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(54) CAPSULE FOR THE PREPARATION OF BEVERAGES

KAPSEL ZUR HERSTELLUNG VON INFUSIONEN

CAPSULE POUR PRÉPARER DES INFUSIONS

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(73) Proprietor: **CUP OUT OF THE BOX S.L.**
34200 Venta de Baños Palencia (ES)

(72) Inventor: **REINOSO VELASCO, Javier**
E-47007 Valladolid (ES)

(74) Representative: **Curell Suñol S.L.P.**
Via Augusta 21
08006 Barcelona (ES)

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Description

Field of the invention

[0001] The invention relates to a capsule for preparing infusions according to claim 1.

State of the art

[0002] Single-dose capsules for preparing infusions from a product such as coffee or tea, contained inside the substantially frustoconical capsule whose larger base has a ring-like peripheral flange extending radially outwards are known.

[0003] In this system for preparing infusions, the capsule is inserted in a machine having a cavity specially adapted to its shape. On the side corresponding to the larger base of the capsule, the machine has a wall provided with a plurality of piercing members, while at the other side the machine has a water injection cylinder the cavity of which mates with the external frustoconical shape of the capsule. The injection cylinder is moveable between an open position in which it is remote from the capsule and an injection position. Starting out from the open position and with the capsule inserted in the machine, when the cylinder assumes the injection position, it pierces the smaller base of the capsules with punches that open liquid passages. Simultaneously, the injection cylinder compresses the capsule against the wall against which its larger base is bearing thanks to the front edge bearing against the ring-like peripheral flange. This causes the simultaneous piercing of the larger base thanks to the action of the piercing members and the capsule to be immobilized inside the machine to start preparing the infusion.

[0004] In this position, the injection of hot water at a pressure of between 1 and 20 bars is started. As a result of the perforations in the smaller base and the larger base of the capsule, the hot water is led through the inner chamber thereof. The water flows across the inner chamber entering through the smaller base and exiting through the larger base towards an outlet collector conduit towards the cup, such that the water extracts the essences of the product from which it is desired to prepare the infusion.

[0005] The critical point of this system is the support point of the cylinder on the capsule. During the preparation of the infusion, water leaks can appear at this point, since a correct watertightness is not obtained between the injection cylinder and the capsule owing to the high working pressures. This results in an unsatisfactory operation of the machine, because the water leaks accumulate inside it and in the second place the pressure at which the infusion is brewed is directly affected by this lack of tightness. Owing to it not being possible to operate at such a high pressure, the taste or intensity characteristics of the infusion prepared are directly affected.

[0006] EP2303077 suggests a partial solution to this problem. To this end, this document proposes a capsule for working at a pressure of 9 bars comprising a cup with a circumferential wall, a bottom closing the circumferential wall at a first end and a flange extending outwardly of the circumferential wall at a second end opposite the bottom of the cup. The capsule also comprises a lid connected to the flange. In the use of the capsule, the bottom, the wall and the lid define a closed chamber containing the product to be extracted. Thus, to prevent water from leaking between the injection cylinder and the capsule, the cup is also provided with a number of concentric circumferential ridges extending outwardly from the cup and which are made from the same material as the cup. Nevertheless, this capsule, particularly when the ridges are provided on the flange is sensitive to misalignment between the injection cylinder and the capsule. Thus, when the front edge of the cylinder is misalignment with the ridges, the water may leak at this point relatively easily, which presents the previously mentioned disadvantages.

[0007] Document US 2011/185910 A1 discloses a capsule for containing beverage ingredients, the capsule being designed for insertion in a beverage production device. The capsule comprises a cup-like body portion, a flange-like rim portion, a delivery wall and a sealing member having-in a radial cross sectional view-at least one concentric protrusion and/or recession.

Summary of the invention

[0008] It is an object of the invention to provide a capsule for preparing infusions of the type indicated at the beginning guaranteeing good tightness between the injection cylinder of the machine and the capsule, independently of the relative position between both members and simultaneously allowing infusions of constant characteristics to be brewed.

[0009] This purpose is achieved by a capsule for preparing infusions of the type indicated at the beginning according to claim 1.

[0010] In the context of the invention, deformation under pressure during the preparation of the infusion refers to the pressure exerted by the injection cylinder of the machine on the capsule to guarantee a tight seal.

[0011] The discrete blind openings of the capsule according to the invention act at different levels. In the first place, they weaken the closing member enhancing the deformation thereof to achieve an improved watertightness. Another great advantage of the openings being discrete consists, unlike the concentric grooves of the state of the art, of the discrete openings not allowing a fluid communication to be established between the closed space between the inside of the injection cylinder with the capsule itself and the outside facilitating water leaks, since each opening is isolated from the adjacent openings. Finally, since the openings are blind, where the closing member is independent of the main body, guarantee the watertightness on the pressure faces of the closing member. Thus, correct watertightness is

achieved during the preparation of the infusion independently of the relative position between the capsule and the injection cylinder. As has already been explained above, this allows an infusion of constant characteristics with regard to taste or intensity of the infusion to be obtained.

[0012] The invention further includes a number of preferred features that are object of the dependent claims and the utility of which will be highlighted hereinafter in the detailed description of an embodiment of the invention.

[0013] In a particularly preferably way, in the invention at least the closing member is made from a plastics material having a Vicat softening temperature comprised between 70º and 140ºC. Surprisingly, during the development of the invention, it was observed that the combination of the discrete blind openings, together with the use of a plastics material having a softening temperature comprised in said range, caused such a plastic deformation in the pressure region of the cylinder that particularly notably improves the watertightness.

[0014] In one embodiment of the invention, the closing member is provided on the surface of said flange facing the smaller base of said main body. This configuration allows a high pressure of the injection cylinder on the capsule to be guaranteed. When the injection cylinder presses on the flange of the capsule, the latter bears with the opposite surface of the flange against the wall containing the plurality of piercing members, such that it is easier to deform the closing member.

[0015] A further object of the invention is to produce a low cost capsule. To this end, the closing member is preferably made from the same material as said capsule.

[0016] Also, with a view to reducing production costs even further, particularly preferably the closing member is integral with said capsule. This avoids the existence of separate parts which have to be assembled. The capsule main body can be manufactured with a single mould or die.

[0017] To guarantee a more uniform behaviour of the deformation of the closing member, in one embodiment of the invention the openings have the same cross section and in another embodiment the openings have the same depth.

[0018] Alternatively, the cross sectional dimension of the openings increases as the radial separation from the main body increases. For example, where the openings have a circular cross section, those located near the centre of the frustoconical main body have a smaller diameter than those located at a greater radial distance, namely, further removed from the main body. Thereby it is achieved that the material forming the closing member with the openings of dimensions increasing with the radius of separation from the main body has a similar density and, therefore, a similar compressibility in any radius of the sealing region.

[0019] Likewise, alternatively, the depth of the openings could also be different depending on the distance from the centre at which they are located.

[0020] Particularly preferably, the depth of the openings is greater than 0.10 mm, from which there is obtained a sufficiently large deformation to guarantee a good seal between the injection cylinder and the capsule.

[0021] Also alternatively with a view to obtaining a more regular opening pattern, the openings are preferably staggered. Again this guarantees also a more uniform compressibility.

