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(54) Disposable capsule for beverages

Einweg-Getränkekapseln

Capsule jetable pour boissons

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EP 2 298 671 B9

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Description

Background of the invention.

[0001] The present invention concerns a disposable capsule for beverages; the capsule containing powder or ground products intended for the preparation of beverages such as coffee, tea or the like in dispensing machines.

Description of the known art.

[0002] EP 1440910 concerns a disposable capsule for the preparation of beverages starting from a food product containing liquid or powder milk, or containing roasted or ground coffee, tea, etc..

[0003] Currently, the disposable capsules available for the preparation of beverages are obtained from plastic materials, such as polyolefins (e.g. polypropylene and polyethylene and/or copolymers thereof) or laminated films of polyolefins and aluminium suitable for use in the food field. US 4646626 (Tuttoespresso) discloses capsules from a plastic material provided with one or more holes, obtained on the lid, to allow the inflow of pressurized water during their use. The beverage exits the capsule through an opening in the bottom and an underlying collector. Because of the holes, in order to avoid the oxidation and the deterioration of the organoleptic characteristics of the product, capsules are distributed in sealed packages, as for example the so called "blisters".

[0004] Thus, the capsule is hermetically packaged between a pre-formed tray from a plastic material and a foil made from plastic or aluminium. The latter must be removed to allow its use in the dispensing machine.

[0005] This solution is not suitable for the use with automatic beverage dispensing machines. In fact, once the capsules are removed from their hermetic package and loaded in the automatic machine, they are no longer sealed and the product (for instance ground coffee) might deteriorate as above described.

[0006] Also, disposable capsules are known intended to be perforated at the time of their use. However, perforation of the capsule when it is used is operated by one or more lances, or piercing elements, which penetrate the capsule from the outside to the inside. Breaking of the container walls, or their perforation, may cause the release of particles of the same capsule that fall inside the container, mixing with the food product. As a consequence, the dispensed beverage may also be disagreeable and have a poorly appetizing aspect, or worst, may contain extraneous parts.

[0007] For example, US 5656316 (Nestec) concerns a disposable capsule for beverages whose upper wall can be perforated by a conduct for feeding of pressurized water inside the capsule. In this embodiment means for the capsule opening are provided on the beverage dispensing machine, having the disadvantage of contacting the beverage, with resulting cross-contamination problems when capsules for different beverages are utilized.

[0008] A further example of a system for opening the capsule through mobile lances or piercing elements is the one related to the capsule described in the international patent application WO2004/026091 (Kraft)

[0009] EP 1344722 discloses a cartridge comprising at least a disc shaped fluid director member, acting also as a filter, and an auxiliary frame member, which separates the fluid director member from the bottom of the cartridge, which is pierced by a piercing member.

[0010] EP 1344724 discloses a beverage cartridge a including a filter dividing the cartridge in an upper brewing chamber and a beverage receiving chamber, having a recess to support the filter during brewing.

[0011] Therefore, there is the need for a sealed capsule to be provided, containing product for the preparation of beverages, which is cheap and easy to manufacture, which can be used with both automatic dispensing machines, and with hand-loaded machines, which does not require changes in the structure of the same machines and which allows known capsules, e.g those packed in blisters, to be used.

[0012] Traditional capsules have another drawback. The amount of product to be housed inside the capsule depends on the type of the beverage to supply. For example, capsules used for soluble beverages generally contain up to about 20 grams soluble powder, while the capsules used for dispensing coffee generally contain up to about 10 grams of powder coffee. Consequently, the volume of the capsule has to be adapted, during the design, to the different uses which the capsule is intended for. Typically, the capsules for the soluble beverages have greater dimensions than the corresponding dimensions of the capsules for coffee, for example the height of the capsule for soluble beverages may be greater than the height of the capsules for coffee. Thus also the machines provided for dispensing the beverages have to be designed in such a way to be compatible with the different available capsules.

[0013] Therefore the need is felt to provide capsules having sizes standardized as much as possible. It is required to provide capsules, having a given size, which can be utilized for the soluble beverages and for the coffee indifferently, or more generally, to provide capsules which can be utilized indifferently for dispensing beverages also in the case that the amount of the dose to be encapsulated differs between the various cases.

Summary of the invention

[0014] Thus, it is an object of the present invention to provide a disposable sealed capsule for beverages and foodstuff which overcomes, in a simply and effective way, the drawbacks of the known technique, being at the same time cheap to manufacture and simple to use.

[0015] A further object of the present invention is to provide a disposable capsule which is suitable to be sealed in a controlled atmosphere, or vacuum-packed,

without using further capsule packages for preserving the organoleptic properties of the beverage.

[0016] It is a further object of the present invention to provide a disposable capsule which permit to prevent, or however to limit as much as possible, the eventual release of capsule particles during its opening.

[0017] Another object of the present invention is to provide a capsule for the preparation of different beverages (or other similar foodstuff), compatible with automatic or hand-loaded dispensing machines, which allows for the encapsulation of different product doses in its inside, each dose with the suitable compactness grade depending on the kind of beverage to be dispensed, with no need for changing the external dimensions of the capsule.

[0018] These and other objects are achieved by the present invention which concerns a disposable capsule according to claim 1.

[0019] This object is achieved by way of the disposable capsule according to the present invention for the preparation of a beverage from a food product housed therein, which capsule comprises a plurality of walls and means for dispensing the beverage, **characterized in that** it comprises at least an element for the partition of the internal volume of the capsule in two or more volumes for housing at least said food product, said partition element being fixed with respect to the capsule.

[0020] The volumes of the capsule may contain one or more food products, each in its optimal configuration, for example coffee powder with the right grounding grade and with the suitable compression.

[0021] According to an aspect of the present invention, the partition element is housed internally to the capsule, for example secured or snap-engaged, preferably in correspondence of its lower portion.

[0022] According to an embodiment of the invention, the partition element is a disc or a substantially cylindrical spacer intended to support the food product between its upper wall and the upper wall of the capsule. In other words, the disc - or the spacer - works as a double bottom for the capsule. In this case the upper wall of the spacer is in fluid communication with the lower wall of the capsule (for example it is bored), in order to have the beverage prepared with the food product housed in the upper volume of the capsule to flow into the lower volume and then trough the opening for dispensing the beverage.

[0023] According to an embodiment, when the food product is for example ground coffee, the upper wall of the spacer is provided with a filter in order to block the solid portion of the beverage during its distribution.

[0024] The partition element may be snap-coupled to the lower portion of the capsule or it can be welded to the same. It is important that it reduces and/or divides the internal volume of the capsule without modifying the functioning thereof, thus permitting the normal beverage supply.

[0025] According to a further embodiment of the invention, the capsule provided with the partition element contains different products for a beverage into different volumes or chambers defined by the partition element inside the capsule. For example coffee may be housed in the upper chamber and powder (or liquid) milk into the lower chamber.

[0026] The capsule of the invention is particularly advantageous since it can be used indifferently for the preparation of soluble beverages or for the preparation of coffee from ground powder. In the first case, in fact, the capsule is not provided with the spacer and the internal volume of the capsule is the maximum. In the second case the spacer is inserted into the capsule before this is filled with the coffee powder, and the internal volume of the capsule is thus divided in a lower volume and in an upper volume, for example the upper volume is reduced of the amount necessary to house a lower dose of food product, maintaining at the same time the desired compactness grade. In this way it is possible to use the same capsule, having fixed outer size, i.e. without requiring two different capsules to be provided, having different sizes, each of which is for the preparation of a beverage of one type.

[0027] By changing the size of the spacer, and thus the partition of the capsule internal volume, it is possible to house an amount of food product with the compactness grade which meets the user's taste. In other words, the beverage prepared from the capsule may be more or less diluted also depending on how compacted is the encapsulated product.

[0028] The partition element according to the invention thus allows to adjust such compactness grade in order to dispense more or less diluted beverages, as for example required In different States.

