(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 452 893 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
**16.05.2012 Bulletin 2012/20**

(51) Int Cl.:
***B65D 85/804*** *(2006.01)*

(21) Application number: **11187888.0**

(22) Date of filing: **04.11.2011**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
Designated Extension States:
**BA ME**

(30) Priority: **10.11.2010 IT BO20100677**

(71) Applicant: **E.T.I. S.r.l.**
**40043 Marzabotto (Bologna) (IT)**

(72) Inventor: **Simoncini, Riccardo**
**40043 MARZABOTTO (BOLOGNA) (IT)**

(74) Representative: **Dall'Olio, Christian et al**
**INVENTION S.r.l.**
**Via delle Armi, 1**
**40137 Bologna (IT)**

(54) **Capsule for containing a preparation for a hot drink**

(57) A capsule is disclosed, for a preparation for a hot drink, comprising a body (10) shaped as a beaker, destined to contain a batch of the preparation, and in turn comprising one or more lateral walls (12) and a bottom (11) for inferiorly closing the lateral wall (12), the capsule (1) further being usable with an extraction apparatus in order to produce the hot drink, which apparatus comprises perforating means mobile inside the internal chamber over a given perforating run, comprising at least a point, and provided for the aim of perforating a bottom of a capsule of the prior art in order to create at least a perforation therein which would enable supply of liquid to the batch of preparation. In the disclosed capsule (1), the bottom (11) comprises an inlet filter (110) for enabling passage of liquid into an internal volume (100) of the capsule (1) and for preventing passage of the preparation outside the capsule (1), and the abutting region (111) of the bottom (11) is recessible internally of the capsule (1) upon a push exerted thereon by the point of the perforating means so as to define, externally of the capsule (1), a housing which at least partially accommodates the perforating means.

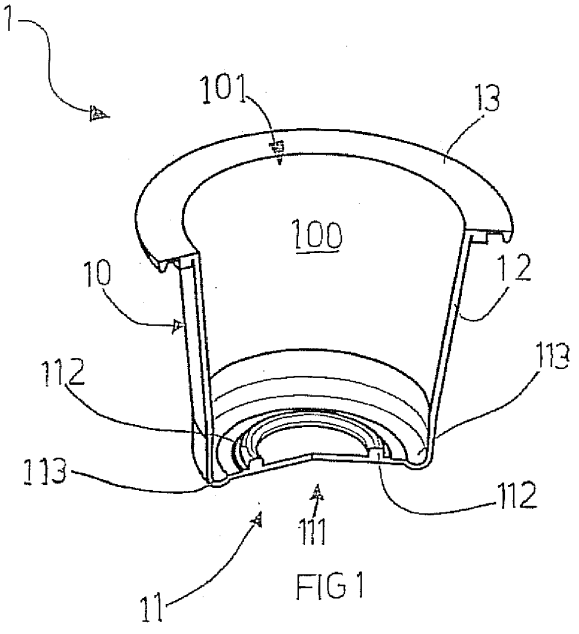


FIG 1

EP 2 452 893 A1

## Description

**[0001]** The present invention relates to capsules for extractable products, and in particular capsules for containing a preparation for drinks.

**[0002]** In particular, the invention relates to capsules for containing preparations for hot beverages such as in particular coffee or tea or milk and so on.

**[0003]** Normally, the capsules contain a batch of a preparation and are usable in automatic machines suitable for extracting the product.

**[0004]** Among these machines, there are the well-known automatic machines for making coffee, designed for domestic use, and which are often used also in offices, etc.

**[0005]** In practice, closed capsules containing a batch of preparation are known as "consumables" and are also referred to colloquially as "pods."

**[0006]** Below a known system for making hot drinks is described, mainly consisting of the extraction apparatus of the machines and of the capsules.

**[0007]** The automatic machines, in the extraction equipment thereof, comprise an internal chamber for temporarily housing and retaining a capsule and a supply device for supplying hot water under pressure to the capsule inserted in the chamber, in order to extract the product.

**[0008]** In the case of hot beverages, from the chemical point of view, the active ingredients and/or the fragrances of the batch of preparation are extracted or dissolved in hot water, by infusion or mixing, in this way obtaining the beverage.

**[0009]** The capsules of the prior art include a beaker-shaped body, and a cover formed by a film attached to the mouth of the beaker-shaped body by the glass, by gluing, heat sealing or ultrasonic welding, or other known technologies.

**[0010]** The known capsules are closed and sealed with the beaker-shaped body made of aluminium, and the cover made of a thin sheet, for example made of aluminium, so that the cover has a certain flexibility.

**[0011]** To extract the product, the water supplied into the chamber must be able to enter the capsule and then the drink has to be able to exit from the capsule such as then to be dispensed out of the machine, directly into a beaker predisposed by the user in a receiving compartment.