[0022] Eventually, depending on the width of the closing member, it could happen that the misalignment between the injection cylinder and the capsule were excessive such that a part of the injection cylinder somewhere along the perimeter of the closing member projected slightly from the perimeter thereof. Thus, to avoid the risk of liquid leaks, preferably the closing member is a cylinder having a smooth outer wall.

[0023] In one embodiment the capsule comprises a gap between the closing member and the sidewall of said main body, such that the closing member may be deformed more freely.

[0024] The invention also contemplates the problem of preventing the capsule from accumulating infusion liquid around the perimeter thereof which would then remain inside the machine. To this end, in an alternative embodiment the inner diameter of said closing member coincides with the sidewall of said main body, whereby the formation of places of liquid accumulation is avoided.

[0025] Preferably said closing member is appropriate for being compressed by an injection cylinder of a machine for preparing infusions forming a deformation and in the radial direction each one of said openings of said closing member is smaller than the width of said deformation on the closing member in the radial direction, such that where the deformation of the closing member is not sufficiently great, there is a complete guarantee that liquid leak paths cannot be formed.

[0026] To guarantee the most possible foreseeable behaviour, in one preferred embodiment the openings have a cross section of one or more of the members of the group formed by circles, ellipses, straight or curved sided polygons and particularly preferably the openings have the shape of a cylinder, a pyramid, a parallelepiped or combinations thereof.

[0027] Likewise, the invention also includes other features of detail illustrated in the detailed description of an embodiment of the invention and in the accompanying figures.

Brief description of the drawings

[0028] Further advantages and features of the invention will be evident from the following description, in which, without any limiting character, preferred embodiments of the invention are disclosed, with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a first embodiment of the capsule of the invention.

Figure 2A is a detail view of the closing member of the capsule of Figure 1 prior to deformation.

Figure 2B is a detail view of the closing member of the capsule of Figure 1 after deformation.

Figure 3 is a top plan view of the capsule of Figure 1.

Figure 4A is a detailed section view of the flange region of the capsule of Figure 1 in the open position of the machine cylinder.

Figure 4B is a detailed section view of the flange region of the capsule of Figure 1 in the injection position of the machine cylinder.

Figure 5 is a section view of the embodiment of the capsule of Figure 1 inside a machine for preparing infusions.

Figure 6 is a section view of a second embodiment of the capsule inside a machine for preparing infusions.

Figure 7 is a section view of a third embodiment of the capsule inside a machine for preparing infusions.

Figure 8 is a detailed section view of the flange region of a fourth embodiment of the capsule in the open position of the machine cylinder.

Figure 9 shows different embodiments of the openings of the closing member.

Figures 10, 10A show another embodiment of the openings of the closing member.

Detailed description of embodiments of the invention

[0029] The capsule 1 according to the invention is for preparation an individual measure of an infusion from a product, such as for example, coffee, tea or the like, contained in the interior thereof by the passage of a pressurized liquid, such as for example water, through the product. Nevertheless, the invention is not limited only to single-dose capsules, but may also be applied to multi-dose capsules by increasing the dimensions of the capsule.

[0030] In particular, the capsule 1 is formed by a hollow frustoconical main body 4 of which the smaller base 10 is closed and the larger base 8 is open. To form the capsule 1 ready for consumption, the larger base 8 is sealed with a lid 18 hermetically sealing an inner chamber 2 of the capsule 1 containing the product from which the infusion is prepared.

[0031] Alternatively, in the case of refillable capsules, the main body 4 and lid 18 delimit an inner chamber 2 which may not be hermetic. For example, in the case of refillable capsules, the lid 18 is put in place by the user himself when preparing the infusion after having filled the inner chamber 2. Alternatively, as is to be seen in Figure 6, the capsule 1 may not be refillable, but not hermetic either.

[0032] Referring back to Figures 1 to 5, a peripheral flange 6 extends radially outwardly from the larger base 8 of the main body 4.

[0033] As previously mentioned, the main problem existing with the conventional capsules is that during the preparation of the infusion a correct watertightness is not always achieved between the machine for preparing infusions 100 and the capsule 1. Therefore, in the invention, it is contemplated that the capsule 1 comprises an annular hermetic closing member 12 somewhere in the region of the capsule 1 comprised between the surface of said flange 6 facing the smaller base 10 of the main body 4 and the smaller base 10 of the main body 4. This region corresponds to the visible region of the capsule 1 clearly to be seen in the top perspective view of Figure 1. In this first embodiment, the closing member 12 is provided on the flange 6.

[0034] When preparing the infusion, the injection cylinder 102 of the machine 100 bears against this closing member 12. Then, to guarantee a correct seal, it is contemplated that the closing member 12 be provided with a plurality of discrete blind openings 14 penetrating in the closing member 12, but not passing through it. Thanks to these openings 14, during the preparation the infusion, with the machine 100, the injection cylinder 102 exerts such a pressure on the closing member 12 as to deform it and form the deformation 16 which is to be seen particularly clearly in Figures 2A and 2B.

[0035] In this first embodiment shown in Figures 1 to 4B, the closing member 12 is a cylindrical ring that is provided on the surface of the flange 6 facing the smaller base 10 of the main body 4. This ring is made from the same material as the capsule 1 and is integral therewith. This facilitates manufacture, for example, by moulding from plastics materials or food grade rubber, very notably reducing the manufacturing costs. Plastics materials suitable for this application are, for example, bioplastics, polyethylenes, polystyrenes, polypropylenes, polyamides or others. In this embodiment shown in Figures 1 to 5, a low density polyethylene, more commonly known as LDPE has been used, having a Vicat softening temperature of 80ºC in accordance with the ISO 306 Test. It has been observed that, advantageously with water temperatures of about 90ºC during the preparation process, the combination of the openings 14 and a plastics closing member 12 having a Vicat softening temperature ranging from 70º to 140ºC, there is achieved a plastic deformation of the closing member 12 substantially improving the watertightness.

[0036] It is also to be seen in the Figures that the openings 14 are formed in such a way that the mould for manufacturing the main body 4 of the capsule 1 is particularly simple, since it does not require complex mould stripping devices.

[0037] In this embodiment, the width of the ring, namely the difference between its outer radius and its inner radius is at least 1.5 mm. Nevertheless, this dimension may extend over the whole flange 6. It has also been established that the most satisfactory results in terms of deformation are obtained for openings 14 having a depth of over 0.1 mm up to a maximum of 0.9 mm. As may be seen in the Figures, the depth in this case is constant. Nevertheless, alternatively, the depth could increase with the radius. Finally, preferably, it is desirable for the min-

imum spacing between openings 14 to range from 0.10 to 0.9 mm.

[0038] In Figures 1 to 5 it is to be seen also that the openings 14 have the same circular cross section, with the same depth and are preferable staggered (see Figure 2) to leave the minimum spacing between openings 14.

[0039] Alternatively, it may not be discarded that the openings 14 may have the same geometrical shape, but nevertheless their size increases radially, i.e., the greater the distance from the main body 4, the larger will be the size of the corresponding opening 14. Through this feature, it is also possible to achieve a constant wall thickness between the openings 14 independently of the radial distance, which guarantees a homogeneous deformation at any point along the radius of the closing member 12. Again, this feature may be combined with a staggered arrangement.