[0029] For these reasons the partition element has predefined dimensions, i.e. it is calibrated to provide the partition of the capsule volume depending on the quality and the amount of the beverage requested by the user according to his taste.

[0030] The volume dividing element, or partition element, should be resistant to the pressure exerted by the water and the food product during the preparation of the beverage, without being subject to deformations which might cause an undesired bypass of solid product to the outside of the same element and the filter, along the capsule walls. For this reason the partition element is preferably designed to have a structure optimized to support the different pressures which generate in the capsule depending on the different amounts and groundings of the contained product and on the different supplying pressure of the water. In fact different dispensing pressures are often provided in various Countries, as well as different product amounts, which product also has its predefined particle size.

[0031] For example, the spacer may be designed to resist to pressures in the range from 1,5 bar to 20 bar, more frequently from 3 bar to15 bar, so to allow a filter element (coupled to the same spacer or provided into it) to operate without being deformed.

[0032] As described in detail in the following descrip-

tion, the means for perforating the capsule operate the perforation of the film when this deforms under the force of an external pressure, for example the pressure exerted by the pressurized hot water directed toward the capsule, and its film, for the beverage preparation.

[0033] According to a preferred embodiment of the present invention, the means for perforating the film are provided on the capsule wall, preferably the upper wall, which is located adjacent and underlying the film which seals the capsule.

[0034] Preferably the means for the perforation of the film are fixed and bonded with respect to the capsule and, for instance, comprise one or more cutting projections. The cutting projections may be integral with a surface of the capsule and may have different shapes. For example they may be sharp cusps or wedges, and also they may have a generally pyramidal shape.

[0035] According to a preferred embodiment of the invention, the film is externally provided and covers the whole upper wall of the capsule, so to hermetically seal it, and the cutting projections are cusps located on the upper surface of the same wall, directed toward the film. The cusps are preferably located in correspondence of through holes provided in the upper wall of the capsule to supply pressurized water inside the capsule, where the food product, e.g coffee powder, is housed.

[0036] The capsule according to the invention has numerous advantages over prior art. In fact, the film which seals the capsule of the invention is perforable at the time of the actual use of the capsule by perforation means which are fixed to the capsule. Thus, differently from what provided for the known capsules, the film has not to be manually separated from the capsule before its use and has not to be perforated by means provided on the machines loaded with the capsule (as in the capsule according to US 5656316**).** The capsule according to the invention is thus simple to pack and to use, and also guarantees high quality standards for the contained foodstuff which keeps unaltered for a long time, in an optimal conservation state, the organoleptic characteristics.

[0037] With respect to the embodiment according to application WO 02/081337 the capsule according to the present invention has a simplified structure, because the surfaces for the perforation of the film are fixed, and permits to perfectly isolate the food product from the external environment, while resulting inexpensive.

[0038] It will be clear to the skilled person that the capsule of the invention is particularly suitable for the use with machines for the preparation of coffee or beverages. In fact the film of the capsule can be moved toward the cutting projections by the pressurized water supplied by such machines for dispensing the beverages. Thus the film breaks only when the capsule is actually used, allowing the water to enter the capsule itself.

Brief description of the drawings.

[0039] Further characteristics and advantages of the present invention will be more evident from the following description, given as a non limiting example with reference to the attached schematic drawings, wherein:

- figure 1 is an exploded view of a capsule according to the present invention;
- figure 2A is a top view of a detail of the capsule of figure 1;
- figures 2B and 2C are two section views of the detail of figure 2A;
- figure 3A is a top view of a detail of an alternative embodiment of the capsule according to the present invention;
- figures 3B and 3C are two section view of the detail of figure 3A;
- figures 4A-4C are three views, respectively a side view, a top view and a bottom view, of the capsule of figure 1 in its assembled state;
- figure 5 is a A-A section view of the capsule of figure 4;
- figure 6 is a section view of a capsule according to the invention;
- figure 6A is an exploded view of another capsule according to the invention;
- figure 6B is a cross section view of the capsule of figure 6A;
- figure 6C is an exploded view of another capsule according to the invention;
- figure 6D is a cross section view of the capsule of figure 6C;
- figure 7 is a schematic view of a configuration of the breaking lines of the bottom wall of the capsule of figure 1.

Description of the invention embodiment

[0040] Figure 1 shows a capsule C according to the invention, comprising a container 1, an upper wall 2 suitable to close the container 1 and a film 4. The upper wall 2 together with the film 4 hermetically close the assembled capsule C. For instance, the wall 2 may be welded to the container 1 through ultrasound welding. The film 4 is fixed, for example is thermo-welded, to the container 1 coupled to the wall 2, for example by thermo-welding the film 4 on a peripheral circular area of the wall 2. The capsule C may contain different food products 3. For example the capsule C of figures 1 and 2-2C is suitable for the preparation of beverages from fresh ground products, e.g. coffee or the like, while the capsule shown in the figures 3A-3C can be used for the preparation of beverages from soluble products.

[0041] In the embodiment shown in figure 1 the encapsulated product is coffee powder 3, compressed in the container 1 to a predefined compactness grade, known in the art. The film 4 is coupled to the upper wall 2, in order to seal it from the external atmosphere. In fact the upper wall 2 is provided with a plurality of holes 5 which set in fluid communication the upper surface of the same

wall 2 with the internal volume of the container 1, and thus with the coffee powder. Thus holes 5 allow the pressurized water supplied by the pump to enter the assembled capsule upon it has passed through the film 4. Thus the task of the latter is to seal the capsule C until it is used, preventing the product 3 from being exposed to the air through the holes 5 of the wall 2, thus deteriorating or loosing its characteristics.

[0042] Advantageously, and contrary to the known capsules, capsule C is provided with its own means of perforating the film 4. As described in detail in the following, this feature allows to use capsule C with the traditional coffee dispensing machines (i.e. without having to customize the same), according to well known procedures, and to open it when the water is supplied to the capsule C for dispensing the beverage.

[0043] The means of perforating the film 4 preferably comprise a plurality of cutting surfaces or projections, fixed to a portion of the capsule C, which by contacting the same film 4 operate its partial breaking, for instance through perforation or tearing. The contact between the film 4 and the cutting surfaces is preferably provided upon a deformation of the same film 4.

[0044] In the embodiment shown in the figure 1, the cutting surfaces comprise a plurality of cusps 6, projecting from the upper surface 7 of the wall 2, directed toward the film 4. As shown in detail in the figures 2A-2C, the film 4 extends over the cusps 6, at a small distance from them, in such a way that a slight bending of the same film 4 in the direction of the arrow D leads the film 4 into contact with the cusps 6, causing the perforation of the film.

[0045] The number and the arrangement of the cusps 6 may vary depending on the needs. In the case shown in the figures 1-2C, the cusps 6 are eighteen, arranged in two concentric circular series (figure 2A). However, the cusps 6 may be a different number and may provide different arrangements, star like, triangle like, asterisk like, etc.

[0046] The capsule C provides that the pressurized water flow, impinging the film 4, causes its bending in the direction of the arrow D (fig. 2), so to bring the film 4 into contact with the perforation element 6 which tears the film. In particular, the distance between the film 4 and the cutting surfaces of the cusps, or of other means for perforating or tearing, must be smaller than the deflection displacement of the deformed film in all the provided working conditions. In other words, when the film is subject to the pressure of the water supplied by the pump of the dispensing machine, in normal working conditions of the same, it is deformed of an amount sufficient to bring it into contact with the aforesaid cutting surfaces.

[0047] In other words, the invention provides that the capsule C is used in a beverage dispensing machine and that the water supplied by the machine to the capsule C breaks the film 4. In this way the entirety of the contents 3 of the capsule C is guaranteed until the time of its effective usage.

