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(54) **CAPSULE FOR PREPARING INFUSIONS**

KAPSEL ZUR ZUBEREITUNG VON INFUSIONEN

CAPSULE POUR LA PRÉPARATION D'INFUSIONS

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Description

Field of the invention

[0001] The invention relates to a capsule for preparing infusions comprising first and second capsule parts connected to each other such as to delimit an inner chamber containing an infusion product and a sealing member provided on the outer surface of said capsule and which on the side corresponding to the inner chamber side forms a hollow space delimited between said first and second capsule parts, said sealing member being deformable such as to provide a watertight seal between a fixed part and a movable part of a machine housing said capsule for preparing said infusion, by causing a pressurized fluid to pass between an injection side and an extraction side of said capsule.

State of the art

[0002] The system for preparing infusions such as coffee, tea, soups or the like from capsules of individual or multiple portions in which pressurized hot water is introduced is known. In this system, the capsule is inserted in the capsule holder of a machine for preparing infusions, the capsule holder being formed by a fixed part and a movable part having a shape mating with that of the capsule. On closing the capsule holder, the fixed and movable parts trap and perforate the capsule on two opposite sides; the injection side and the extraction side. The pressurized hot water is introduced through the injection side at a pressure of between 1 and 20 bar and becomes impregnated with the infusion product. The ready prepared infusion exits through the extraction side towards the corresponding cup once the water has completely passed through the capsule inner chamber.

[0003] Owing to the high working pressures, achieving a correct seal between the fixed part and the movable part of the capsule holder is essential for obtaining an infusion having optimum organoleptic properties. In the described system, it is usual for the capsule to have a perimetrical annular rim in the region where it is trapped between the fixed part and the movable part of the capsule holder to avoid water leaks at this point.

[0004] FR2617389 discloses a capsule for the preparation of an express beverage containing an infusion product. The capsule is provided with a frustoconical cup open at the larger base thereof. Furthermore, the cup is provided at this larger base with a rim acting as a sealing member in the machine. Before its use, the capsule is hermetically sealed at the larger and smaller bases thereof by means of sealing covers that must be removed for preparing the infusion. During use, to guarantee a watertight seal with the machine, in the region of the rim where the machine traps the capsule, there is provided an inner step facilitating the elastic deformation of this region. Inside the capsule, the step is covered by a cover of filter material that prevents the infusion product grains from coming out once the sealing cover has been removed from the larger base, but allows the water to pass. Said capsule has the problem of being complicated and expensive to manufacture, since it requires three sealing covers for its correct operation.

[0005] EP1700548 discloses a capsule that is designed to be inserted in a beverage production device and to be perforated on an injection side and an extraction side. Then, a pressurized fluid penetrates in the capsule through the injection side to interact with the ingredients and to drain a beverage from the capsule through the extraction side. The capsule comprises a main body shaped as a cup and a closing foil; or a lenticular capsule with two opposite coincident walls, comprising a hollow sealing member on the outer surface of the capsule, to provide a sealing effect between the enveloping member of the beverage production device and the capsule support. This capsule simplifies the capsule according to FR2617389 since it avoids the covers that must be removed prior to preparing the infusion. However, the sealing member does not always work satisfactorily since it can cause the closing force of the machine not to be uniform around the entire perimeter of the sealing member. Owing to this the sealing member can be become irregularly deformed, affecting the hermetic closing of the capsule holder. An irregular deformation of the sealing member can reduce the pressure of the injected water and therefore affect the organoleptic properties of the infusion beverage.

[0006] Document WO 2010/116284 A2 discloses a capsule for preparing a drink, such as coffee, comprising a hollow element designed to contain a serving, e.g. ground coffee, said hollow element comprising a side wall, an upper face, and a lower face comprising a brewing membrane and a rim in the shape of a ring; said side wall being continued at its lower end in such a way as to form said rim, which latter is oriented in a plane that cuts said side wall; the capsule being characterized in that the rim has a recess in the form of an annular groove on the underside of the rim, and the recess communicates with the interior of the capsule.

Summary of the invention

[0007] It is an object of the invention to provide a capsule for preparing infusions of the type mentioned at the beginning, that guarantees a correct sealing around the entire perimeter of the sealing member and that therefore allows the preparation of infusion beverages whose organoleptic properties do not depend on the structural characteristics of the capsule itself.

[0008] This object is achieved by means of a capsule for preparing infusions according to claim 1.

[0009] The most popular state of the art capsules are frustoconical and are provided with a rim projecting radially outwardly from the larger base and incorporating the deformable sealing member formed from an annular rim that is provided with an inner step on the face corre-

sponding to the inner chamber of the capsule forming a hollow space that facilitates the deformation when the capsule holder bears on this point. In turn, a closing foil adhered to the rim seals the side of the capsule through which the infusion is extracted. Among the machines adapted to this type of the capsules, there are those in which the infusion extraction direction is vertical and those in which the direction is horizontal. Thus, this type of the capsules has the problem that between the packaging and the final use, the infusion product, for example grains of ground coffee, accumulates and clogs in the afore mentioned hollow space. If the capsule has a vertical extraction direction, and therefore the sealing member is oriented horizontally, all the coffee blocks the hollow space in an uncontrolled fashion. This can cause irregular deformations of the sealing member leading to a worsening of the seal in this point and an increase of the effort necessary to close the capsule holder. This same effect is more noticeable in the case of vertical extraction machines, since all the coffee accumulates by gravity at the bottom of the capsule.

[0010] On the contrary, with the capsule according to the invention, this effect is successfully prevented in a particularly simple and economic way. The separating means guarantee that no relevant amount of infusion product penetrates or can accumulate in the hollow space provided below the sealing member that can cause the negative effects observed in the state of the art capsules, in which the hollow space forms part of the inner chamber of the capsule. Furthermore, this configuration also simplifies the state of the art capsules where a filter foil was provided on the step forming the hollow space, since it allows one element to be avoided, but furthermore increases the useful volume of the inner chamber or otherwise allows a more compact capsule to be produced. The increase of the useful volume in a radial direction allows the amount of coffee inside the capsule to be increased and the infusion obtained to be improved.

[0011] 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.

[0012] The separating means can close the hollow space completely such as to prevent the infusion product from getting in. However, this is not essential for the invention, since depending on the particle size of the product, it can be enough to leave slight opening separating the inner chamber from the hollow space below the sealing member. This affords the advantage that the sealing member can be configured to be highly deformable, since this opening allows the sealing member to become deformed freely without being supported on the side corresponding to the inner chamber of the capsule. Thus, preferably said separating means leave an opening between said hollow space and said inner chamber comprised between 0 and 0.5 mm. Preferably the opening extends in a longitudinal direction, but alternatively it could extend in a radial direction. As an example, in the case of ground coffee, where the grains have a finer particle size, compared with other products such as tea, the grain size distribution is such that there is a not to be neglected proportion of grains having a diameter over 0.5 mm. Thus, in spite of some grains having a particle size below 0.5 mm and therefore being able to penetrate in the hollow space formed below the sealing member, the amount that can pass through will not be sufficient to fill the hollow space, since the larger diameter grains cooperate with the separating means to block access to the hollow space.

[0013] Also, particularly in the case of coffee, it may be necessary to obtain mixtures with finer grains to obtain a more intense flavour. To this end, it is necessary for the particle size to be finer, namely, grains of diameters below 0.3 mm in a proportion of up to 20% of the mixture. For that reason, preferably, the opening between said hollow space and said inner chamber is comprised between 0.1 and 0.3 mm. Again, the 80% of grains of diameter greater than 0.3 mm cooperate with the opening of the separating means to prevent the massive entrance of fines in the hollow space and thereby they allow the sealing member to deform freely.

[0014] The invention also considers the maximum simplification of the structure of the capsule by avoiding complicated assemblies. To this end, preferably the separating means are a perimetrical skirt integral with said first and/or second capsule parts, said skirt facing said hollow space as a partition wall relative to said inner chamber. The skirt can be formed completely in the first or the second part, but it is not outside the scope of the invention that both the first and the second part may have an integrated semiskirt.

[0015] Thus, optionally, the separating means comprise at least two concentric skirts, one skirt being provided on said first part and a second skirt provided on said second part and both consecutive skirts are offset from one another and configured such as to form a labyrinth. This reduces even more the possibility of grains penetrating in the hollow space below the sealing member, since the grains have to cover an even longer path.

[0016] With a view to obtaining a correct elastic deformation of the sealing member without weakening other parts of the capsule in one embodiment it is contemplated that the perimetrical skirt comprises a plurality of interruption points around its entire perimeter.

[0017] In order to improve the barrier formed by the separating means where the interruption points are particularly large, in a preferred embodiment of the invention it is contemplated that said separating means comprise at least two concentric skirts comprising said plurality of interruption points, and in that the interruption points of two consecutive skirts are offset from one another such as to form a labyrinth. Thus, in case that a grain can get beyond the interruption of the first skirt, it will always run up against the second skirt, making it difficult for it to get into the hollow space below the sealing member.

[0018] In an alternative embodiment, the second part is a foil and the skirt consists of a fold in said foil. Thanks to it, the amount of material used in the capsule is reduced.

[0019] In another alternative embodiment the separating means are a perimetrical skirt, said skirt facing said hollow space as a partition wall relative to said inner chamber and said annular skirt is formed by an elastic material different from the material of said first or second capsule parts. This embodiment blocks the hollow space completely preventing completely the entrance of infusion material, but however it does not prevent the deformation of the sealing member because the skirt is made from elastic material.

[0020] Preferably the said separating means are a ring independent from said first and second parts arranged such as to allow the free deformation of said sealing member. This embodiment is particularly appropriate for the case that the capsule is made from a sheet-like material, such as for example aluminium.