**[0012]** The extraction apparatus thus comprises pointed mobile elements, for example needle-shaped, which are activated to push, with the points thereof, on the bottom of the capsule, at predetermined points, such as to perforate it by puncturing and enable the water supplied by the supply device to enter the capsule from the bottom.

**[0013]** In practice, the mobile parts penetrate the capsule by piercing the bottom thereof, otherwise they could not make relatively large holes, which are required to supply a sufficient amount of water to a batch of preparation to form the beverage.

**[0014]** The pressure inside the capsule that forms when the hot water accedes to it leads to a deformation of the cover.

**[0015]** In practice, the cover takes on a convex shape, with an externally-directed curvature.

**[0016]** Outside the chamber, and in an opposite position with respect to the pointed elements, there may be further fixed pointed elements.

**[0017]** These further pointed elements are in such a position as to abut the cover when it is deformed by the pressure inside the capsule, to tear it and thus enable the prepared beverage to exit from the capsule.

**[0018]** This known system has the following drawbacks.

**[0019]** First, the perforation by puncturing of the bottom of the capsule may produce a partial obstruction of the openings thus formed by the points that have just made the openings, which implies poor efficiency of the water supply to a prepared batch.

**[0020]** Alternatively, if the pointed elements are quickly retracted after use, exit of the preparation from the capsule through the perforations which, as mentioned, must be relatively large, is possible.

**[0021]** In fact, the preparation is usually powder material, i.e. in a loose form, with grains of small dimension; its undesired escape from the bottom might cause damage to the quality of the dispensed drink, as the active ingredients would not have been efficiently extracted.

**[0022]** Further, this possible occurrence implicates a waste of preparation and a progressive but rapid fouling of the interior of the machine, which is detrimental to both the operating thereof and to the hygienic conditions of the apparatus.

**[0023]** Additionally, since the perforations made by puncturing of the bottom necessarily have to be of not a small size, it may happen that the increase in pressure within the capsule caused by the entry of hot water is less than expected, with the result that the convexity of the cover will be less pronounced.

**[0024]** This can produce only a partial tearing of the cover and therefore inefficient dispensing and a waste of preparation, part of which remains in the capsule or in the chamber.

**[0025]** A further drawback is caused by the fact that in the known system, the water penetrates only through the perforations made by puncturing done by the mobile pointed elements, which must be in a predetermined position and also must be in a limited number such as to prevent the bottom from coming away at the edge or completely bursting when crossed by the pressurised water, which would completely prejudice the extraction and dispensing of the product.

**[0026]** Therefore, from these few points of access for the water, realised at the bottom of the capsule, up to the points of exit in the torn cover, preferential paths are formed of hot water flow passing through the preparation.

**[0027]** These preferential flows necessarily create a non-uniform and therefore inefficient extraction of the

product.

**[0028]** This leads to the consequence that the preparation and dispensing of a less "intense" drink in terms of flavour or at least with a body and flavour that vary from time to time, which is detrimental to the commercial interests of the system, not to mention the waste of preparation that is not efficiently dissolved or infused.

**[0029]** An aim of the present invention is to obviate the above-mentioned drawbacks and others besides, with a capsule for a preparation of a hot drink, according to claim 1.

**[0030]** The capsule of the invention comprises a beaker-shaped body, designed to contain a batch of the preparation, and in turn comprising one or more lateral walls and a bottom wall for closing the lateral wall.

**[0031]** The capsule can be used with an extraction unit for producing the hot drink, such as the one already described, although it is clear that this destination does not in itself limit the ambit of application of the invention.

**[0032]** For the sake of clarity, it is specified that the extraction apparatus includes:

an internal chamber for accommodating and retaining the beaker-shaped body of the capsule during preparation of the drink;

perforating means movable in the internal chamber along a given perforating run, comprising at least a point, and provided for the aim of perforating a bottom of a capsule of the prior art in order to create at least a perforation therein which would enable supply of liquid to the batch of preparation; and

a supply device for supplying the capsule, once accommodated in the chamber, with a quantity of liquid, for example pressurised hot water, able to react with the preparation in order to form the drink.

**[0033]** The bottom of the proposed capsule includes an abutting region predisposed to abut the top of the perforating means when the said perforation means move along the perforating run thereof.

**[0034]** The capsule according to the invention, as set out in claim 1, is characterised in that:

the bottom comprises an inlet filter for enabling passage of liquid into an internal volume of the capsule and for preventing passage of the preparation outside the capsule, and

the abutting region of the bottom is recessible internally of the capsule upon a push exerted thereon by the point of the perforating means so as to define, externally of the capsule, a housing which at least partially accommodates the perforating means.

**[0035]** Thus, first the disclosed capsule can be used in the preparation of drinks with the described apparatus without any need for tearing the bottom, due to the presence of the inlet filter which enables access of the liquid to the preparation — the liquid being pressurised hot water — for the aim of forming the hot drink.

