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(54) PREPARATORY ELEMENT SUITABLE FOR BECOMING A REINFORCEMENT RING FOR CAPSULES FOR OBTAINING BEVERAGES

(57) The present invention relates to a preparatory element suitable for becoming a reinforcement ring for capsules for obtaining beverages, such as coffee, the preparatory element comprising a side wall extending around an axis y and having a first extremity and a second extremity; a flat surface, protruding from the side wall at the first extremity; and a reinforcement surface at the second extremity, where the reinforcement surface is configured to open symmetrically with respect to the axis y, so as to obtain a plurality of elements extending from the second extremity.

The present invention also relates to the reinforcement ring obtained from such a preparatory element and comprising a plurality of elements extending from one extremity of the ring. Furthermore, the present invention relates to the beverage capsule comprising such a reinforcement ring.

Finally, the method of forming the reinforcement ring from the preparatory element and the corresponding beverage capsule and the method of using the beverage capsule for beverage production are described in the present invention.

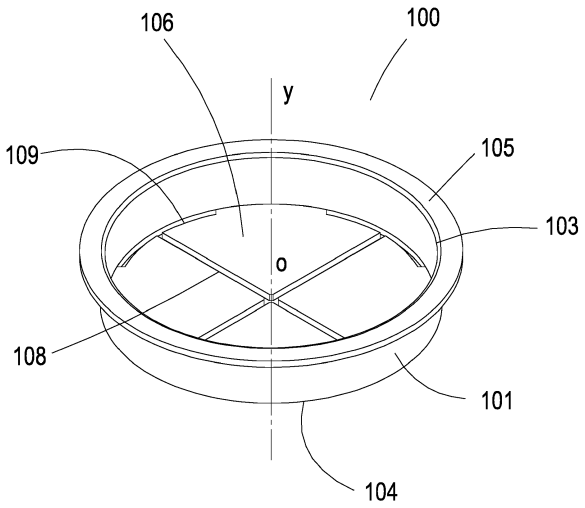

Fig. 1a

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Description

FIELD OF TECHNOLOGY

[0001] The present invention relates to the field of capsules for obtaining beverages, such as coffee or the like. More in particular, the present invention relates to the field of reinforcement rings for capsules for obtaining beverages.

STATE OF THE ART

[0002] On the market, there is a wide range of reinforcement rings for capsules for obtaining beverages. Examples of such rings are described in European patent applications EP 2 555 997 A2 and EP 3 152 134 A1.

[0003] Reinforcement rings of known types are often made of biodegradable and/or compostable materials and tend to deform during storage. Deformation of reinforcement rings can cause incompatibility between rings and capsules during assembly and between capsules with reinforcement rings and beverage machines during use. For this reason, it is desirable to prevent the reinforcement rings from deforming when they are stored in the storehouse, prior to release on the market.

[0004] At the same time, there is a constant need to improve sealing between capsules with reinforcement rings and beverage machines while dispensing the beverage.

[0005] The present invention thus aims to solve one or more of the above problems and improving the reinforcement rings currently on the market.

SUMMARY

[0006] According to one aspect of the present invention, a preparatory element is provided, which is suitable for becoming a reinforcement ring for capsules for obtaining beverages, such as coffee, comprising:

- a side wall extending around an axis y and having a first extremity and a second extremity; and
- a flat surface protruding from the side wall at the first extremity,

wherein the preparatory element also comprises a reinforcement surface at the second extremity, and the reinforcement surface is configured to open symmetrically with respect to the axis y, so as to obtain a plurality of elements extending from the second extremity.

[0007] This solution is particularly advantageous because the reinforcement surface ensures that the preparatory element is stabilized and reinforced during storage, thus preventing it from deforming, regardless of the material used to form the ring. This allows large quantities of preparatory elements to be stored for long periods, while still minimizing the risk of deformation.

[0008] It should be understood that the reinforcement surface temporarily closes the preparatory element at the second extremity, so as to form a compartment together with the side wall. However, the reinforcement surface is configured to open symmetrically with respect to the axis y under the effect of a thrust or pressure applied on it.

[0009] Once the reinforcement surface has been opened, for example because pressure has been applied on it, the preparatory element becomes a reinforcement ring suitable for reinforcing the side wall of coffee capsules. In fact, the reinforcement surface is advantageously divided into a series of two or more parts divided by perforation lines, which, under the effect of applied pressure, separate from each other and create a through-opening within the preparatory element, where a capsule can be accommodated. After being separated from each other and pushed away from the side wall, the parts of the reinforcement surface form a plurality of elements extending from the second extremity, in the opposite direction with respect to the first extremity. Preferably, these elements extend from the second extremity parallel to the direction of pressure applied to the reinforcement surface to open it.

[0010] Advantageously, one or more of the elements extending from the second extremity may include distinctive signs, images, or, in general, any kind of labeling, to give predefined indications to the user, such as directions on the correct orientation of the capsule in a beverage machine.

[0011] In the present application, it should be understood that the axis y is the symmetry axis of the reinforcement ring.

[0012] Preferably, the perforation lines extend from the center of symmetry (or central point) of the reinforcement surface to the edges of the reinforcement surface at the second extremity of the side wall, wherein the center of symmetry (or central point) is the point where said reinforcement surface crosses the axis y. This allows the reinforcement surface to open more effectively at the center of symmetry and along the perforation lines, thus symmetrically and progressively with respect to the axis y of symmetry, when pressure is applied to it.

[0013] According to a preferred embodiment of the present invention, the preparatory element is made of a biodegradable and/or compostable and/or bio-based material, for example paper, paperboard, PLA, PHA, PBS, Starch Blends, bio-based PE, PET, PA or PT.

[0014] This solution is particularly advantageous because the preparatory element and, in particular, the reinforcement ring obtained from it and the capsule provided with such a reinforcement ring can be easily disposed of. In particular, paper or cardboard-based materials are particularly advantageous because they also allow disposal directly by the user (home composting).

[0015] According to a preferred embodiment of the present invention, a preparatory element is provided, which further comprises a layer of thermoformable ma-

terial, preferably filtering material, fixed to the flat surface. The layer of thermoformable material is suitable for becoming the capsule body after thermoforming. Therefore, the preparatory element according to this embodiment is not only a preparatory element suitable for becoming a reinforcement ring for capsules for obtaining beverages, but it is also a preparatory element suitable for becoming a capsule for obtaining beverages comprising both the reinforcement ring and a capsule body made by thermoforming. Preferably, the layer of thermoformable material covers the compartment made by the side wall and the reinforcement surface of the preparatory element, thus creating a closed volume with them.

[0016] According to a further aspect of the present invention, a reinforcement ring for capsules for obtaining beverages, for instance coffee, is provided, which comprises:

- a side wall extending around an axis and having a first extremity and a second extremity; and
- a flat surface protruding from the side wall at the first extremity,

wherein the reinforcement ring further comprises a plurality of elements extending from the second extremity.

[0017] This solution is particularly advantageous because the elements extending from the second extremity form elements that partially lengthen the reinforcement ring and serve to further reinforce the capsule for beverages and improve its sealing in the machine for obtaining beverages.

[0018] Advantageously, one or more of the elements extending from the second extremity may include distinctive signs, images, or, in general, any kind of labelling, to give predefined indications to the user, for example directions on the correct orientation of the capsule in a beverage machine.

[0019] Preferably, the elements extend from the second extremity parallel to the direction of the axis y.

[0020] Preferably, the elements extend from the second extremity along the direction of the axis y, in the direction of insertion of the beverage capsule.

[0021] According to a particularly advantageous embodiment, such a reinforcement ring is obtained from a preparatory element according to the present invention. In this way, the elements that formed the reinforcement surface of the preparatory element now form the elements that partially lengthen the reinforcement ring. Moreover, in this way, the elements resulting from the reinforcement surface are re-used, thus avoiding material waste and scraps, and machine waste.

[0022] According to a further aspect of the present invention, a capsule for obtaining beverages, for example coffee, is provided, which comprises:

- a reinforcement ring as described above; and
- a capsule body fixed to the reinforcement ring, preferably by means of welding, where the capsule body is suitable for forming the containment volume for the product used to obtain the desired beverage, for instance ground coffee.

[0023] Preferably, the elements extend from the second extremity of the reinforcement ring along the body of the capsule.

[0024] The capsule body can be made by any method known to the skilled person, such as by means of thermoforming.

[0025] The capsule body can advantageously be made of a biodegradable and/or compostable and/or bio-based material. In particular, the capsule body can advantageously be made of a material that, together with the material of the reinforcement ring, allows for the possible disposal of the entire capsule directly by the user, i.e., by home composting. The capsule body can be made of paper, cardboard, PLA, PHA, PBS, Starch Blends, bio-based PE, PET, PA, or PT.

[0026] According to a further aspect of the present invention, a method for forming a reinforcement ring for capsules for obtaining beverages, such as coffee, is provided, wherein the method includes the following steps:

(a) providing a preparatory element such as those described above;

(b) opening the reinforcement surface to form the plurality of elements extending from the second extremity.

[0027] This solution is particularly advantageous in that it allows a reinforcement ring to be formed from the preparatory element in a quick and simple manner, for example by applying enough pressure to the reinforcement surface to open it and obtain a through-opening for capsule insertion.