[0021] In one embodiment of the capsule the said first and second parts are externally convex and are connected along a rim adjacent to said sealing member.

[0022] Alternatively, said first part is a frustoconical cup comprising an annular rim projecting radially outwardly from its larger base, being open at said larger base, and constituting said sealing member, a hollow step being provided below said sealing member and said second part is a foil sealing said cup at the support surface of said capsule on said rim. This facilitates that the foil sealing the cup does not come off the rim, since the only part that is substantially deformed is the sealing member.

[0023] Finally, to obtain an optimal flow of the infusion fluid through the interior of the capsule, it is contemplated preferably that the injection side and said extraction side face each other.

[0024] 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

[0025] Further advantages and features of the invention will become apparent 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:

Fig. 1 is a longitudinal section view of a detail of a capsule according to the state of the art

Fig. 2 is a longitudinal section view of a detail of the capsule according to the state of the art, during the closing of the capsule holder.

Fig. 3 is a schematic longitudinal section view of a first embodiment of a capsule according to the invention inserted inside the capsule holder of an infusion machine.

Fig. 4 is a longitudinal section view of a detail of the capsule of Fig. 3, during the closing of the capsule holder.

Fig. 5 is a longitudinal section view of a detail of a second embodiment of the capsule according to the invention.

Fig. 6 is a perspective view from below of a third embodiment of the cup of a capsule according to the invention.

Fig. 7 is a longitudinal section view of a detail of the third embodiment of the capsule according to the invention with the cup of Fig. 6.

Fig. 8 is an enlarged detail in perspective of region VIII of the capsule of Fig. 6.

Fig. 9 is an enlarged detail in perspective of a fourth embodiment of the capsule according to the invention, corresponding to a region analogous to region VIII in Fig. 7.

Fig. 10 is a longitudinal section view of a detail of a fifth embodiment of the capsule according to the invention.

Fig. 11 is a longitudinal section view of a detail of a sixth embodiment of the capsule according to the invention.

Fig. 12 is a longitudinal section view of a detail of a seventh embodiment of the capsule according to the invention.

Fig. 13 is a longitudinal section view of a detail of an eighth embodiment of the capsule according to the invention.

Fig. 14 is a longitudinal section view of a detail of a ninth embodiment of the capsule according to the invention.

Fig. 15 is a longitudinal section view of a detail of a tenth embodiment of the capsule according to the invention.

Fig. 16 is a longitudinal section view of a detail of an eleventh embodiment of the capsule according to the invention.

Fig. 17 is a longitudinal section view of a detail of a twelfth embodiment of the capsule according to the invention.

Detailed description of embodiments of the invention

[0026] Figs. 1 and 2 show two alternatives of known state of the art capsules.

[0027] In particular, the state of the art capsule 201 shown in Fig. 1 is formed by a frustoconical cup 202 with the smaller base closed and the larger base open. A rim 214 project radially outward from the larger base. The capsule 201 has a foil 204 adhered to the rim 214. The cup 202 and foil 204 delimit an infusion chamber 216 to contain an infusion product 208, such as coffee, tea, broth or the like. The capsule 201 is conceived as a single dose capsule that works with known machines for preparing infusions adapted specifically to the outer form of the capsule. The machine, better to be seen in Fig. 3, is pro-

vided with a capsule holder formed by a fixed part 100 and a movable part 102, moveable relative to the fixed part 100. The cylinder 102 moves in the direction of arrow A (see Fig. 2) to trap the capsule 201 in the capsule holder by compressing the sealing member 218. The movable part 102 perforates the capsule 201 through its smaller base with punches 106. Likewise, the foil 204 that closes the larger base of the cup 202 is also perforated by pyramid-like projections 110. The pump 104 causes an infusion fluid, such as, for example, water at a temperature close on 100 °C, or a fluid containing mainly water, to flow through the perforations in the larger and smaller bases of the capsule 201. The water becomes impregnated with the infusion product 208 and leaves the capsule 201, now in the form of an infusion ready for consumption, through the passages 108 of the capsule holder support 100 towards a cup (not shown). However, in this first capsule 201 of the state of the art it is difficult to obtain a watertight seal in the region of the sealing member 218. This is because the capsule 201 is not deformed at this area. Thus owing to undesired clearances in the capsule holder or manufacturing tolerances considerable water losses affecting the organoleptic properties of the infusion can appear.

[0028] The capsule of Fig. 2 represents a step ahead relative to the capsule of Fig. 1, since therein in the area adjacent the larger base of the cup 202, a diametrical step forming a hollow space 220 is formed below the sealing member 218. The purpose of this hollow space 220 is to allow the free deformation of the sealing member 218 during the closing of the capsule holder. However, it is not always possible to achieve this objective satisfactorily, since as has been explained in the foregoing paragraphs in relation to document EP1700548, the infusion product gets into the hollow space 220 and makes the homogenous deformation of the sealing member 218 difficult and therefore fluid losses can also occur through the sealing member. Again, the organoleptic properties of the infusion, as also the repeatability of the preparation process are affected.

[0029] A first embodiment of the capsule 1 according to the invention is to be seen in Figs. 3 and 4. In this case, the capsule 1 also comprises first and second parts 2, 4 connected to each other to delimit an inner chamber 6 containing an infusion product 8, such as coffee, tea, broth or the like.

[0030] In this embodiment the first part 2 is also a frustoconical cup, with the smaller base closed and the larger base open. As it is to be seen hereinafter, the smaller base corresponds with the injection side 14 of the capsule, whereas the larger base corresponds with the extraction side 16. The rim 28 also projects radially outward from the larger base. This cup can be made from any type of material that can be perforated by means of the punches 106. For example, food grade plastics such as, for example, bioplastics, polythenes, polystyrenes, polypropylenes, polyamides or others are applicable. In this embodiment shown a low density polyethylene, better known as LDPE, having a Vicat softening temperature of 80°C, according to ISO 306 test. Another preferred material in this case is a mixture of 50% of high density polyethylene HDPE and 50% of low density polypropylene LDPE. However, other percentages or materials, such as, for example, aluminium, are not discarded.

[0031] The second part 4 of the capsule 1 is in this case a foil also made from material perforatable by the projections 110 and which seals the extraction side 16 of the capsule 1. Preferably the foil is an aluminium foil reinforced with a polyethylene foil to conserve the organoleptic properties of the product contained in the chamber 6. However, depending on the circumstances the aluminium foil may be omitted. Thus, the foil forming the second part 4 is adhered to the support surface 38 of the capsule when it rests on the rim 28 of the cup.

[0032] On the outer support surface 38 of the capsule 1, and in particular on the cup rim 28, the capsule 1 comprises a sealing member 10, consisting of an annular region around the cup. On the inner chamber 6 side of the sealing member 10, a diametrical step forming a hollow space 12 delimited between the first and second parts 2, 4 of the capsule 1 is provided, namely the hollow space 12 alone would form part of the inner chamber 6.

[0033] As has been seen in Fig. 2, thanks to this hollow space 12, the sealing member 10 can be deformed to guarantee the watertight seal between the fixed and movable parts 100, 102 of the infusion machine housing the capsule 1. Once the capsule 1 is within the machine and the movable part 102 of the capsule holder compresses it against the fixed part 100 in the direction of arrow B of Fig. 4, the capsule 1 is perforated on the injection side 14 with the punches 106 and on the extraction side 16 with the projections 110. In spite of this, it should be observed, that the fixed and movable parts 100, 102 of the machine of the state of the art should not be understood to be limitative of the invention. In other words although in the example shown here it is considered that the fixed part 100 is the one corresponding to the extraction side 16 of the capsule 1 and the movable part 102 to the injection side, the configuration could be the other way round. In this case, the part of the capsule holder corresponding to the extraction side 16 of the capsule 1 would be movable, whereas the part of the capsule holder adapted to the injection side 14 would be fixed. Finally, the infusion is obtained by causing the infusion fluid to pass between the injection side 14 and the extraction side 16 of the capsule 1 at a pressure of between 1 and 20 bar.

[0034] The invention contemplates that to obtain an optimal seal in the region of the sealing member 10 during the injection of the infusion fluid, the capsule 1 also comprises separating means 18 disposed between the hollow space 12 and the inner chamber 6 to physically separate both parts. However, the term to separate, does not of necessity imply that the inner chamber 6 and the hollow space 12 are isolated from each other in all the embodiments.

[0035] As is to be seen in Fig. 4, these separating means 18 are a perimetrical skirt 22 extending in the longitudinal direction L of the capsule 1. In this embodiment, the skirt 22 is integral with the frustoconical cup and it faces the hollow space 12 as a partition wall relative to the inner chamber 6. This same figure allows it to be seen how on compressing the sealing member 10 in the direction of the arrow B, this is freely deformed on the side closest to the longitudinal axis L, since in this point the sealing member 10 is not supported until it abuts against the fixed part 100 of the machine. Simultaneously, the skirt 22 prevents at all times the accumulation of the infusion product 8 in hollow space 12 prior to injection of the infusion fluid. That is, from the time of packaging the infusion product in the inner chamber to the use of the capsule 1 to prepare the infusion, the skirt prevents the ingress of the infusion product 8 in relevant amounts. By preventing the massive entry of grains in the hollow space 12, these are prevented from clogging at this point and preventing or hindering the free deformation of the sealing member the 10 when closing the capsule holder and harming the gasket function of the sealing member 10. Another important advantage of the capsule according to the invention consists of the force required for closing the machine being reduced and its comfort of use being increased.

[0036] Hereinafter, the capsules of Figs. 5 to 9 and 11 to 16 are structurally similar to that of Figs. 3 and 4, whereby, for all the common features reference is made to the description of these two earlier figures. On the contrary, all those novel features not described in previous paragraphs will be described hereinafter.

