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Octrooihouder(s):
Koninklijke Douwe Egberts B.V. te Utrecht.

(43)

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(72)

Uitvinder(s):
**Andrew Michael Halliday te Utrecht.
Glen Andrew Oliver te Utrecht.**

(47)

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Gemachtigde:
ir. C.M. Jansen c.s. te Den Haag.

(54)

Capsule, system and method for preparing a beverage

(57)

In a capsule containing a substance constituted by a mass of loose, solid particles, for the preparation of a potable beverage by extracting and/or dissolving the substance by means of supplying a fluid under pressure into the capsule, a screen, permeable to water and impermeable to a predominant portion of particles of the substance is positioned between the substance and the bottom. The screen is provided with a plurality of passages dimensioned so that at least a fraction of the substance can pass through the passages in solid form. A beverage brewing system comprising such a capsule and a method of use of such a capsule are described as well.

TITLE: Capsule, system and method for preparing a beverage

FIELD AND BACKGROUND OF THE INVENTION

The invention relates to a capsule according to the introductory portion of claim 1. Such a capsule is known from European patent application

5 0 468 079.

In practice, such capsules are mostly arranged and used for extracting coffee, by pressing an injection fluid such as hot water under pressure through powder obtained by grinding roasted coffee beans. However, the substance, which may be in the form of for instance granules, chips or flakes, may also be
10 constituted by or contain constituents that are to be dissolved and/or entrained, such as sugar or milk powder. Substances to be extracted may also be of other types than coffee, such as tea or herbs.

Widely used in the market are capsules of which the capsule body is of aluminium or plastic and of which the open end is sealed-off by a thin sheet,
15 usually of aluminium. The closed end of the capsule body is typically referred to as the bottom. The coffee machine has a housing in which a major portion of the capsule body can be received and a closing member. The housing and/or the closing member is/are movable relative to the other between an operating position in which the flange of the capsule is clamped between the housing and
20 a closing member and a transfer position leaving an opening through which a used capsule can be removed from the housing and a fresh capsule can be positioned in the housing. Piercing elements are provided which in use pierce a bottom portion of the capsule body inside the housing.

When pressurised fluid is fed into the housing, it penetrates the capsule
25 through the holes made by the piercing element, and causes an increase in the internal pressure which causes the cover to be torn, for instance with assistance of piercing members of the closing member. Then, a flow of water is pressed into the substance and brewed beverage exits the capsule and guided

to a receptacle of the user outside of the machine. The cover may also be to some extent open prior to injection of the pressurized fluid, for instance if the capsule is packaged in a barrier material for retaining flavours, which barrier material is to be removed prior to use.

5 European patent 1 165 398 discloses a capsule which comprises, in the dish of the capsule at the level of the bottom of the capsule, a means guaranteeing retention of solid substance when it is open, so that substance does not pass through the pierced openings while or after the piercing elements are retracted out of the capsule. This means may be a fabric which
10 may be pierced easily by means of a perforating needle and, at the end of the extraction, its flexibility and elasticity allow the pierced openings to close again when said needle is removed from the cartridge so that the grounds do not exit the capsule. According to another solution a non-return valve is adhesively bonded to the bottom. This valve may have a cross-shaped cut-out
15 which allows satisfactory opening and satisfactory re-closing when the extraction needle is inserted and removed.

WO2010/115970 discloses a capsule with a filter downstream of the substance in the capsule, which filter has pyramid shaped openings that are dimensioned to prevent the powdered substance from passing through the
20 openings.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a capsule which can be
25 manufactured in a simple manner at low costs and which is further improved with respect to processing of the substance into a beverage of high organoleptic and visual quality.

According to the invention, this object is achieved by providing a capsule according to claim 1.

30 Since the passages are dimensioned to allow particles of the substance to pass through in solid form, particles may pass to the outside of the capsule

body after the piercing elements have been retracted and pressure from the outside is no longer applied to the capsule. Amounts of substance flowing out will show the user the substance from which the beverage has been brewed, which enhances the similarity to brewing coffee in a manually filled brewing apparatus such as a conventional espresso machine, so that the real coffee making experience is improved. Thus by doing exactly the opposite as proposed in the previously mentioned European patent 1 165 398, an important advantage is realised. Moreover a second advantage is realised. Because the screen is provided with a plurality of passages dimensioned so that at least a fraction of the substance can pass through in solid form, water distribution over the substance, through which the water is pressed, is guided effectively, but incurs less flow resistance than a screen of the same water permeable material without passages dimensioned so that at least a fraction of the substance can pass through in solid form. The relatively large passages provide distributed areas where flow resistance is particularly low. In particular the screen may be made from a filter material provided with the plurality of passages. More particularly the filter material may be a non-woven material. It shows that such a screen provides an excellent water distribution over the substance bed (in particular ground coffee bed) so that extraction is improved. Without being bound to theory, it is expected that the improved extraction is obtained by a combination of the porosity of the filter material on the one hand and the passages in the filter material on the other hand.