[0028] According to a particularly advantageous configuration of the present invention, a method for forming a capsule for obtaining beverages from a reinforcing element according to the present invention is provided, in which opening of the reinforcement surface is carried out directly by inserting the capsule body into the preparatory element. In other words, the capsule body previously formed and aligned with the preparatory element is inserted into the compartment formed by the side wall and the reinforcement surface. Then, the reinforcement surface is opened by further pushing the capsule body until it reaches the final position where it is attached to the reinforcement ring that has thus been formed. For example, the capsule body can be inserted into the preparatory element and contribute to opening the reinforcement surface directly by the welder used to insert and weld the capsule body to the reinforcement ring. The capsule body can be pleated but may also have any other shape.

[0029] According to a particularly advantageous con-

figuration of the present invention, a method for forming a capsule for obtaining beverages from a reinforcing element according to the present invention is provided, in which the capsule body is formed by thermoforming and opening of the reinforcement surface is directly carried out by the forming die that molds the thermoformable material to obtain the final capsule body.

[0030] For example, according to a particularly advantageous embodiment, the thermoformable material, such as a layer or a film of thermoformable material, may already be present on the preparatory element. In other words, the preparatory element may already comprise a layer of thermoformable material fixed to the flat surface, so as to close the compartment formed by the side wall and the reinforcement surface. When the forming die pushes the film of thermoformable material to mold it and form the body of the final capsule, the forming die can also push the reinforcement surface so as to open it at the same time as thermoforming.

[0031] According to another embodiment, the preparatory element is not initially provided with a film or sheet of thermoformable material, and the latter is added and fixed to the flat surface of the preparatory element only at a later stage, such as during production of the capsule. Even in this case, however, according to an embodiment of the present invention, opening of the reinforcement surface is done directly by the forming die that molds the thermoformable material in order to obtain the body of the final capsule and also pushes the reinforcement surface of the preparatory element during this process.

[0032] According to a further aspect of the present invention, a system for beverages is provided, which comprises:

- a capsule of the type described above; and
- a container suitable for accommodating the capsule during the step of supplying pressurized water for producing the beverage, where the container comprises a lateral surface and a bottom forming the compartment suitable for accommodating the capsule during the water supply;

wherein a predefined portion of an inner surface of the lateral surface of the container and one or more of the elements extending from the second extremity, preferably all of them, are watertight with each other.

[0033] In the present disclosure, it should be understood that the predefined portion of the inner surface of the lateral surface of the container is that portion of the inner surface that contacts the element (or elements) extending from the second extremity of the reinforcement ring when the capsule comprising the reinforcement ring is inserted into the container. Accordingly, that predefined portion preferably has the same or similar dimensions as the element (or elements) extending from the second extremity.

[0034] This solution is particularly advantageous because it allows the elements extending from the second extremity of the capsule reinforcement ring to seal the inner wall of the beverage machine container.

BRIEF DESCRIPTION OF THE FIGURES

[0035] The present invention will be described with reference to the attached figures in which the same reference numbers and/or signs indicate the same and/or similar and/or corresponding parts of the system.

Fig. 1a schematically illustrates a three-dimensional view of a preparatory element suitable for becoming a reinforcement ring for capsules for obtaining beverages, according to an embodiment of the present invention;

Fig. 1b schematically illustrates a three-dimensional view of a preparatory element suitable for becoming a reinforcement ring for capsules for obtaining beverages, according to a further embodiment of the present invention;

Fig. 2a schematically illustrates a top view of a preparatory element suitable for becoming a reinforcement ring for capsules for obtaining beverages and having eight perforation lines, according to an embodiment of the present invention;

Fig. 2b schematically illustrates a top view of a preparatory element suitable for becoming a reinforcement ring for capsules for obtaining beverages and having three perforation lines, according to an embodiment of the present invention;

Fig. 2c schematically illustrates a top view of a preparatory element suitable for becoming a reinforcement ring for capsules for obtaining beverages and having six perforation lines, according to an embodiment of the present invention;

Fig. 2d schematically illustrates a top view of a preparatory element suitable for becoming a reinforcement ring for capsules for obtaining beverages and having five perforation lines, according to an embodiment of the present invention;

Fig. 3 schematically illustrates a three-dimensional view of a capsules for obtaining beverages provided with a reinforcement ring according to an embodiment of the present invention;

Fig. 4 schematically illustrates the alignment of a capsule for obtaining beverages with a preparatory element, during a step of production of a capsule, according to an embodiment of the present invention;

Fig. 5a schematically illustrates the different steps of a method for producing capsules for obtaining beverages from a preparatory element, according to an embodiment of the present invention;

Fig. 5b schematically illustrates the different steps of a method for producing capsules for obtaining beverages from a preparatory element, according to a further embodiment of the present invention;

Fig. 6 schematically illustrates an exploded view of a system for producing beverages, according to an embodiment of the present invention;

Fig. 7 schematically illustrates a three-dimensional view of the system for producing beverages shown in Fig. 6, in the assembled configuration;

Fig. 8 schematically illustrates a cross-sectional view of the system for producing beverages shown in Fig. 7, in a stage of use.

DETAILED DESCRIPTION

[0036] In the following, the present invention is described with reference to particular embodiments as illustrated in the attached drawings. However, the present invention is not limited to the particular embodiments described in the following detailed description and illustrated in the figures, but rather the embodiments described simply exemplify the various aspects of the present invention, the scope of which is defined by the claims. Further modifications and variations of the present invention will be clear to the person skilled in the art.

[0037] In the present disclosure, it should be understood that terms such as "top," "bottom," "upper," "lower," and the like, refer to the particular orientation of the elements shown in the figures and should not be construed as limiting the present invention.

[0038] Fig. 1a schematically shows a preparatory element 100 suitable for becoming a reinforcement ring for capsules for obtaining beverages, such as coffee. The preparatory element 100 comprises a side wall 101 extending around an axis y of symmetry and having a first extremity 103 and a second extremity 104. The axis of symmetry y is the axis passing through the center O of the circumference defined by the side wall 101. The preparatory element 100 also comprises a flat surface 105 protruding from the side wall 101 at the first extremity 103.

[0039] The preparatory element 100 also comprises a reinforcement surface 106 at the second extremity 104. The reinforcement surface 106 includes four perforation lines 108 that intersect at the center O of the circumference defined by the side wall 101. The perforation lines 108 then define four circular sectors that form the reinforcement surface. The vertices of the circular sectors coincide with the center O, while the portions at the arcs of the circular sectors are partially attached to the side wall 101. The reinforcement surface 106 also includes additional perforation lines 109 at the second extremity 104. The additional perforation lines 109 intersect the perforation lines 108 at the second extremity 104 and form T-shaped pre-cut structures that extend from the second extremity 104 toward the center O of the reinforcement surface 106.

[0040] The perforation lines 108 and 109 allow the reinforcement surface 106 to open under the effect of the pressure applied to the surface. The reinforcement surface 106 opens symmetrically and progressively with respect to the axis y and allows for a through-opening at the center O to be formed, the through-opening being delimited by a plurality of elements extending from the second extremity 104. Such elements 201 are shown for example in Fig. 3.

[0041] Once the through-opening is formed in the preparatory element 100, the latter can serve as a reinforcement ring 200 for capsules for obtaining beverages. In fact, capsule bodies can be inserted into the through-opening.

[0042] During storage, before capsules are formed, the reinforcement surface 106 allows the preparatory element to be stabilized and prevent deformation due to external factors, such as moisture or heat.

[0043] Figure 1b schematically illustrates a three-dimensional view of a preparatory element suitable for becoming a reinforcement ring for capsules for obtaining beverages, according to another embodiment of the present invention. Compared with the embodiment shown in Figure 1a, the preparatory element of Figure 1b further comprises a layer of thermoformable material 320 fixed to the flat surface 105. The layer of thermoformable material 320 closes the compartment formed by the reinforcement surface 106 and the side wall 101. In other words, the layer of thermoformable material 320 forms a closed volume with the side wall 101 and the reinforcement surface 106. The features of the preparatory element within the closed volume, such as the perforation lines 108 and the additional perforation lines 109, are shown with dashed lines in the figure, because they are covered by the layer of thermoformable material 320. This layer of thermoformable material 320 is suitable for becoming the body of the capsule, after thermoforming. Hence, the preparatory element of Figure 1b is not only suitable for becoming a reinforcement ring, but is also suitable for becoming a capsule including both the reinforcement ring and a capsule body made by thermoforming.

[0044] Figures 1a and 1b show preparatory elements with four perforation lines 108 and four additional perforation lines 109. However, this configuration should not be limiting. In fact, it is apparent that any number of perforation lines 108 and 109 suitable for dividing the reinforcement surface 106 into a series of parts of equal or different sizes can be formed on the reinforcement surface 106. However, it is necessary that the perforation lines 108 extend till the center of symmetry O of the side

wall 101, so that the reinforcement surface 106 can open symmetrically with respect to the axis of symmetry y, when pressure is applied on it. In fact, preferably, the opening force of the reinforcement surface 106 is applied at the center O.

[0045] According to a preferred configuration, the perforation lines 108 intersect at the center of symmetry O of the side wall 101, so that the reinforcement surface 106 can open symmetrically with respect to the axis of symmetry y when pressure is applied on it.

