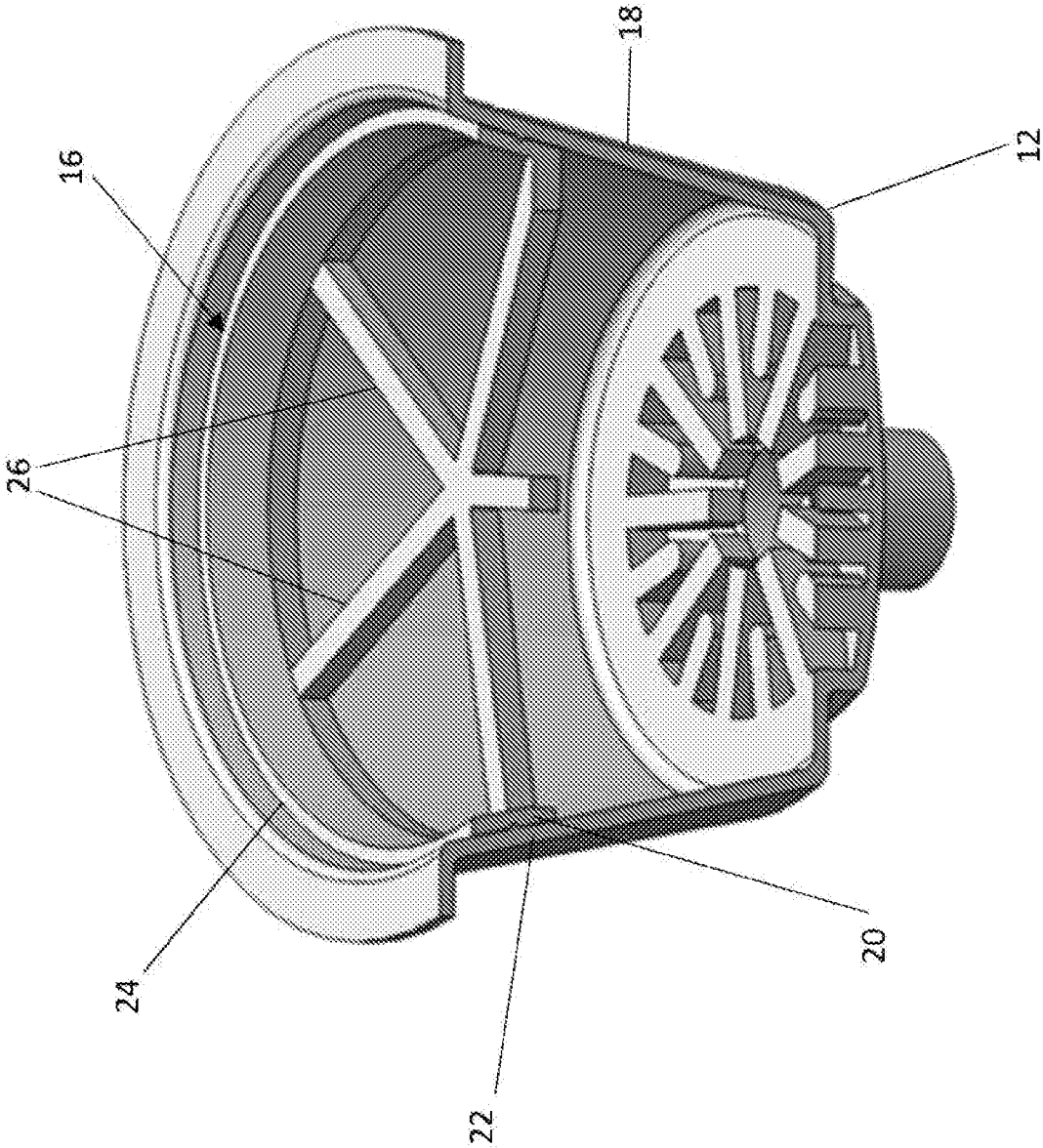


Fig. 2

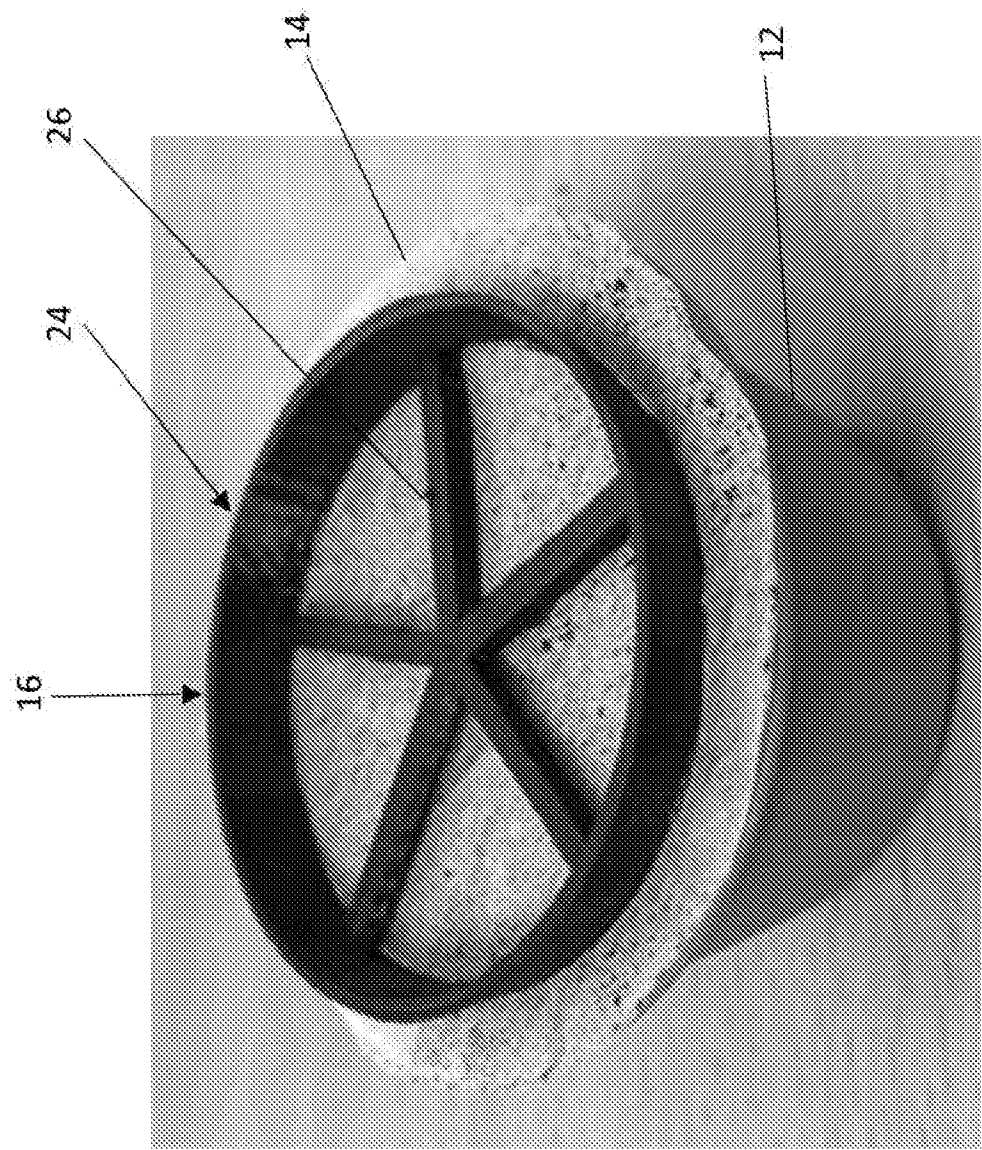