**[0036]** Further, owing to the fact that the abutting region is recessible in the capsule, and, importantly, the perforating means are housed in the housing which consequently forms outside the capsule, at the bottom thereof, there is the advantageous result that the bottom is not torn to create large through-perforations.

**[0037]** In fact, even if the point (or points) of the perforating means puncture the abutting region, as the region recedes and the perforating means are not received in the capsule but are received in a housing that is external of the capsule, the possibility that the movement of the perforating means might cause relatively large perforations in the bottom is completely prevented.

**[0038]** As explained, the above type of perforations is produced because the perforating means (usually pointed elements having needle- or pin-shape) penetrate into the capsule in the prior art, crossing through the bottom.

**[0039]** If these relatively large perforations (as mentioned above) are not produced and if the perforating means do not pass through the bottom, but are received in an external housing, all the drawbacks in the prior art are completely obviated.

**[0040]** The above and following use of the term "recessible" in connection with the abutting region is intended to mean the ability of the region to retract to inside the capsule, such as to leave a space where before the region was located.

**[0041]** In other terms, the abutting region displaces, retreating to inside the capsule when the perforating means advance on the perforating run thereof; in this way a space is left externally in which the perforating means are located (until, that is, they return into the original position).

**[0042]** In the interests of full clarity, though it is implicit, the disclosed capsule, though having been designed such as to be usable with the above-described apparatus, has also been invented expressly such as to be used with other types of apparatus, in various types of machine for automatic dispensing of beverages.

**[0043]** In fact, since it advantageously provides the input filter, the capsule can very well be used in machines that include no means for perforating the bottom.

**[0044]** Note that the advantageous characteristic of the recessibility of the abutting region of the bottom comes into play only if there are perforating means present, intended for perforating the bottom of a capsule in the prior art, or other equivalent means, with or without points, configured such that they can push the abutting region, but this in no way precludes the functioning of the capsule in apparatus in which perforating means or thrust means acting on the abutting region are not present.

**[0045]** Specific embodiments of the invention, and advantageous technical-functional characteristics related to the embodiments that can only partly be derived from

the above description, will be described in the following, in accordance the what is set out in the claims and with the aid of the accompanying figures of the drawings, in which:

figure 1 is an axonometric projection and sectioned view of the capsule according to the invention, in which the inlet filter is not represented in, and

figure 2 is an axonometric view from below of the capsule.

**[0046]** In the attached table of the drawings, 1 denotes the capsule according to the invention.

**[0047]** In both figures it can be seen how the capsule 1 of the invention comprises a body 10 having a beaker shape, in turn comprising a lateral wall 12 and a bottom 11 which inferiorly closes the lateral wall.

**[0048]** The capsule 1 is preferably realised in a single body, and made of polypropylene, a completely non-toxic material.

**[0049]** In the embodiment of the capsule 1 shown in the figures, the bottom 11 is substantially circumferential in the periphery (although not flat in all its parts, as will emerge) and the lateral wall 12 is located in whole or in part on the lateral surface of an ideal cone, thus giving the beaker-shaped body a shape that resembles a truncated cone.

**[0050]** In detail, the lateral wall 12 is located on the lateral surface of a cone (or of a truncated cone) at least up to the connecting edge with the bottom 11, in which the capsule 1 can exhibit special aspects, as described in detail herein below.

**[0051]** In any case, the lateral wall 12 and the bottom 11 of the beaker-shaped body 10 define the internal volume 100 of the capsule 1 for containing the preparation for hot drinks.

**[0052]** We mention here that the capsule 1 can also include an abutment fashioned around the mouth 101 (see both figures), which is substantially an upper collar 13 protruding laterally from the edge of the mouth 101, and can be used to attach the cover over it (not shown in the figures), of which more information will be given later together with other relevant but optional aspects relating to the upper collar 13.

**[0053]** In practice, the capsule 1, above the beaker-shaped body 10, also exhibits the collar 13.

**[0054]** The input filter and the abutting region are generally indicated by 110 and 111 in the figures.

**[0055]** Note that the inlet filter 110 is not shown in figure 2 in order to make the figure clearer to view (though it is illustrated in figure 2).

**[0056]** In non-preferential and non-illustrated versions, but nevertheless possible and within the ambit of protection of the invention, the capsule 1 can be configured to have an abutting region coinciding with the bottom 11, in the sense that the whole bottom 11 can be used generally to abut the point or points of the perforating means (for example, in a case of a multiplicity of points arranged side by side) and recede internally of the capsule 1 itself, in practice displacing into the internal volume 100 that contains the preparation.

**[0057]** Further, the input filter 110 can be located almost anywhere in the bottom 11 itself, in the sense that the means for enabling the pressurised hot water to enter and for enabling the preparation not to leave the capsule 1 (which means are more fully described in their preferred embodiment herein below) are located in different positions along the length of the bottom 11.

**[0058]** The preferred version of the capsule 1 is described below, including its operation within the extraction apparatus, which apparatus is not illustrated in the figures as it is of known type and not an object of the invention (for which reason the components thereof which have already been introduced will not be further described in detail for the sake of brevity and clarity).