[0046] Preferably, the perforation lines 108 are configured to divide the reinforcement surface 106 into a series of equal circular sectors.

[0047] For example, Fig. 2a schematically shows the configuration of the preparatory element 100 comprising eight perforation lines 108, eight additional perforation lines 109 and eight circular sectors equal to each other. For example, Fig. 2b schematically shows the configuration of the preparatory element 100 comprising three perforation lines 108, three additional perforation lines 109 and three circular sectors equal to each other. For example, Fig. 2c schematically shows the configuration of the preparatory element 100 comprising six perforation lines 108, six additional perforation lines 109 and six circular sectors equal to each other. For example, Fig. 2d schematically shows the configuration of the preparatory element 100 comprising five perforation lines 108, five additional perforation lines 109 and five circular sectors equal to each other.

[0048] Fig. 3 shows a three-dimensional schematic view of a capsule 300 for obtaining beverages provided with a reinforcement ring 200, according to an embodiment of the present invention.

[0049] The capsule 300 of Fig. 3 is a ramekin and has a capsule body 301 having a substantially flat bottom wall and a pleated side wall, that is, made in regular or irregular folds. Attached to the body of the capsule 301 is the reinforcement ring 200 obtained from the preparatory element of Fig. 1.

[0050] As can be seen in Fig. 3, the elements 201 protrude from the side wall 101 of the reinforcement ring 200 and extend parallel to the capsule body 301. In this way, the capsule 300 is further reinforced by the presence of the elements 201. Moreover, since the elements 201 that formed the reinforcement surface 106 of the preparatory element are also exploited as parts of the reinforcement ring 200, material waste is avoided because, for example, the elements 201 are not removed and disposed of.

[0051] Capsule 300 also includes a lid 310 attached to the side wall 101 of the reinforcement ring 200 to prevent leakage of the beverage product.

[0052] The method for forming the capsule 300 provided with a reinforcement ring 200, according to an embodiment of the present invention, will be described with reference to Figs. 4 and 5a.

[0053] As a first step, a preparatory element 100 provided with the reinforcement surface 106 is prepared and aligned with the capsule body 301 for assembly, as shown schematically in Fig. 4.

[0054] For example, the preparatory element 100 and the capsule body 301 may be placed in two independent transport housings, which are arranged coaxially to facilitate the insertion of the capsule body 301 into the preparatory element 100.

[0055] Subsequently, a welder 400 is set up above the capsule body 301, coaxially with respect to the capsule body 301 and the preparatory element 100.

[0056] As shown in Fig. 5a, the welder 400 is then moved downward until it contacts the pleated capsule body 301. By drawing air from the inner opening of the welder 400, the pleated capsule body 301 is captured by the welder thruster. In this way, the bottom surface of the thruster contacts the inner bottom surface of the pleated capsule body 301. For this reason, the lower part of the thruster preferably has a truncated cone shape, so as to effectively match the lower part of the pleated capsule body 301.

[0057] Afterwards, as shown in Fig. 5a, the pleated capsule body 301 held by the thruster is pushed by the welder 400 toward the preparatory element 100 located below it, until it enters inside the preparatory element 100. As a result of this thrust, pressure is applied to the reinforcement surface 106 of the preparatory element 100. The reinforcement surface 106 then breaks along the perforation lines 108 and 109, and the elements 201 are formed and extend downward, in the direction of the force applied by the welder 400. The elements 201 remain partially attached to the side wall 101 and extend parallel to the capsule body 301. In fact, the additional perforation lines 109 extend only partially along the perimeter of the reinforcement surface 106 and thus allow the elements 201 to remain partially attached to the side wall 101.

[0058] The side wall 101 of the preparatory element 100 with the flat surface 105 and elements 201 then form the reinforcement ring 200 for the capsule 300.

[0059] The process of inserting the capsule body 301 and welding same to the reinforcement ring 200, and the corresponding welding station may be analogous to those described in paragraphs [0074-0084] of the patent EP 3 357 819 B1 by the same applicant, the content of which is herein entirely incorporated by reference. Therefore, it should be understood that an inserting and welding process analogous to that presented in EP 3 357 819 B1 can be carried out, for example, in order to insert the capsule body 301 into the preparatory element 100 according to the present invention, push and open the reinforcement surface 106, while the capsule body 301 is further inserted by the welder, and then attach the reinforcement ring 200 to the capsule body 301, according to a particular embodiment of the present invention.

[0060] As shown in the figure, in a later step of the method for forming the capsule 300, the capsule body 301 is filled with the product P for obtaining the beverage, for example, coffee.

[0061] Finally, the capsule body 301 is closed with a

lid 310 to prevent the product P from leaking. The lid 310 is welded to the flat surface 105 of the reinforcement ring 200, for example, by heat welding.

[0062] The capsule body 301 can be prepared according to any method known to the skilled person. Furthermore, even if the figures show a pleated capsule body, the capsule body according to the present invention may have any shape.

[0063] Figure 5b schematically shows the different steps of a method for producing beverage capsules from a preparatory element, according to a further embodiment of the present invention.

[0064] The method of Figure 5b starts with a preparatory element that includes a layer of thermoformable material 320, as described in detail with reference to Figure 1b.

[0065] As a first step, a preparatory element 100 having the reinforcement surface 106 and a layer of thermoformable material 320 is provided. The layer of thermoformable material 320 may already be present on the preparatory element, or may be applied to a preparatory element without it directly in the initial step of the method according to the present invention. The application of the layer 320 to the preparatory element may be carried out according to any method known to the skilled person.

[0066] Subsequently, a forming die 410 is set up above the preparatory element 100, coaxially with respect to the preparatory element 100. The forming die 410 is suitable for molding the layer of thermoformable material 320 by thermoforming and can be configured for this purpose according to any manner known to the skilled person.

[0067] As shown in Fig. 5b, the forming die 410 is then moved downward so that it contacts the layer of thermoformable material 320.

[0068] Then, as shown in Fig. 5b, the forming die 410 is pushed further down so that, simultaneously, the layer of thermoformable material 320 is molded by thermoforming and the reinforcement surface 106 of the preparatory element 100 is opened. Due to the thrust of the forming die 410, pressure is applied to the reinforcement surface 106 of the preparatory element 100. The reinforcement surface 106 then breaks along the perforation lines 108 and 109, and the elements 201 are formed and extend downward in the direction of the force applied by the forming die 410. The elements 201 remain partially attached to the side wall 101 and extend parallel to the capsule body 301. In fact, the additional perforation lines 109 extend only partially along the perimeter of the reinforcement surface 106 and thus allow the elements 201 to remain partially attached to the side wall 101.

[0069] The side wall 101 of the preparatory element 100 with the flat surface 105 and the elements 201 then form the reinforcement ring 200 for the capsule 300.

[0070] The thrust of the forming die 410 is stopped when the capsule body 301 obtained by molding the layer of thermoformable material 320 has the desired shape and size.

[0071] Forming the capsule body by thermoforming using a forming die can be accomplished by any thermoforming method known to the skilled person. For example, thermoforming can be carried out as described in the European patent application published under publication number EP3356237A1, whose content is herein entirely incorporated by reference. Thermoforming can also be carried out as described in the European patent EP3222558B1, whose content is herein entirely incorporated by reference.

[0072] At the end of the thermoforming process, when the forming die 410 is removed, a capsule is obtained, which has the reinforcement ring 200 and the thermoformed capsule body 301 that is fixed to the reinforcement ring and empty.

[0073] As shown in the figure, in a later step of the method for forming the capsule 300, the capsule body 301 is filled with the product P for obtaining the beverage, for example, ground coffee.

[0074] Finally, the capsule body 301 is closed with a lid 310 to prevent leakage of the product P. The lid 310 is welded to the flat surface 105 of the reinforcement ring 200, for example, by heat welding. Thermoformable material of the layer 320 may be present between the lid 310 and the flat surface 105.

[0075] A method for producing a beverage from the capsule 300, according to an embodiment of the present invention, will be described with reference to Figs. 6-8.

[0076] Fig. 6 schematically illustrates an exploded view of the system for beverages 1000. The system 1000 comprises a container 500 suitable for accommodating the capsule 300 while dispensing the beverage, and a closing element 505. The container 500 can be of the type known from the state of the art.

[0077] The container 500 includes a lateral surface 501 and a bottom surface 502, forming the compartment suitable for accommodating the capsule 300 while dispensing the beverage. The lateral surface 501 of the container 500 includes an inner surface 503 (visible in Fig. 8), facing the compartment and thus toward the inside of the container 500.

[0078] The container 500 also comprises an upper edge with four recesses 506 suitable for facilitating insertion and/or removal of the capsule 300 from the container 500. It is to be understood that any number of recesses 506 can be formed in the top edge of the container 500, for example, two, three, five, six, or more.

[0079] The closing element 505 is suitable for enclosing the capsule 300 during beverage production. The closing element 505 also includes a conduit 504 through which the pressurized water for beverage production flows.

[0080] Fig. 7 schematically shows the system 1000 for beverage production in its assembled state. In Fig. 7, it can be seen that, when the capsule 300 provided with the reinforcement ring 200 is inserted into the container 500 and the latter is closed by the closing element, the elements 201 extending along the body of the capsule 301 are visible from the outside through the recesses

506. The elements 201 extending along the body of the capsule 301 thus cover the recesses 506.

[0081] The operation of the system 1000 for beverage production is similar to that described in paragraphs [0050-0102] of the European Patent EP 3403547 by the same applicant, whose content is herein entirely incorporated by reference.