The openings may for instance have a diameter of 1-4 mm. The diameter of the screen may for instance be 20-40 mm, for example 22-30 mm. The diameter of the bottom of the capsule may for instance be 20-40 mm, for example 22-30 mm. The diameter of the screen may be about the same as (e.g. 95 – 105% of) the diameter of the bottom at the inside of the capsule. The screen may for instance be provided with 4-30 passages, preferably about 15-25 passages. The screen area including a pattern of the passages may cover 50-100% of the bottom, the remainder of the screen area being free of a pattern of

the passages. In a practical embodiment the screen is provided with 15-18 passages each having a diameter of 1.5-2.5 mm, preferably 1.6–2.2 mm, more preferably of 1.6-1.8 mm.

5 The screen material may for instance have a weight of 20-200 g/cm², preferably 40-100 g/cm². The screen material may for instance have a thickness of 0.1-1 mm, preferably 0.2-0.5 mm. The screen material (without the passages) may for instance have an air permeability between 500 and 3000 l/(m²s) at a pressure drop of 100 Pa over the screen material, preferably between 1000 and 1500 l/(m²s) at a pressure drop of 100 Pa over the screen material.

10 In general, as a result of the relatively low pressure loss at the screen, the screen according to the invention allows water to be distributed over flow paths including flow paths of a relatively great length, where pressure drop per unit of flow distance would otherwise be relatively low. Also any tendency of water to pass along flow paths circumventing the screen or to pass through a hole pierced in the screen is reduced because the pressure drop over the screen is lowered. Reducing the pressure drop over the screen further provides the advantage that more of the overall pressure drop is left as a net pressure drop over the substance, so that extraction can be more intensive.

15 Particular elaborations and embodiments of the invention are set forth in the dependent claims. The invention may also be embodied in a system according to claim 23 and in a method for brewing a beverage according to claim 25.

20 Further features, effects and details of the invention appear from the detailed description and the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective cross-sectional view of a first example of a capsule according to the invention;

Fig. 2 is a schematic cross-sectional side view of the capsule according to Fig. 1 positioned between a housing and a closing member of a coffee making machine;

Fig. 3 is a perspective cross-sectional view of a second example of a capsule according to the invention;

Fig. 4 is a top plan view of a screen of a third example of a capsule according to the invention;

Fig. 5 is a top plan view of a screen of a fourth example of a capsule according to the invention; and

Fig. 6 is a top plan view of a screen of a fifth example of a capsule according to the invention.

DETAILED DESCRIPTION

In Figs. 1 and 2 a first example of a capsule 1 according to the invention is shown. The capsule 1 has a capsule body 2 having a bottom 3, a side wall 4, an end 5 opposite of the bottom 3 and a flange 6 extending outwardly from the side wall 4 and around the open end 5. A cover 7 of the capsule is attached to the outwardly extending flange 6 and hermetically closes off the end 5 of the capsule body 5 opposite of the bottom 3. For illustrative purposes, the cover 7 is shown as a transparent member. The cover may also be open to some extent, for instance in an embodiment in which the capsule is packaged in a flavour retaining barrier that is to be removed prior to use and in which the cover does not have to be opened further to allow the brewed beverage to flow through.

The capsule body 2 and the cover 7 bound a capsule chamber 8. The capsule chamber 8 contains a substance 9 constituted by a mass of loose, solid particles, for the preparation of a potable beverage by extracting and/or dissolving the substance by means of supplying an injection fluid under pressure into the capsule.

In this example and also in other embodiments of the invention, the substance can for instance be ground, roasted coffee beans, but may also be

another substance from which constituents are to be extracted and/or which is to be dissolved and/or emulsified when pressurised injection liquid such as hot water is passed through, for instance tea, milk powder and/or sugar, or dried soup. The substance may for instance be 5 - 40 grams, preferably 5 - 30 grams,
 5 more preferably 5 - 14 grams of roasted and ground coffee.

For compatibility with widely used coffee machines, it is generally preferred that the capsule is in accordance with one or more of the following features, wherein dimensions are to be selected within these ranges depending on the type of coffee making machine in which the capsule is to be used:

- 10 • the outer diameter of the outwardly extending flange is approximately 37 - 45 mm,
- the diameter of the bottom of the capsule is about 23 - 30 mm,
- an inner edge of a curled outer edge of the outwardly extending flange has a radius about the central capsule body axis of at least 32 - 42 mm,
- 15 • the curled outer edge of the outwardly extending flange has a largest dimension of about 1.2 – 1.6 mm,
- the inner diameter of the free end of the side wall of the capsule body is about 29 - 35 mm,
- the distance between the free end of the side wall of the capsule body and
 20 an outermost edge of the outwardly extending flange is about 3.5 - 5 mm,
- a height of the capsule body is about 28 - 40 mm,
- the capsule body is truncated, wherein preferably the side wall of the capsule body encloses an angle with a line transverse to the central capsule body axis of about 94 - 98°,
- 25 • the bottom of the capsule body has a largest inner diameter of about 23 - 29 mm,
- the bottom of the capsule body is truncated, preferably having a bottom height of about 4 - 7 mm and wherein the bottom further has a generally flat central portion opposite the cover having a diameter of about 8 - 11
 30 mm,

- the height of the sealing member portion to be contacted first by the free end of the enclosure member when the enclosure member is closed is at least about 0.1 mm, more preferably at least 0.2 mm and most preferably at least 0.8 mm and at most 3 mm, more preferably at most 2 mm and most preferably at most 1.2 mm.