**[0059]** In the preferred embodiment, the abutting region 111 of the bottom 11 comprises a resistant portion 112.

**[0060]** The resistant portion 112 is arranged facing the point (or points) of the perforating means, when the capsule 1 is in use in the equipment, such to be able to receive the point/s and be thrust thereby, when the perforating means move along the perforating run.

**[0061]** Thus, the resistant portion 112 is the part of the abutting region 111 of the bottom 11 which directly receives the point of the perforating means and which therefore can be pierced, and especially pushed thereby.

**[0062]** In this embodiment the abutting region 111 is flexible inwardly of the capsule 1 such as to define the above-mentioned housing that at least in part receives the perforating means.

**[0063]** The flexibility can for example be given the fact that at least the abutting region 111 is made of polypropylene, a point which will be expanded upon in the following, but it is clear that various flexible materials different to polypropylene are known.

**[0064]** Furthermore, the flexibility, as will be explained in more detail below, may be given or at least increased by particular configurations of the bottom 11 itself.

**[0065]** It is of great importance that in the preferred embodiment the resistant region 112 has a resistance to perforation which is sufficient to prevent complete perforation by the points of the perforating means which press thereon during the perforating run.

**[0066]** Therefore, the flexible abutting region of 111 is forced to flex due to the pressure exerted by the perforating means on the resistant portion 112 by means of the point, causing the region of 111 to recede into the capsule 1, making way for the perforating means which are performing the above-mentioned perforating run into the chamber housing the capsule 1.

**[0067]** In practice, as they push against the bottom 11, in detail against the resistant portion 112, the perforating means are gradually received, at least in part, into the housing, while the housing is being formed.

**[0068]** The resistance to perforation is a physical property of objects, which varies depending on materials and shapes, measured in kilograms per centimetre (kilogram-force, naturally) using well-known measurement systems.

**[0069]** In practice, when the capsule 1 is in the chamber of the extraction apparatus, the perforating means move to perform the perforating run thereof, as if they were directed at perforating the bottom of a capsule.

**[0070]** The tip or tips of the perforating means encounter the resistant portion 112 and push it: since the abutting region 111 can flex, instead of piercing the bottom 11, the thrust from the points displaces the abutting region 111 and causes it to recede into the capsule 1 (or towards the inside of the containing volume 100).

**[0071]** In this way, perforations or tears are not created, also because the perforating means are accommodated, in the part thereof which substantially constitutes the excursion during the penetrating run, in the housing which forms below the bottom 11 but outside the capsule.

**[0072]** Therefore the flexibility of the abutting region of 111 together with the resistance to perforation of the resistant portion 112 are such that the perforating means do not pass through the bottom 11.

**[0073]** At this point, the above delivery device delivers pressurised hot water or another fluid suitable for the purpose that floods the chamber, if the capsule 1 is smaller than the space inside the chamber, and especially through the inlet filter 10; therefore the liquid reacts with the preparation to form the beverage in widely known ways (see a following part of the description for the outlet of the thus-prepared drink).

**[0074]** It should be remembered that the run of the perforating means of the known apparatus is a few millimetres, and that therefore the calibration of flexibility and resistance to penetration, which can be performed by a technical expert in the sector by trial and error, must take account of this brief excursion.

**[0075]** In even clearer detail, usually the perforation means comprise one or more pointed elements, having a shape of pins or needles, which are orientated perpendicularly to the bottom 11 of the capsule 1 when it is in the chamber.

**[0076]** When activated in the perforating run, the pointed elements slide axially towards the bottom 11 of the capsule 1, for a certain tract of their length, which tract is in practice equal to the excursion performed during the run.

**[0077]** In practice, a longitudinal section of the pointed elements having a same length as the tract is received in the housing which is defined with the receding of the abutting region 111 (except, possibly, a very small section at the point which can in some cases penetrate into the wall of the resistant portions 112 without passing through).

**[0078]** The capsule 1 of the invention can include a cover, not illustrated, glued on the collar 13, which can be made either of aluminium or "filter paper", i.e. a known pre-perforated layer made of a compound of cellulose and polypropylene.

**[0079]** If the cover is made of aluminium, the outlet of the beverage can occur similarly to with known capsules: the pressure that forms in the internal volume 100 when the water enters through the inlet filter 11 is such that the cover is deformed, taking on an externally-convex curvature and thus abutting upper points, opposite the perforating means, which pierce the cover and cause the form beverage to exit, which can then be dispensed using known methods.

**[0080]** Otherwise, if the cover is made of filter paper, as it is pre-perforated, it may even not deform to such an extent as to encounter the points, as in any case the drink exits from the holes, causing the pressure inside the internal volume 100 to automatically drop.

**[0081]** The cover made of filter paper also functions as a retaining filter of the preparation resides in the case of infusion drinks.

