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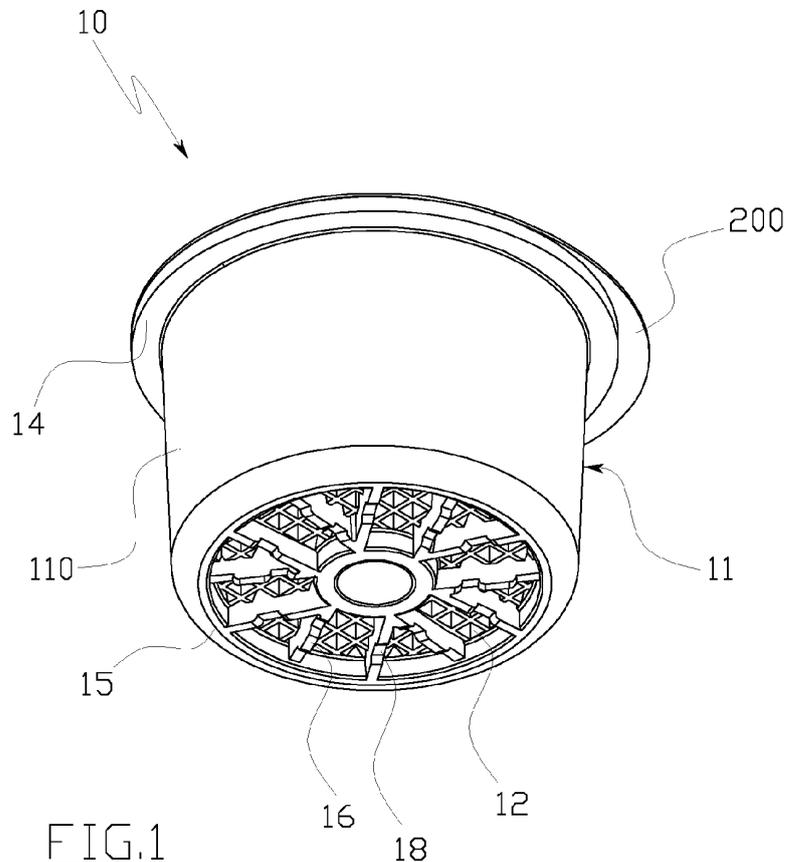
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**(54) A disposable cartridge for preparation of beverages**

(57) A cartridge (10) for preparing beverages, comprising a beaker-shaped body (11) made of a waterproof material, internally of which a substance for preparation

of the beverage is contained, the beaker-shaped body exhibiting a bottom wall (12) provided with a plurality of reinforcing ribs (16), characterised in that at least one of the ribs (16) exhibits a passage opening (18).



**FIG.1**

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## Description

**[0001]** The present invention relates to a disposable cartridge for the preparation of beverages, typically coffee, tea or other beverages obtainable by infusion or solution of a granular or powder food substance.

**[0002]** It is known that a disposable capsule of this type generally comprises a beaker-shaped container, closed at the bottom and open at the top, a dose of comestible substance contained in the container, and a cover element suitable for closing the top opening of the container, so as to retain the dose of comestible substance internally of the capsule.

**[0003]** In some embodiments, the container and the cover element are perforated, with holes sufficiently small to retain the food substance within the capsule, but large enough to allow the passage of the water and/or steam necessary for the preparation of the beverage.

**[0004]** In other embodiments, the container and/or the cover element are made of a continuous and impermeable material, so as to completely insulate the comestible substance from the external environment.

**[0005]** In both the above cases, the cover element can have the form of a thin film that is fixed, for example by heat sealing or gluing, on a flange of the container which delimits the opening.

**[0006]** Starting from a disposable capsule of this type, the preparation of the beverage is performed with the aid of a suitable dispensing machine which enables introduction of the hot water and/or steam internally of the capsule, and then enables extraction of the drink thus-obtained, leaving that remains of the comestible substance in the capsule.