[0040] The purpose of the openings 14 is to weaken the closing member 12 facilitating the deformation thereof under the pressure of the injection cylinder 102. As is to be seen in Figures 9A to 9I, the cross section of these openings 14 may be one or several of the members of the group formed by circles, ellipses, straight or curved sided polygons. For example, the cross section of the openings 14 may be a circle, a square, a triangle or an octagon (see Figures 9A to 9D respectively). Nevertheless, the cross section may comprise other polygons not shown in the Figures, such as a pentagon, a hexagon or the like.

[0041] Figures 10, 10A show another possible embodiment of the openings 14 by intersection of cylinders placed very close to one another.

[0042] These openings 14 may likewise have the three dimensional form of a cylinder, a pyramid, a parallelepiped or even combinations of these. For example, the combinations can be, for example, a cylinder with a conical or cylindrical countersink, or a cone or frustum of a cone with a cylindrical countersink. These possible combinations are to be seen in Figures 9G and 9I. Particularly, the countersink combinations allow a deformation out of proportion to the compression exerted by the injection cylinder 102 to be obtained.

[0043] A priori, the deformation of the closing member 12 may be elastic or plastic. For example, in the case shown in Figures 1 to 5, particularly when the closing member 12 is made from an injected plastics material, the deformation of the closing member 12 will preferably be plastic. Thus, the deformation 16 will be permanent once the injection cylinder 102 moves from the injection position of Figure 4B to the open position.

[0044] In Figures 4A and 4B it will be seen in detail that particularly preferably in the radial direction the openings 14 of the closing member 12 are smaller than the width of the deformation 16 on the closing member 12, which corresponds to the thickness of the bearing surface 112 of the injection cylinder on the closing member 12. This feature guarantees that, in spite of the bearing surface 112 not completely covering a series of openings 14, no fluid passage facilitating liquid leaks, with the already mentioned drawbacks, can be formed.

[0045] Another relevant feature of this embodiment consists in the existence of a space 22 between the closing member 12 and the sidewall 20, which facilitates the deformation of the bearing surface of the injection cylinder 102. In particular, the space allows the formed ring to be laterally deformed both inwardly and outwardly.

[0046] It is also to be seen in the Figures that preferably the closing member 12 is a cylinder having a smooth outer wall, which prevents with even greater guarantee liquid leaks in case of an excessive misalignment between the capsule 1 and the injection cylinder 102.

[0047] Hereinafter and referring to Figures 4A to 5, a detailed explanation will be given of the operation of the first embodiment of the capsule of the invention. The machine 100 has a liquid injection pump 104 for supplying liquid to the injection cylinder 102. The capsule 1 is inserted in the interior of the injection cylinder 102. Figure 4A or 5 show the instant prior to moving to the injection position. Particularly, the injection cylinder 102 has approached the flange 6 of the capsule 1 and has started to pierce the smaller base 10 of the capsule 1 with the punches 110. On the side of the larger base 8, the machine 100 has a bearing wall 106 provided with a plurality of piercing members 114 for piercing the lid 18 of the capsule 1 in the injection position of the injection cylinder 102. Furthermore, this bearing wall 106 has a plurality of exit passages 108 for the prepared infusion.

[0048] When the cylinder moves from the position shown in Figure 5 to the injection position of the injection cylinder 102, shown in Figure 4B, the bearing surface 112 of the injection cylinder 102 pushes the capsule 1 by way of the flange 6 until it abuts the wall 106 of the machine 100. When the flange 6 abuts the wall, the injection cylinder has not yet reached the end of its stroke, such that from this time on the closing member 12 starts to deform, with the appearance of the deformation 16. Finally, when the cylinder reaches the end of its stroke, namely the injection position, the closing member 12 is compressed and deformed between the injection cylinder 102 and the bearing wall 106, whereby a watertight seal is obtained between the injection cylinder 102 and the capsule 1 as shown in Figure 4B.

[0049] From this position the pump 104 starts injecting the water. Owing to the tight seal, the water can flow only through the perforations in the smaller base 10 and exit through the lid 18 of the capsule 1, crossing through the inner chamber 2.

[0050] Once the liquid impregnated with the infusion product contained in the chamber 2 exits through the lid 18, is reaches the passages 108 and now flows towards the outside as an infusion by way of a manifold of the machine not shown in the drawings.

[0051] The advantages of the capsule 1 according to the invention may be appreciated from Figure 3. Particularly, a top plan view of the closing member 12 is to be seen and through the dashed circle there is shown the

region on which the injection cylinder 102 has been applied. The latter, on compressing the capsule 1 during the preparation of the infusion, leaves the deformation 16. In the figure, this is seen to be eccentric relative to the closing member 12. Nevertheless, the seal is guaranteed owing to the fact that the width of the deformation 16 is always greater than the size of each of the openings 14 in the radial direction. Also, since the openings are blind and discrete, no fluid passage can be formed either in the radial direction or tangentially, so that the watertightness of the assembly is guaranteed.

[0052] Figure 6 shows a second embodiment of the capsule 1 of the invention. The first outstanding item consists in that the inner diameter of the closing member 12 coincides with the sidewall 20 of the main body 4, which avoids an undesired accumulation of liquid inside the capsule 1.

[0053] On the other hand, in this embodiment, the capsule 1 is not watertight and has a plurality of inlets 24 and outlets 26 allowing for the flow of liquid for the infusion. Owing to this, in this case, it is not absolutely necessary for the machine 100 to pierce the smaller base 10 and the lid 18.

[0054] The embodiment shown in this Figure is made from a combination of high density polyethylene (HDPE) and low density polyethylene (LDPE). Particularly, the material consists of 15% of HDPE having a Vicat softening temperature of 128ºC and 85% LDPE having a Vicat softening temperature of 80ºC.

[0055] In the third embodiment of the capsule 1 shown in Figure 7 it is to be seen that the closing member 12 may be disposed at any point of the region of the capsule 1 comprised between the surface of the flange 6 facing the smaller base 10 of the main body 4 and the smaller base 10 of the main body 4. In this particular case, the closing member 12 is integral with the smaller base 10 of the main body 4, namely is projects outwardly in ring-like fashion from said smaller base 10. This configuration affords the advantage that the liquid is retained in the proximity of the perforations made by the punches 110, which facilitates the correct guiding of the water into the interior of the chamber 2.

[0056] Figure 8 shows a fourth embodiment of the capsule 1. In this case, the closing member 12 is a ring independent from the capsule 1. The inner diameter thereof coincides with the outer diameter of the frustoconical portion of the capsule 1. In this case, the closing member 12 is made from a highly deformable material, such as a polyurethane foam. It will be appreciated in the Figures that the openings 14, like in previous embodiments, are discrete and blind for avoiding the leakage of liquid from which the infusion is prepared.

[0057] In this Figure it may be seen that the thickness of the bearing surface 112 of the injection cylinder 102 is greater than the size of the openings 14. In this way, it is achieved that any possible misalignment between the injection cylinder 102 and the capsule will not cause a fluid passage leading to a loss of water during the preparation of the infusion.