[0048] The holes 5 are distributed in a known way on the surface 7 of the wall 2 so to facilitate both the water flowing to the inside of the capsule C and the preparation of the product. As it will be clear from the following, in the case of ground coffee (figures 1-2C) the holes are distributed in a way to guarantee a uniform contact coffee-water, while in the case of soluble coffee the preferential arrangement provides two holes.

[0049] Furthermore, the arrangement of the holes 5 in the wall 2 should optimize the turbulent flow of the water flowing inside the capsule C. It is desirable for the water entering the capsule C to reach the entire product 3 before flowing to the outside leaving the capsule C. The holes 5 are arranged according to the shown configuration which exactly optimizes the water flow into the capsule C. Preferably the holes 5 are slanting with respect to the direction D (feature not shown) in order to direct the water - entering the capsule C - according to a direction as much as possible horizontal (i.e oblique with respect to the direction D). In other words it is desired for the water to enter the container 1 generating a vortex.

[0050] Preferably, the cusps 6 are located close to the holes 5 for the passage of the water. In this way the film 4, once lacerated, is prevented from adhering the upper wall 4 in correspondence of one of the holes 5 thus blocking or reducing in the water flow through the same. In the embodiment of figures 1-2C, the holes 5 are alternate with respect to the cusps 6 in the two concentric series. Preferably, the distance between the centre of a hole 5 and the base of a cusp 6 is less than 10 mm, more preferably such distance is included in the range 0.01 mm - 3 mm.

[0051] Preferably, the cusps 6 according to the shown embodiment have a star-like shaped cross section, with a triangular shaped contour in vertical section. This shape has proved particularly effective since the film 4, perforated by the cusps 6 with circular holes, does not adhere to the external surface of the cusp 6, and passages remain between the film 4 and the cusps 6, sufficient to allow the water flow to penetrate under the film 4. The cusps 6 may be obtained with other shapes, different from the shown one. For instance, the cusps 6 may have a jigsaw tooth shape, and thus may tilt with respect to direction D, with a pyramidal shape, etc..

[0052] In this way the film 4, when perforated by a cusp 6, is prevented from fitting or adhering on the same cusp 6, which would prevent the water flow from reaching the gap between film 4 and upper surface 7 of the wall 2 and entering only the capsule the capsule C. The shape of the cusps 6, as above exemplified, must permit the passage of the water at least in the direction of the closest hole 5. In other words, once the film 4 has been perforated by a cusp 6 because of the water flow impinging the same film 4, the water should pass in the opening provided on the film 4 and, flowing on the cusp 6, direct toward a hole 5.

[0053] The film 4 can be a traditional type one, for example a film utilized in the food field for sealing packages.

Clearly, film 4 must have good mechanical characteristics in order to resist to undesired ruptures, but at the same time it must be sufficiently flexible in order to be deformed by a fluid flow which impinges on it. Moreover, the film has to be rapidly and easily perforable when contact with the cusps 6 starts. In the shown embodiment the film 4 is of a multilayer type, made of a plurality of coupled films, among which an aluminum film and one or more plastic films may be provided, possibly reporting the manufacturer's data and/or the data concerning the product 3.

[0054] Figure 4 shows a capsule C assembled and ready to be used in beverage dispensing machine. As previously described, once the capsule C has been loaded in the machine, the opening of the capsule C in correspondence of its upper portion is operated by the water flow supplied by the machine on the film 4. The water flows between the film 4 and the surface 7 and through holes 5 into capsule C, where the coffee powder is. The opening of the lower portion 8 is achieved through the rupture of the frangible mobile element or trap 9 operated by a piercing element (or collector) of the same machine or by the increasing of the internal pressure in the capsule C due to the water entering the same.

[0055] Preferably, the trap 9 has the square shape shown in the figures 1 and 4. This means that the shape delineated by the breaking lines 10 - which define the trap 9 - is generally square or "window" like (with two wings), that is the trap may be torn in two halves which open as a wing. In this case the portion of the piercing element intended to break the trap 9 preferably has a circular section, as schematically shown in figure 10, with a diameter having length lower than, or equal to, the side 10 of the trap 9. During the perforation of the trap 9, this configuration provides gaps 12 which permit the coffee to flow outside from the capsule C.

[0056] The figures 3A-3C show the upper wall 20 of a capsule C according to the present invention, designed for soluble beverages. As known, capsules used for the preparation of soluble beverages (chocolate, tea, white coffee, etc.) contain a greater amount of product 3 than the correspondent capsules for the coffee (for example up to 20 grams of soluble powder versus about 8 grams of ground coffee). In order to obtain an optimal solubilization, even if the upper wall 20 is sealed by way of the film 4 which - as in the case of the figures 1-2C - adheres to the edges 21, the number and the arrangement of the holes 25 and cusps 26 are different with respect to the correspondent holes 5 and cusps 6 of the wall 2. The position of the holes 25 on the wall 20 is as much as possible peripheral in order to supply the water to the encapsulated product 3 in its entirety. Two cusps 26 are provided in correspondence of the holes 25 for perforating the film 4.

[0057] Figures 5-6D show a capsule C provided with a partition element having the function of dividing, or partitioning, its internal volume. The partition element may have different shapes and dimensions depending on the specific uses which the capsule C is intended to.

[0058] In figure 6, the partition element is constituted by a spacer 40 having a predefined height extension, in such a way that once inserted in the container 1, the internal volume of the container left available to the product 3 is reduced to the room 62 included between the upper surface 41 of the spacer 40 and the upper surface 7 of the capsule C.

[0059] With evident economic advantages, the spacer 40 allows the capsule C to be used both for the preparation of the coffee and for the preparation of soluble beverages. In the first case (coffee), the capsule C is coupled to the spacer 40, in the second case the capsule C has no spacer 40 and the internal volume of the container 1 may be completely filled with the product 3.

[0060] Thus, spacer 40 may be inserted in the container 1 at the time of the filling of the capsule C with the product 3. If the amount of product 3 is for example not greater than 10 grams, the spacer 40 is inserted in the container 1 and works as a double bottom for the capsule C. If the product is soluble, the container 1 does not contain the spacer.

[0061] In this way it is possible to standardize the external dimensions of the capsule C, and vary the internal ones depending on the needs. It has to be noticed that the element for dividing the volume of the capsule may be provided also in the traditional capsules, i.e. independently by the provided means for the opening of the capsule.

[0062] Advantageously, the spacer 40 permits to encapsulate the product 3 according to the most opportune load and/or the compactness grade. In fact the reduction of the convenient volume of the capsule C may be designed to obtain the desired compactness grade for the product 3 in the capsule C.

[0063] The figures 1 and 5 show a capsule C provided with a spacer 40 and with opening means of the above mentioned type. A paper filter, or another approved material for foodstuff, is interposed between the spacer 40 and the product 3, in order to stop any powder 3 which has not solubilized during the preparation of the related beverage. Another filter may be interposed between the product 3 and the upper wall of the capsule C.

[0064] In order to facilitate dispensing of the beverage prepared with the product 3, the spacer 40 is provided with a set of holes 42 in correspondence of the wall 41.

[0065] The figure 6A shows a capsule C according to the invention and a piercing-collector element 50 having the function to perforate the trap 9 and direct the beverage dispensed by the capsule C. With respect to the embodiment shown in the figure 6, the capsule C of figure 6A is provided with a container 1 having a narrowing 51 which forms a step suitable to support an element for dividing the capsule volume which is constituted by a disc 52. Practically, the narrowing 51 is a base internal to the container 1 on which the disc or septum 52 lays. This last has a height lower than the one of the spacer 40 and is not provided with leg portions which abut the bottom of

container 1 (figure 6B). As one can see in figure 6B, during the usage of the capsule C, the piercer-collector 50 partially houses the same capsule and helps to avoid its deformation. A filter 53 is provided between the disc or septum 52 and the food product 3.