**[0007]** In the case in which the capsule is of a waterproof type, the dispensing machine is further predisposed to pierce the cover element, so as to enable introduction of hot water and/or steam, and allow the outflow of the beverage obtained.

**[0008]** The full exploitation of the product contained inside the container, and consequently the quality of the drink obtained, is only achieved by a perfect saturation of water/steam in the product itself. To this end it is of great importance that the product contained within the container does not create preferential paths through which the beverage emerges from the capsule, since, in this case, the drink obtained is of poor quality.

**[0009]** This drawback occurs particularly in the case of containers with a sealed covering, which are pierced during use, creating a small number of points of entry of the hot water and/or steam, which tend to create preferential paths for the passage of water and steam.

**[0010]** The drawback exists for all types of capsules, including in the case in which the dispensing of the mixture from the dispensing machine is partially blocked by dirt, machining errors, or positioning of the capsule, so as to facilitate the outflow through the cited preferential paths.

**[0011]** This phenomenon is more greatly evident in the

case in which the beverage is an espresso coffee preparation, as together with the liquid portion of the drink a cream must be generated, which is created by emulsifying the liquid part with air at the moment at which the coffee is dispensed. If preferential paths get created in the capsule for the passage of the mixture, this cream will not be created and the coffee will therefore be of poor quality.

**[0012]** An example of a capsule according to the preamble of claim 1 is described in international application no. WO 2012/104795.

**[0013]** The openings present on the reinforcing ribs located on the bottom wall of the capsule described in the prior document are all aligned with respect to an imaginary circumference centred on the bottom wall and having a radius a little longer than the radius of the central shank which projects axially (externally) from the bottom wall.

**[0014]** This arrangement of the openings, while placing the various circular sectors in which the bottom wall is sub-divided in communication, does not however enable effective distribution of the beverages between the sectors and a homogeneous aeration thereof for realising an optimal emulsion and a lasting cream.

**[0015]** An aim of the present invention is therefore to provide a solution that enables solving the above-mentioned drawbacks.

**[0016]** Another aim of the present invention is to attain this objective in the context of a simple, rational and relatively inexpensive solution.

**[0017]** These and other aims are achieved by the characteristics of the various embodiments of the invention reported in the independent claim. The dependent claims describe preferred and/or particularly advantageous aspects of the various embodiments of the invention.

**[0018]** In particular, an embodiment of the present invention provides a cartridge for preparing beverages, comprising a beaker-shaped body made of a waterproof material, internally of which a substance for preparation of the beverage is contained, the beaker-shaped body exhibiting, for example externally of the beaker-shaped body, a bottom wall provided with a plurality of reinforcing ribs able to sub-divide the bottom wall into a plurality of sectors (for example circular sectors).

**[0019]** According to the invention, some or all of the ribs exhibit at least a passage opening, which is able to place the two adjacent sectors in communication. The openings, for example of two contiguous ribs, are positioned staggered on the ribs.

**[0020]** The realising on the bottom of the capsule of a series of ribs in sectors exhibiting different heights, which define passage openings, enables a uniform emulsion of the beverage to be obtained.

**[0021]** The staggered arrangement of the openings that open in a sector facilitates the filling of the sector and improves the emulsion of the beverage, as well facilitating the natural circulation of the air around the fluid, enabling a correct and optimal emulsion and a generation

of a more lasting cream.

**[0022]** Moreover, this solution ensures the outflow of fluid dispensed under all operating conditions, as it prevents even only partial occlusion, and the consequent creation of preferential paths.

**[0023]** In the preparation of certain drinks, such as espresso coffee, the solution according to the invention advantageously facilitates the natural circulation of air around the fluid, allowing a correct emulsion and the generation of a more persistent cream.

**[0024]** By the expression "staggered position" it is advantageously intended that an opening afforded on a rib (substantially radial) is located at a distance from the centre of the bottom wall that is different with respect to the distance of an opening afforded on a contiguous rib.