Fig. 3

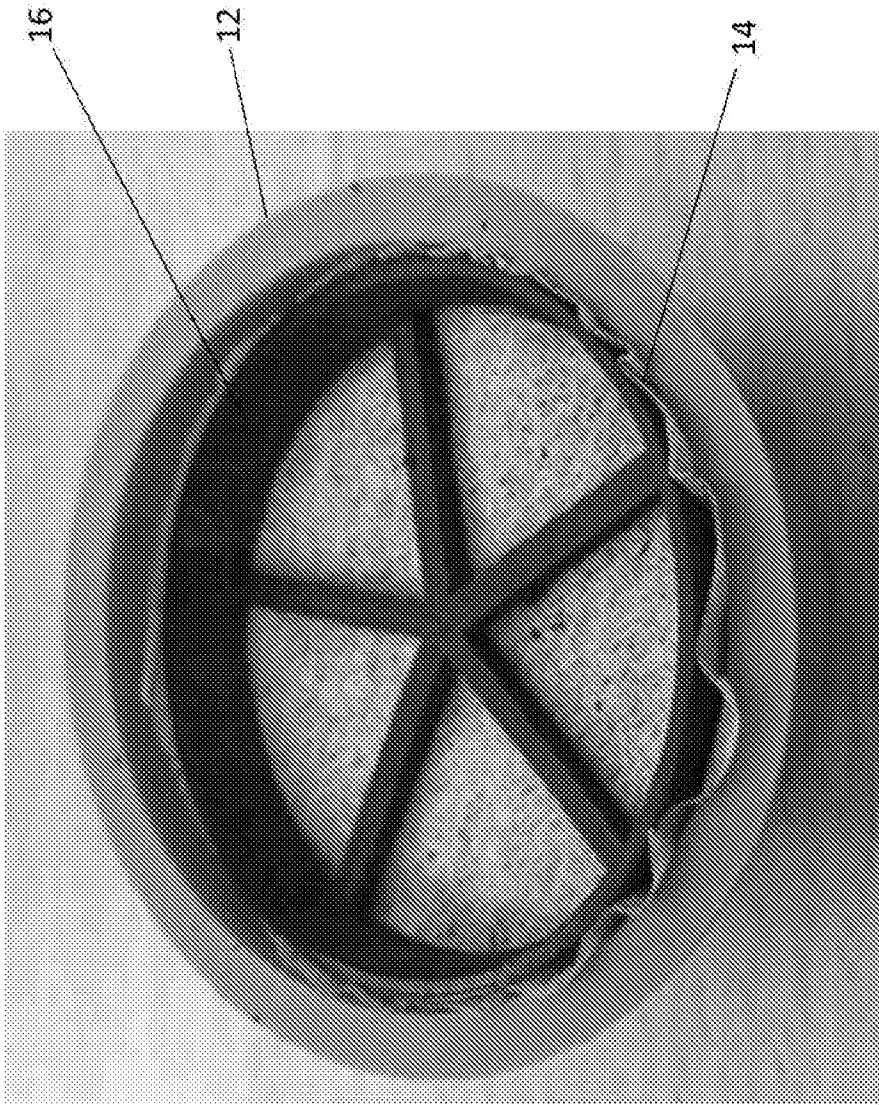


Fig. 4