[0037] Figure 5 shows a second embodiment of the capsule 1 for the preparation of coffee in individual doses according to the invention. In this case, the frustoconical cup is made from a combination of high (HDPE) and low density (LDPE) polythene. In particular, the material consists of 15% of HPDE with a Vicat softening temperature of 128 °C and 85% of LPDE with a Vicat softening te mperature of 80°C. As already commented, the capsules 1 according to the invention are provided with the separating means 18 extending in the longitudinal direction L to separate the hollow space 12 from the inner chamber 6. In this embodiment, the separating means 18 are also a skirt 22. Between the hollow space 12 and the inner chamber 6, and more particularly between the foil and the base of skirt 22, an opening 20 is formed that preferably is comprised between 0.1 and 0.3 mm. In this particular embodiment, the skirt 22 leaves an opening of 0.25 mm, which allows the massive invasion coffee grains to be prevented when it is wanted to obtain coffee with more intense flavour. In this embodiment it is also to be seen that the perimetrical skirt 22 comprises a plurality of interruption points 24 around its entire perimeter. These interruptions confer elasticity to the cup in the region of the skirt to improve the deformation thereof. Also in this embodiment these interruption points are radial, but they could have other orientations, such as spiral, straight lines parallel to each other or others. Furthermore, the opening space they leave is within the same ranges as the opening 20, namely between 0.1 and 0.3 mm to prevent the massive passage of coffee grains.

[0038] In Figs. 6 to 8 there is shown a third embodiment of the capsule 1 according to the invention in which the separating means 18 comprise two concentric skirts 22. As in the previous case, to improve the deformation capacity of the capsule 1 in the region of the sealing member 10 a plurality of interruption points 24 is provided. In this case, the cup is conceived for coarser infusion products, such as, for example, tea. Thus, preferably, the opening 20 between the hollow space 12 and the inner chamber 6 is between 0 and 0.5 mm, and in particular in this case it is 0,4 mm. However, in this embodiment it is not necessary for the interruption points 24 to be as narrow as in the previous embodiment, namely they can be larger than 0.5 mm and preferably smaller than 1 mm. It is also worthwhile commenting that at no time will the width of the tongues remaining on the skirt be less than the width of the interruption points themselves. Furthermore, in this embodiment, it is contemplated that the interruption points 24 of both consecutive skirts 22 are offset from one another so as to form a labyrinth. Thus, two interruption points 24 of two different skirts 22 could never be facing one another such as to leave a gap wider than 0.5 mm between them. However, particularly preferably, the interruption points 24 of two consecutive skirts 22 will be angularly offset from one another so that they never leave a radial hollow space between them.

[0039] In Fig. 9 there is shown an embodiment in which two concentric skirts 22 are also provided. However, in this case, the skirts 22 are formed by a plurality of cylinder-like bosses. This allows the dimensions of the continuous sections of skirt 22 to be considerably reduced and therefore the elastic deformation capacity of the sealing member 22 to be improved.

[0040] Fig. 10 shows a capsule 1 in which the first and second parts 2, 4 are externally convex, mirror symmetrical and made from a foil-like material such as, for example, aluminium. However, both parts can also be made from food grade plastics provided that the wall thickness is sufficiently small. Both parts 2, 4 are connected along the rim 28 to delimit an inner chamber 6 and define a lenticular capsule 1. Again, in the region of the inner chamber 6 the sealing member 10 consists of a perimetrical ring formed in two parts, namely each half is formed respectively on the first and second parts 2, 4. Thereby, below the sealing member 10, the capsule 1 is provided with the hollow space 12 facilitating its deformation. Also in this case, the capsule 1 is provided with separating means 18 as a plastic ring 26 independent from said first and second parts 2, 4 and extending again in the longitudinal direction L of the capsule 1. In this case, the physical separation between the chamber 6 and the hollow space 12 is total, namely there is no opening 20 between the hollow space and the inner chamber.

[0041] In the embodiment of Figs. 11 to 13, the sepa-

rating means 18 are provided on the second part 4 of the capsule 1, namely on the sealing foil provided on the rim 28 closing the larger base of the frustoconical cup.

[0042] In Fig. 11, the skirt 22 consists of a fold in the foil generated by heat forming. Because the foil is a thin polyethylene foil, the hollow space 12 can be separated completely from the inner chamber 6. In this case, the apex 30 of the fold bears directly against the underside of the sealing member 10. However, the sealing member 10 can be deformed freely, since the foil owing to its limited thickness of less than 0.2 mm scarcely offers resistance to the deformation.

[0043] In the embodiment of Fig. 12, the separating means 18 are a perimetrical skirt 22 extending in the longitudinal direction L as a ring of the second part 4. In this case, the second part 4 is an injection molding of polypropylene. The skirt 22 completely closes the hollow space 12. However, it is contemplated that the outer diameter of the skirt 22 be substantially equal to the inner diameter of the inner wall of the chamber 6, thereby to allow the free deformation of the sealing member 10. In this case, to guarantee the exit of the infusion through the extraction side 16, the cover closing the cup is provided with a plurality of passages 32.

[0044] In the embodiment of Fig. 13, the separating means 18 are a perimetrical skirt 22 extending in the longitudinal direction as a partition wall relative to said inner chamber 6. Unlike the forms of Figs. 11 and 12 the annular skirt 22 is formed by a rubber type elastic material different from the material of the foil forming the second part 4, namely the foil sealing the extraction side 16 of the cup. Thus, the rubber type elastic material is any one that can have properties similar to rubber, such as, for example, elastomers, synthetic resin, latex or others. Alternatively the annular skirt 22 could be provided on the cup instead of on the foil also touching the foil with its apex.

[0045] Figs. 14 and 15 show two last embodiments similar to the ones described in Figs. 5 to 8. However, in this case, to increase the elasticity and capacity of deformation in the outer region of the sealing member 10, recesses are provided to increase the pressure of the capsule holder at this point.

[0046] In Fig. 14, there is provided a plurality of concentric grooves 34 sunken relative to the outer surface of the capsule 1 in the region of the sealing member 10. In case any water could leak out, it could gather in the grooves 34 and thus any liquid leak could be prevented. The grooves 34 also allow the surface pressure to be increased in case the sealing member 10 abuts at the end of its stroke and the capsule holder has not been completely closed. By increasing the surface pressure, the grooves could deform plastically and improve the seal even more. Alternatively, the grooves could be provided in projection relative to the outer surface of the capsule. Also it should be commented that the form of the grooves is not limited to the triangular form, but could also be rectangular or trapezoidal.

[0047] In Fig. 15, there is provided a plurality of uniformly distributed cylindrical orifices 36. Again, the orifices 36 improve the deformation of the sealing member because they make the wall less rigid. Furthermore, the orifices 36 allow possible losses of liquid to gather and increase the surface pressure that the capsule holder exerts at this point. Also again, these point orifices 16 do not have to be limited to the cylindrical form, so that within the scope of the invention the orifices 36 can also be prismatic with a polygonal base or pyramid-like with a polygonal or circular base, the latter type being possibly truncated at their apex.

[0048] In Fig. 16 there is to be seen another alternative of the capsule 1 according to the invention, starting out from the concept of Fig. 12. In this case, the separating means 18 comprise two concentric skirts 22. However, there could also be more than two. A skirt 22 is provided on the foil or piece of plastic closing the mouth of the cup. The other skirt 22 is provided on the frustoconical cup. Both consecutive skirts 22 are offset in the longitudinal direction of the capsule so that they form a labyrinth making the ingress of coffee in the hollow space 12 even more difficult.

[0049] Figure 17 shows another embodiment of the capsule 1 according to the invention, in which the sealing member 10 comprises a layer 40 of rubber type elastic material, resin or the like and different from the material of the capsule 1. This highly deformable additional layer 40 can be applied independently, for example, by overmolding or projection.

[0050] Finally, it should be commented that in spite of not having been shown in detail any one of the embodiments of Figs. 3 to 13 and 16 can also be provided on the outer surface of the sealing member 10 with a finish of the type of grooves, cylindrical, prismatic or the like orifices or a layer 40 of highly deformable material.

Claims

1. A capsule for preparing infusions comprising

[a] first and second capsule (1) parts (2, 4) connected to each other such as to delimit an inner chamber (6) containing an infusion product (8) and

[b] a sealing member (10) provided on the outer surface of said capsule (1) and which on the side corresponding to the inner chamber (6) side forms a hollow space (12) delimited between said first and second capsule (1) parts (2, 4),

[c] said sealing member (10) being deformable such as to provide a watertight seal between a fixed part (100) and a movable part (102) of a machine housing said capsule (1) for preparing said infusion, by causing a pressurized fluid to pass between an injection side (14) and an extraction side (16) of said capsule (1),

characterized in that

[d] it further comprises separating means (18) for separating said hollow space (12) from said inner chamber (6), said separating means (18) extending in the longitudinal direction (L) of said capsule (1) and being formed such as to prevent the accumulation of said infusion product (8) in said hollow space (12).

2. The capsule for preparing infusions according to claim 1, **characterized in that** said separating means (18) leave an opening (20) between said hollow space (12) and said inner chamber (6) comprised between 0 and 0.5 mm.

3. The capsule for preparing infusions according to claim 2, **characterized in that** said opening (20) between said hollow space (12) and said inner chamber (6) is comprised between 0.1 and 0.3 mm.

4. The capsule for preparing infusions according to anyone of claims 1 to 3, **characterized in that** said separating means (18) are a perimetrical skirt (22) integral with said first and/or second capsule (1) parts (2, 4), said skirt (22) facing said hollow space (12) as a partition wall relative to said inner chamber (6).