**[0082]** In practice, in the case of preparations for infusions, such as coffee, after the formation of the drink, residues remain in the capsule 1 which must not reach as far as the cup together with the consumer's drink.

**[0083]** The filter paper, as is known, lets the drink pass through the holes but retains residues that are granular, as known also from everyday experience.

**[0084]** According to a preferred conformation of the bottom 11, it is made in a single body and the above-mentioned sufficient resistance is attributed to the resistant portion 112 due the fact that it has an increased thickness with respect to the remaining part of the abutting region111, as can be seen also from figure 1.

**[0085]** In practice, in this case, the resistant portion 112 is a thickening of the abutting region 111 (and thus the bottom 11).

**[0086]** The bottom 11, or at least the abutting region 111, as mentioned, can be made of polypropylene which is a suitable material in both terms of the required properties of flexibility and in terms of sufficient resistance by dint of the thickening (in the case of application thereof to the production of capsules, naturally).

**[0087]** The thickening 112 can also be a little more rigid than the rest of the abutting region, whose flexibility, and thus recessibility, is in any case absolutely guaranteed by the remaining part thereof which is not thickened.

**[0088]** The points of the perforating means, when pushing on the thickened part 112 of the bottom thus cannot completely perforate it; at most they can slightly pierce it and penetrate it over a very short tract thereof, enabling the retraction and the creation of the housing, mentioned herein above at several points, thanks to the flexibility of the rest of the abutting region.

**[0089]** The abutting region 111 may have an annular thickening 112 such as to receive points of elements of perforating means that are arranged in a circle, as often happens in practice; that is, more precisely, the are arranged within an ideal area between two ideal concentric circles.

**[0090]** The annular thickening 112 is preferably housed in the bottom 11, i.e. inside the internal volume 100.

**[0091]** The reason for this is that, since the size of the chamber in which the capsule 1 is received are standard, it is best to avoid the capsule having a part projecting below which might create problems of insertion, and removal after use.

**[0092]** For example, a projecting lower part could go to abut with the perforating means before they perform the perforating run, thus creating problems not only of insertion but also of functionality.

**[0093]** In any case, in more general terms, the capsule 1 can be used with an extraction device in which the perforating means include a plurality of pointed elements, with their points placed side by side, because of the providing of an abutting region 111 with increased thickness 112 over an area facing the points, naturally when the perforating means perform their perforating run.

**[0094]** Preferably, with the aim of increasing the functioning efficiency of the capsule 1, the abutting region 11 comprises an annular thinning 113, i.e. a slimming of the bottom wall 11, having an annular hollow shape, arranged about the resistant portion 112 and having a smaller thickness than the rest of the abutting region 111.

**[0095]** Thus, when the bottom 11 is made of polypropylene, for example, or another material with similar physical properties, the annular thinning 113 reduces the rigidity of the bottom 11 (more precisely of the abutting region 11) in the area where it is fashioned.

**[0096]** Therefore, the bottom 11 deforms even more easily in the places where the annular thinning 113 is located.

**[0097]** As this more easily deformable area 113 is located about the annular thickening 112 (in general about the resistant portion 112 in its various possible configurations), recession is facilitated of the part of the bottom 11 circumscribed in the annular thinning 113 and which comprises the annular thickening 112 against which the points of the perforating means push.

**[0098]** This effect is increased if the annular thinning 113 is fashioned in the internal surface of the bottom 11 and has basically the form of a circumferential hollowing (or groove) and is made on the toroidal circumferential surface of or in any case, if it has a concavity facing the interior of the capsule 1 (the internal volume of 100).

**[0099]** In fact, the groove, obviously concave, further decreases the rigidity of the bottom 11 when pushed in the direction in which it faces the concavity of the groove (obeying known structural laws).

**[0100]** The use of polypropylene as a material to make the capsule 1 is fully compatible with all the functionalities described above, and enhances the properties of resistance to perforation, flexibility or rigidity of the invention.

**[0101]** The Applicant has found that the most efficient configuration of the annular thinning 113 is the one described below.

**[0102]** As shown in figure 1, the annular relief 113 is fashioned at the connecting edge between the bottom edge 11 and a lateral wall 12 of the beaker-shaped body 10 to substantially define a projecting external crease and a toroidal internal convexity, in which the thickness of the wall of the beaker-shaped body 10 is smaller than in the rest of the capsule 1.

**[0103]** According to a preferred aspect, in itself known, but not known in combination with other essential elements of the invention, the input filter 110, preferably realised in a monolithic body in the beaker-shaped body 10, comprises a multiplicity of through holes of such a size as to allow the passage of pressurised hot water and prevent passage of powder having a grain size that is equivalent to or greater than the grain size of powder preparations for hot drinks.

**[0104]** The above relates both to the fact that the holes are smaller than the smallest grains of powder preparation usable for producing hot drinks, and to the fact that they are of a sufficiently small size such that the grains of a particular preparation to which the capsule is destined cannot pass through, at least when they have a low moisture level, i.e. in the condition in which they are transported.