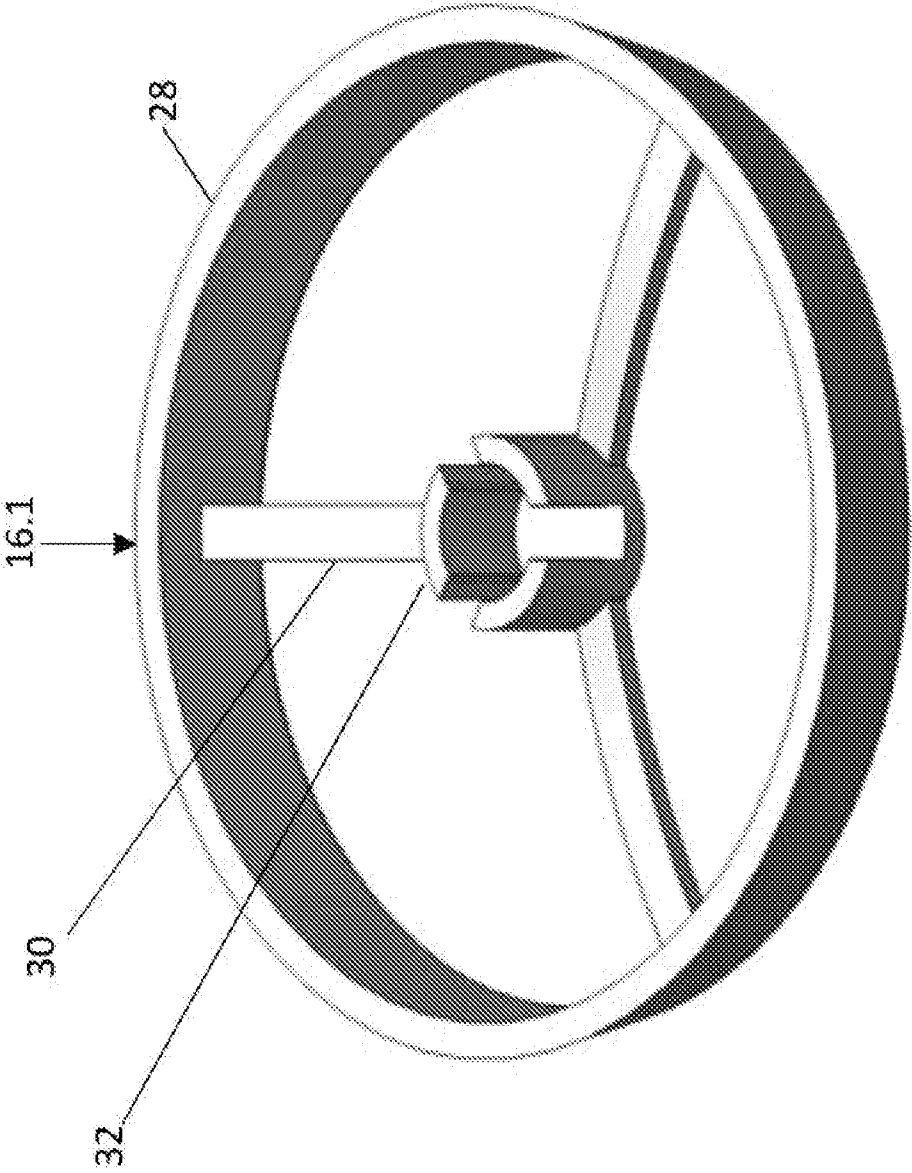


Fig. 5

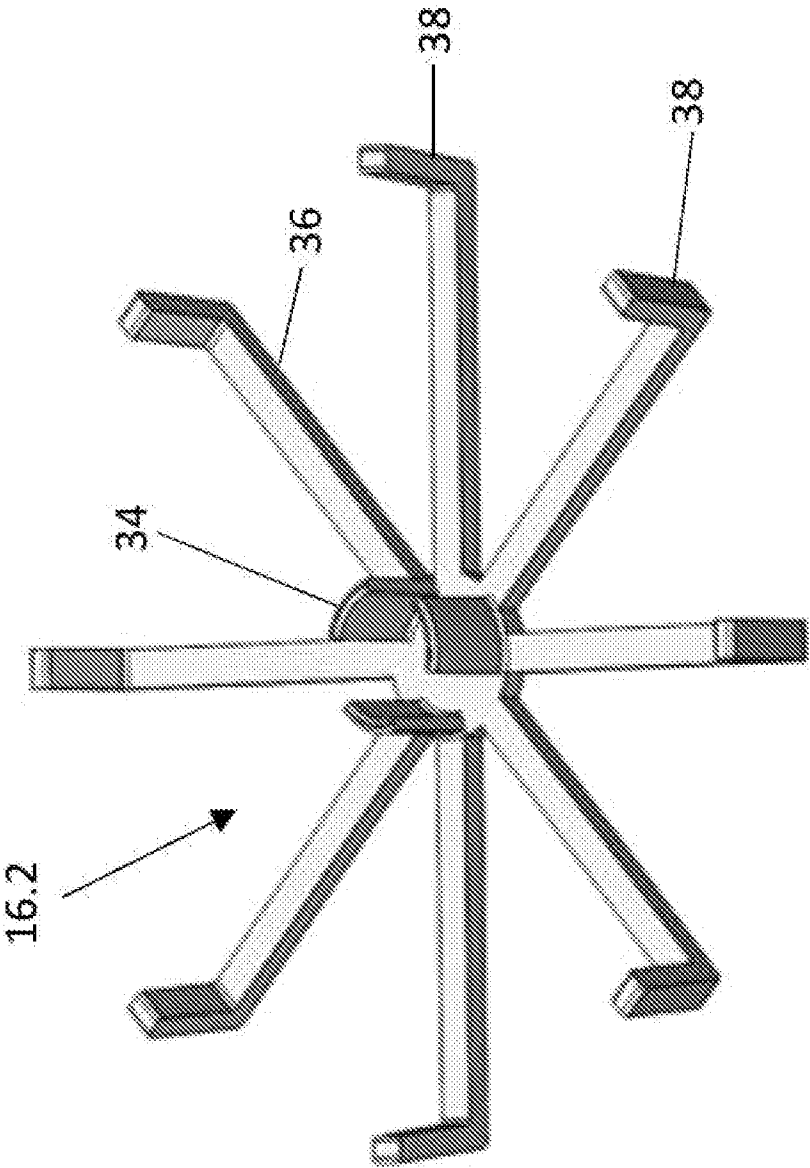


Fig. 6