5. The capsule for preparing infusions according to claim 4, **characterized in that** said perimetrical skirt (22) comprises a plurality of interruption points (24) around the entire perimeter thereof.

6. The capsule for preparing infusions according to claim 5, **characterized in that** said separating means (18) comprise at least two concentric skirts (22) comprising said plurality of interruption points (24), and **in that** the interruption points (24) of two consecutive skirts (22) are offset from one another such as to form a labyrinth.

7. The capsule for preparing infusions according to claim 4 to 5, **characterized in that** said separating means (18) comprise at least two concentric skirts (22) one skirt being provided on said first part (2) and a second skirt provided on said second part (4) and **in that** said two consecutive skirts (22) are offset from one another and configured such as to form a labyrinth.

8. The capsule for preparing infusions according to anyone of claims 1 to 4, **characterized in that** said second part (4) is a foil and **in that** said skirt (22) consists of a fold in said foil.

9. The capsule for preparing infusions according to anyone of claims 1 to 3, **characterized in that** said separating means (18) are a perimetrical skirt (22), said skirt (22) facing said hollow space (12) as a partition wall relative to said inner chamber (6) and **in that** said annular skirt (22) is formed by an elastic material different from the material of said first or second capsule (1) parts (2, 4).

10. The capsule for preparing infusions according to anyone of claims 1 to 3, **characterized in that** said separating means (18) are a ring (26) independent from said first and second parts (2, 4).

11. The capsule for preparing infusions according to anyone of claims 1 to 10, **characterized in that** said first and second parts (2, 4) are externally convex and are connected along a rim (28) adjacent to said sealing member (10).

12. The capsule for preparing infusions according to anyone of claims 1 to 10, **characterized in that** said first part (2) is a frustoconical cup comprising

[a] an annular rim (28) projecting radially outwardly from its larger base,
[b] being open at said larger base, and
[c] constituting said sealing member (10),
[d] a hollow step (12) being provided below said sealing member (10) and **in that**

said second part (4) is a foil sealing said cup at the support surface (38) of said capsule (1) on said rim (28).

13. The capsule for preparing infusions according to claim 11 or 12, **characterized in that** said injection side (14) and said extraction side (16) face each other.

Patentansprüche

1. Kapsel zur Vorbereitung von Infusionen, umfassend

[a] erste und zweite Kapselteile (2, 4), die miteinander verbunden sind, um eine Innenkammer (6) zu begrenzen, die ein Infusionsprodukt (8) enthält, und
[b] ein Dichtungselement (10), das an der Außenfläche der Kapsel (1) vorgesehen ist und auf der Seite, die der Innenkammerseite entspricht, einen Hohlraum (12) bildet, der zwischen den ersten und zweiten Kapselteilen (2, 4) begrenzt ist,
[c] wobei das Dichtungselement (10) verformbar ist, um eine wasserdichte Dichtung zwischen einem befestigten Teil (100) und einem bewegbaren Teil (102) einer Maschine vorzusehen, die die Kapsel zur Vorbereitung der Infusion unterbringt, indem ein unter Druck stehendes Fluid

zwischen einer Einspritzseite (14) und einer Entnahmeseite (16) der Kapsel (1) geleitet wird, **dadurch gekennzeichnet, dass**
[d] sie ferner ein Trennmittel (18) zur Trennung des Hohlraums (12) von der Innenkammer (6) umfasst, wobei sich das Trennmittel (18) in der Längsrichtung (L) der Kapsel (1) erstreckt und ausgebildet ist, um die Ansammlung des Infusionsprodukts (8) in dem Hohlraum (12) zu verhindern.

2. Kapsel zur Vorbereitung von Infusionen nach Anspruch 1, **dadurch gekennzeichnet, dass** das Trennmittel (18) zwischen dem Hohlraum (12) und der Innenkammer (6) eine Öffnung (20) lässt, die zwischen 0 und 0,5 mm beträgt.

3. Kapsel zur Vorbereitung von Infusionen nach Anspruch 2, **dadurch gekennzeichnet, dass** die Öffnung (20) zwischen dem Hohlraum (12) und der Innenkammer (6) zwischen 0,1 und 0,3 mm beträgt.

4. Kapsel zur Vorbereitung von Infusionen nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** das Trennmittel (18) eine mit den ersten und/oder zweiten Kapselteilen (2, 4) einstückige Umfangsschürze (22) ist, wobei die Schürze (22) dem Hohlraum (12) als eine Trennwand relativ zu der Innenkammer (6) zugewandt ist.

5. Kapsel zur Vorbereitung von Infusionen nach Anspruch 4, **dadurch gekennzeichnet, dass** die Umfangsschürze (22) eine Mehrzahl von Unterbrechungspunkten (24) um ihren gesamten Umfang umfasst.

6. Kapsel zur Vorbereitung von Infusionen nach Anspruch 5, **dadurch gekennzeichnet, dass** das Trennmittel (18) mindestens zwei die Mehrzahl von Unterbrechungspunkten (24) umfassende konzentrische Schürzen (22) umfasst und die Unterbrechungspunkte (24) von zwei aufeinanderfolgenden Schürzen (22) gegeneinander versetzt sind, um ein Labyrinth zu bilden.

7. Kapsel zur Vorbereitung von Infusionen nach Anspruch 4 oder 5, **dadurch gekennzeichnet, dass** das Trennmittel (18) mindestens zwei konzentrische Schürzen (22) umfasst, wobei eine Schürze an dem ersten Teil (2) und eine zweite Schürze an dem zweiten Teil (4) vorgesehen ist, und die zwei aufeinanderfolgenden Schürzen (22) gegeneinander versetzt und eingerichtet sind, um ein Labyrinth zu bilden.

8. Kapsel zur Vorbereitung von Infusionen nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** der zweite Teil (4) eine Folie ist und die Schürze (22) aus einer Falte in der Folie besteht.

9. Kapsel zur Vorbereitung von Infusionen nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** das Trennmittel (18) eine Umfangsschürze (22) ist, wobei die Schürze (22) dem Hohlraum (12) als eine Trennwand relativ zu der Innenkammer (6) zugewandt ist und die ringförmige Schürze (22) aus einem elastischen Material gebildet ist, das sich von dem Material der ersten oder zweiten Kapselteile (2, 4) unterscheidet.

10. Kapsel zur Vorbereitung von Infusionen nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** das Trennmittel (18) ein von den ersten und zweiten Teilen (2, 4) unabhängiger Ring (26) ist.

11. Kapsel zur Vorbereitung von Infusionen nach einem der Ansprüche 1 bis 10, **dadurch gekennzeichnet, dass** die ersten und zweiten Teile (2, 4) äußerlich konvex und entlang einem zu dem Dichtungselement (10) benachbarten Rand (28) verbunden sind.

12. Kapsel zur Vorbereitung von Infusionen nach einem der Ansprüche 1 bis 10, **dadurch gekennzeichnet, dass** der erste Teil (2) ein kegelstumpfförmiger Behälter ist, der

[a] einen von seiner größeren Basis radial nach außen ragenden ringförmigen Rand (28) umfasst,
[b] an der größeren Basis offen ist, und
[c] das Dichtungselement (10) bildet,
[d] wobei eine hohle Stufe (12) unter dem Dichtungselement (10) vorgesehen ist, und

der zweite Teil (4) eine Folie ist, die den Behälter an der Stützfläche (38) der Kapsel (1) an dem Rand (28) abdichtet.

13. Kapsel zur Vorbereitung von Infusionen nach Anspruch 11 oder 12, **dadurch gekennzeichnet, dass** die Einspritzseite (14) und die Entnahmeseite (16) einander zugewandt sind.

Revendications

1. Capsule pour la préparation d'infusions, comprenant

[a] des première et seconde parties (2, 4) de capsule (1) reliées entre elles de façon à délimiter une chambre intérieure (6) contenant un produit d'infusion (8) et
[b] un élément d'étanchéité (10) prévu sur la surface extérieure de ladite capsule (1) et qui, sur le côté correspondant au côté de la chambre intérieure (6), forme un espace creux (12) déli-

mité entre lesdites première et seconde parties (2, 4) de capsule (1),
[c] ledit élément d'étanchéité (10) étant déformable de façon à fournir un joint étanche à l'eau entre une partie fixe (100) et une partie mobile (102) d'une machine recevant ladite capsule (1) pour préparer ladite infusion, en faisant passer un fluide sous pression entre un côté injection (14) et un côté extraction (16) de ladite capsule (1),
caractérisée en ce
[d] **qu'**elle comprend, en outre, un moyen de séparation (18) pour séparer ledit espace creux (12) de ladite chambre intérieure (6), ledit moyen de séparation (18) s'étendant dans la direction longitudinale (L) de ladite capsule (1) et étant formé de manière à empêcher l'accumulation dudit produit d'infusion (8) dans ledit espace creux (12).

2. Capsule pour la préparation d'infusions selon la revendication 1, **caractérisée en ce que** ledit moyen de séparation (18) laisse une ouverture (20) entre ledit espace creux (12) et ladite chambre intérieure (6), comprise entre 0 et 0,5 mm.

3. Capsule pour la préparation d'infusions selon la revendication 2, **caractérisée en ce que** ladite ouverture (20) entre ledit espace creux (12) et ladite chambre intérieure (6) est comprise entre 0,1 et 0,3 mm.

4. Capsule pour la préparation d'infusions selon l'une quelconque des revendications 1 à 3, **caractérisée en ce que** ledit moyen de séparation (18) est une jupe périphérique (22) solidaire desdites première et/ou seconde parties (2, 4) de capsule (1), ladite jupe (22) étant située en regard dudit espace creux (12) en tant que cloison de séparation par rapport à ladite chambre intérieure (6).