[0066] The figures 6C and 6D show a further embodiment according to the invention. The element for the partitioning of the serviceable volume of the capsule C in this case is a disk 54 which abuts the base 51. It is important to notice that the distance between the base 51 and the bottom of the capsule is constant for the different embodiments of the figures 6A and 6C, while the height of the element 52, 54 for the reduction of the volume varies. The reduction of the volume for housing product 3 is thus adjusted by varying the height of the used element 40, 52 or 54, while the travel range of the piercing element within the capsule C is constant.

[0067] Summarizing, the element for partitioning/reducing the volume of the capsule may have the shape of the spacer 40 which - as shown has a cylindrical shape, is substantially hollow and abuts the bottom of the capsule. Alternatively, such partitioning element may have the shape of a disk or a septum (52 or 54) and may stand on a base 51 provided on the capsule wall. However, other shapes are possible. It is sufficient that the partition element 40, 52 or 54 is fixed to container 1, for example by way of a fit coupling or welding, and allows the passage of the beverage toward the trap 9. In order to avoid possible interferences between the trap and the partition element, the capsule is preferably provided with the trap 9, having two halves which open by departing one from the other. In fact the "double wing" like opening of the trap 9 minimizes the risks that interferences generate between the two halves of the trap 9 (the wings) pushed by the piercing element inside the capsule C and the element 40, 52, 54 provided within the capsule C. In fact a single wing trap 9, once it has been opened, may contact the lower wall of the spacer or disk, thus interfering with the proper beverage dispensing, for example preventing part of the foam formed by the infusion of the product 3 inside the capsule to exit.

[0068] As above mentioned, the trap 9 has a square or quadrilateral shape in combination with a circular shape of the section of the piercing element 50A, in order to obtain a plurality of gaps for the beverage exit in correspondence of the trap vertices. In this way the presence of foam is increased in the dispensed product.

[0069] Alternatively to trap 9, the capsule C according to the present invention may be provided with an opening sealed by a film which is perforable by the piercing element. For example an opening, having equal dimensions of the trap 9, is provided on the bottom of the container 1 and sealed is a film perforable by the piercer-collector 50 or by an equivalent element. This solution, in fact, prevents an interference from generating between parts of the capsule C and the lower wall of the element 40, 52 or 54 for the volume reduction.

[0070] The spacer 40 is provided with a supporting surface 45 suitable to contact the piercing element 50A. The supporting surface, for example a rise or a shim, permits the piercing element 50A to abut the spacer, and to support the same during the beverage dispensing and avoiding harmful "swellings", i.e. deformations toward the capsule C bottom due to the force exerted by the internal pressure during the dispensing of the beverage. In other words, the support provided by the piercing element 50A of the collector 50 improves the resistance of the capsule C to the deformations caused by the increase of the internal pressure, which deformations may cause the passage of powder around the capsule filter. Because of the length of the piercing element 50A being constant, the thickness of the supporting surface 45 may be greater or smaller depending on the distance between the disk 52 or 54 and the capsule bottom, in such a way that the surface 45 is always substantially abutting the piercing element 50A: for example, in the figures 6A and 6B the thickness of the supporting surface 45 is greater than the one of the embodiment of figures 6C and 6D because the volume defined upwardly from the partition element is lower than the one of figures 6C and 6D.

[0071] With reference to figures 5, 6B and 6D, a volume 60 is provided between the lower wall of each element 40, 52 or 54 and the bottom 8 of the container 1. Also the volume 60 may be used for housing food product, for example a second product which, together the product 3, is used to prepare the beverage. For example, the volume 60 may be completely or partially filled with powder milk, or with liquid milk, powder cocoa, etc.. The elements 40, 52 or 54 for dividing/reducing the volume of the capsule C may thus be designed also for maximizing or minimizing the volume 60. For example, when minimization of the volume 60 is desired, the element 54 of figure 6D may be provided with a lower portion 61 having a toroidal shape.

[0072] The capsules according to the present invention may be madeof known common plastic materials used in this field, for example polyolefins (e.g. polypropylene and polyethylene and/or copolymers thereof), or multilayer polyolefin and aluminium suitable for use in the food field, according to the needs of each particular application.

Claims

1. A disposable capsule (C) for beverage dispensing machines for preparing a beverage from a food product (3) housed within it, comprising a plurality of walls (1, 1 a, 1b, 2, 7), means (9) for dispensing said beverage, and at least an element (40, 52, 54) for partitioning the internal volume of the capsule (C) into two or more volumes (62, 60) to house at least said food product (3), said partition element being spaced with respect to the wall of the capsule (C) provided with said beverage dispensing means, **characterized in that** said means (9) for dispensing said bev-

erage comprises a trap (9) or an opening sealed by a film that are pierceable by a piercing element (50, 50A), and wherein said partitioning element (40, 52, 54) has a supporting surface (45) that is substantially abutting said piercing element, in order to be supported by said piercing element during dispensing of beverage.

2. A disposable capsule (C) according to claim 1, wherein said partition element (40, 52, 54) is fixed to the capsule wall.

3. A disposable capsule (C) according to claim 1 or claim 2, wherein said partitioning element (40, 52, 54) is substantially parallel to the bottom wall of said capsule (C).

4. A disposable capsule (C) according to any claim 1 to 3, wherein said element comprises a substantially cylindrical and hollow spacer (40) to support said food product (3) between its upper wall (41) and the upper wall (7) of said capsule (C).

5. A disposable capsule (C) according to claim 4, further comprising at least a filter (50) to hold back the solid portion of said beverage food product (3) when dispensed.

6. A disposable capsule (C) according to claim 4 or claim 5, wherein said partitioning element (40, 52, 54) is fitted in the lower portion of the capsule (C).

7. A disposable capsule according to any claim 1 to 6, wherein said means (9) for dispensing said beverage comprises a trap (9) having a substantially square shape and being pierceable by a piercing element (50, 50A) external to the capsule (C) that has a substantially circular section (11), which diameter is lower than, or equal to, the side (10) of said trap (9).

8. A disposable capsule (C) according to any previous claim, further comprising means (5) for supplying a fluid inside the capsule (C), a film (4) for isolating said supplying means (5) from the external environment and means (6, 26, 36, 37) for perforating said film (4), wherein said means (6, 26, 36, 37) for perforating said film (4) are fixed with respect to the capsule (C) and at least a portion of the film (4) is movable between a rest position and a position where it engages said means (6, 26, 36, 37) for its perforation.

9. A disposable capsule (C) according to claim 8, wherein said film (4) is deformable and the displacement from said rest position to said engaging position is obtained through its deformation.

10. A disposable capsule (C) according to claim 8 or 9, wherein said means (6, 26, 36, 37) for perforating said film (4) are located between at least a wall (2) of the capsule (C) and said film (4).

11. A disposable capsule (C) according to any previous claims, wherein said means (6, 26, 36, 37) for perforating said film (4) comprise one or more cutting projections (6, 26, 36, 37), arranged on a wall (2, 7, 8, 1 a, 1b) of the capsule (C) underlying the film (4).

12. A disposable capsule (C) according to claim 11, wherein said cutting projections (6, 26, 36, 37) are arranged in correspondence of through holes (5) provided in said wall (2, 7) underlying the film.

13. A disposable capsule (C) according to claim 12, wherein said through holes (5) are oblique with respect to the vertical axis of the capsule (C).

Patentansprüche

1. Eine Einweg-Kapsel (C) für Getränkeabgabemaschinen zur Zubereitung eines Getränks aus einem Nahrungsmittelprodukt (3), das darin untergebracht ist, enthaltend eine Vielzahl von Wänden (1, 1a, 1b, 2, 7), Mittel (9) zur Abgabe des Getränks und mindestens ein Element (40, 52, 54) zur Aufteilung des Innenraumes der Kapsel (C) in zwei oder mehr Räume (62, 60), um zumindest das Nahrungsmittelprodukt (3) unterzubringen, wobei das Trennelement gegenüber derjenigen Wand der Kapsel (C) beabstandet ist, die mit dem Mittel zur Abgabe des Getränkes ausgestattet ist, **dadurch gekennzeichnet, dass** das Mittel (9) zur Abgabe des Getränks einen Verschluss (9) aufweist oder eine Öffnung, die durch einen Film verschlossen ist, der mit Hilfe eines Durchstechelementes (50, 50A) durchstoßen werden kann, und wobei das Trennelement (40, 52, 54) eine unterstützende Fläche (45) besitzt, die im Wesentlichen an das Durchstechelement anstößt, um durch das Durchstechelement während der Getränkeabgabe unterstützt zu werden.