Claims

1. A capsule for preparing infusions from a product contained in a closed inner chamber (2), by forcing a liquid to flow under pressure through said chamber (2), said capsule comprising a frustoconical main body (4) having a smaller base (10) and a larger base (8) and a peripheral flange (6) extending outwardly from the larger base (8) of said main body (4), said capsule further comprising an annular hermetic closing member (12) provided on the region of said capsule (1) comprised between the surface of said flange (6) facing the smaller base (10) of said main body (4) and the smaller base (10) of said main body (4), **characterised in that** said closing member (12) comprises a plurality of discrete blind openings (14) penetrating in said closing member (12), said blind openings not being concentric grooves, such that said closing member (12) is deformable under pressure during the preparation of said infusion.

2. The capsule according to claim 1, **characterized in that** at least said closing member (12) is made from a plastics material having a Vicat softening temperature comprised between 70 and 140ºC.

3. The capsule according to claim 1 or 2, **characterized in that** said closing member (12) is provided on the surface of said flange (6) facing the smaller base (10) of said main body (4).

4. The capsule according to anyone of claims 1 to 3, **characterized in that** said closing member (12) is made from the same material as said capsule (1).

5. The capsule according to claim 4, **characterized in that** said closing member (12) is integral with said capsule (1).

6. The capsule according to anyone of claims 1 to 5, **characterized in that** said openings (14) have the same cross section.

7. The capsule according to anyone of claims 1 to 5, **characterized in that** said openings (14) have a cross section the dimensions of which increase as the radial separation from said main body (4) increases.

8. The capsule according to anyone of claims 1 to 7, **characterized in that** said openings (14) have the same depth.

9. The capsule according to anyone of claims 1 to 7, **characterized in that** said openings (14) have a

depth increasing with the radial distance.

10. The capsule according to anyone of claims 1 to 9, **characterized in that** the depth of said openings (14) is greater than 0.10 mm

11. The capsule according to anyone of claims 1 to 10, **characterized in that** said openings (14) are staggered.

12. The capsule according to anyone of claims 1 to 11, **characterized in that** said closing member (12) is a cylinder having a smooth outer wall.

13. The capsule according to anyone of claims 1 to 12, **characterized in that** it comprises a space (22) between the closing member (12) and the sidewall (20) of said main body (4).

14. The capsule according to anyone of claims 1 to 12, **characterized in that** the inner diameter of said closing member (12) coincides with the sidewall (20) of said main body (4).

15. The capsule according to anyone of claims 1 to 14, **characterized in that** said closing member (12) is appropriate for being compressed by an injection cylinder (102) of a machine for preparing infusions (100) forming a deformation (16) and **in that** in the radial direction each one of said openings (14) of said closing member (12) is smaller than the width of said deformation (16) on the closing member (12) in the radial direction.

Patentansprüche

1. Kapsel zur Herstellung von Infusionen von einem Produkt, das in einer geschlossenen inneren Kammer (2) enthalten ist, durch Zwingen einer Flüssigkeit, unter Druck durch die Kammer (2) zu fließen, wobei die Kapsel einen kegelstumpfförmigen Hauptkörper (4) mit einer kleineren Basis (10) und einer größeren Basis (8) und einen peripherischen Flansch (6) aufweist, der sich von der größeren Basis (8) des Hauptkörpers (4) nach außen erstreckt, wobei die Kapsel ferner ein ringförmiges, hermetisch schließendes Element (12) enthält, das sich in dem Bereich der Kapsel (1) zwischen der Fläche des Flansches (6), die der kleineren Basis (10) des Hauptkörpers (4) zugewandt ist, und der kleineren Basis (10) des Hauptkörpers (4) befindet,
dadurch gekennzeichnet,
dass das schließende Element (12) eine Vielzahl von gesonderten Blindöffnungen (14) enthält, die in das schließende Element (12) eindringen, dass die Blindöffnungen nicht konzentrische Nuten sind, derart, dass das schließende Element (12) unter Druck während der Herstellung der Infusion verformbar ist.

2. Kapsel nach Anspruch 1,
dadurch gekennzeichnet,
dass wenigstens das schließende Element (12) aus einem Kunststoffmaterial mit einer VICAT-Erweichungstemperatur zwischen 70 und 140°C hergestellt ist.

3. Kapsel nach Anspruch 1 oder 2,
dadurch gekennzeichnet,
dass das schließende Element (12) auf der Fläche des Flansches (6) vorgesehen ist, die der kleineren Basis (10) des Hauptkörpers (4) zugewandt ist.

4. Kapsel nach jedem der Ansprüche 1 bis 3,
dadurch gekennzeichnet,
dass das schließende Element (12) aus demselben Material wie die Kapsel (1) hergestellt ist.

5. Kapsel nach Anspruch 4,
dadurch gekennzeichnet,
dass das schließende Element (12) einstückig mit der Kapsel (1) ist.

6. Kapsel nach jedem der Ansprüche 1 bis 5,
dadurch gekennzeichnet,
dass die Öffnungen (14) denselben Querschnitt haben.

7. Kapsel nach jedem der Ansprüche 1 bis 5,
dadurch gekennzeichnet,
dass die Öffnungen (14) einen Querschnitt haben, dessen Abmessungen zunehmen, wenn der radiale Abstand von dem Hauptkörper (4) zunimmt.

8. Kapsel nach jedem der Ansprüche 1 bis 7,
dadurch gekennzeichnet,
dass die Öffnungen (14) dieselbe Tiefe haben.

9. Kapsel nach jedem der Ansprüche 1 bis 7,
dadurch gekennzeichnet,
dass die Öffnungen eine Tiefe haben, die mit dem radialen Abstand zunimmt.

10. Kapsel nach jedem der Ansprüche 1 bis 9,
dadurch gekennzeichnet,
dass die Tiefe der Öffnungen (14) größer als 0,10 mm ist.

11. Kapsel nach jedem der Ansprüche 1 bis 10,
dadurch gekennzeichnet,
dass die Öffnungen (14) versetzt angeordnet sind.

12. Kapsel nach jedem der Ansprüche 1 bis 11,
dadurch gekennzeichnet,
dass das schließende Element (12) ein Zylinder ist mit einer glatten äußeren Wand.

13. Kapsel nach jedem der Ansprüche 1 bis 12, **dadurch gekennzeichnet, dass** sie einen Zwischenraum (22) zwischen dem schließenden Element (12) und der Seitenwand (20) des Hauptkörpers (4) aufweist.

14. Kapsel nach jedem der Ansprüche 1 bis 12, **dadurch gekennzeichnet, dass** der Innendurchmesser des schließenden Elements (12) mit der Seitenwand (20) des Hauptkörpers (4) übereinstimmt.

15. Kapsel nach jedem der Ansprüche 1 bis 14, **dadurch gekennzeichnet, dass** das schließende Element (12) geeignet ist, durch einen Injektionszylinder (102) einer Maschine zur Herstellung von Infusionen (100) zusammen gedrückt zu werden, wodurch eine Verformung (16) gebildet wird, und dass in der radialen Richtung jede der Öffnungen (14) des schließenden Elements (12) kleiner ist als die Breite der Verformung (16) an dem schließenden Element (12) in der radialen Richtung.