**[0025]** The openings are for example passage thresholds, through-hole, or having alike specifications, realised in the ribs or lowered zones of the ribs, which each define a passage channel, for example with an axis that is substantially transversal with respect to the lie plane of the rib, which places two adjacent sectors in communication (also when the bottom wall is resting on a rest plane by means of the ribs).

**[0026]** At least a rib advantageously also comprises at least a pair of the openings, for example located at different distances from the centre of the bottom wall. In a further aspect of the invention the number of openings afforded in a rib of a pair of contiguous ribs is different from the number of openings afforded in the other rib of the pair of ribs.

**[0027]** For example, each rib comprising a sole opening is contiguous to at least one (two in the example) rib comprising more than an opening (for example a pair of openings).

**[0028]** A still further aspect of the invention can comprise an opening of any rib being aligned with respect to an imaginary circumference, centred at the centre of the bottom wall, with a portion of a contiguous rib not interested by an opening.

**[0029]** A further advantageous aspect of the invention comprises each rib comprising at least an opening.

**[0030]** In this way, the whole bottom wall can be interested by a flow of beverage, thanks to which the beverage is effectively emulsified in the passage between the various sectors through the various openings.

**[0031]** Further characteristics and advantages of the invention will more fully emerge from a reading of the following description, provided by way of nonlimiting example, with the help of the figures illustrated in the attached tables.

Figure 1 is a perspective view of a closed cartridge for preparing a beverage, according to a second embodiment of the present invention.

Figure 2 is a view from below of a closed cartridge for preparation of a beverage according to the invention.

Figure 3 is the section along line V-V of figure 2.

Figure 4 is a view in larger scale of a portion of the closed cartridge according to the invention.

Figure 5 is a schematic section view of the infusion assembly of a machine for dispensing a beverage that uses the cartridge according to the invention.

With reference to the above figures, a disposable cartridge 10 is illustrated,

for the preparation of beverages, typically coffee, tea or other beverages obtainable by infusion or dissolving of a granular or powder food substance.

The cartridge 10 comprises a beaker-shaped body 11, or shaped as a container that is closed at the bottom by a bottom wall 12 and is provided with an opposite open mouth 13.

**[0032]** The beaker-shaped body 11 contains a dose of granular or powder food substance that is able to make the drink by infusion or solution in water.

**[0033]** The bottom wall 12 includes a plurality of holes small enough to retain the food substance inside, but large enough to allow the passage of water.

**[0034]** The shape of the beaker-shaped body 11 may be any, for example truncoconical as in the figures, or cylindrical, hemispheric or another shape.

**[0035]** The open mouth 13 of the beaker-shaped body 11 is delimited by a flat peripheral flange 14, formed in a single piece with the beaker-shaped body 11, which projects from the top of the side wall 110 of the beaker-shaped body 11, extending externally of the cavity.

**[0036]** The beaker-shaped body 11 also includes a lower edge 15 which derives from the bottom wall 12 in continuation of the side wall 110.

**[0037]** A plurality of reinforcing ribs 16 are associated to the bottom wall 12, which is perforated in the illustrated embodiment, the maximum height of which ribs 16 is equal to or just a little less than the height of the edge 15, such that the bottom surface of the edge 15 and the lower surface of the ribs 16 are substantially coplanar.

**[0038]** Each of the reinforcing ribs 16 has at least an opening 18 for the passage of the beverage being dispensed. The passage openings 18 ensure a greater uniformity of the emulsifying of the beverage before dispensing, as will be better explained in the following.

**[0039]** In the illustrated embodiment, the bottom wall 12 comprises a central shank 120 and the ribs are positioned between the central shank 120 and the lower edge 15. In particular, the ribs are arranged in pairs, each pair of ribs having an end in common, and free ends distant from one another such as to form a V-shaped arrangement. With reference to figures 1 and 2, note that each pair of ribs is bi-symmetrical with respect to a radial plane of the cartridge 10. This arrangement of the ribs 16 is particularly effective in ensuring a good uniformity of the emulsion of the beverage.