**[0105]** In this way, there is no loss of powders from the filter during transport of the capsule 1 or when the filters are manually inserted into the machine.

**[0106]** Note that the size of the holes is relative to the beverage the preparation is for, and is not relative to residues dissolved in the hot drink, which in any case do not exit from the internal volume 100 towards the outside for the inlet filter 10 as they cannot move against the current of the water flow (or the flow of the drink being brewed).

**[0107]** In the embodiment of the capsule 1 in which it has the annular thickening 112, the inlet filter 110 is preferably surrounded by the thickening 112 itself, because the area included in it is the one which deforms least during the receding by the capsule 1, (although it may well be the one that best recedes into the capsule 1) due to the fact that the described structure, especially if there is the thinning 113, creates a combination of forces acting on the bottom 11 cause it to deform to a considerable extent externally of the thickening 112.

**[0108]** The thickening 112 is pushed directly by the points in several places and so is less likely to bend, and with it the area comprised therein.

**[0109]** To further increase the efficiency of water flow from the chamber 100 to the internal volume of the capsule 1, an additional portion can be provided of the inlet filter 110 fashioned between the annular thickening 112 and the thinning 113, as shown in figure 2.

**[0110]** In order to describe a particular aspect of the invention relating to the upper collar 13, we now introduce a part of the functioning of automatic machine/capsule systems that has not been dealt with up to the present point.

**[0111]** In a majority of cases, the internal chambers of extraction equipment are made in such a way as to be closed by insertion of a capsule, even in prior art reali-

sations.

**[0112]** In practice, a capsule inserted in the chamber acts as a cap, with the upper collar, or similar elements of the prior art, in contact with the upper edge of the chamber or, if so desired, with the edge of a particular mouth thereof, so that the part of the beaker-shaped body of the capsule below the collar passes.

**[0113]** As explained herein above, in both the prior art and with the disclosed capsule 1, the beverage formed exits through the cover and at this point is already outside the chamber and can easily be destined for final dispensing to the user.

**[0114]** The hot water flooding the chamber during preparation of the drink, which with the capsules of known type is the moment following the perforation of the bottom might however exit from the upper edge of the chamber and the upper collar of the capsule, due to the pressure which forms inside the chamber (or even by capillary action).

**[0115]** For this reason, in known systems the upper edge of the chamber exhibits prominences at an apex of which there is an edge; the prominences are arranged in a row along the upper edge such that the apex edges are arranged flanked about the mouth of the opening (which is normally round).

**[0116]** The capsules of know type bear, below the upper collar, a silicone ring destined to be deformed on encountering the apex edges such as at least partly to fill the spaces between the prominences.

**[0117]** The use of silicone rings makes the capsules of the prior art expensive.

**[0118]** The disclosed capsule 1 can advantageously comprise a thinned zone (not illustrated in the figures) along a circular crown fashioned in the lower wall of the upper collar 13, for example realised with an alternation of slim blind splits and walls, which give a greater plasticity to the thinned zone with respect to the rest of the upper collar 13, such that with the encounter with the prominences, the thinned zone is deformed by the apex corners such that it goes to fill the spaces between the prominences, sealing the chamber once the capsule 1 has been inserted.

**[0119]** The walls and the blind splits can be arranged (or "orientated") in a spoke-fashion about the beaker-shaped body 10.

**[0120]** The above is intended to be purely by way of non-limiting example, so that any constructional variants are understood to fall within the ambit of protection of the present technical solution, as claimed herein below.

## Claims

1. A capsule for a preparation for a hot drink, comprising a body (10) shaped as a beaker, destined to contain a batch of the preparation, and in turn comprising one or more lateral walls (12) and a bottom (11) for inferiorly closing the lateral wall (12), the capsule (1) being usable with an extraction apparatus in order to produce the hot drink, which apparatus comprises: an internal chamber for accommodating and retaining the beaker-shaped body (10) of the capsule (1) during preparation of the drink; perforating means movable in the internal chamber along a given perforating run, comprising at least a point, and provided for the aim of perforating a bottom of a capsule of the prior art in order to create at least a perforation therein which would enable supply of liquid to the batch of preparation; a supply device for supplying the capsule (1), once accommodated in the chamber, with a quantity of liquid, for example pressurised hot water, able to react with the preparation in order to form the drink, the bottom (11) of the capsule (1) comprising an abutting region (111) provided for abutting the point of the perforating means when the perforating means move along the perforating run thereof, the capsule (1) being **characterised in that**:

   the bottom (11) comprises an inlet filter (110) for enabling passage of liquid into an internal volume (100) of the capsule (1) and for preventing passage of the preparation outside the capsule (1), and **in that**
   the abutting region (111) of the bottom (11) is recessible internally of the capsule (1) upon a push exerted thereon by the point of the perforating means so as to define, externally of the capsule (1), a housing which at least partially accommodates the perforating means.