Revendications

1. Capsule pour préparer des infusions à partir d'un produit contenu dans un réservoir (2) interne fermé, en forçant un liquide à s'écouler sous pression à travers ledit réservoir (2), ladite capsule comprenant un corps principal (4) tronconique comportant une base de taille inférieure (10) et une base de taille supérieure (8) et une collerette (6) périphérique s'étendant extérieurement à partir de la base de taille supérieure (8) dudit corps principal (4), ladite capsule comprenant en outre un élément (12) annulaire de fermeture hermétique prévu dans la région de ladite capsule (1) comprise entre la surface de ladite collerette (6) faisant face à la base de taille inférieure (10) dudit corps principal (4) et la base de taille inférieure (10) dudit corps principal (4), **caractérisée en ce que** ledit élément (12) de fermeture comprend une pluralité d'ouvertures (14) borgnes distinctes pénétrant dans ledit élément (12) de fermeture, lesdites ouvertures borgnes n'étant pas des rainures concentriques, de manière que ledit élément (12) de fermeture est déformable sous pression pendant la préparation de ladite infusion.

2. Capsule selon la revendication 1, **caractérisée en ce qu'**au moins ledit élément (12) de fermeture est fabriqué à partir de matériaux plastiques ayant une température de ramollissement Vicat comprise entre 70 et 140°C.

3. Capsule selon la revendication 1 ou 2, **caractérisée en ce que** ledit élément (12) de fermeture est prévu sur la surface de ladite collerette (6) faisant face à la base de taille inférieure (10) dudit corps principal (4).

4. Capsule selon l'une quelconque des revendications 1 à 3, **caractérisée en ce que** ledit élément (12) de fermeture est fabriqué à partir du même matériau que ladite capsule (1).

5. Capsule selon la revendication 4, **caractérisée en ce que** ledit élément (12) de fermeture est solidaire de ladite capsule (1).

6. Capsule selon l'une quelconque des revendications 1 à 5, **caractérisée en ce que** lesdites ouvertures (14) ont la même section transversale.

7. Capsule selon l'une quelconque des revendications 1 à 5, **caractérisée en ce que** lesdites ouvertures (14) ont une section transversale dont les dimensions augmentent à mesure que la séparation radiale avec ledit corps principal (4) augmente.

8. Capsule selon l'une quelconque des revendications 1 à 7, **caractérisée en ce que** lesdites ouvertures (14) ont la même profondeur.

9. Capsule selon l'une quelconque des revendications 1 à 7, **caractérisée en ce que** lesdites ouvertures (14) ont une profondeur augmentant avec la distance radiale.

10. Capsule selon l'une quelconque des revendications 1 à 9, **caractérisée en ce que** la profondeur desdites ouvertures (14) est supérieure à 0,10 mm.

11. Capsule selon l'une quelconque des revendications 1 à 10, **caractérisée en ce que** lesdites ouvertures (14) sont en quinconce.

12. Capsule selon l'une quelconque des revendications 1 à 11, **caractérisée en ce que** ledit élément (12) de fermeture est un cylindre ayant une paroi extérieure lisse.

13. Capsule selon l'une quelconque des revendications 1 à 12, **caractérisée en ce qu'**elle comprend un espace (22) entre l'élément (12) de fermeture et la paroi latérale (20) dudit corps principal (4).

14. Capsule selon l'une quelconque des revendications 1 à 12, **caractérisée en ce que** le diamètre interne dudit élément (12) de fermeture coïncide avec la paroi latérale (20) dudit corps principal (4).

15. Capsule selon l'une quelconque des revendications 1 à 14, **caractérisée en ce que** ledit élément (12) de fermeture est adapté à être comprimé par un cylindre d'injection (102) d'une machine pour préparer

les infusions (100) formant une déformation (16) et **en ce que**, dans la direction radiale, chacune desdites ouvertures (14) dudit élément (12) de fermeture est de taille inférieure à la largeur de ladite déformation (16) sur l'élément (12) de fermeture dans la direction radiale.