5. Capsule pour la préparation d'infusions selon la revendication 4, **caractérisée en ce que** ladite jupe périphérique (22) comprend une pluralité de points d'interruption (24) tout autour de son périmètre.

6. Capsule pour la préparation d'infusions selon la revendication 5, **caractérisée en ce que** ledit moyen de séparation (18) comprend au moins deux jupes concentriques (22) comprenant ladite pluralité de points d'interruption (24), et **en ce que** les points d'interruption (24) de deux jupes consécutives (22) sont décalés entre eux de façon à former un labyrinthe.

7. Capsule pour la préparation d'infusions selon la revendication 4 à 5, **caractérisée en ce que** ledit moyen de séparation (18) comprend au moins deux jupes concentriques (22), une jupe étant prévue sur ladite première partie (2) et une seconde jupe étant prévue sur ladite seconde partie (4) et **en ce que** lesdites deux jupes (22) consécutives sont décalées entre elles et configurées de façon à former un labyrinthe.

8. Capsule pour la préparation d'infusions selon l'une quelconque des revendications 1 à 4, **caractérisée en ce que** ladite seconde partie (4) est une feuille et **en ce que** ladite jupe (22) consiste en un pli dans ladite feuille.

9. Capsule pour la préparation d'infusions selon l'une quelconque des revendications 1 à 3, **caractérisée en ce que** ledit moyen de séparation (18) est une jupe périphérique (22), ladite jupe (22) étant située en regard dudit espace creux (12) en tant que cloison de séparation par rapport à ladite chambre intérieure (6) et **en ce que** ladite jupe annulaire (22) est formée d'un matériau élastique différent du matériau desdites première ou seconde parties (2, 4) de capsule (1).

10. Capsule pour la préparation d'infusions selon l'une quelconque des revendications 1 à 3, **caractérisée en ce que** ledit moyen de séparation (18) est un anneau (26) indépendant desdites première et seconde parties (2, 4).

11. Capsule pour la préparation d'infusions selon l'une quelconque des revendications 1 à 10, **caractérisée en ce que** lesdites première et seconde parties (2, 4) sont extérieurement convexes et sont reliées le long d'un bord (28) adjacent audit élément d'étanchéité (10).

12. Capsule pour la préparation d'infusions selon l'une quelconque des revendications 1 à 10, **caractérisée en ce que** ladite première partie (2) est une coupe tronconique comprenant

[a] un bord annulaire (28) faisant saillie radialement vers l'extérieur à partir de sa base plus large,
[b] étant ouverte au niveau de sa base plus large, et
[c] constituant ledit élément d'étanchéité (10),
[d] une marche creuse (12) étant prévue au-dessous dudit élément d'étanchéité (10) et **en ce que**

ladite seconde partie (4) est une feuille scellant ladite coupe au niveau de la surface support (38) de ladite capsule (1) sur ledit bord (28).

13. Capsule pour la préparation d'infusions selon la revendication 11 ou 12, **caractérisée en ce que** ledit côté d'injection (14) et ledit côté d'extraction (16) sont situés en regard l'un de l'autre.

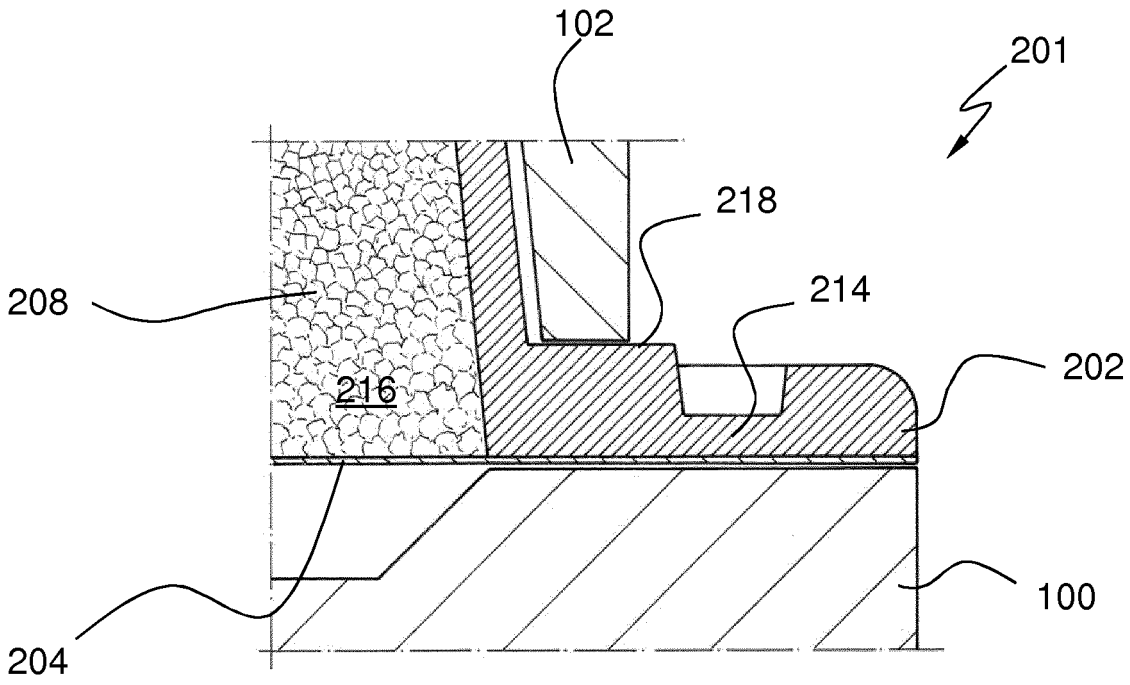

102
201
218
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100
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Fig. 1