**[0040]** In figures 1, ..., 4, which illustrate a cartridge 10 of the type known as closed, or perforable, the open mouth 13 of the beaker-shaped body 11 has a closing wall 19 which comprises a film 20, applied on the periph-

eral flange 110.

**[0041]** The closing film 20 is also made of a waterproof and continuous material, and is fixed on the perimeter flange 110, so as to hermetically seal the food substance, contained in the beaker-shaped body, with respect to the external environment.

**[0042]** The closing film 20 is therefore quite thin, in the order of a few tenths of a millimetre.

**[0043]** The sealing film 20 is preferably made of aluminium and is fixed on the perimeter flange 110 by heat sealing, without excluding that this can be realised using other materials, including for example plastic.

**[0044]** The closing film exhibits, in the illustrated embodiment, a recycling tab 200, which passes beyond the flange 110 in an externalwise direction. The tab 200 has the function of enabling the cartridge to be opened after use in order that powder can be removed from the inside of the cartridge, in order to advantageously recycle the cartridge.

**[0045]** Where the cartridge is of the open or preperforated type, the open mouth 13 of the beaker-shaped body 11 is closed by a perforated lid, not shown as known *per se*, with holes that are sufficiently small to internally retain the comestible substance, but large enough to allow the passage of water.

**[0046]** The beaker-shaped body 11 is made of an elastically yielding, waterproof and continuous material, i.e. free of holes or openings, so as to constitute an effective barrier against the passage of liquids and preferably also gases. Preferably, the beaker-shaped body 11 is made of plastic, for example produced in a heat-forming process, but it could be made using other materials, including for example aluminium.

**[0047]** The cartridge 10 can be used by a machine that generally comprises a boiler for heating water, an infusion group 30 (see figure 5) able to receive the cartridge 10, and a pump to pump the hot water from the boiler and feed it to inside the infusion assembly 30.

**[0048]** The pump and the boiler, as well as the body of the machine, the hydraulic circuits and the apparatus' accessories, are not illustrated herein and described in detail since they are widely known to the skilled person in the sector.

**[0049]** The infusion assembly 30, which in the illustrated example is of the laterally-open type, comprises a beaker-shaped body 31 which can accommodate the cartridge 10, which body 31 exhibits at the bottom thereof a dispensing spout 310 of the beverage, and a mouth located opposite, for the introduction and extraction of the cartridge 10.

**[0050]** The infusion assembly 30 also comprises a cylindrical closing plate 32 which is able to close on the beaker-shaped body 11, abutting against the flange 110, so as to define a closed infusion chamber, coinciding with the internal volume of the beaker-shaped body, which completely encloses the comestible substance.

**[0051]** Needles 35 are associated to the closing plate, which needles 35 are also conical having a point and

project towards the beaker-shaped body 31. Each of these needles 35 has a central hole 350 which is placed hydraulically in communication with the water feed pump.

**[0052]** The infusion chamber is hermetically sealed, with suitable gaskets interposed between the beaker-shaped body 31 and the cartridge 10 and the closing plate 32 and the cartridge itself.

**[0053]** The closing plate 32 can be unremovably fixed to the machine, while the beaker-shaped body 31 can be separable and associable to the machine by means of a screw system enabling the beaker-shaped body 31 to be axially neared to the stationary closing plate 32.

**[0054]** Alternatively, the beaker-shaped body 31 could be unremovably associated with the machine and axially mobile thereon, between an open position and a closed position.

**[0055]** The clamping action of the beaker-shaped body 31 on the closing plate 32 (or vice versa), or in any case the insertion of the cartridge 10 between them, is able to slightly compress the beaker-shaped body 11 in the axial direction, so that the edge 15 of the cartridge is pushed against a surface 311 (for example upper in the figure) of the beaker-shaped body 31.