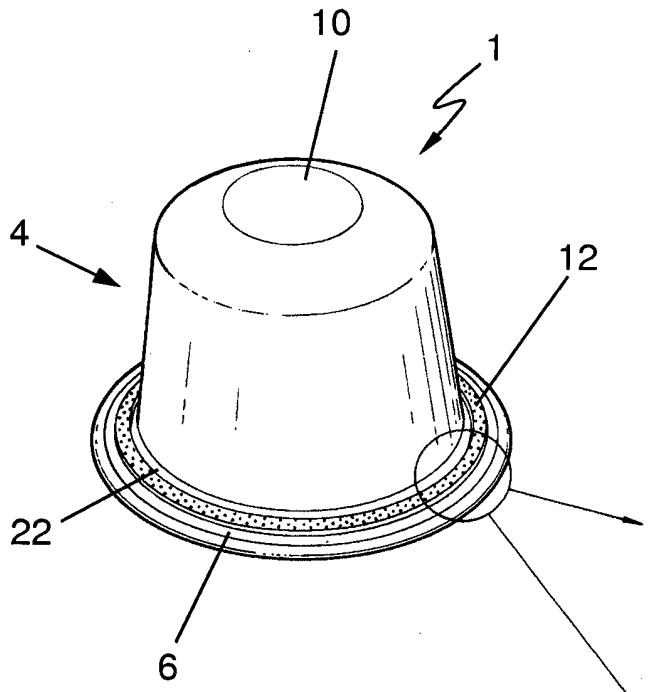


Fig. 1

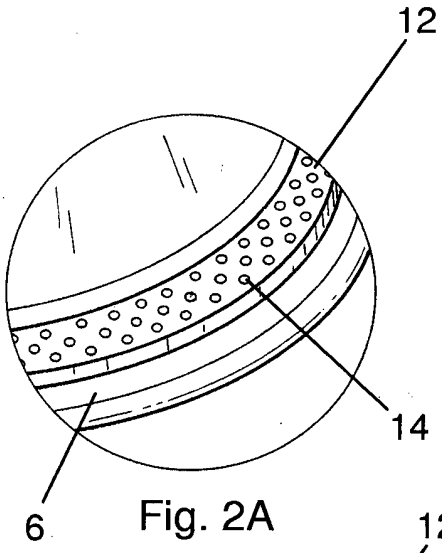


Fig. 2A

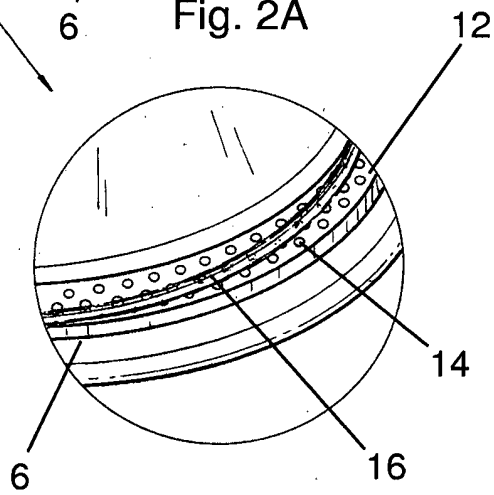


Fig. 2B

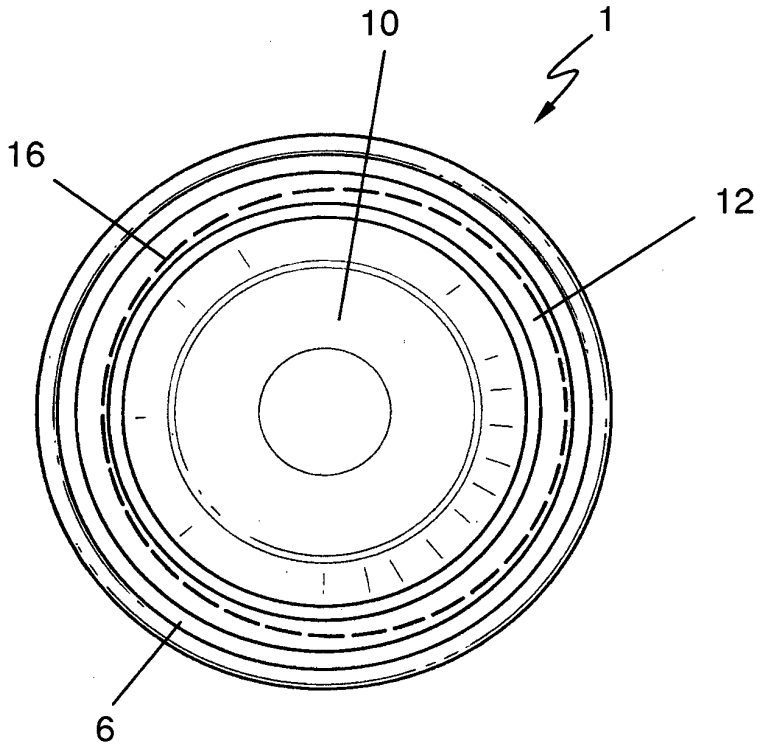


Fig. 3

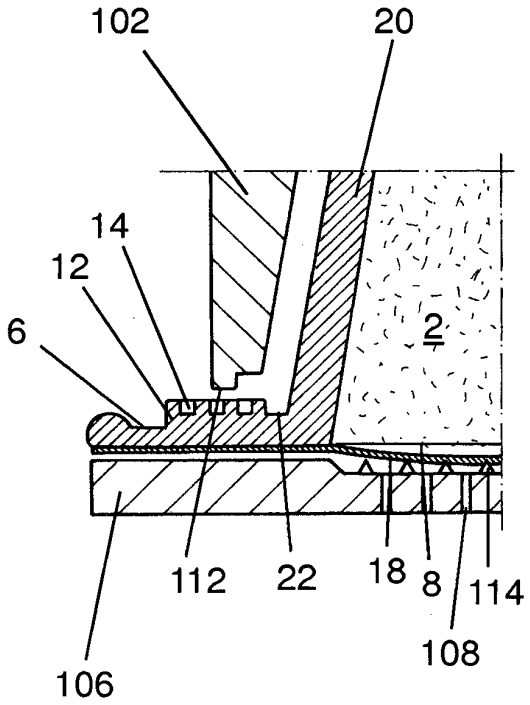


Fig. 4A

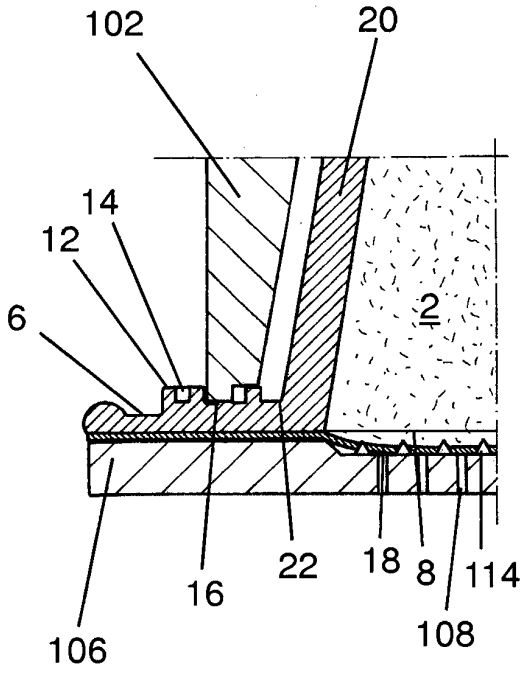
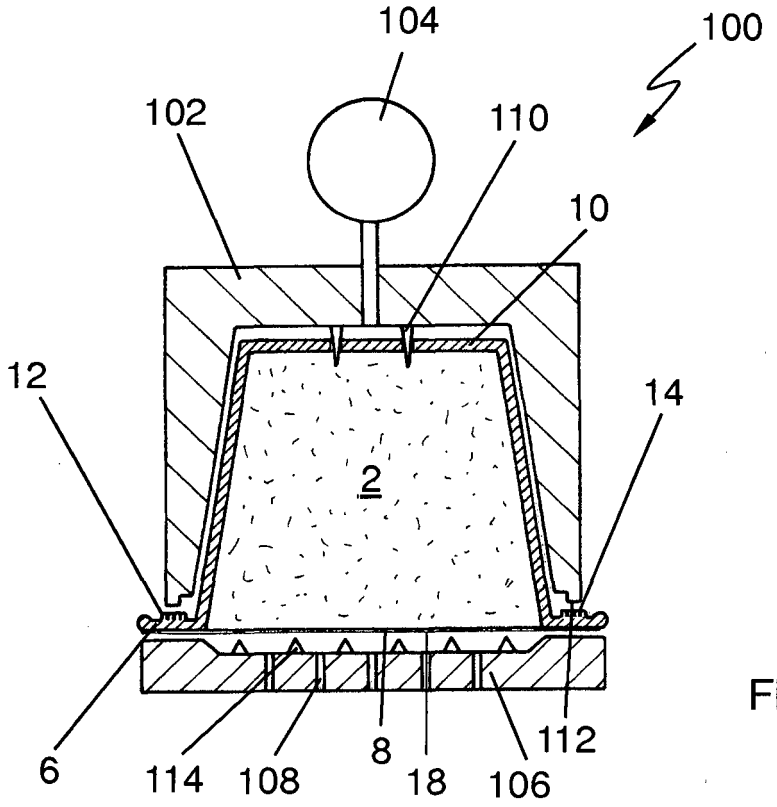


Fig. 4B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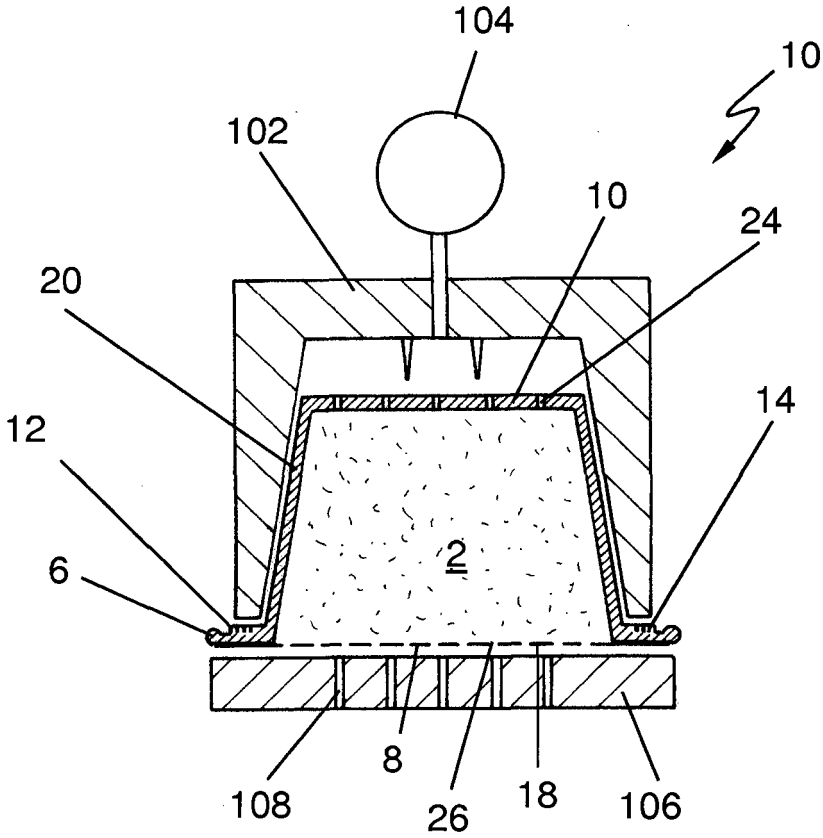
12
14
2
6
114
108
8
18
106
112