2. Eine Einweg-Kapsel (C) gemäß Anspruch 1, wobei das Trennelement (40, 52, 54) an der Kapselwand befestigt ist.

3. Eine Einweg-Kapsel (C) gemäß Anspruch 1 oder 2, wobei das Trennelement (40, 52, 54) im Wesentlichen parallel zu der Bodenwand der Kapsel (C) angeordnet ist.

4. Eine Einweg-Kapsel (C) gemäß irgend einem der Ansprüche 1 bis 3, wobei das Element einen im Wesentlichen zylindrischen und hohlen Abstandshalter (40) besitzt, um das Nahrungsmittelprodukt (3) zwischen seiner oberen Wand (41) und der oberen Wand (7) der Kapsel (C) zu halten.

5. Eine Einweg-Kapsel (C) gemäß Anspruch 4, weiterhin enthaltend mindestens einen Filter (50), um den festen Anteil des Getränkenahrungsmittelproduktes (3) bei der Abgabe zurückzuhalten.

6. Eine Einweg-Kapsel (C) gemäß Anspruch 4 oder Anspruch 5, wobei das Trennelement (40, 52, 54) in dem unteren Bereich der Kapsel (C) angebracht ist.

7. Eine Einweg-Kapsel (C) gemäß irgend einem der Ansprüche 1 bis 6, wobei das Mittel (9) zur Abgabe des Getränks einen Verschluss (9) mit einer im Wesentlichen rechteckigen Gestalt aufweist und das mit Hilfe eines außerhalb der Kapsel (C) angeordneten Durchstechelementes (50, 50A) durchstoßen werden kann, welches einen im Wesentlichen kreisförmigen Querschnitt (11) besitzt, dessen Durchmesser kleiner oder gleich der Seitenlänge (10) des Verschlusses (9) ist.

8. Eine Einweg-Kapsel (C) gemäß irgend einem der vorherigen Ansprüche, weiterhin enthaltend:

   Mittel (5) zum Einführen eines Fluids in das Innere der Kapsel (C),
   einen Film (4) zur Isolierung der Versorgungsmittel (5) gegenüber der äußeren Umgebung, und
   Mittel (6, 26, 36, 37) zum Perforieren des Films (4),
   wobei die Mittel (6, 26, 36, 37) zum Perforieren des Films (4) kapselseitig (C) angebracht sind und mindestens ein Bereich des Films (4) zwischen der Ruhestellung und einer Position, an der er die Mittel (6, 26, 36, 37) zu seiner Perforation berührt, beweglich ist.

9. Eine Einweg-Kapsel (C) gemäß Anspruch 8, wobei der Film (4) verformbar ist und die Auslenkung von der Ruhestellung in die Betriebsstellung durch seine Verformung erreicht wird.

10. Eine Einweg-Kapsel (C) gemäß Anspruch 8 oder 9, wobei die Mittel (6, 26, 36, 37) zum Perforieren des Films (4) zwischen mindestens einer Wand (2) der Kapsel (C) und dem Film (4) angeordnet sind.

11. Eine Einweg-Kapsel (C) gemäß irgend einem der vorherigen Ansprüche, wobei die Mittel (6, 26, 36, 37) zum Perforieren des Films (4) einen oder mehrere Schneidvorsprünge (6, 26, 36, 37) besitzen, der/die an einer Wand (2, 7, 8, 1a, 1b) der Kapsel (C) angebracht ist/sind, die unterhalb des Films (4) angeordnet ist.

12. Eine Einweg-Kapsel (C) gemäß Anspruch 11, wobei die Schneidvorsprünge (6, 26, 36, 37) in Übereinstimmung mit Durchgangslöchern (5) angebracht sind, die in der Wand (2, 7) bereitgestellt werden, die unterhalb des Films (4) angeordnet ist.

13. Eine Einweg-Kapsel (C) gemäß Anspruch 12, wobei die Durchgangslöcher (5) gegenüber der vertikalen Achse der Kapsel (C) geneigt sind.

Revendications

1. Capsule jetable (C) pour machines de distribution de boissons, permettant de préparer une boisson à partir d'un produit alimentaire (3) contenu à l'intérieur de celle-ci, comprenant une pluralité de parois (1, 1a, 1b, 2, 7), des moyens (9) pour distribuer ladite boisson et au moins un élément (40, 52, 54) pour diviser le volume interne de la capsule (C) en deux volumes ou plus (62, 60) pour contenir au moins ledit produit alimentaire (3), ledit élément de division étant espacé relativement à la paroi de la capsule (C) dotée dudit système de distribution de boisson, **caractérisée en ce que** lesdits moyens (9) pour distribuer lesdites boissons comprennent une trappe (9) ou une ouverture scellée par un film, qui peuvent être percées par un élément de perçage (50, 50A) et dans laquelle ledit élément de division (40, 52, 54) a une surface de support (45) qui est sensiblement en butée contre ledit élément de perçage, de manière à être supporté par ledit élément de perçage pendant la distribution de boisson.

2. Capsule jetable (C) selon la revendication 1, dans laquelle ledit élément de division (40, 52, 54) est fixé à la paroi de la capsule.

3. Capsule jetable (C) selon la revendication 1 ou 2, dans laquelle ledit élément de division (40, 52, 54) est sensiblement parallèle à la paroi inférieure de ladite capsule (C).

4. Capsule jetable (C) selon l'une quelconque des revendications 1 à 3, dans laquelle ledit élément comprend une entretoise sensiblement cylindrique et creuse (40) pour supporter ledit produit alimentaire (3) entre sa paroi supérieure (41) et la paroi supérieure (7) de ladite capsule (C).

5. Capsule jetable (C) selon la revendication 4, comprenant en outre au moins un filtre (50) pour retenir la portion solide dudit produit alimentaire de boisson (3) lors de sa distribution.

6. Capsule jetable (C) selon la revendication 4 ou 5, dans laquelle ledit élément de division (40, 52, 54) est installé dans la partie inférieure de la capsule (C).

7. Capsule jetable (C) selon l'une quelconque des revendications 1 à 6, dans laquelle lesdits moyens (9)

pour distribuer ladite boisson comprennent une trappe (9) ayant une forme sensiblement carrée et pouvant être percée par un élément de perçage (50, 50A) extérieur à la capsule (C) qui a une section sensiblement circulaire (11), dont le diamètre est inférieur ou égal au côté (10) de ladite trappe (9).

8. Capsule jetable (C) selon l'une quelconque des revendications précédentes, comprenant en outre des moyens (5) pour fournir un fluide à l'intérieur de la capsule (C),
un film (4) pour isoler lesdits moyens d'alimentation (5) de l'environnement extérieur et des moyens (6, 26, 36, 37) pour perforer ledit film (4),
dans laquelle lesdits moyens (6, 26, 36, 37) pour perforer ledit film (4) sont fixés relativement à la capsule (C) et au moins une partie du film (4) est mobile entre une position de repos et une position où il vient en prise avec lesdits moyens (6, 26, 36, 37) pour sa perforation.

9. Capsule jetable (C) selon la revendication 8, dans laquelle ledit film (4) est déformable et le déplacement de ladite position de repos à ladite position de prise est obtenu par sa déformation.

10. Capsule jetable (C) selon la revendication 8 ou 9, dans laquelle lesdits moyens (6, 26, 36, 37) pour perforer ledit film (4) sont situés entre au moins une paroi (2) de la capsule (C) et ledit film (4).