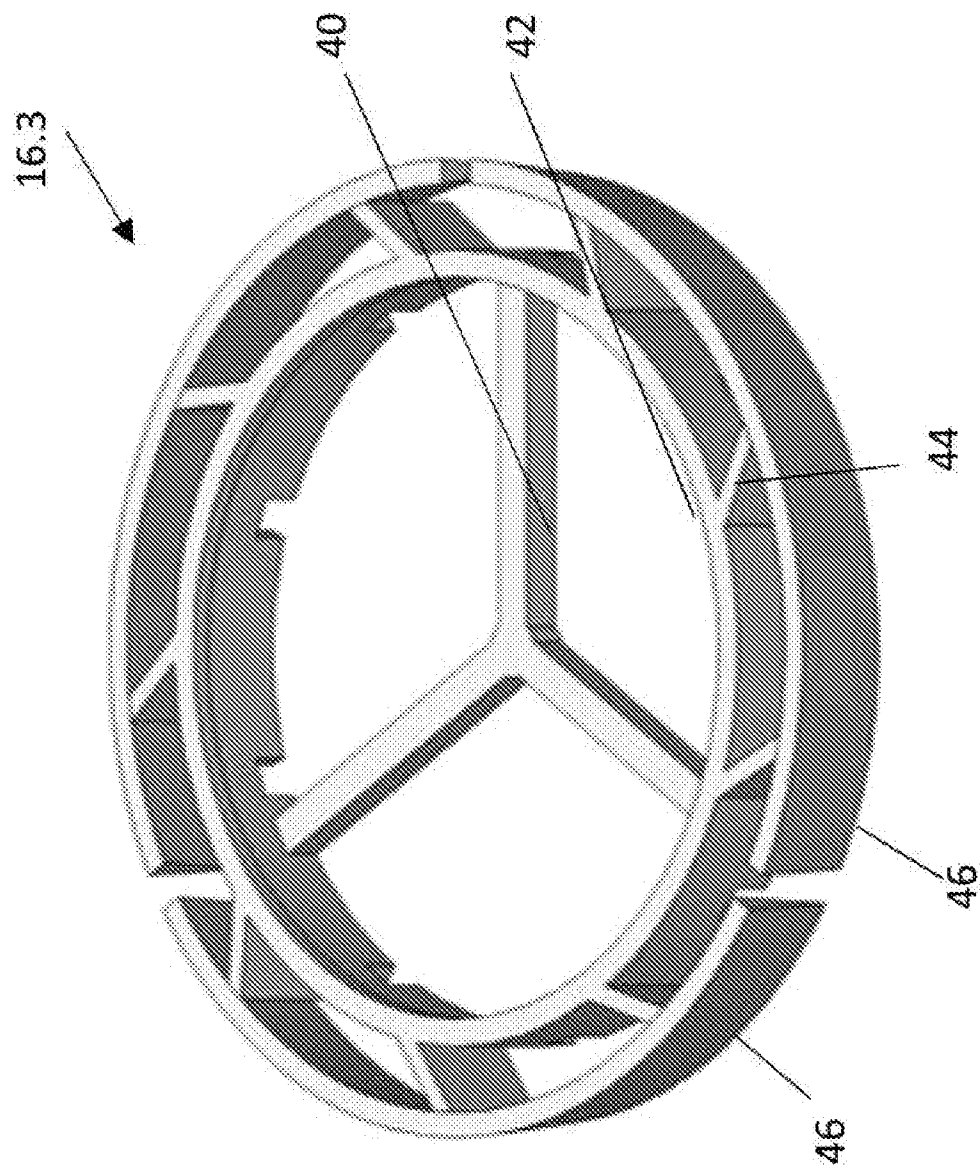
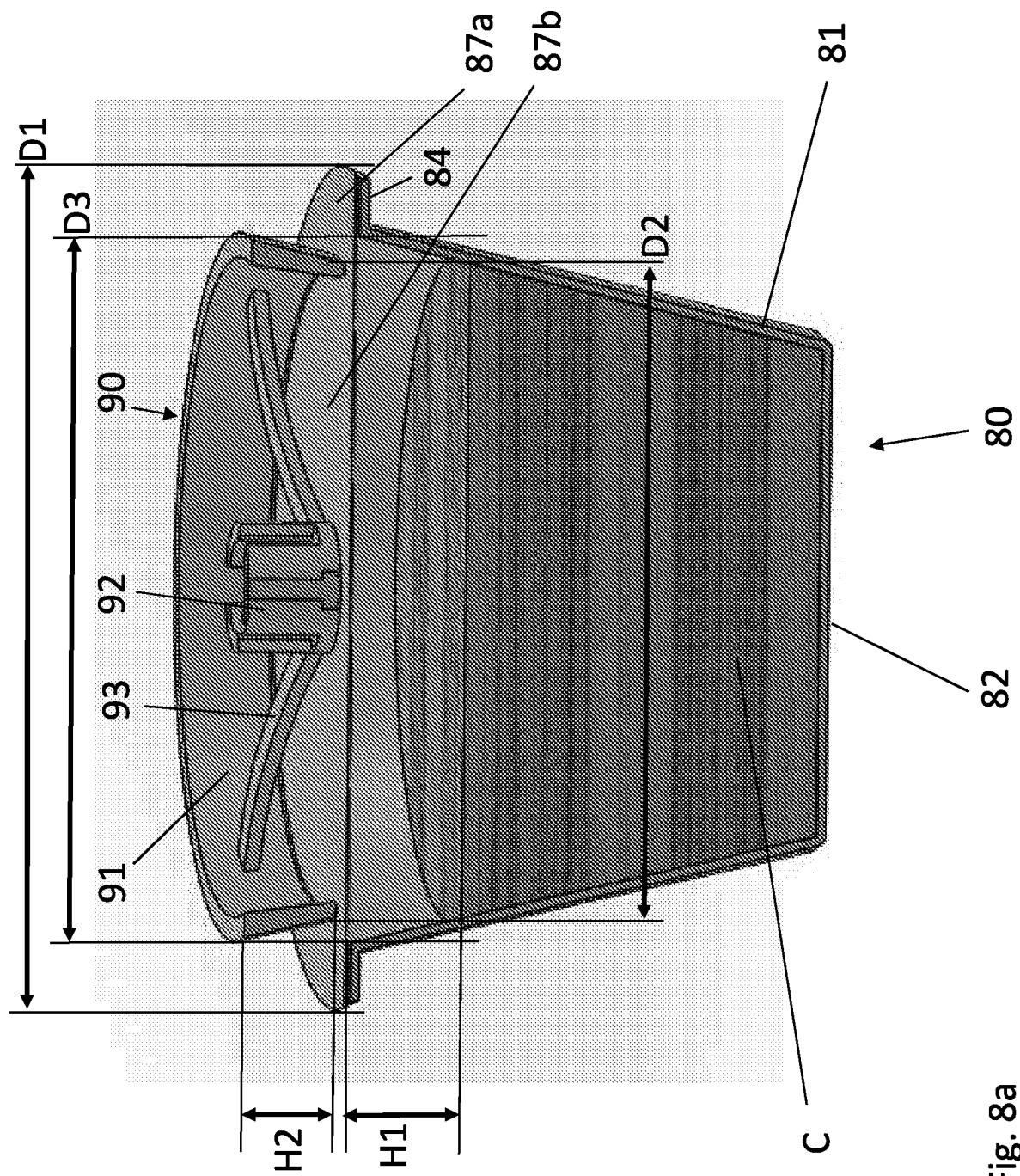