[0082] The use of the capsule 300 provided with the reinforcement ring 200 according to the present invention, in the system 1000, is advantageous in that the elements 201 extending from the side wall 101 of the reinforcement ring 200 enable improving sealing of the inner surface 503 of the lateral surface 501 of the container 500.

[0083] As visible in the cross-sectional view of the system 1000 in Fig. 8, the elements 201 extend along the capsule body 301 below the edges delimiting the corresponding recesses 506, so as to close the recesses. During production of the beverage, part of the pressurized water, delivered through the conduit 504, pushes the elements 201 outward from the capsule body 301, in contact with the inner surface 503 of the lateral surface 501 of the container 500. In this way, the elements 201 press against the inner surface 503 and close the recesses 506. Water or beverage leakage is thus prevented, during beverage production, and the overall sealing of the system 1000 is improved.

[0084] Even if the present invention has been described with reference to the embodiments described above, it is clear to the skilled person that it is possible to carry out various modifications of the present invention in light of the teachings described above and within the scope of the appended claims, without departing from the subject matter and scope of protection of the invention.

[0085] For example, the size of the preparatory element and consequently of the ring can appropriately vary, so that the ring can be applied to different capsules for obtaining beverages, for example, to single-dose capsules containing different amounts of product for obtaining the desired beverage.

[0086] Furthermore, even if the attached figures show rings with a circular shape, the present invention is not limited to such shapes. In fact, it is possible to form also polygonal rings, that is, having a side wall whose cross-section has a polygonal shape, e.g., triangular, squared, rectangular, pentagonal, hexagonal, octagonal, dodecagonal. The projecting surface can also have a variety of shapes.

[0087] In the case of polygonal rings, it should be understood that the preparatory element also has a side wall with a polygonal cross-section. In such a case, the center O and the axis y are to be understood as the geometric center and the axis passing through that center.

[0088] Finally, those areas that are believed to be known to the skilled person have not been described to avoid unnecessarily obscuring the described invention.

[0089] Accordingly, the invention is not limited to the embodiments described above, but it is only limited by the scope of protection of the appended claims.

Claims

1. A preparatory element (100) suitable for becoming a reinforcement ring (200) for capsules for obtaining beverages, for instance coffee, comprising:

   a side wall (101) extending around an axis (y) and having a first extremity (103) and a second extremity (104); and
   a flat surface (105), protruding from said side wall (101) in correspondence with said first extremity (103),

   characterized in that:
   said preparatory element (100) further comprises a reinforcement surface (106) in correspondence with said second extremity (104), wherein said reinforcement surface (106) is configured to open symmetrically with respect to said axis (y), so as to obtain a plurality of elements (201) that extend from said second extremity (104).

2. The preparatory element (100) according to claim 1, wherein said side wall (101), said protruding flat surface (105) and said reinforcement surface (106) are made as a single body.

3. The preparatory element (100) according to claim 1 or 2, wherein said side wall (101) and said reinforcement surface (106) form a compartment.

4. The preparatory element (100) according to any one of the previous claims, wherein said reinforcement surface (106) comprises one or more perforation lines (108, 109), for instance two, three, four, five, six, seven, or eight.

5. The preparatory element (100) according to claim 4, wherein said one or more perforation lines (108) extend from the central point (O) of said reinforcement surface (106) to the extremity (102) of said reinforcement surface (106) in correspondence with said second extremity (104) of said side wall (101), wherein said central point (O) is the point where said axis (y) crosses said reinforcement surface (106).

6. The preparatory element (100) according to claim 4 or 5, wherein said one or more perforation lines form two or more parts (107), for instance two, three, four, five, six, seven, or eight parts, suitable to become said plurality of elements (201) that extend from said second extremity (104).

7. The preparatory element (100) according to claim 6,

wherein said parts (107) are circular sectors.

8. The preparatory element (100) according to any one of previous claims, wherein said preparatory element (100) is made of a biodegradable material and/or compostable and/or bio-based, for instance paper, paper board, PLA, PHA, PBS, starch blends, bio-based PE, PET, PA or PT.

9. The preparatory element (100) according to any one of previous claims, further comprising a layer of thermoformable material (320), preferably filtering, fixed to said flat surface (105), preferably so as to form a closed volume with said side wall (101) and said reinforcement surface (106).

10. A reinforcement ring (200) for capsules for obtaining beverages, for instance coffee, comprising:

A side wall (101) extending around an axis (y) and having a first extremity (103) and a second extremity (104);
A flat surface (105) protruding from said side wall (101) in correspondence with said first extremity (103),

characterized in that:
said reinforcement ring (200) further comprises a plurality of elements (201) that extend from said second extremity (104).

11. A reinforcement ring (200) for capsules for obtaining beverages, for instance coffee, obtained from the preparatory element according to any one of the claims from 1 to 9, so as to comprise said plurality of elements (201) that extend from said second extremity (104).

12. The reinforcement ring (200) according to claim 10 or 11, wherein said elements (201) that extend from said second extremity (104) are two or a number bigger than two, for instance, three, four, five, six, seven, or eight.

13. The reinforcement ring (200) according to any one of claims from 10 to 12, wherein said elements (201) that extend from said second extremity (104) are circular sectors.

14. A capsule (300) for obtaining beverages, for instance coffee, comprising:

The reinforcement ring (200) according to any one of claims from 10 to 13; and
A capsule body (301) fixed to said reinforcement ring (200), preferably by means of welding, wherein said capsule body (301) is suitable to form a containment volume for the product (P) used for obtaining the desired beverages, for instance, ground coffee.

15. The capsule (300) according to claim 14, wherein said capsule body (301) is made of a filtering material, for instance thermoformable, for instance a biodegradable and/or compostable and/or bio-based material and, for instance, paper, paper board, PLA, PHA, PBS, starch blends, bio-based PE, PET, PA or PT.

16. Method for forming a reinforcement ring (200) for capsules for obtaining beverages, for instance coffee, said method comprising the following steps:

a) Providing a preparatory element (100) according to any one of claims from 1 to 9;
b) Opening said reinforcement surface (106) so as to form said plurality of elements (201) that extend from said second extremity (104).

17. Method for producing a capsule (300) for obtaining beverages, for instance coffee, said method comprising the following steps:

i) Forming a reinforcement ring (200) according to the method of claim 16;
ii) Providing a capsule body (301) suitable for forming the containment volume for the product (P) used for obtaining the desired beverage, for instance ground coffee;
iii) Fixing said capsule body (301) to said reinforcement ring (200);

characterized in that:
said step (b) of opening said reinforcement surface (106) is carried out by inserting said capsule body (301) in said preparatory element (100).

18. Method for producing a capsule (300) according to claim 17, wherein said step (b) of opening said reinforcement surface (106) comprises using a welder (400), wherein said welder (400) is inserted in the capsule body (301) so as to open said reinforcement surface (106) and to fix said capsule body (301) to said reinforcement ring (200).

19. Method for producing a capsule (300) for obtaining beverages, for instance coffee, said method comprising the following steps:

i) Forming a reinforcement ring (200) according to the method of claim 16;
ii) Forming a capsule body (301) suitable for forming the containment volume for the product (P) used for obtaining the desired beverage, for instance ground coffee, wherein said forming of said capsule body (301) is carried out by means

of thermoforming, starting from a layer of thermoformable material (320) by means of a forming die (410);

characterized in that:
said step (b) of opening said reinforcement surface (106) is carried out by inserting said forming die (410) in said preparatory element (100) when said layer of thermoformable material (320) is shaped to form said capsule body (301).

20. System for beverages (1000) comprising:

A capsule (300) according to claim 14 or 15;
A container (500) suitable for accommodating said capsule (300) during the step of supplying pressurized water for producing the beverage, said container (500) comprising a lateral surface (501) and a bottom (502) forming the compartment suitable for accommodating said capsule (300) during the water supply;

characterized in that:
a predefined portion of an inner surface (503) of said lateral surface (501) of said container (500) and one or more of said elements (201) that extend from said second extremity (104), preferably all of them, are watertight with each other.

21. Method for producing a beverage by using the system according to claim 20, comprising the step of making a predefined portion of said inner surface (503) of said lateral surface (501) of said container (500) and one or more of said elements (201) that extend from said second extremity (104), preferably all of them, watertight with each other.