Fig. 5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106

Fig. 6

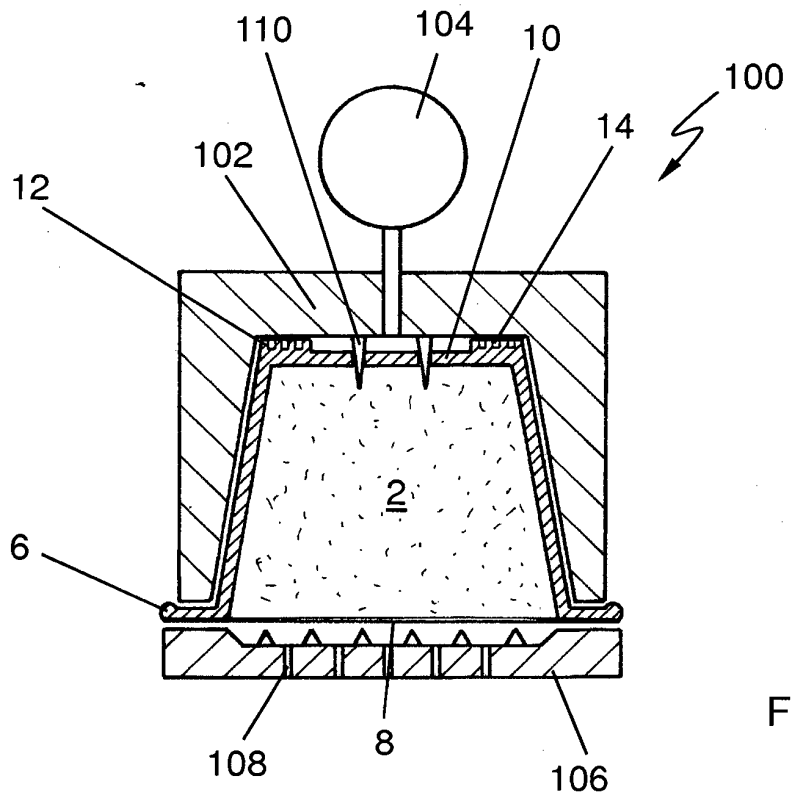


Fig. 7

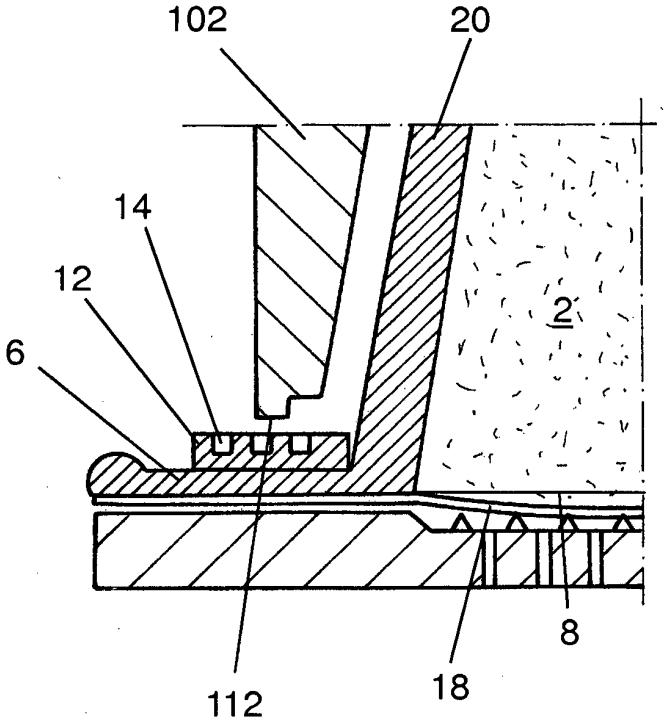
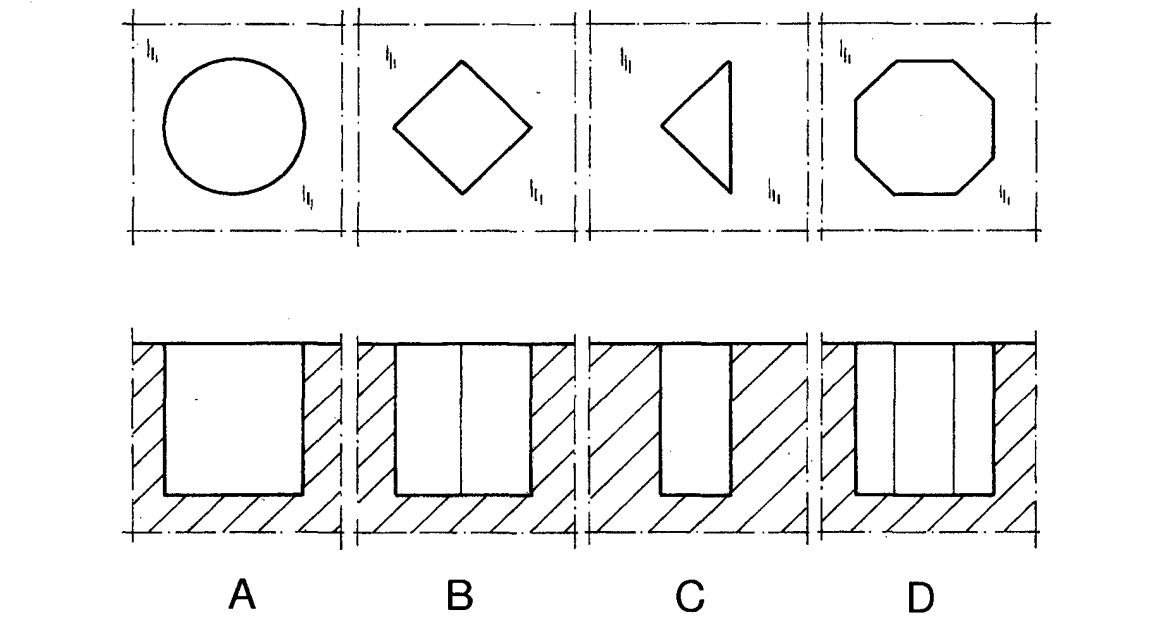