**[0056]** At this point, the boiler supplies the hot water to the infusion chamber through the central holes 350, so that it mixes with the food substance contained in the cartridge 10, by infusion or solution, a beverage that passes through the bottom wall 12 of the beaker-shaped body and, before exiting through the delivery spout 310, fills a chamber defined by the bottom wall 12, the edge 15 and surface 311 of the beaker-shaped body 31. The filling of the chamber is made possible because of the openings 18, which enable the beverage to by-pass the reinforcing ribs 16 and be distributed in the chamber.

**[0057]** In practice, the chamber of the infused beverage is defined by the totality of the sectors delimited by the ribs 16, inferiorly closed by the surface 311 of the beaker-shaped body 31 and communicating with one another through the openings 18.

**[0058]** The openings 18 are advantageously positioned offset on the ribs so as to facilitate the filling of the chamber and improve the emulsion of the beverage. The filling of the chamber, and the passage of the beverage between the winding tunnels defined by the openings 18 between the ribs 16, enables a better uniformity of the beverage emulsion, which makes the beverage qualitatively better. This is particularly evident when the beverage is an espresso coffee preparation, since the presence of the openings in the ribs promotes natural circulation of air around the fluid, leading to a proper emulsion and the generation of a more persistent cream.

**[0059]** The operation of the cartridge has been described with reference to the cartridge shown in figures 1, ..., 4. Obviously if the cartridge is of a different type, for example perforated or open, the closing plate of the infusion group will not exhibit the needles 35 but will be provided with a plurality of holes for the injecting of fluid inside the cartridge.

**[0060]** The invention as it is conceived herein is susceptible to numerous modifications and variations, all falling within the inventive concept. Moreover, all the details can be replaced by other technically equivalent elements.

**[0061]** In practice, the materials employed, as well as the contingent shapes and dimensions, may be any according to requirements without thereby forsaking the scope of protection of the following claims.

the wall (19) comprises a film (20) of perforable waterproof material.

## Claims

1. A cartridge (10) for preparing beverages, comprising a beaker-shaped body (11) made of a waterproof material, internally of which a substance for preparation of the beverage is contained, the beaker-shaped body exhibiting a bottom wall (12) provided externally with a plurality of reinforcing ribs (16) able to sub-divide the bottom wall (12) into a plurality of sectors, wherein the ribs (16) exhibit at least a passage opening (18), each able to place two adjacent sectors in communication, **characterised in that** the openings (18) are positioned staggered on the ribs (16).
2. The cartridge (10) of claim 1, wherein the body of the beaker-shaped body exhibits a lower perimeter edge (15), externally projecting with respect to the bottom wall (12).
3. The cartridge (10) of claim 1, **characterised in that** the bottom wall (12) comprises an external central shank (120).
4. The cartridge (10) of claims 2 and 3, **characterised in that** the ribs (16) are positioned between the shank (120) and the perimeter edge (15).
5. The cartridge (10) of claim 1, **characterised in that** the ribs (16) are arranged in pairs, each pair having an end in common.
6. The cartridge (10) of claim 5, **characterised in that** the two ribs (16) of each pair are bi-symmetrical with respect to a radial plane of the cartridge.
7. The cartridge (10) of claim 1, **characterised in that** the bottom wall is perforated.
8. The cartridge (10) of claim 1, **characterised in that** the beaker-shaped body (10) exhibits a flange (110) to which a wall (19) is applied for closing the mouth of the beaker-shaped body (11).
9. The cartridge (10) of claim 8, wherein the wall (19) comprises a pierced cover.
10. The cartridge (10) of claim 4, **characterised in that**