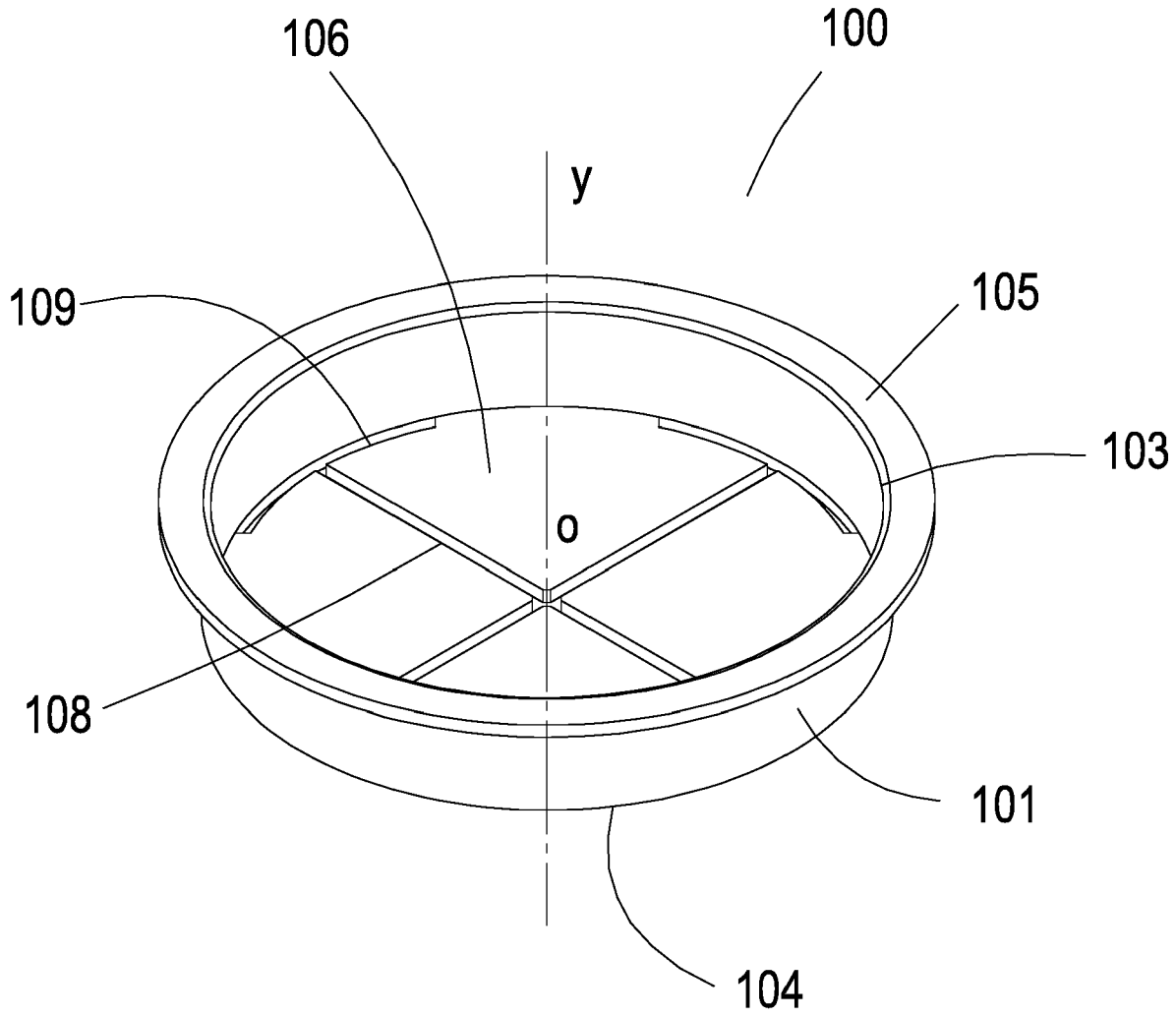

Fig. 1a

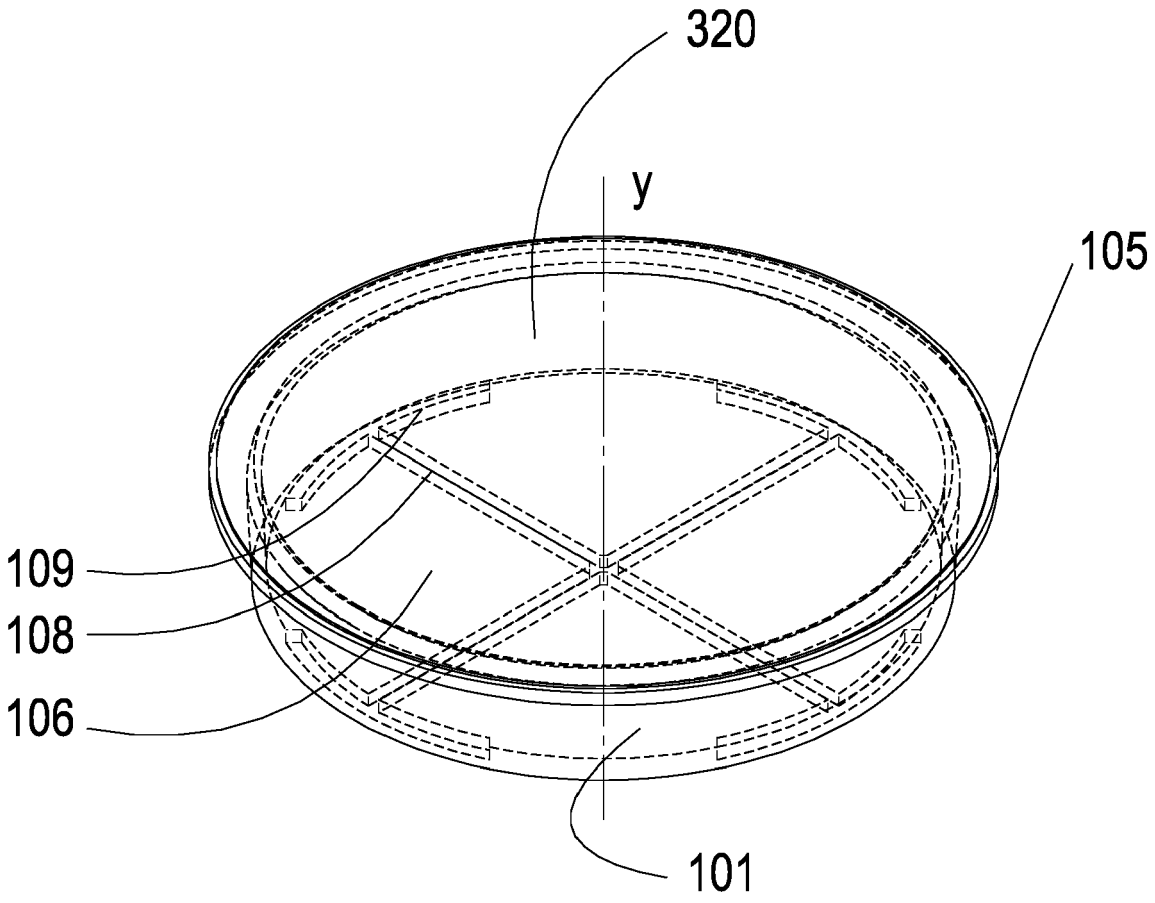

Fig. 1b

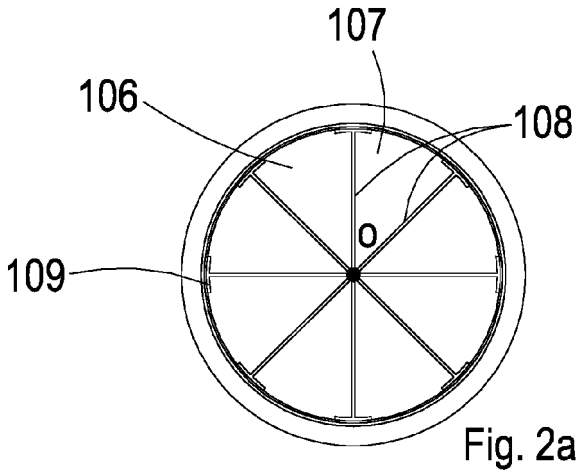

Fig. 2a

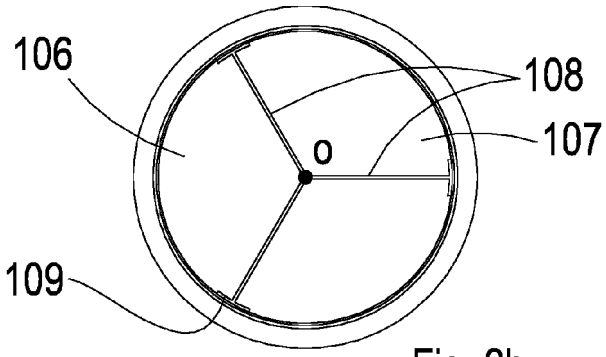

Fig. 2b

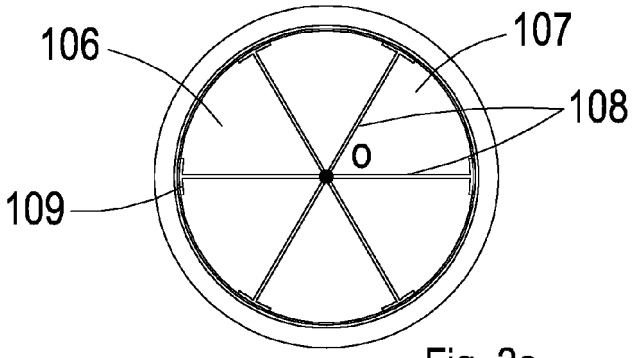

Fig. 2c