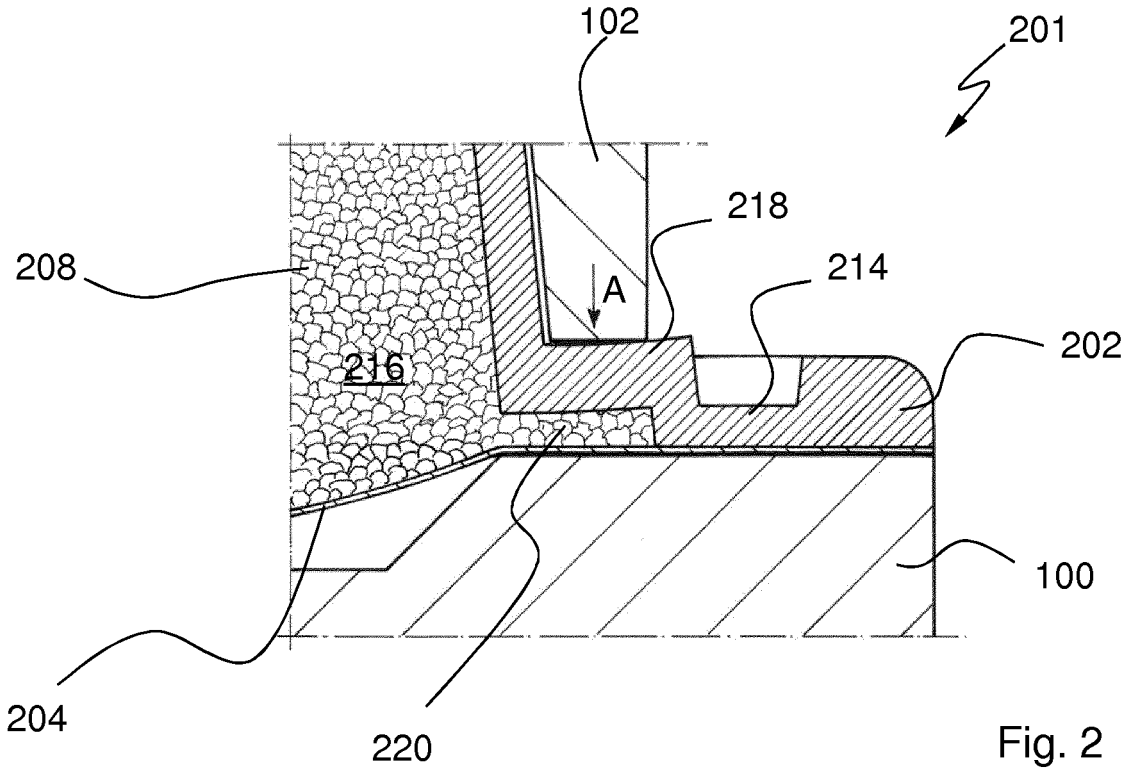

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Fig. 2

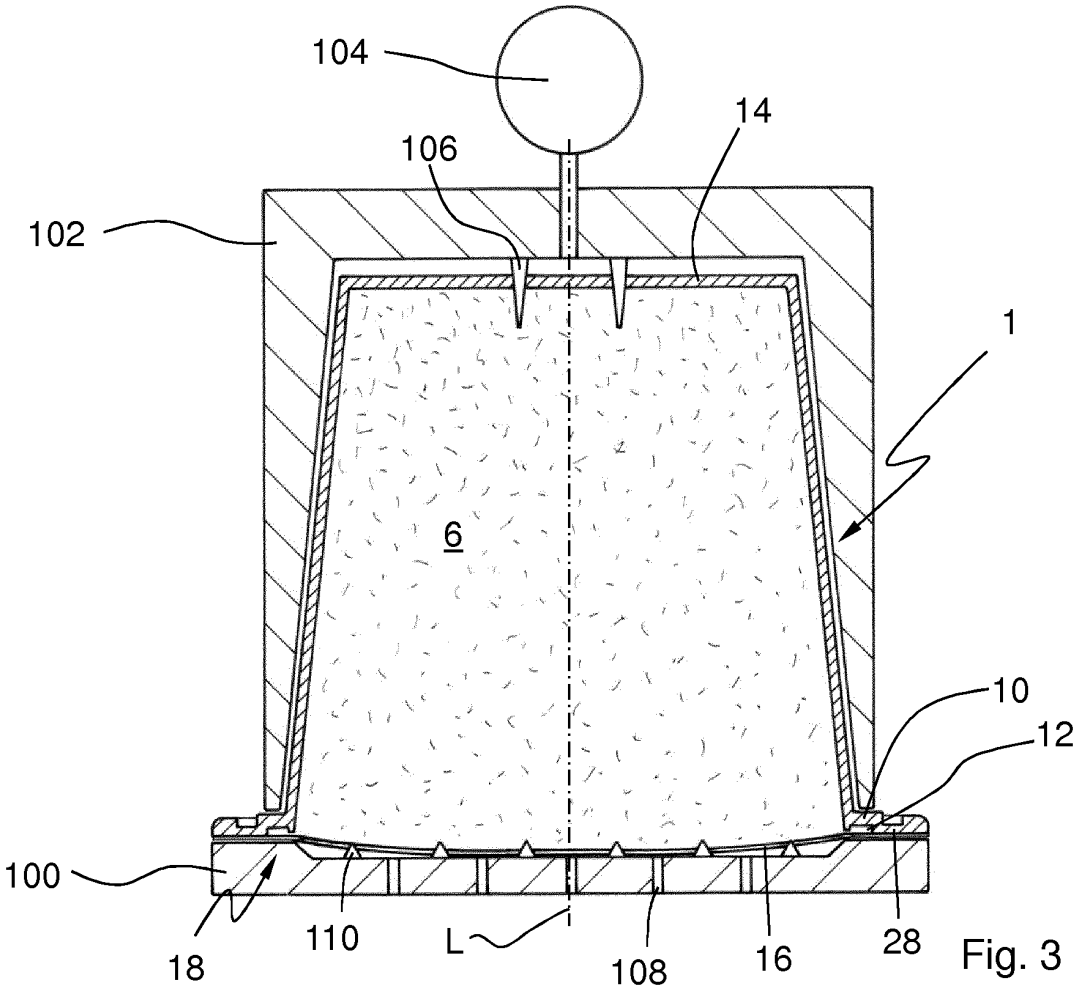

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106
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6
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110
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108
16
28

Fig. 3

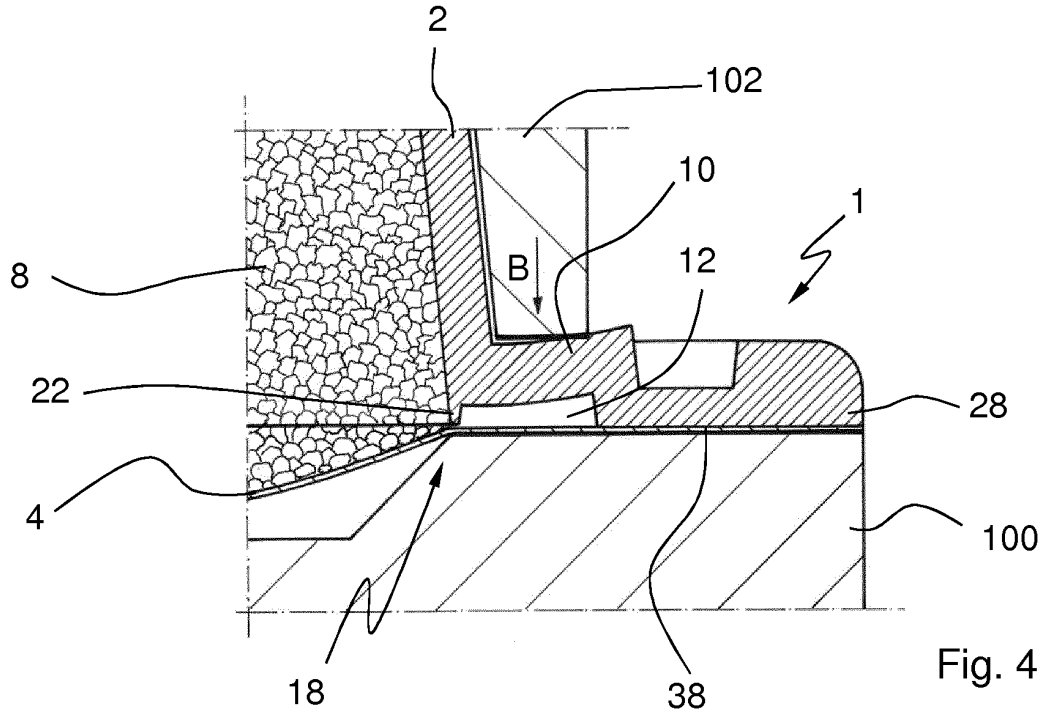

2
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8
B
12
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28
4
100
18
38