Fig. 7



Fi. 8a

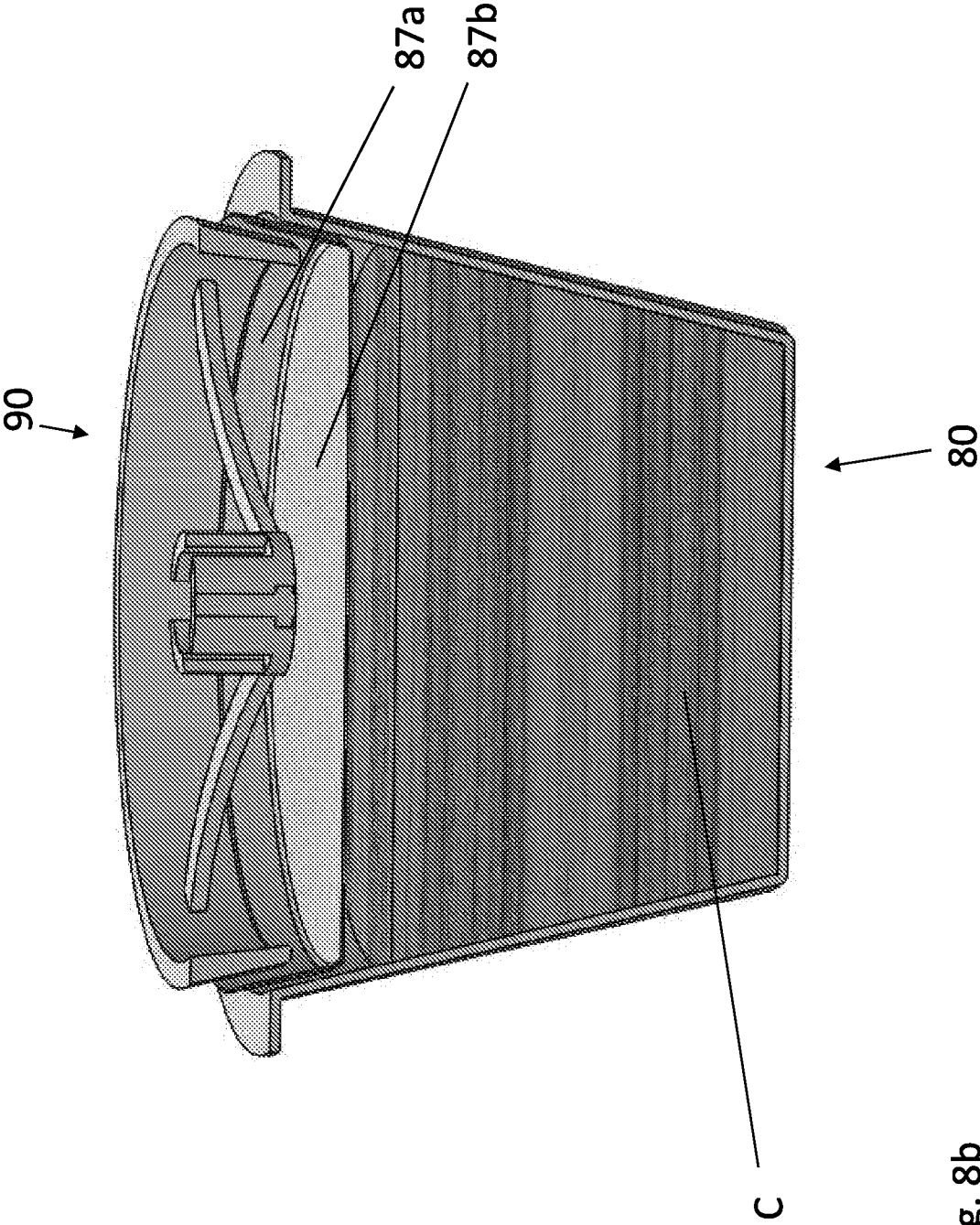


Fig. 8b

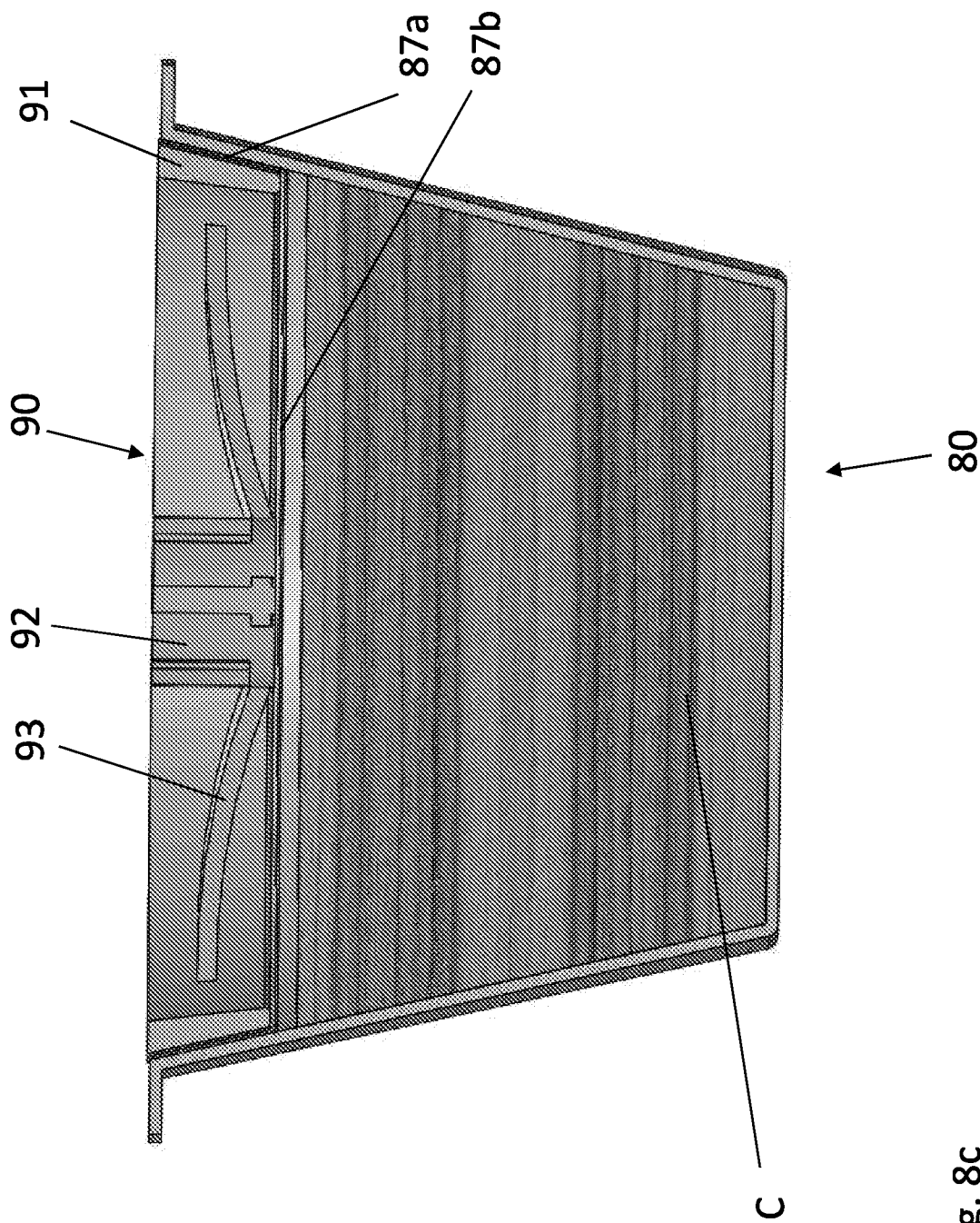


Fig. 8c

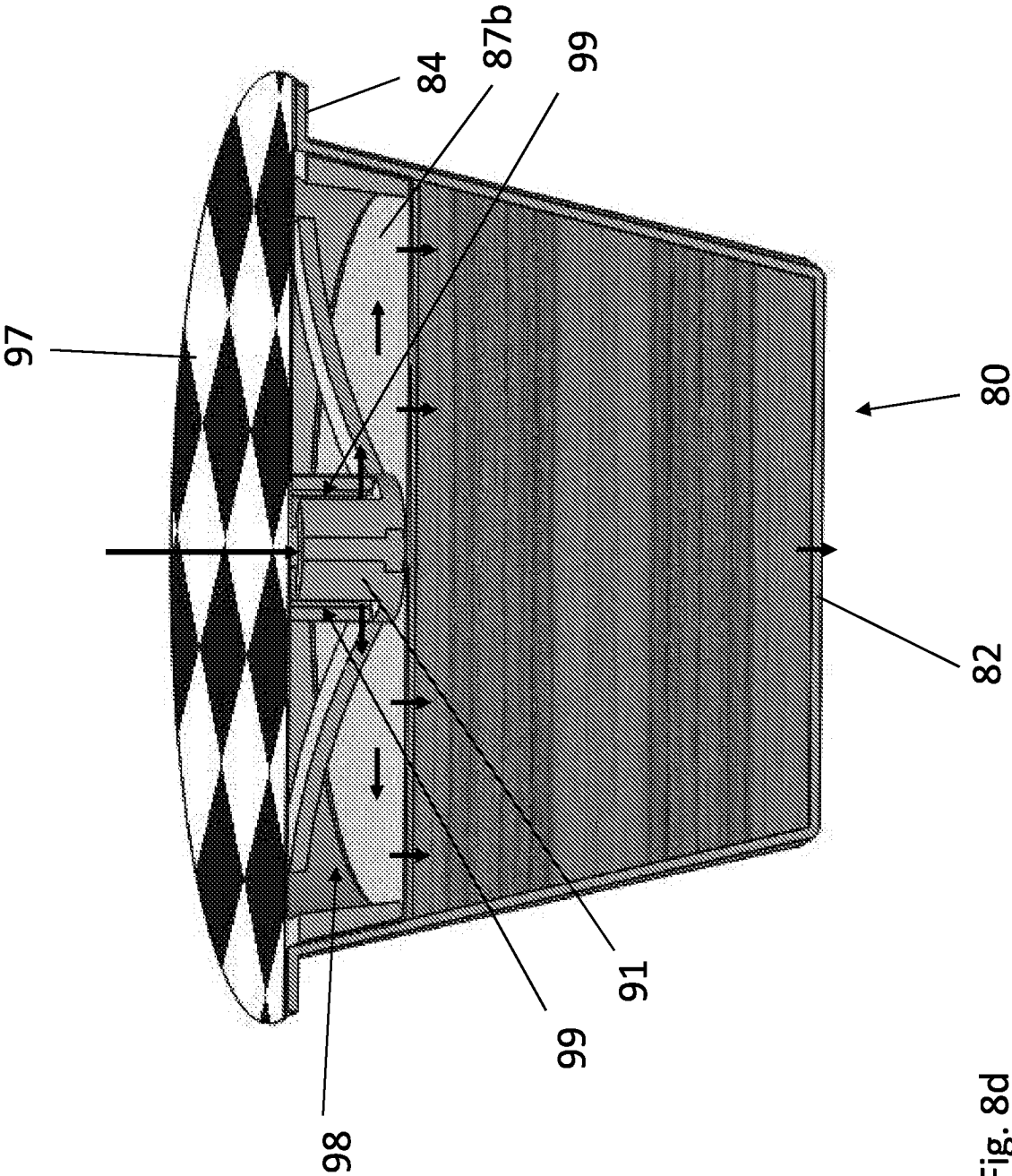


Fig. 8d

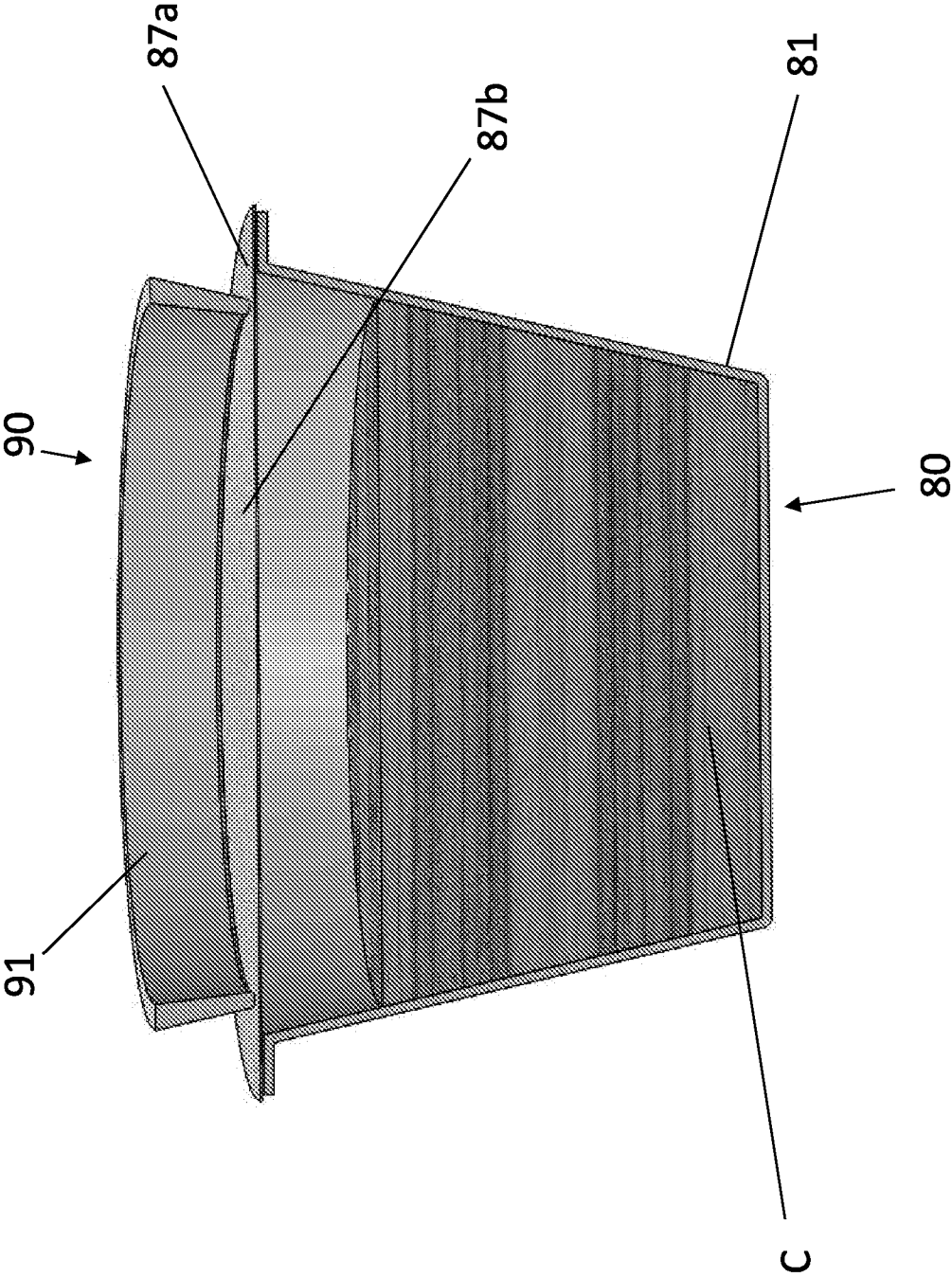


Fig. 9a

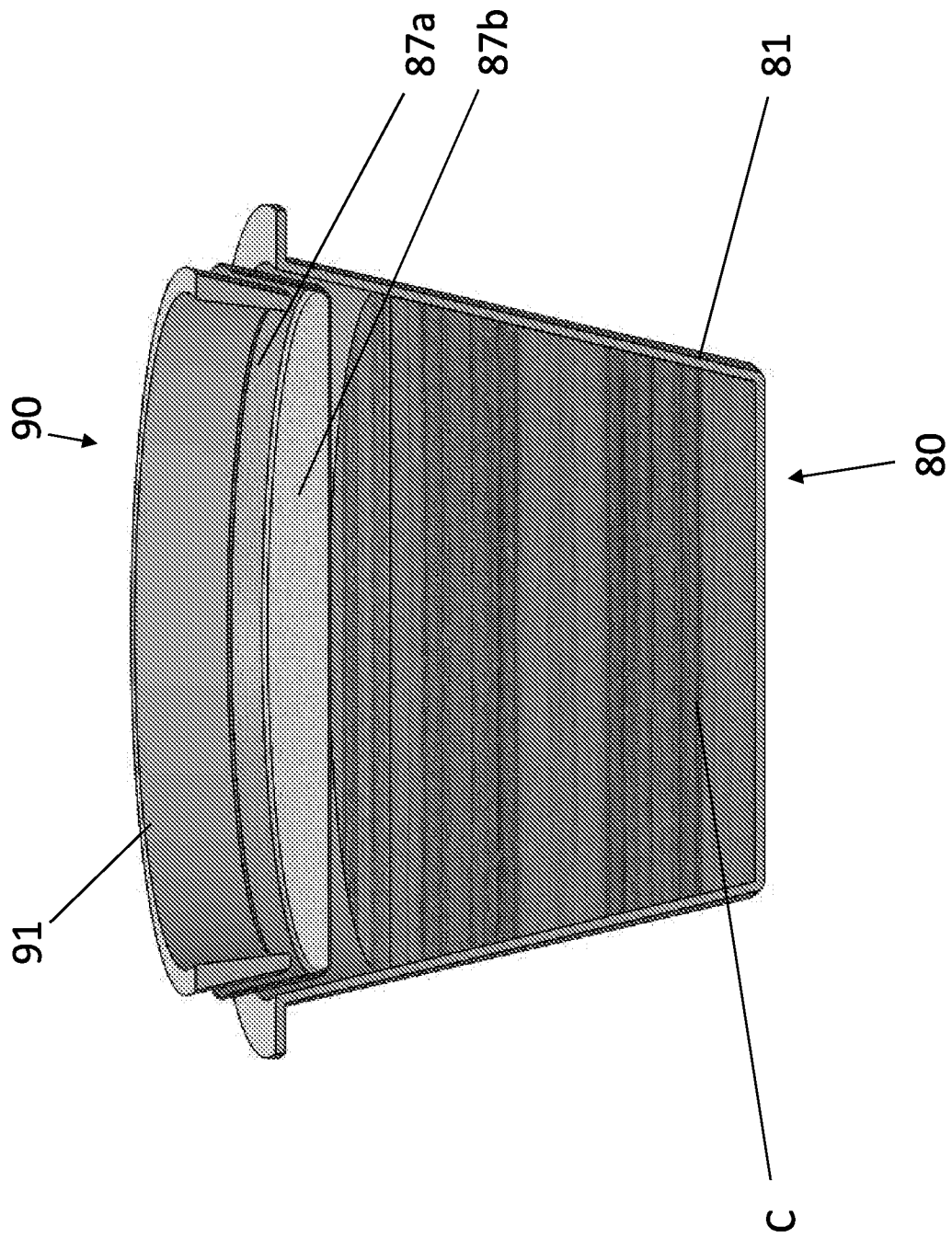


Fig. 9b

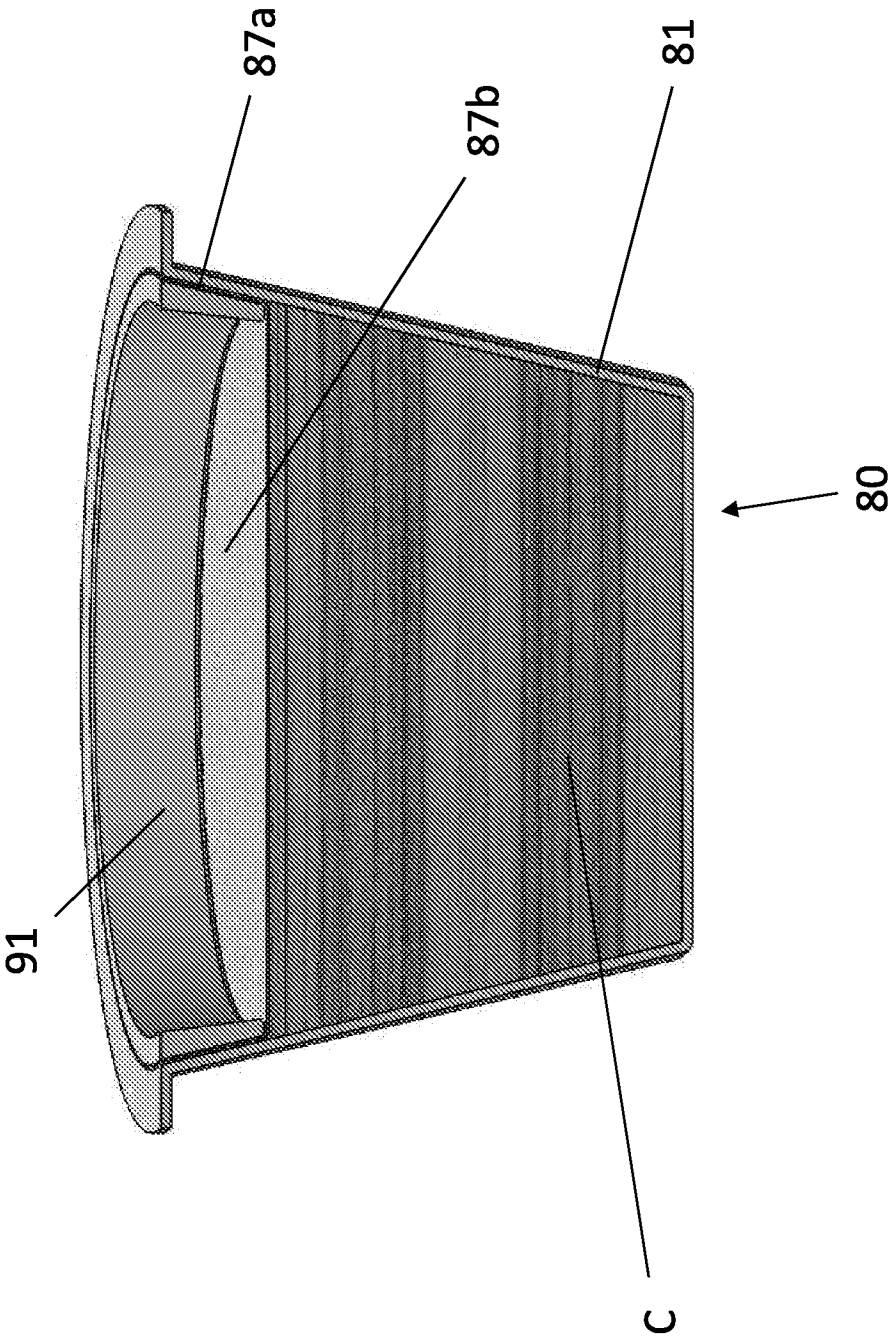


Fig. 9c

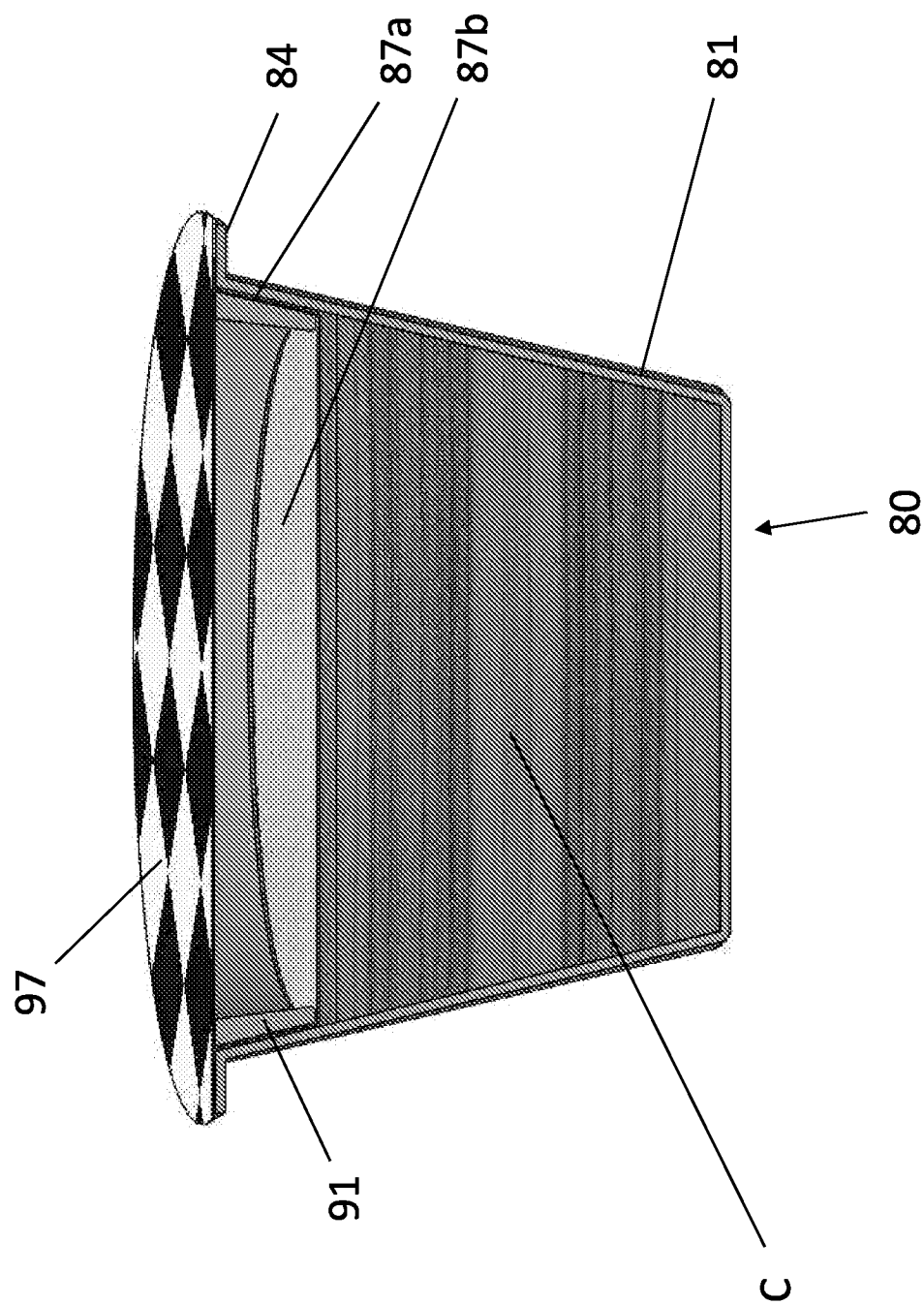


Fig. 9d

INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2019/050414

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65D85/804