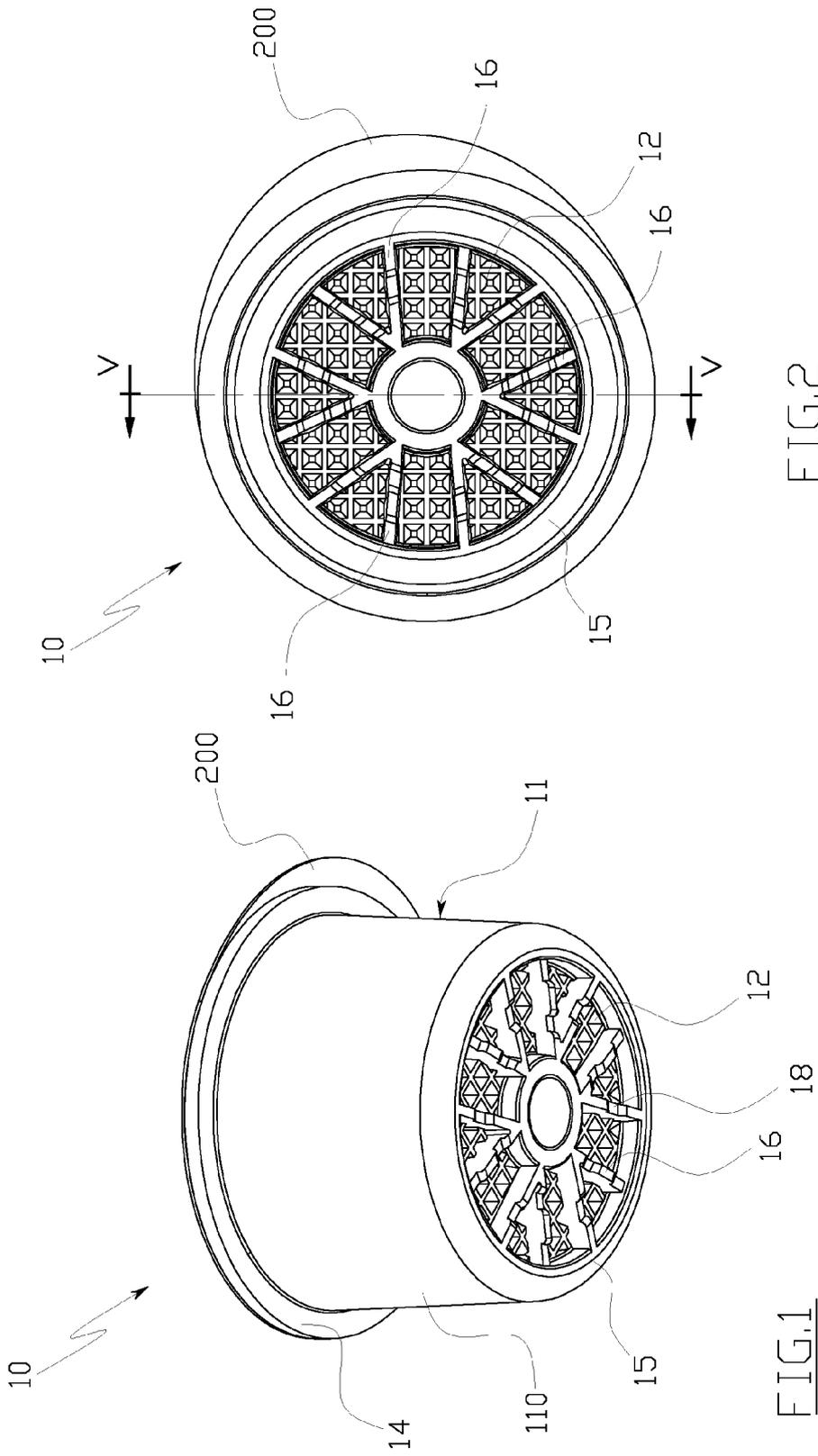


FIG. 2

FIG. 1

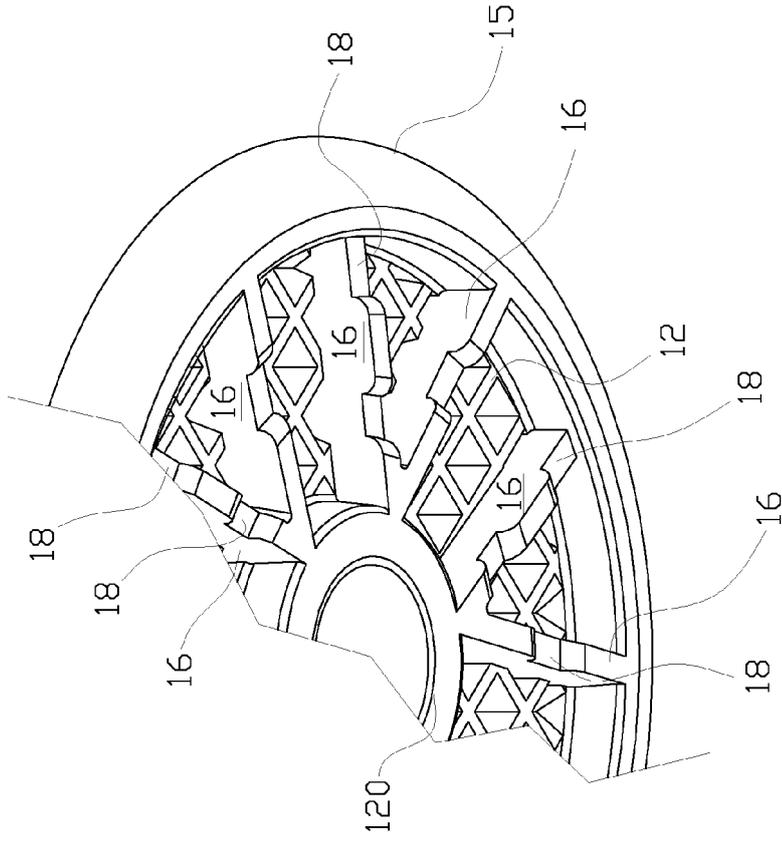


FIG. 4