Fig. 4

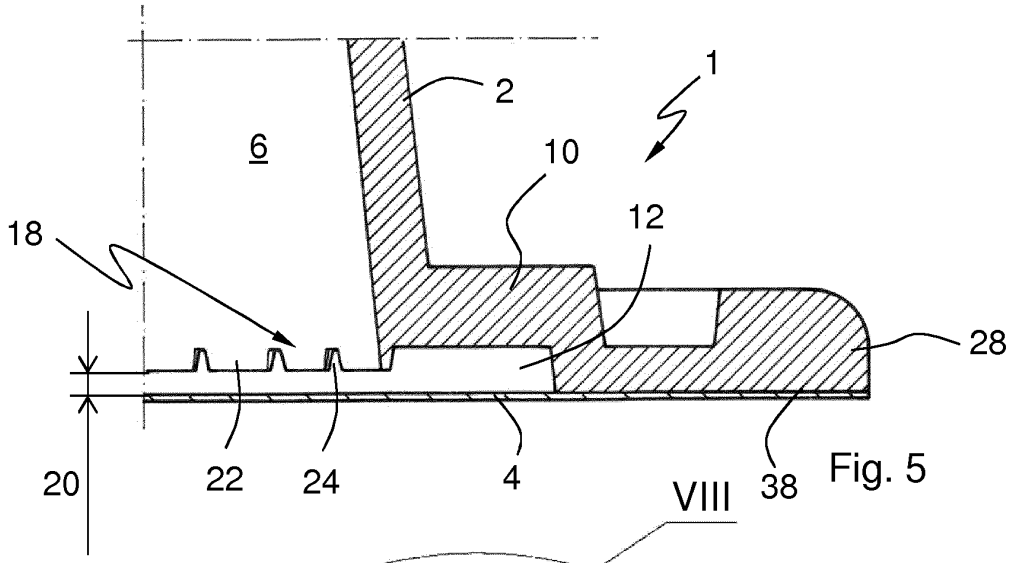


Fig. 5

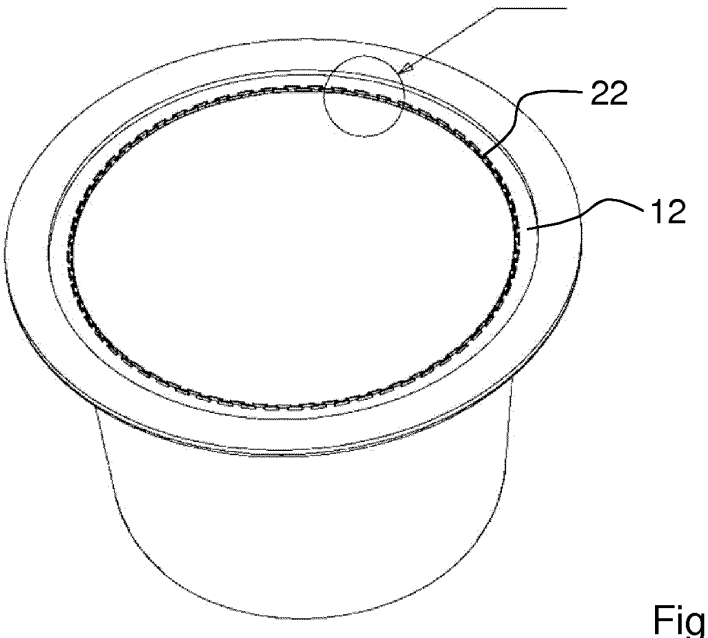


Fig. 6

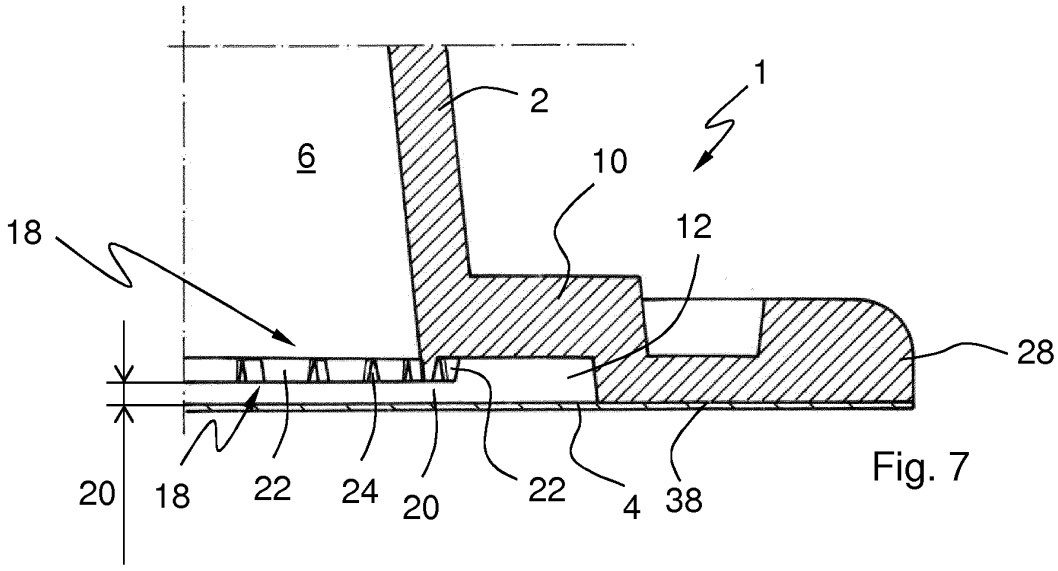


Fig. 7

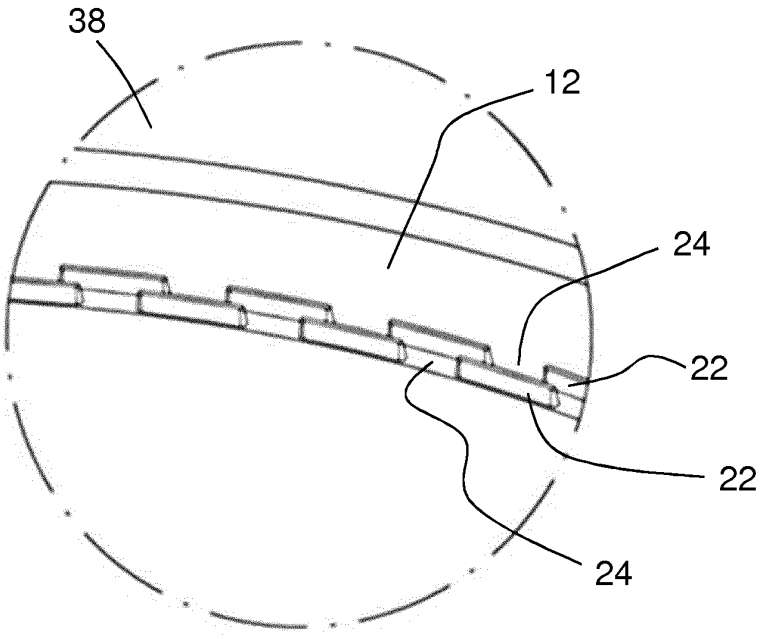


Fig. 8

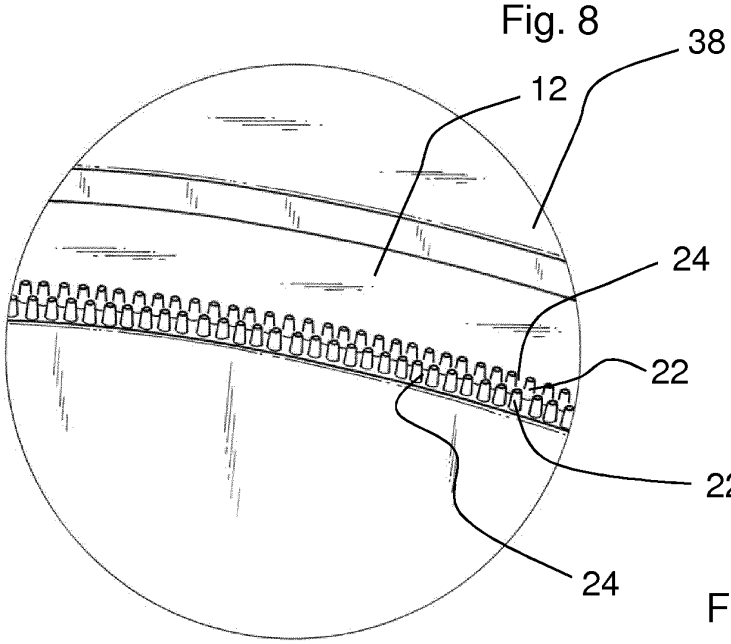


Fig. 9

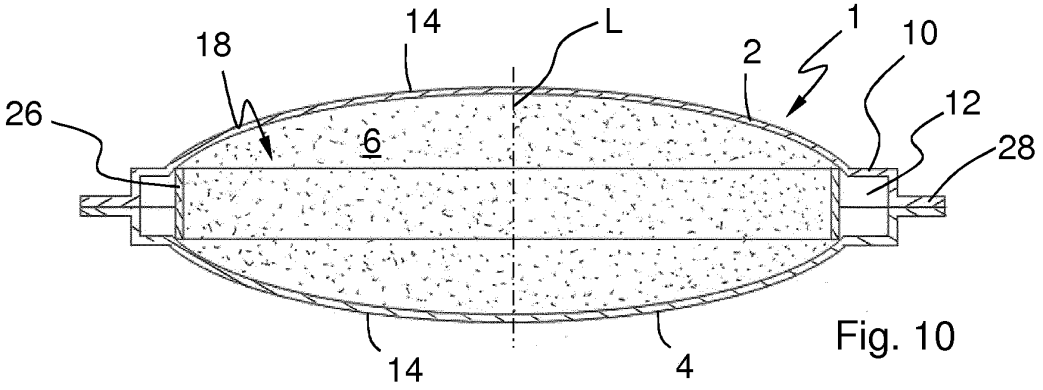


Fig. 10

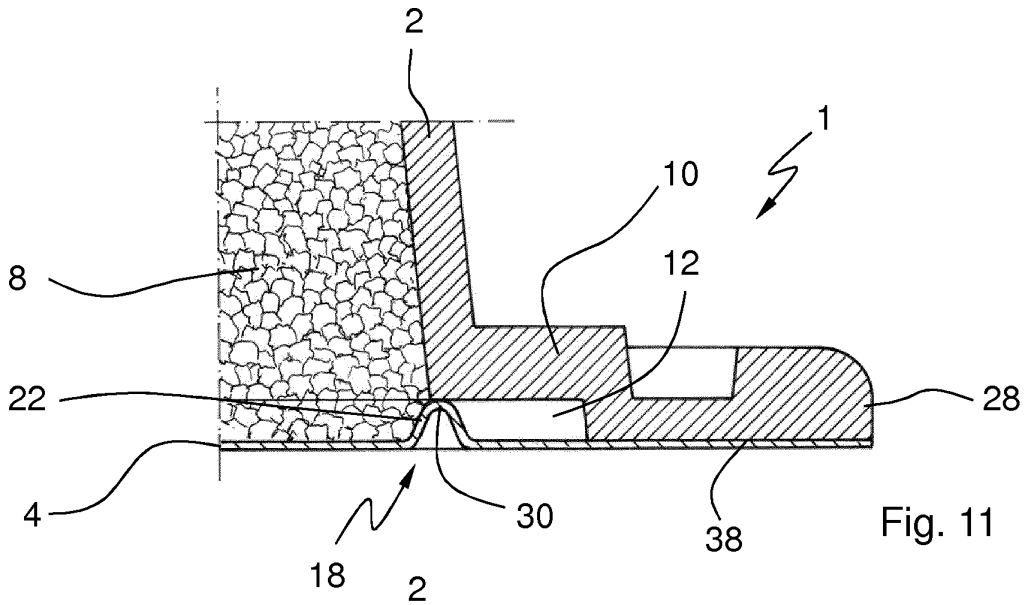


Fig. 11