Fig. 8



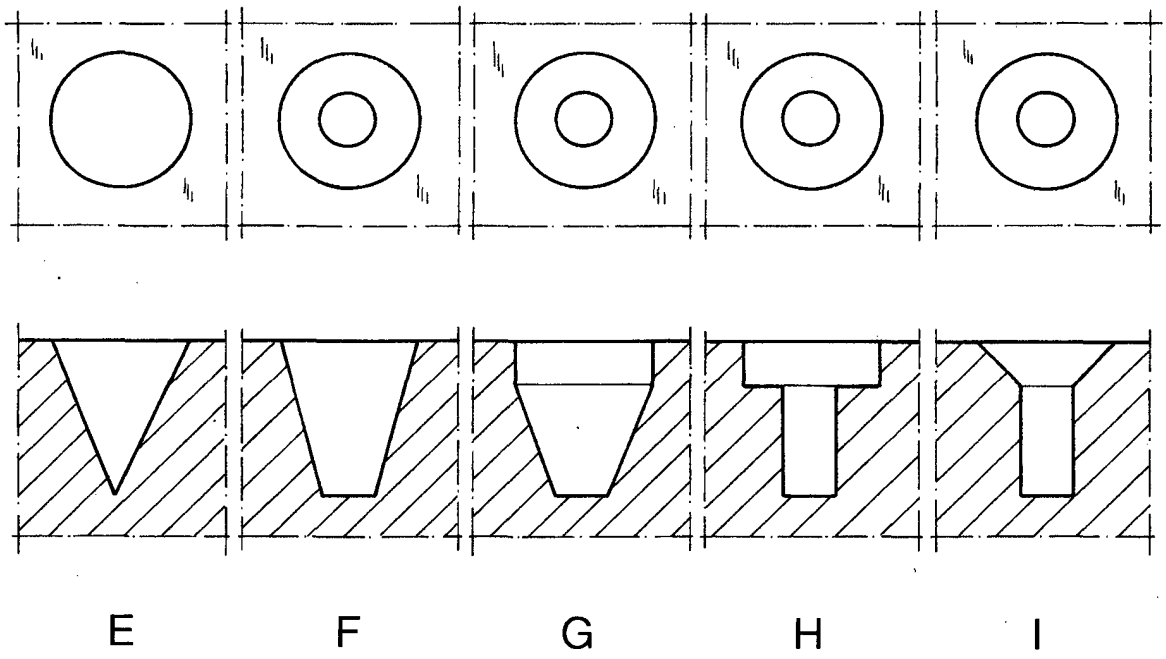


Fig. 9

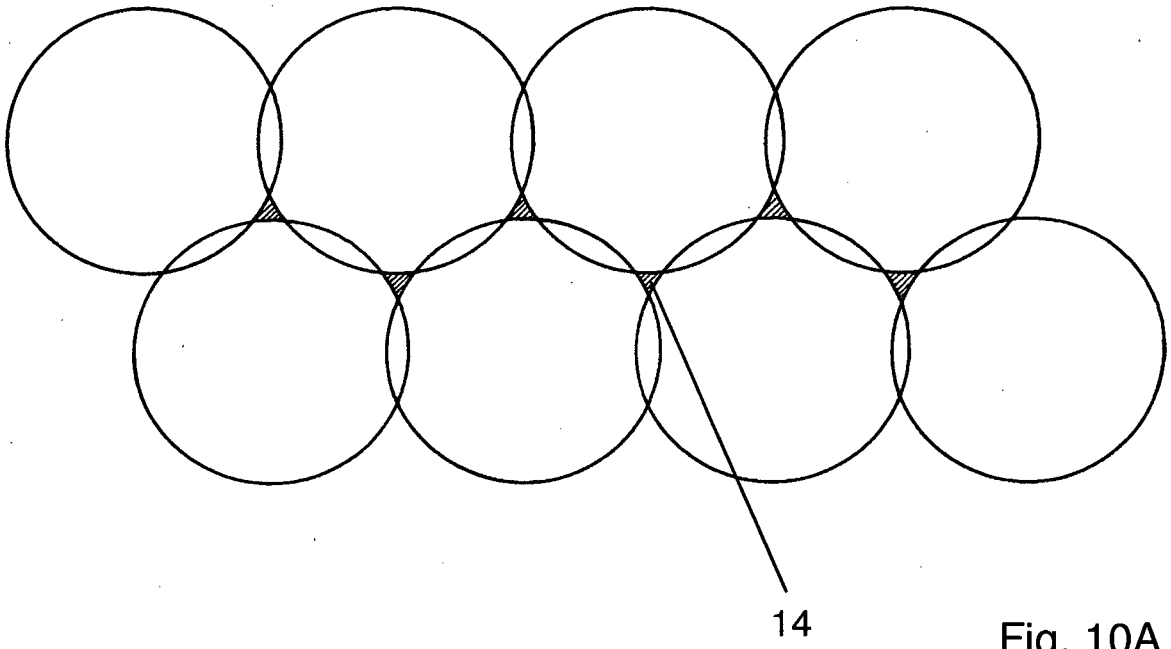


Fig. 10A

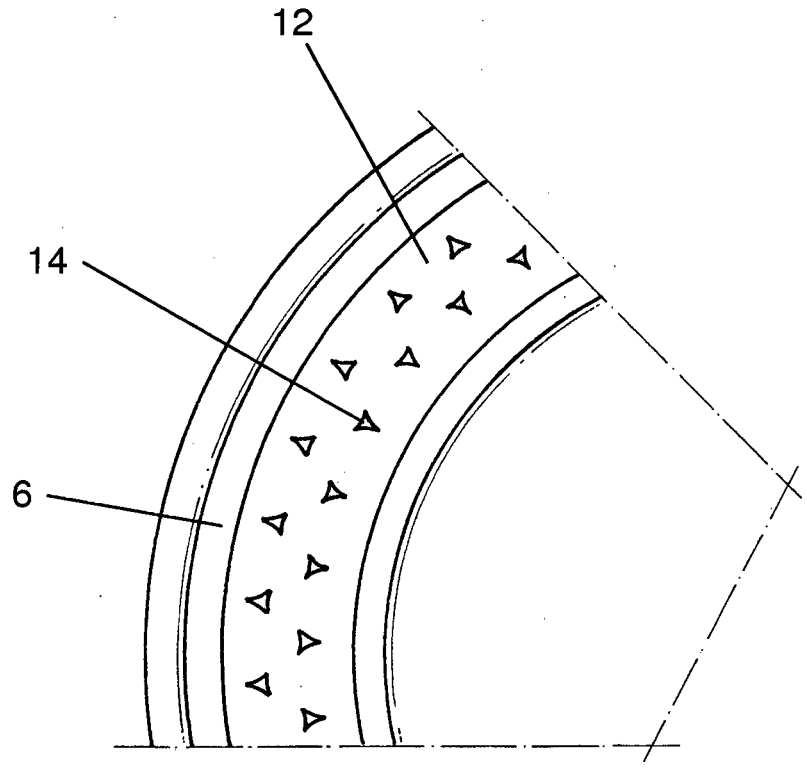


Fig. 10

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 2303077 A **[0006]**
- US 2011185910 A1 **[0007]**