2. The capsule of the preceding claim, wherein:

   the abutting region (111) of the bottom (11) comprises a resistant portion (112) arranged facing the point of the perforating means, when the capsule (1) is in use in the apparatus, such as to be able to receive the point and be pushed, when the perforating means move along the perforating run,
   the abutting region (111) is flexible in an internal direction with respect to the capsule (1) for being able to define said housing, and in that
   the resistant portion (112) has a resistance to perforation which is sufficient to prevent complete perforation by the point of the means which is pushing against the resistant portion (112), during the perforating run,
   whereby the abutting region (111) is forced to flex by the push exerted by the perforating means, which are gradually accommodated at least partially in the housing while the housing is under formation.

3. The capsule of the preceding claim, wherein the resistant portion is in a single body with the abutting region (11) and has an increased thickness (112)

with respect to a remaining part of the abutting region (111), whereby said sufficient resistance to perforation is imparted to the resistant portion.

**4.** The capsule of the preceding claim, usable with an extraction apparatus in which the perforating means comprise a plurality of pointed elements with respective points arranged flanked, wherein the abutting region (111) has the thickening (112) along an area destined to abut the points of the pointed elements.

**5.** The capsule of the preceding claim, wherein the abutting region (111) has an annular thickening (112) such as to receive points of pointed elements of the perforating means, which points are arranged in a circle.

**6.** The capsule of any one of claims from 2 to the preceding claim, wherein the abutting region (111) comprises an annular thinning (113), arranged about the resistant portion (112) and having a reduced thickness with respect to the remainder of the abutting region (111).

**7.** The capsule of the preceding claim, wherein the annular thinning (113) is circumferential and is concave internally of the capsule (1).

**8.** The capsule of claim 6, wherein the annular thinning (113) is afforded at a connecting corner between the bottom (11) and the lateral wall (12) of the beaker-shaped body (10).

**9.** The capsule of any one of the preceding claims, wherein the abutting region (111) of the bottom (11) is made of polypropylene.

**10.** The capsule of the preceding claim, **characterised in that** it is in a single body and is realised entirely of polypropylene.

**11.** The capsule of any one of the preceding claims, wherein the inlet filter (110) comprises a multiplicity of through-holes having such dimensions so as to enable passage of pressurised hot water and to prevent passage of powder having a granulometry which is equivalent to or greater than a granulometry of the powder preparations for hot drinks.