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2006/111807 A1 (AROMA SYSTEM SRL [IT]; RAPPARINI GINO [IT]) 26 October 2006 (2006-10-26) pages 1-5 figures 1-40	1-7, 10-14
X	WO 2017/029565 A1 (LAVAZZA LUIGI SPA [IT]) 23 February 2017 (2017-02-23) pages 1-19 figures 3, 4	1,2, 8-12,14
X	WO 2015/193774 A1 (LAVAZZA LUIGI SPA [IT]) 23 December 2015 (2015-12-23) pages 1-15 figures 7, 8	1,2, 8-12,14
	-/-	



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

29 October 2019

Date of mailing of the international search report

08/11/2019

Name and mailing address of the ISA/

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Authorized officer

Duc, Emmanuel

INTERNATIONAL SEARCH REPORT

International application No

PCT/NL2019/050414

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2012/168764 A1 (BELLOLI GIANPAOLO [IT]; DIOLAITI ERMINIO [IT]) 13 December 2012 (2012-12-13) figures 8, 9 -----	1-14

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/NL2019/050414

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2006111807	A1	26-10-2006	NONE
WO 2017029565	A1	23-02-2017	AU 2016307901 A1 30-11-2017 CA 2985857 A1 23-02-2017 CN 107922108 A 17-04-2018 EP 3337737 A1 27-06-2018 US 2018229923 A1 16-08-2018 WO 2017029565 A1 23-02-2017
WO 2015193774	A1	23-12-2015	AU 2015275748 A1 01-12-2016 AU 2019203059 A1 23-05-2019 EP 3157839 A1 26-04-2017 EP 3388363 A1 17-10-2018 US 2017183145 A1 29-06-2017 WO 2015193774 A1 23-12-2015
WO 2012168764	A1	13-12-2012	NONE