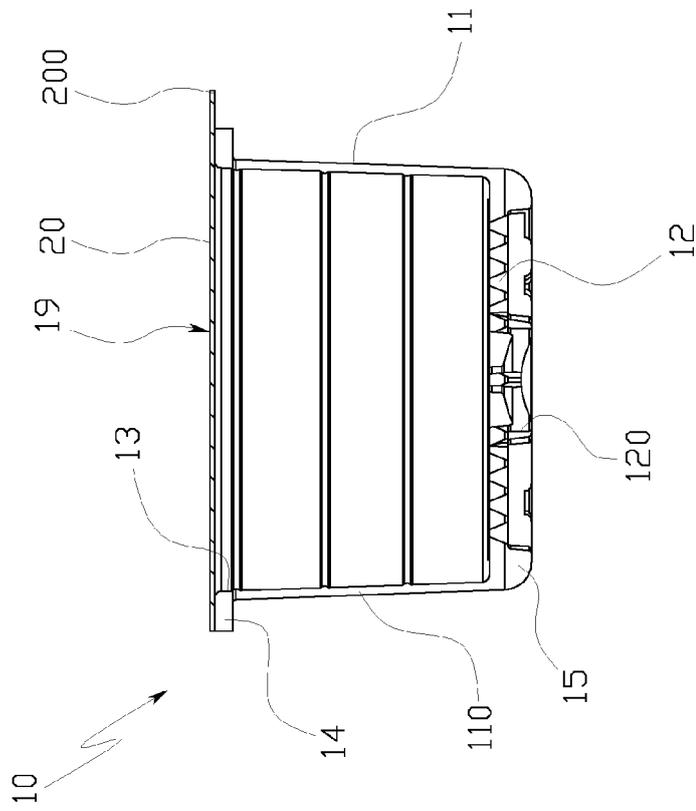


FIG. 3

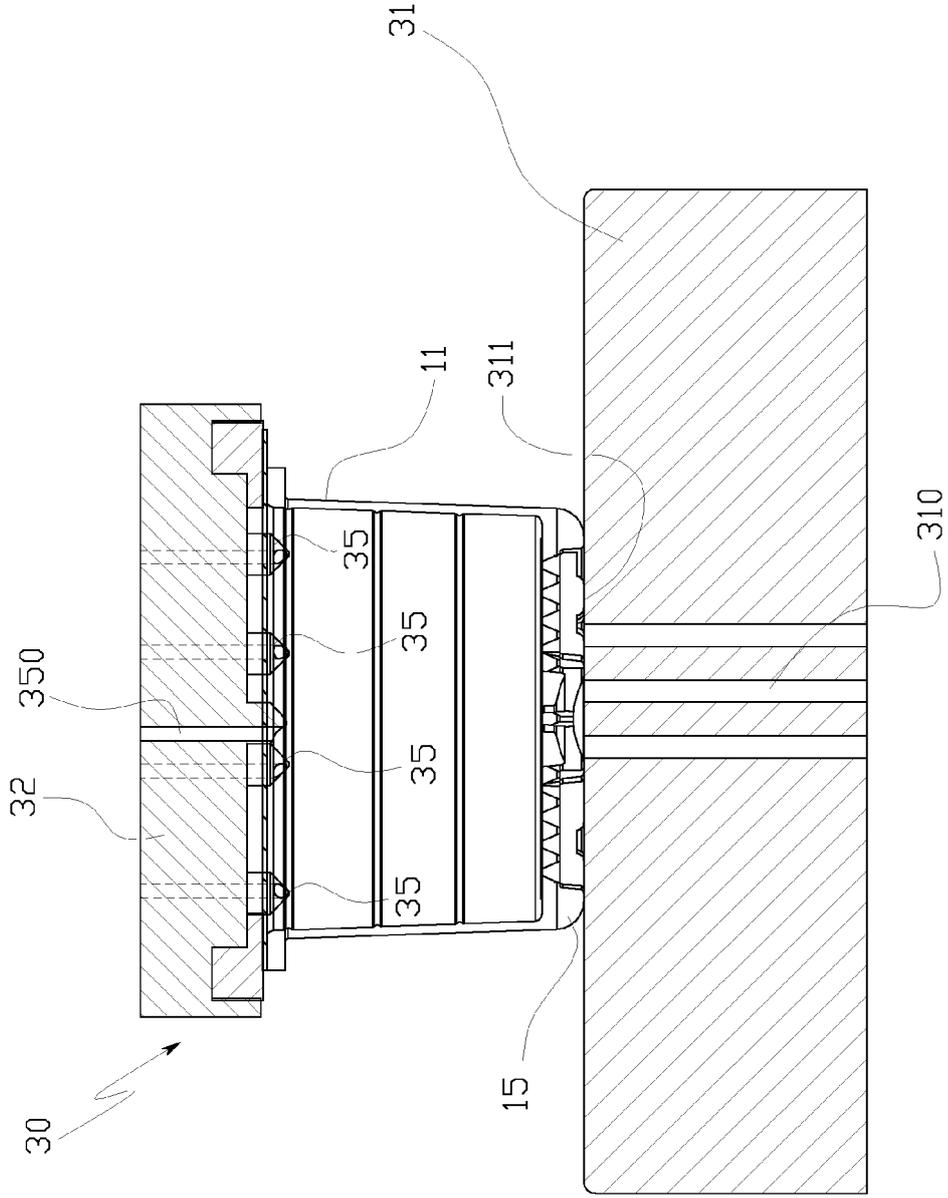


FIG.5



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Application Number  
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