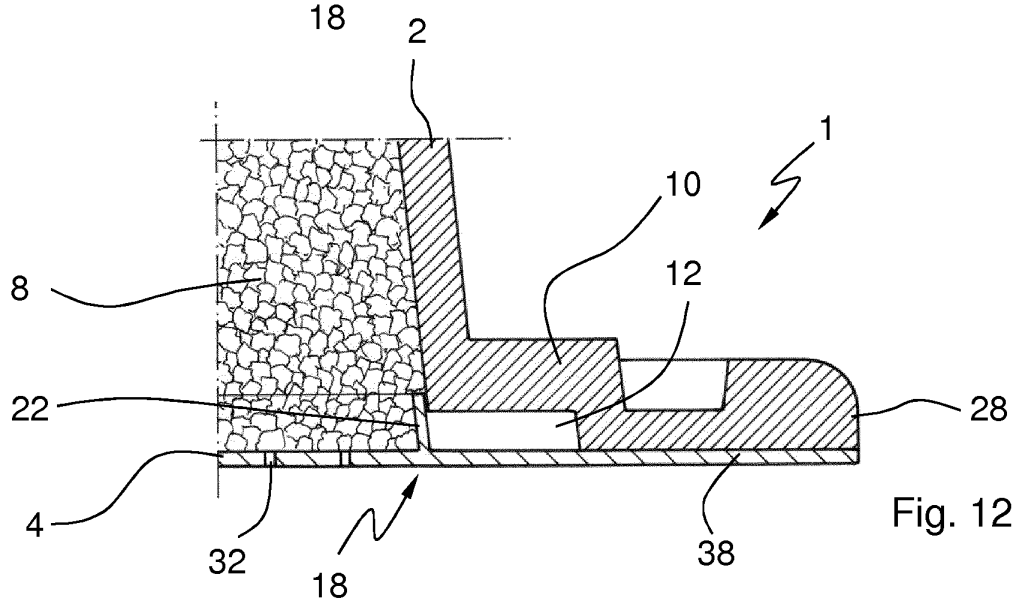


Fig. 12

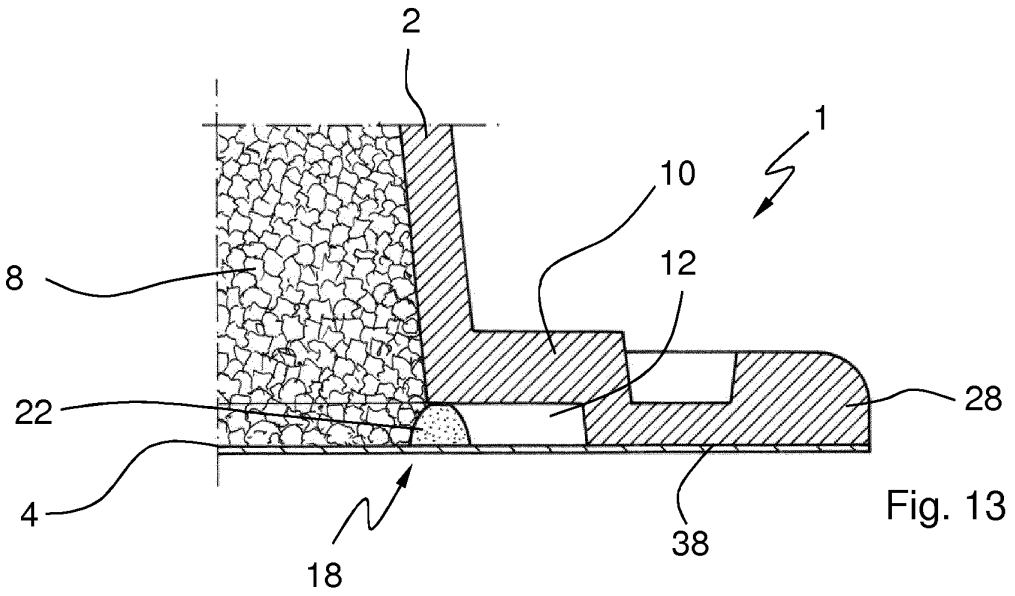


Fig. 13

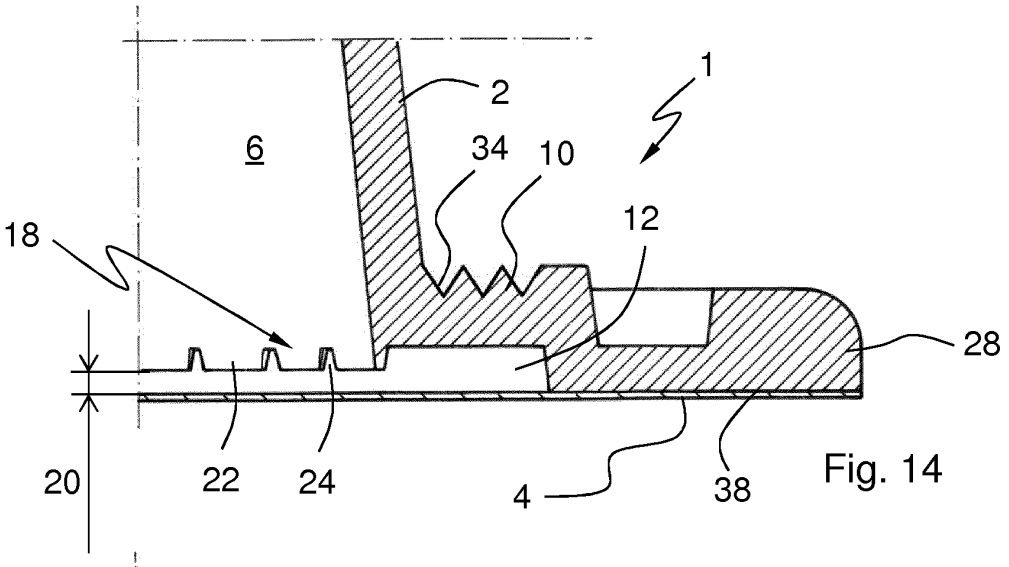


Fig. 14

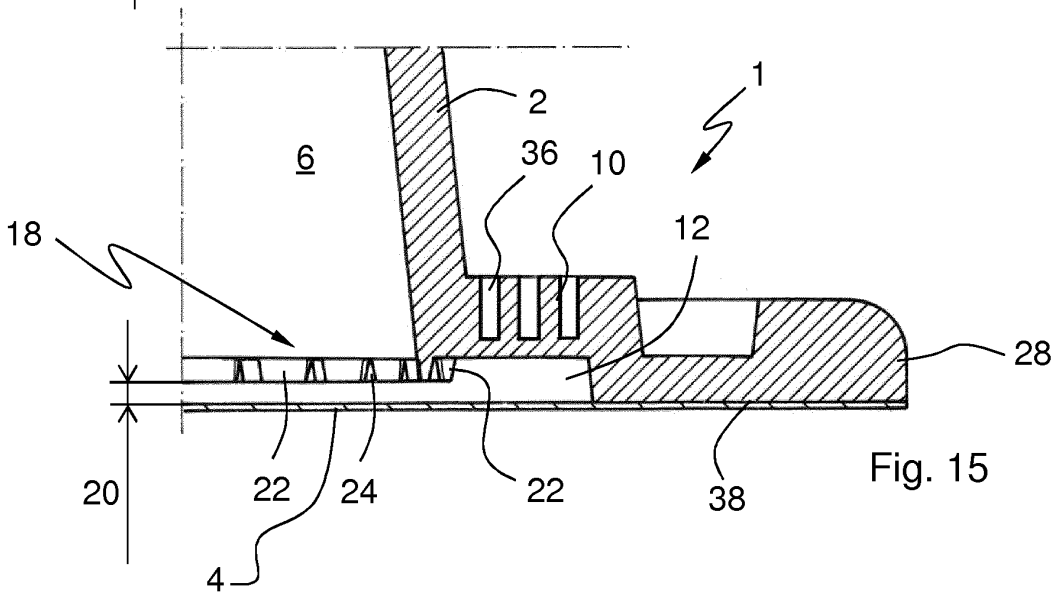


Fig. 15

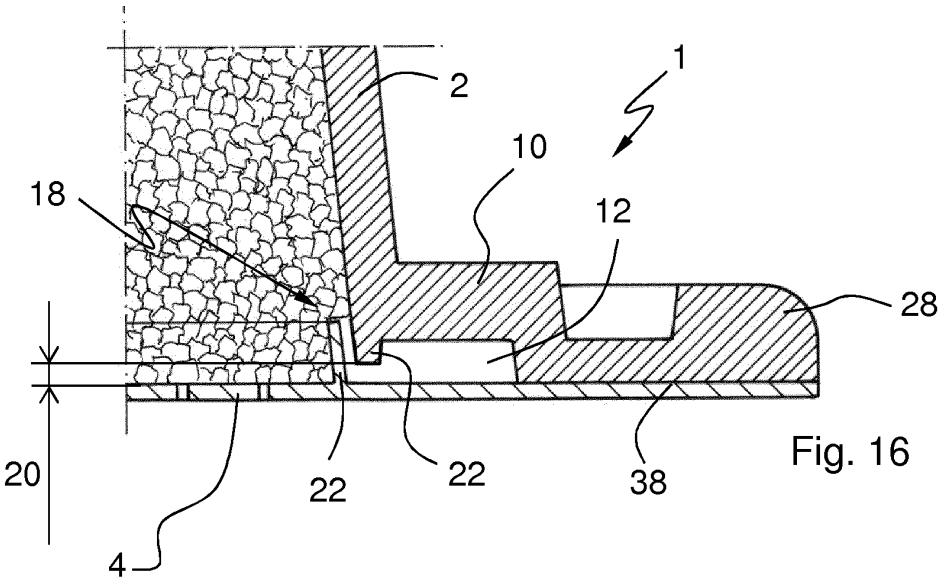


Fig. 16

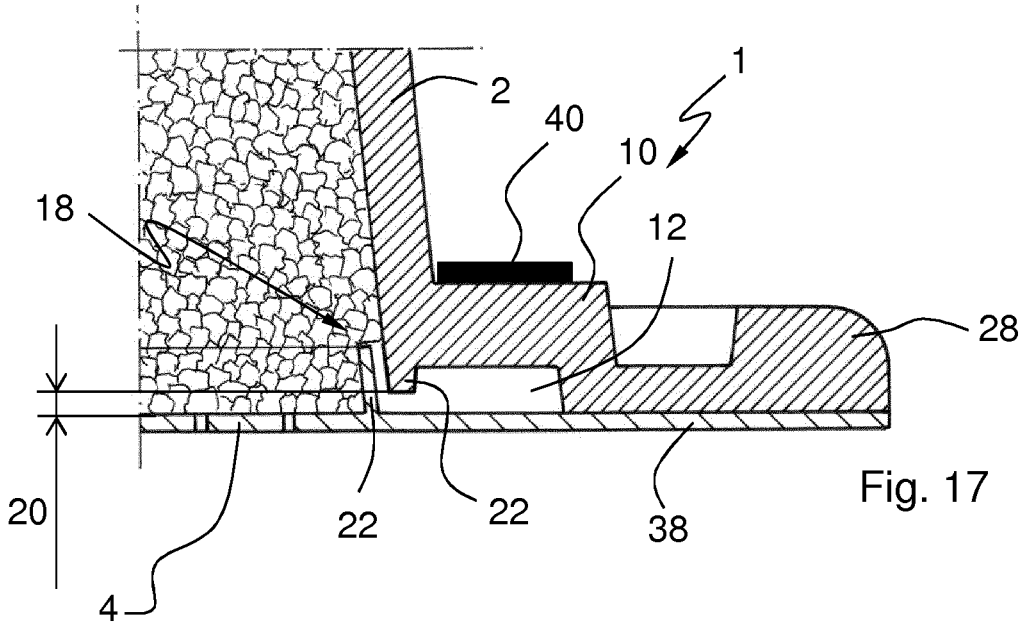


Fig. 17

REFERENCES CITED IN THE DESCRIPTION

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