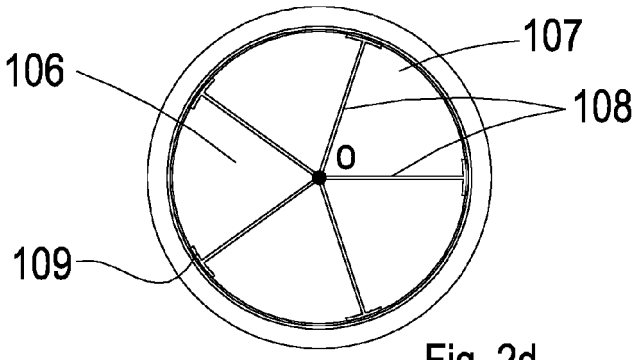

Fig. 2d

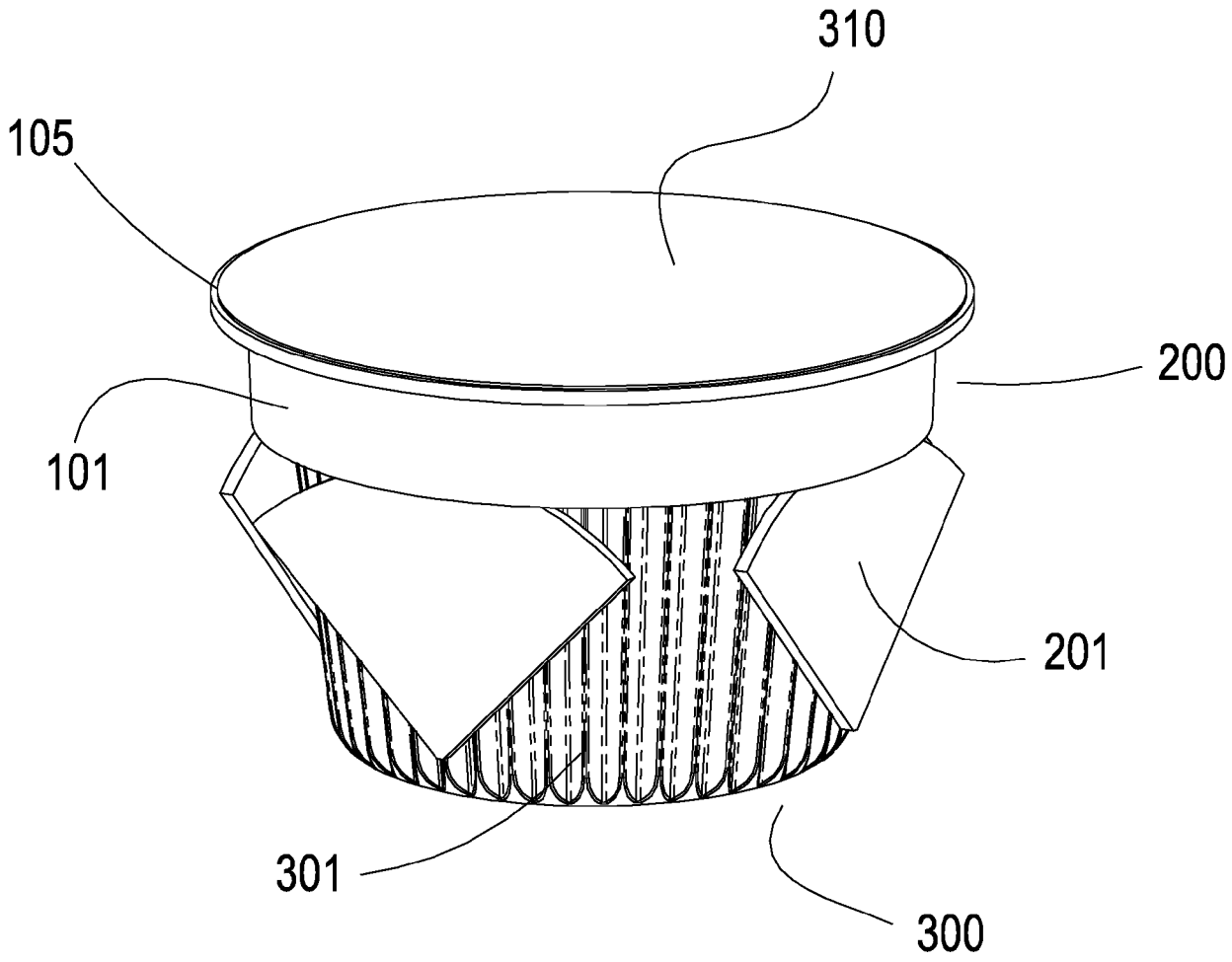

Fig. 3

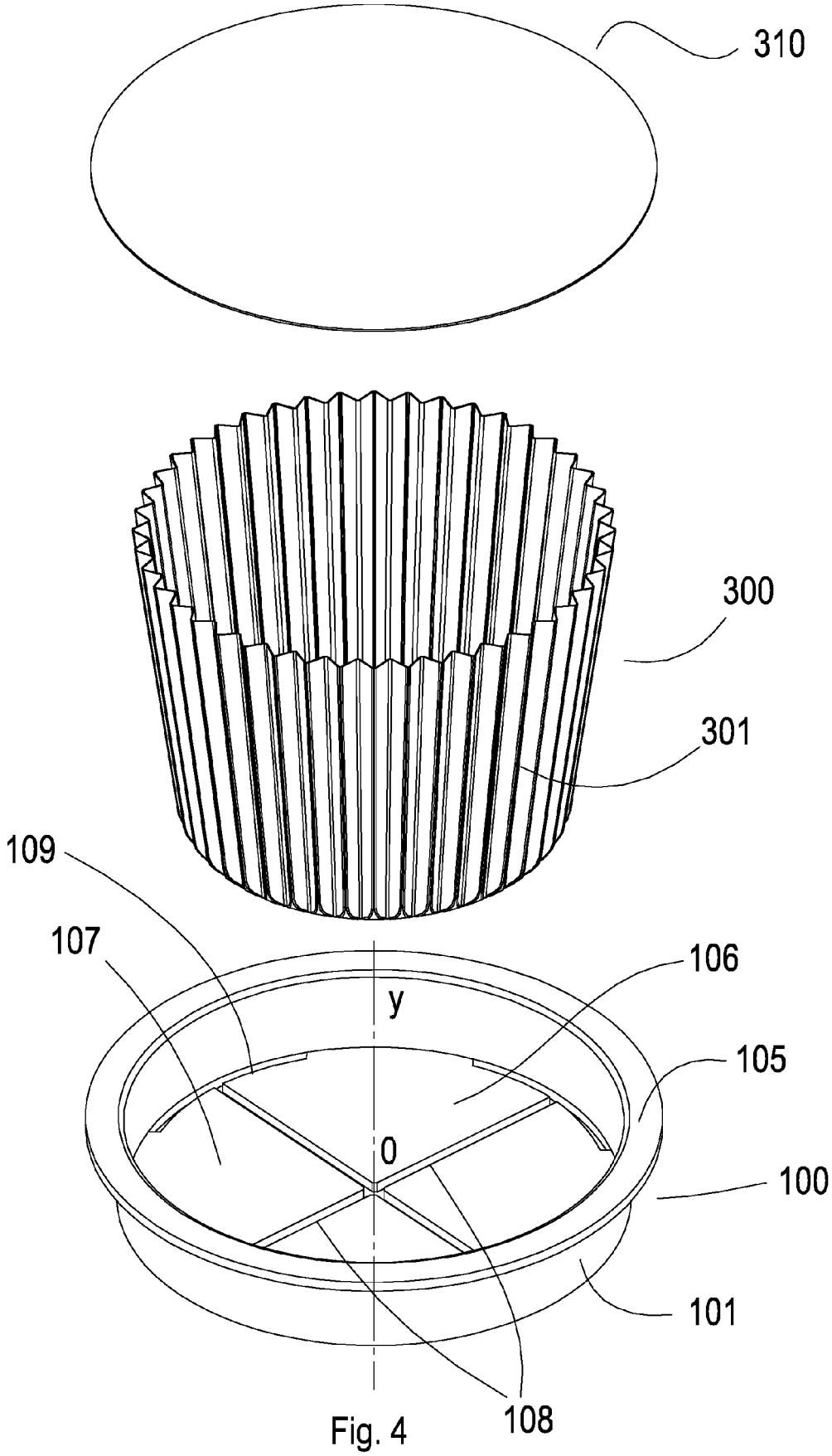

Fig. 4

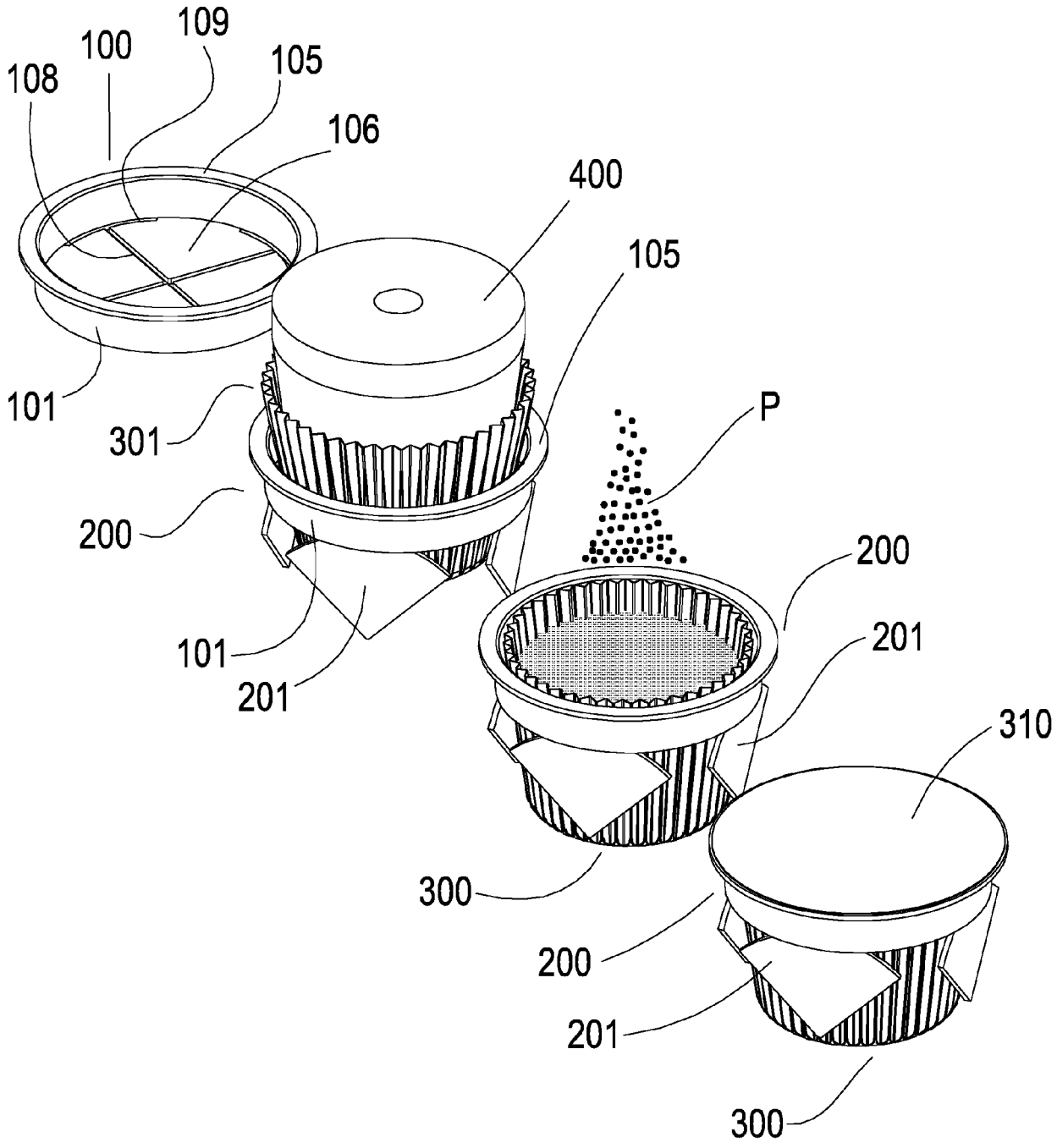
108
100
109
105
106
400
105
101
301
P
200
200
101
201
201
310
300
200
201
300