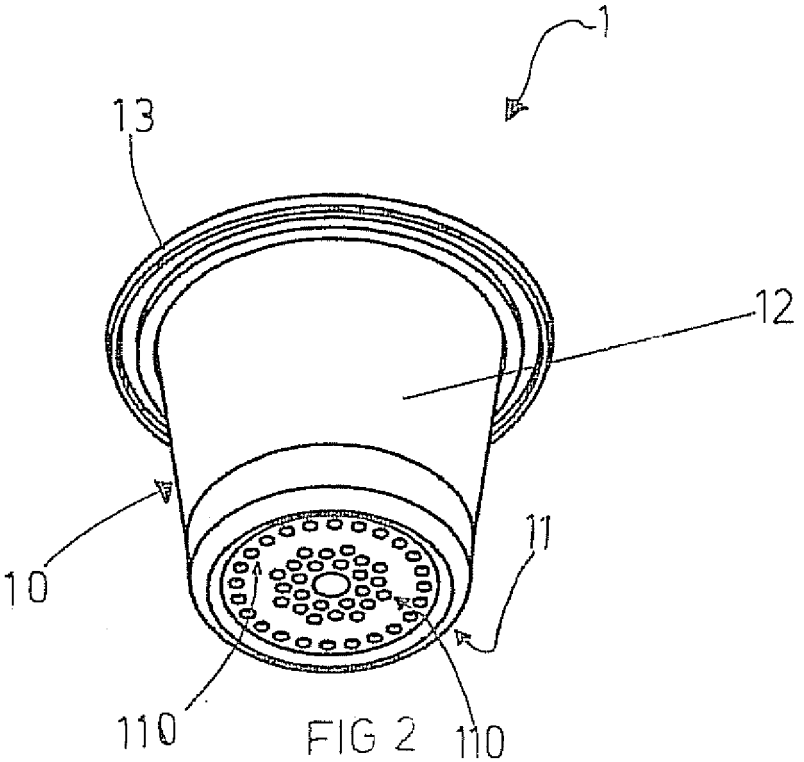


FIG 2

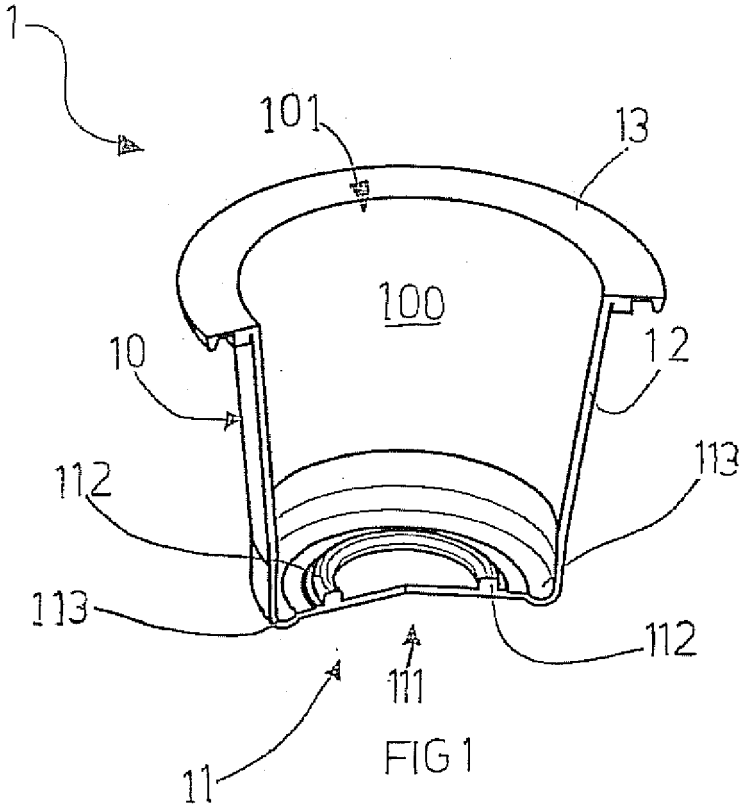


FIG 1

Europäisches Patentamt
European Patent Office
Office européen des brevets

# EUROPEAN SEARCH REPORT

Application Number
EP 11 18 7888

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| A | EP 2 196 407 A1 (DELICA AG [CH])<br>16 June 2010 (2010-06-16)<br>* paragraph [0039]; figures * | 1 | INV.<br>B65D85/804 |
| A | EP 2 228 320 A1 (SARA LEE DE NV [NL])<br>15 September 2010 (2010-09-15)<br>* paragraphs [0007], [0050]; figures * | 1 | |
| A | US 2010/064899 A1 (AARDENBURG KEES [CH])<br>18 March 2010 (2010-03-18)<br>* figures * | 1 | |
| A | EP 1 886 942 A1 (LAVAZZA LUIGI SPA [IT])<br>13 February 2008 (2008-02-13)<br>* figures * | 1 | |
| A | DE 20 2005 021174 U1 (CAFFITA SYSTEM S P A [IT]) 21 June 2007 (2007-06-21)<br>* figures * | 1 | |
| | | | TECHNICAL FIELDS SEARCHED (IPC) |
| | | | B65D |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 26 January 2012 | Fournier, Jacques |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 11 18 7888

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26-01-2012

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| EP 2196407 A1 | 16-06-2010 | EP 2196407 A1 | 16-06-2010 |
| | | KR 20110092338 A | 17-08-2011 |
| | | WO 2010066766 A2 | 17-06-2010 |
| EP 2228320 A1 | 15-09-2010 | AT 471896 T | 15-07-2010 |
| | | DK 2134611 T3 | 11-10-2010 |
| | | EP 2134611 A2 | 23-12-2009 |
| | | EP 2228320 A1 | 15-09-2010 |
| | | WO 2009110783 A2 | 11-09-2009 |
| US 2010064899 A1 | 18-03-2010 | AT 474798 T | 15-08-2010 |
| | | AU 2008207022 A1 | 24-07-2008 |
| | | CA 2674483 A1 | 24-07-2008 |
| | | CN 101636333 A | 27-01-2010 |
| | | EP 1944248 A1 | 16-07-2008 |
| | | EP 2102078 A2 | 23-09-2009 |
| | | JP 2010515556 A | 13-05-2010 |
| | | US 2010064899 A1 | 18-03-2010 |
| | | WO 2008087099 A2 | 24-07-2008 |
| EP 1886942 A1 | 13-02-2008 | AT 448160 T | 15-11-2009 |
| | | AU 2007280072 A1 | 07-02-2008 |
| | | CA 2660119 A1 | 07-02-2008 |
| | | CN 101511708 A | 19-08-2009 |
| | | DK 1886942 T3 | 29-03-2010 |
| | | EP 1886942 A1 | 13-02-2008 |
| | | EP 2141093 A1 | 06-01-2010 |
| | | ES 2334701 T3 | 15-03-2010 |
| | | HK 1113120 A1 | 30-04-2010 |
| | | JP 2009545418 A | 24-12-2009 |
| | | PT 1886942 E | 13-01-2010 |
| | | RU 2009107709 A | 20-10-2010 |
| | | US 2010000415 A1 | 07-01-2010 |
| | | WO 2008015642 A2 | 07-02-2008 |
| DE 202005021174 U1 | 21-06-2007 | NONE | |

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82