11. Capsule jetable (C) selon l'une quelconque des revendications précédentes, dans laquelle lesdits moyens (6, 26, 36, 37) pour perforer ledit film (4) comprennent une ou plusieurs saillies de découpe (6, 26, 36, 37), disposées sur une paroi (2, 7, 8, 1a, 1b) de la capsule (C) sous-jacente au film (4).

12. Capsule jetable (C) selon la revendication 11, dans laquelle lesdites saillies de découpe (6, 26, 36, 37) sont disposées au niveau d'orifices passants (5) ménagés dans ladite paroi (2,7) sous-jacente au film.

13. Capsule jetable (C) selon la revendication 12, dans laquelle lesdits orifices passants (5) sont obliques relativement à l'axe vertical de la capsule (C).

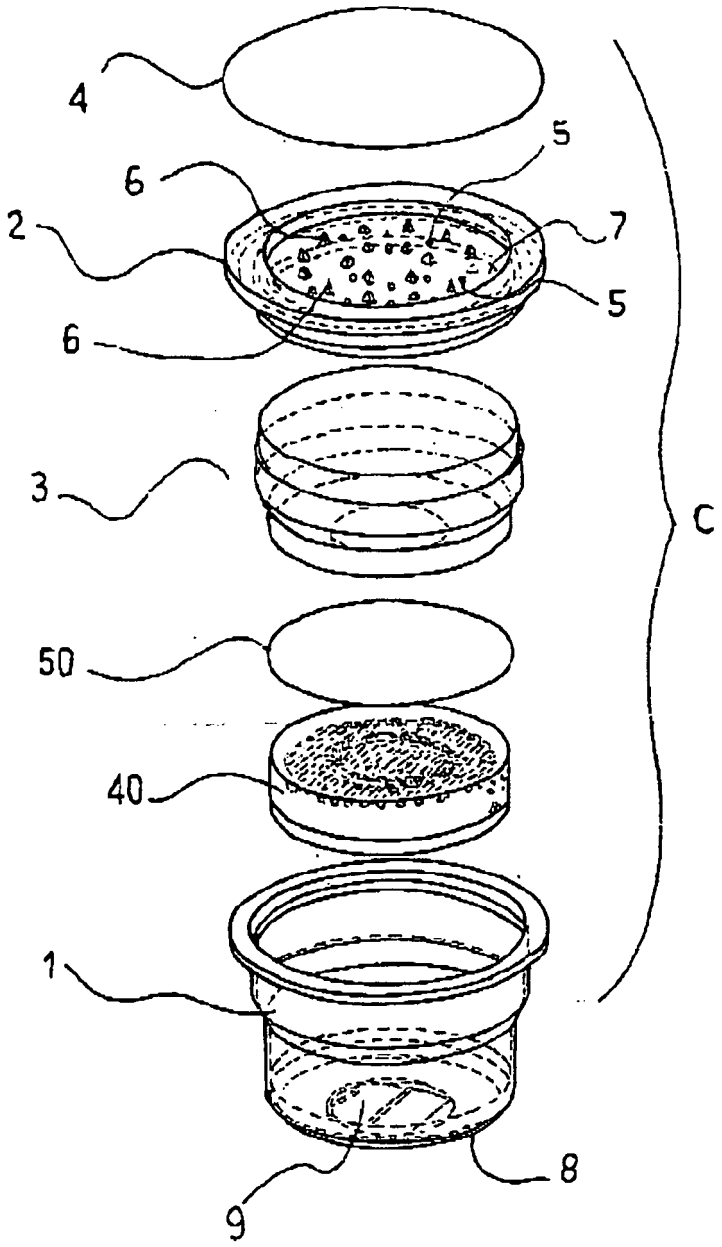

FIG.1

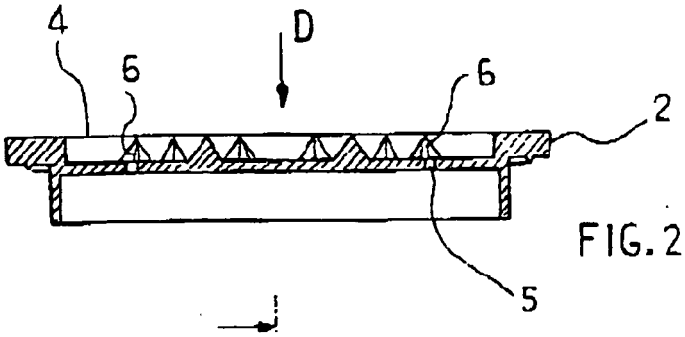

FIG. 2B

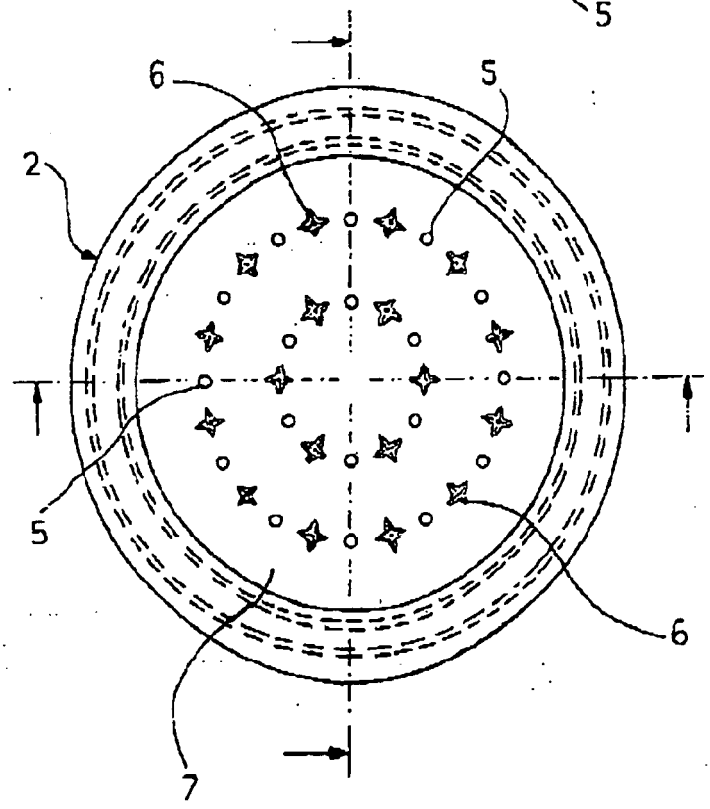

FIG. 2A

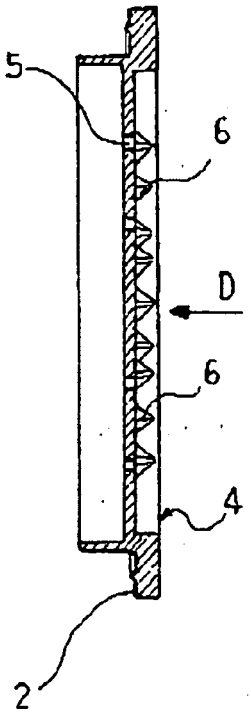

FIG. 2C

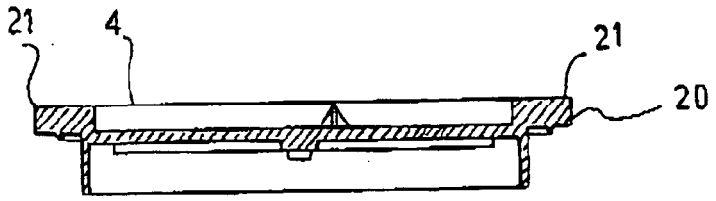

FIG. 3B

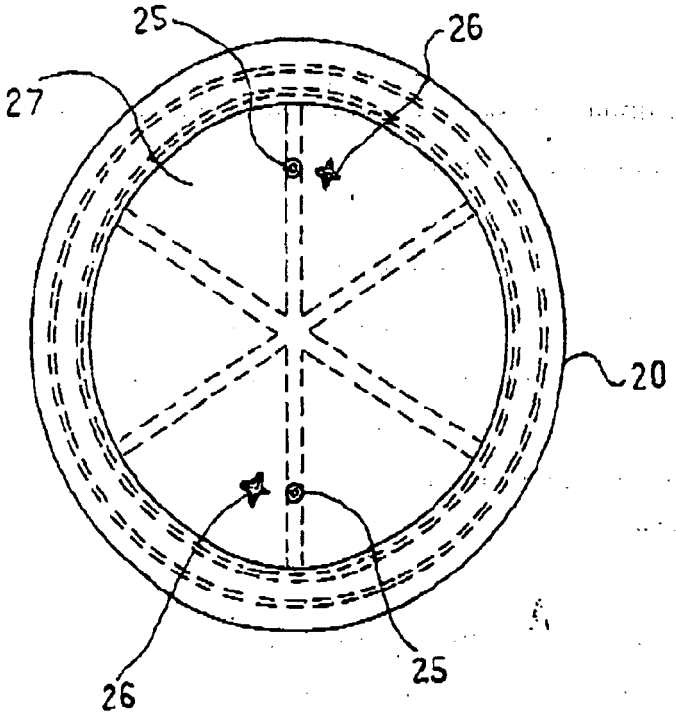

FIG. 3A

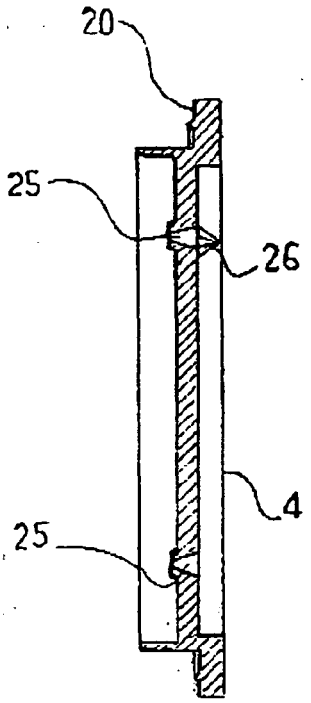

FIG. 3C

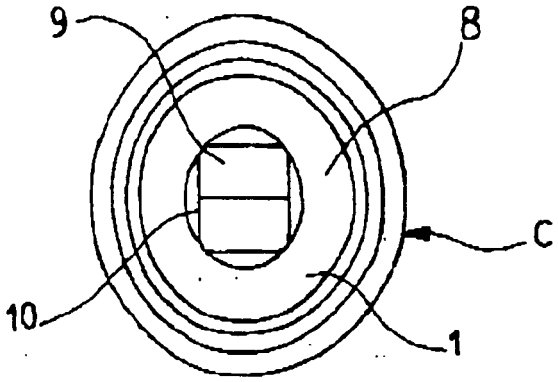

FIG. 4A