Fig. 5a

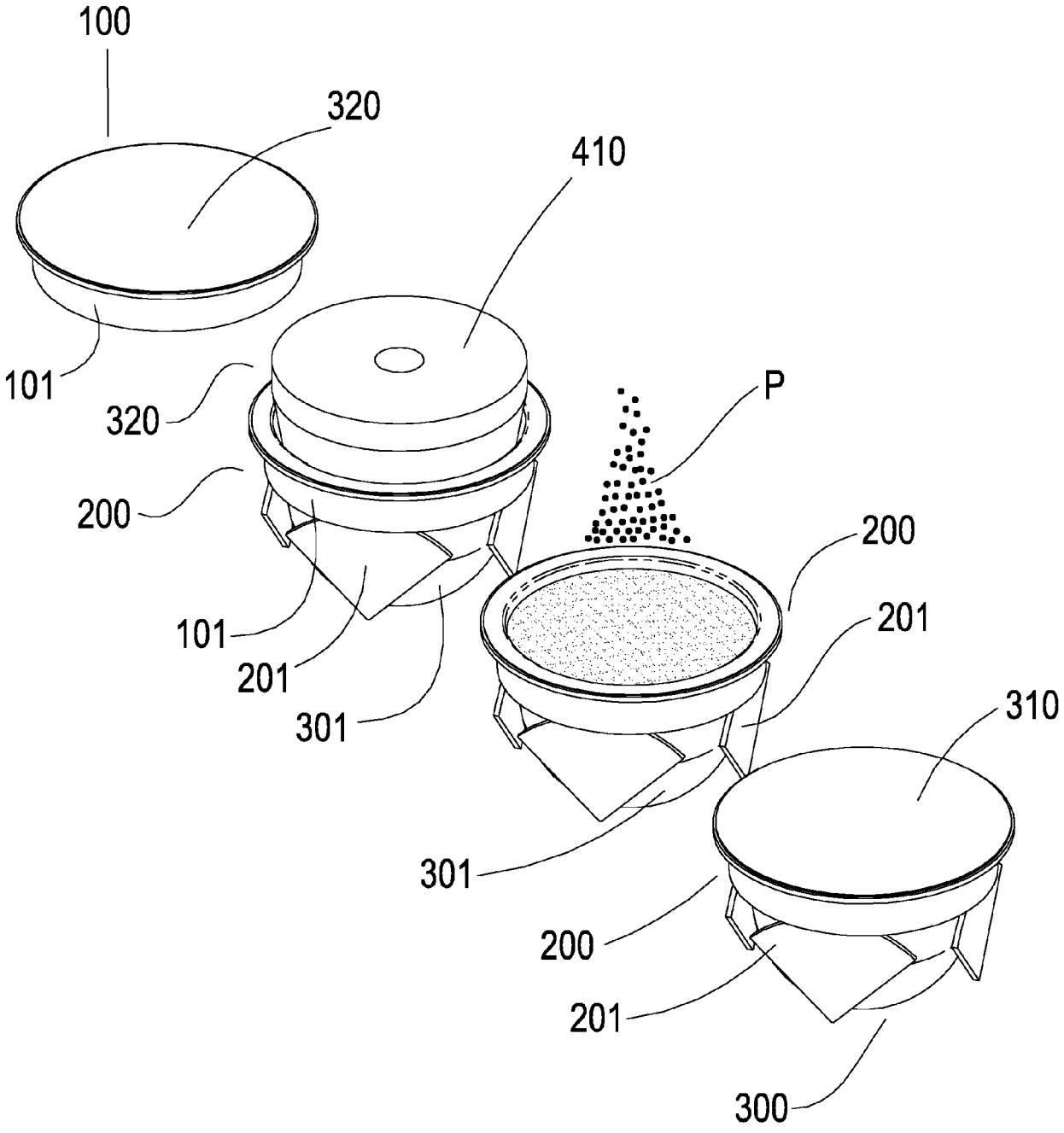

Fig. 5b

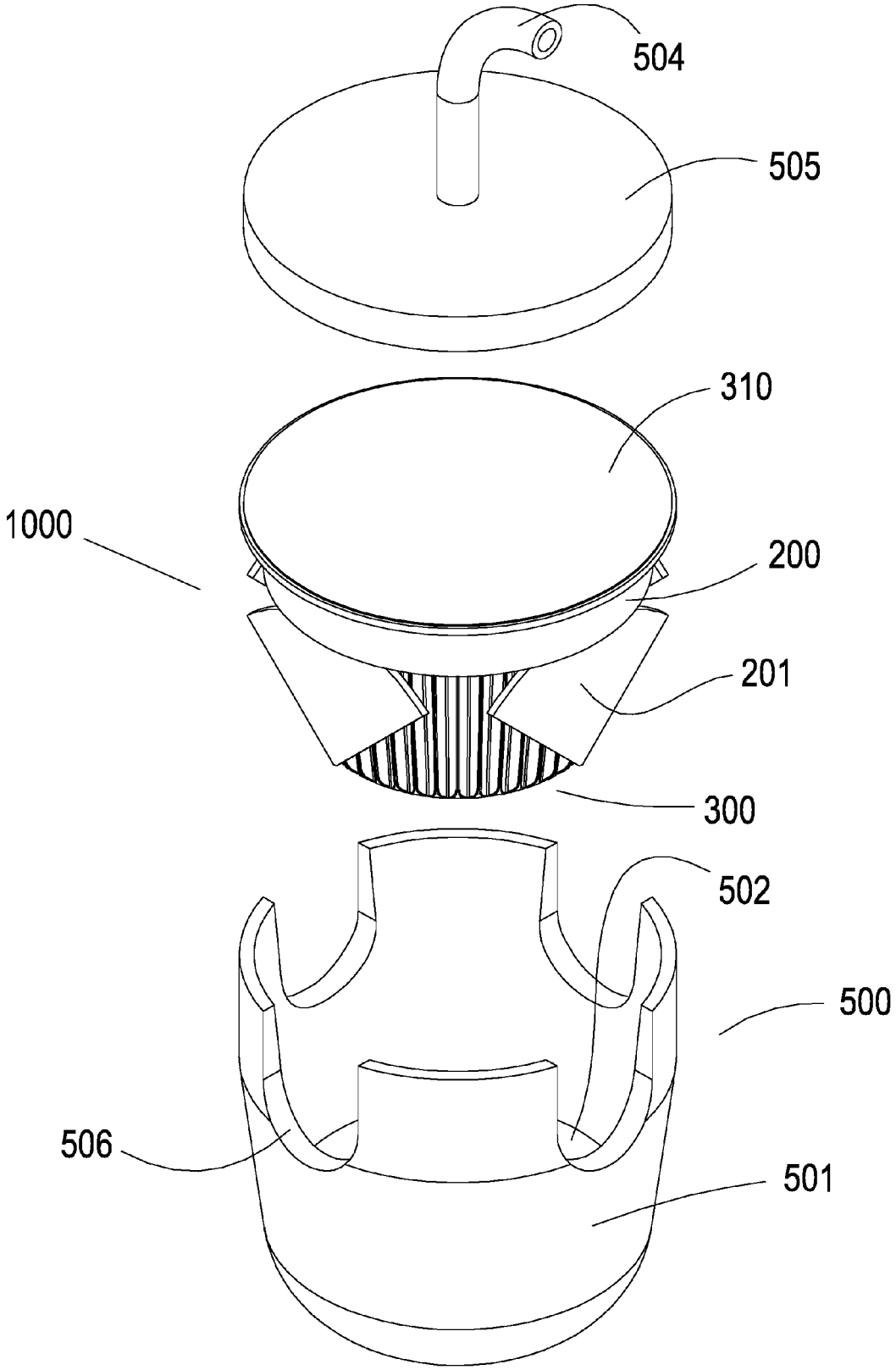

Fig. 6

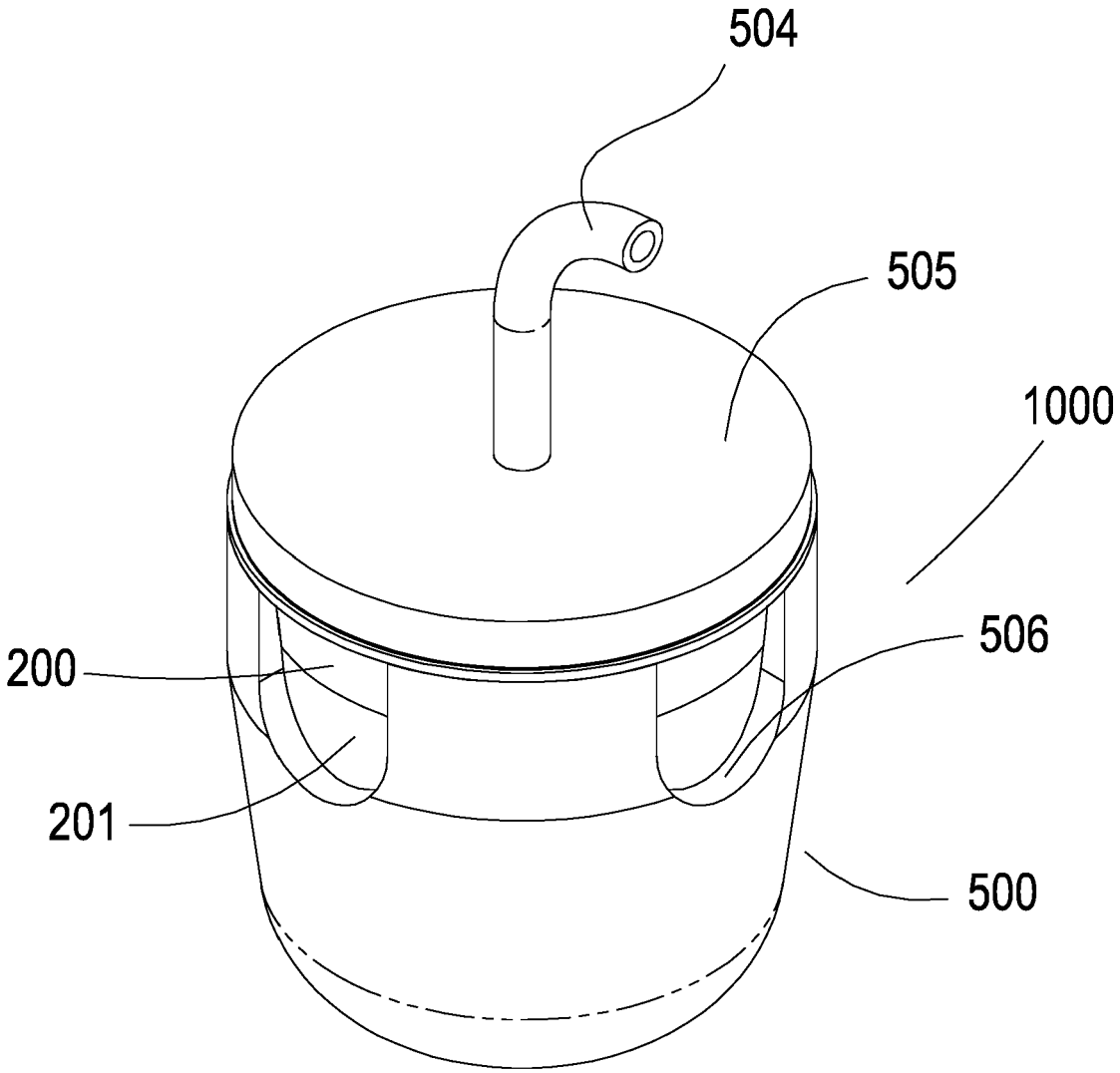

Fig. 7

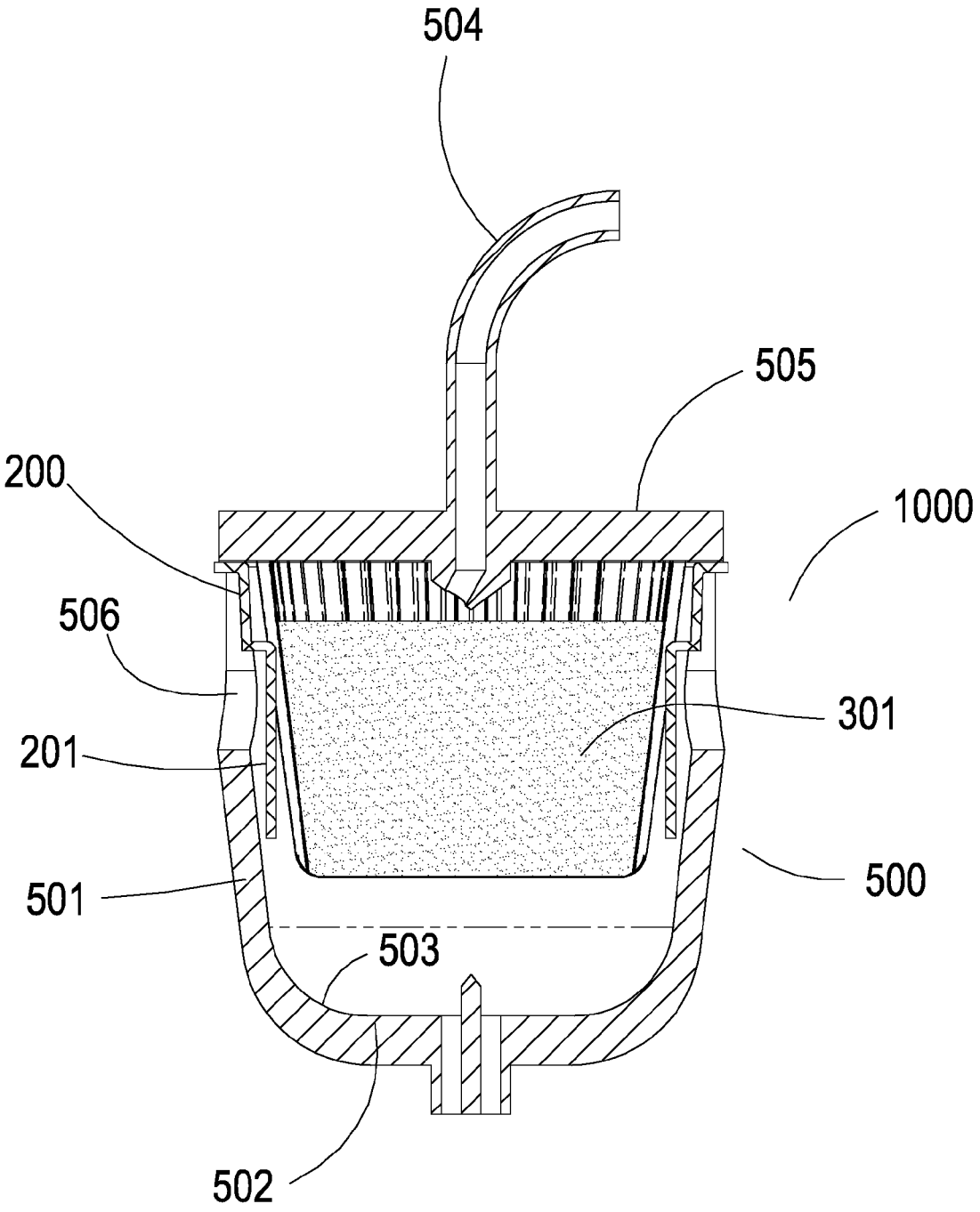

Fig. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 24 17 5977

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			B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 September 2024	Fournier, Jacques

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