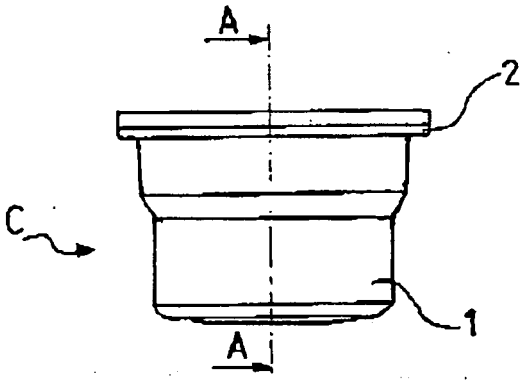

FIG. 4B

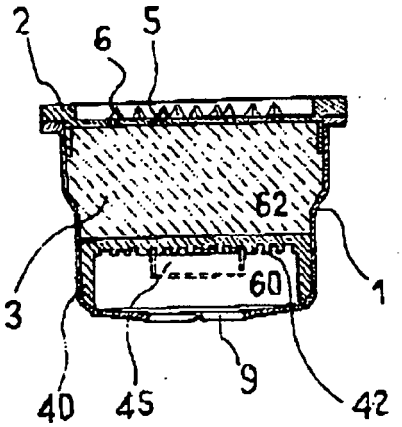

FIG. 5

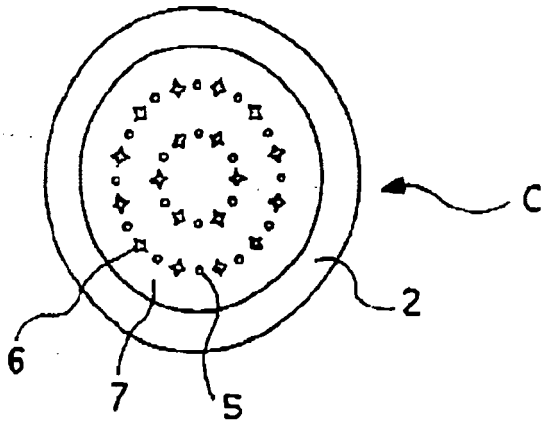

FIG. 4C

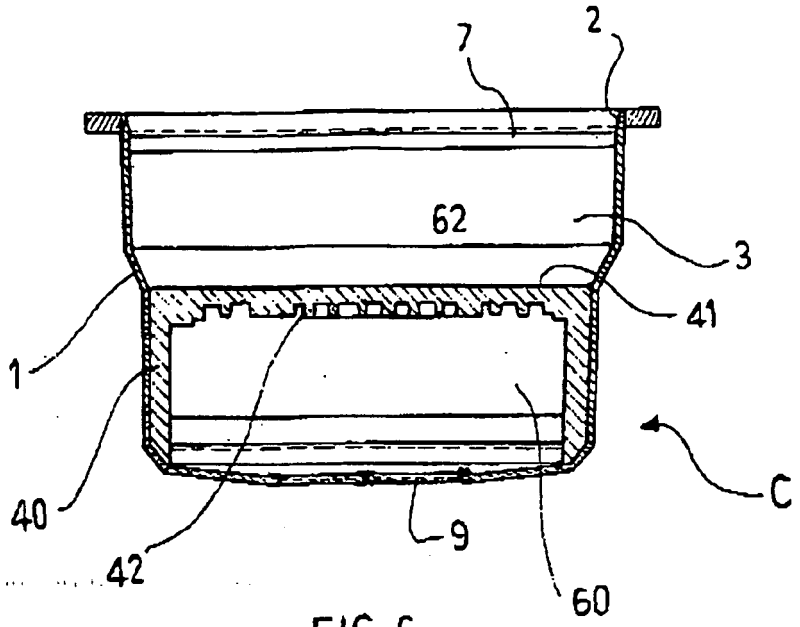

FIG. 6

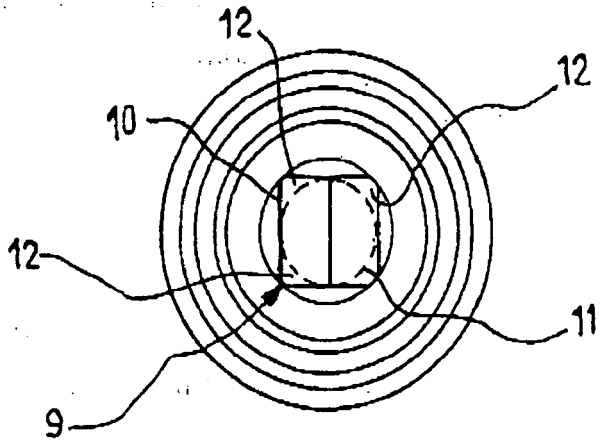

FIG. 7

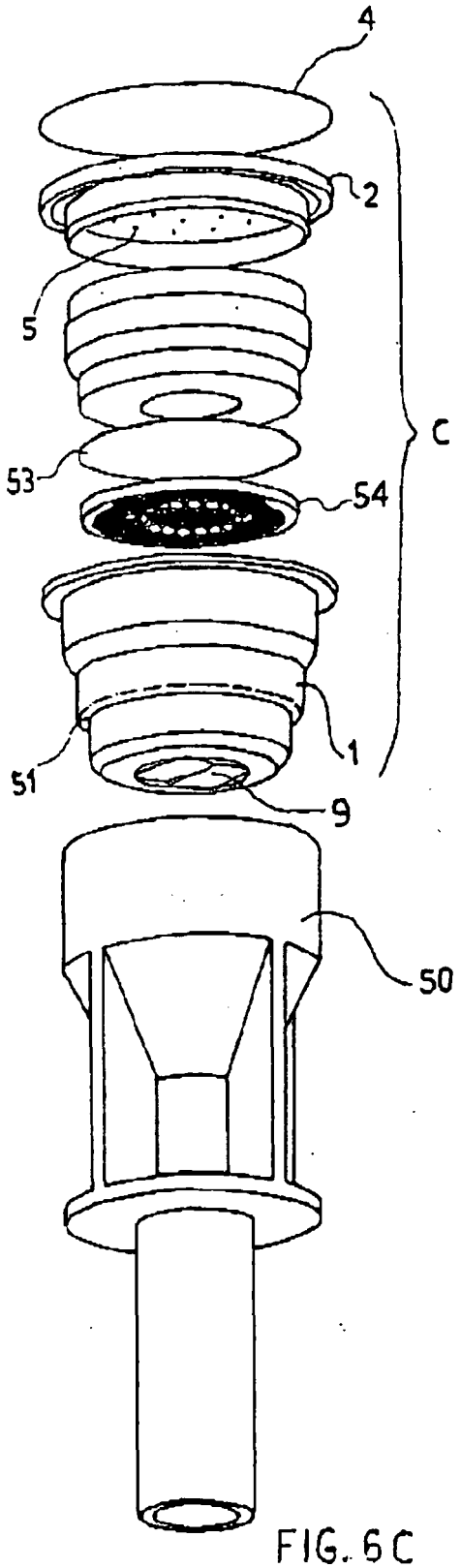

FIG. 6C

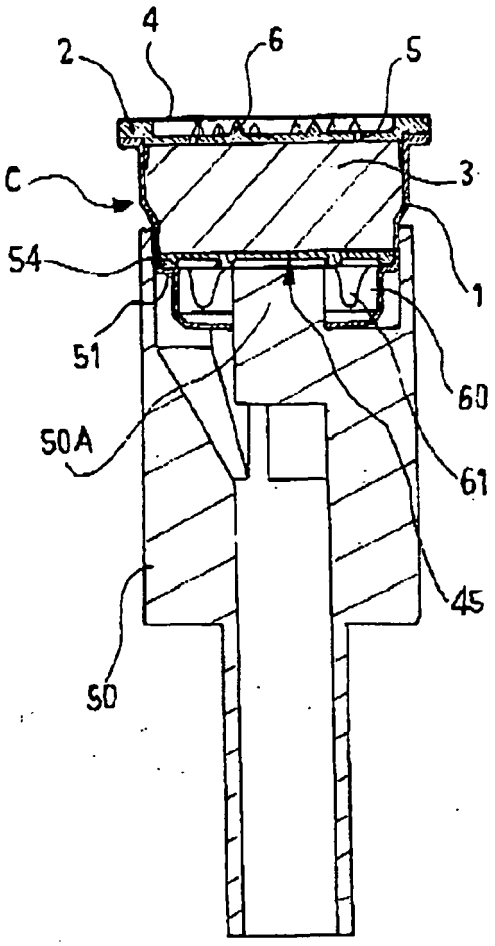

FIG. 6D

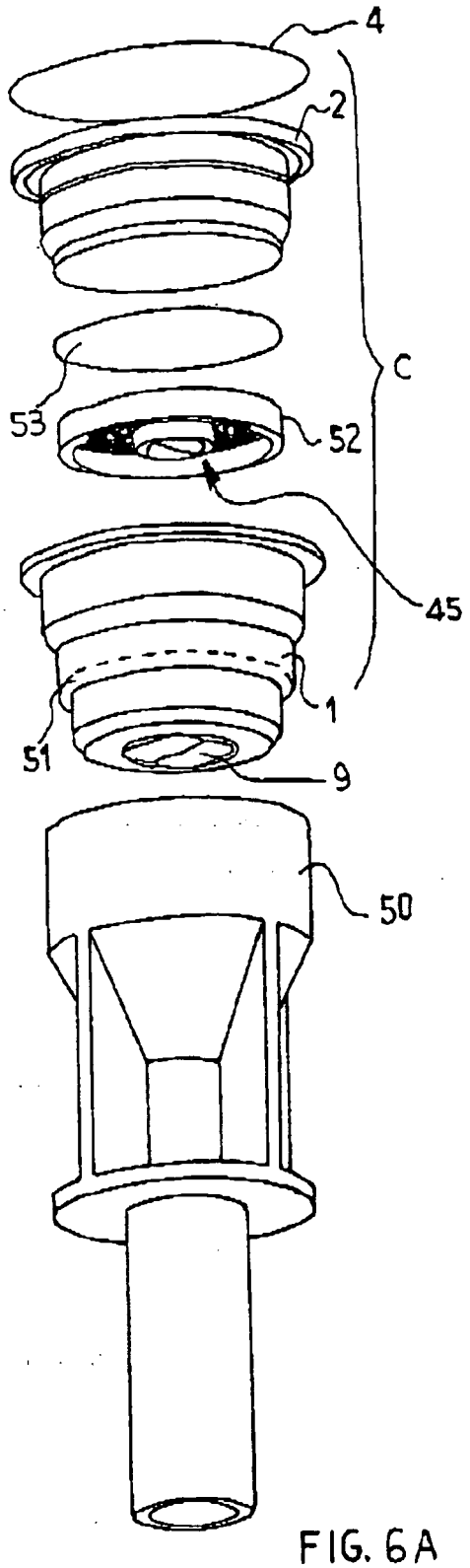

FIG. 6A

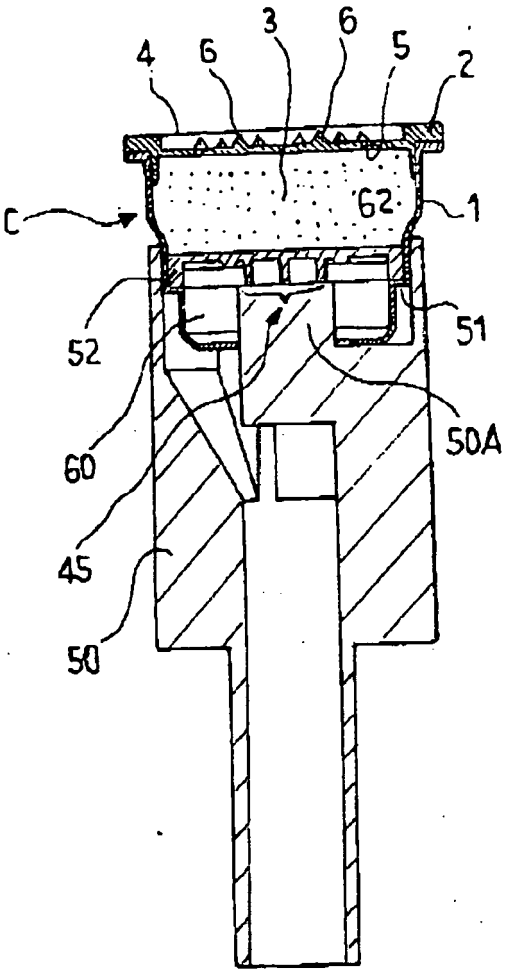

FIG. 6B

REFERENCES CITED IN THE DESCRIPTION

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