5 The wall thickness of the cover (preferably made of aluminium) is preferably smaller than the wall thickness of the capsule body, which may for instance be of aluminium or plastic material, such that the cover can be caused to open with assistance of a pressure applied to the capsule chamber, for
10 instance by causing the aluminium cover to tear open on a closing member of the beverage preparation device, such as an extraction plate of the beverage preparation device, under the influence of fluid pressure in the capsule.

In the capsule chamber 8, a screen 10, of a material permeable to water and impermeable to a predominant portion of the particles of the substance 9
15 is arranged. The screen 10 is positioned between the substance 9 and the bottom 3 of the capsule and has a centre approximately coaxial with a centre line 11 of the capsule 1. In this example, the screen 10 is attached to the capsule body 1 along attachment zones 12 spaced from the centre 11 and circumferentially spaced from each other. The screen 10 may also be arranged
20 loosely in the capsule, without being attached to the capsule body 2.

The circumferentially distributed attachment zones 12 keep a peripheral portion of the screen 10 in position in the capsule 1, yet interfere relatively little with liquid flow through the screen 10, so that a relatively large portion of the screen 10 up to its peripheral edge is available for liquid to
25 pass through. Also, the screen 10 reliably keeps the piercing elements 13 (Fig. 2) separated from the substance, since a portion of the screen 10 centrally of the attachment zones 12 is left free to move away from the bottom 3 when the piercing elements 13 enter the capsule chamber 8 through perforations pierced thereby in the bottom 3 of the capsule body 2. It may however also be provided
30 that the piercing elements do pierce the screen or that a passage is provided in

the screen through which a tip end of the piercing element passes when it is pierced into the capsule.

The screen 10 is provided with a plurality of passages 23 dimensioned so that at least a fraction of the substance 9 can pass through the passages 23 in solid form. The fraction of the substance 9 that can pass (i.e. is small enough to pass) through the passages may for instance be the smallest 10%, 30% or 50% of the substance 9. It may also be provided that all particles of the substance are in principle capable of passing through the passages or that some of the passages allow a larger fraction of the substance to pass through than other ones of the passages. Also, even though particles are in principle capable of passing through the passages, in practice most of the substance, and also most of the fraction that can pass through the passages, will in fact not pass through the passages. This is because, after brewing, most of the substance is not exposed to backflow of sufficient magnitude to entrain these particles through the passages and because particles tend to cling to each other after having been wetted. However, it has been found that a significant amount of particles does pass through the passages and even to the outside of the capsule, so that after brewing a sample of the substance from which the beverage is brewed is visible and can easily be smelled by the consumer.

Moreover, these passages 23 allow water distribution over the substance 9, through which the water is pressed with a smaller pressure drop over the screen, because the relatively large passages provide distributed local areas where flow resistance is particularly low. This allows water to be distributed over flow paths including flow paths of a relatively great length, where pressure drop per unit of flow distance would otherwise be relatively low. Also any tendency of water to pass along flow paths circumventing the screen 10 or to pass to a relatively large extent through a hole pierced in the screen is reduced, because the pressure drop over the screen 10 is lowered. Reducing the pressure drop over the screen 10 further provides the advantage that more of the overall pressure drop is left as a net pressure drop over the substance 9, so that extraction can be more intensive.

For leaving a large peripheral portion of the screen 10 free for the liquid to pass through spacings in circumferential sense between successive attachment zones 12 preferably leave open at least 30% or, in order of increasing preference, 40%, 50%, 60% or 70% of a circumferential zone in which the attachment zones 12 are located.

To allow the screen 10 to be displaced by the piercing elements 13 easily, without being pierced thereby, the screen 10 is preferably made of flexible material, such as paper, plastic film, or fibre material in the form of a woven, non-woven or knitted structure. Good brewing results at low costs can be achieved if the screen 10 is of filter paper. If the filter paper contains thermoplastic constituents such as fibres and/or binder material, these can be used for sealing to the capsule body in the attachment zones, as will be described in more detail.

For allowing the screen 10 to be displaced by the piercing elements 13 easily, it is also advantageous if all the attachment zones are distributed along a periphery of the screen element only.

In Fig. 2 also relevant parts of a coffee machine, which, together with the capsule 1, form a beverage brewing system, are shown. These parts include a housing 14 in which a major portion of capsule body 2 can be received and a closing member 15 with passages 17 for allowing a prepared beverage to flow away from the capsule 1. The housing 14 and/or the closing member 15 is/are movable relative to the other between an operating position in which the flange 6 of the capsule 1 is clamped between the housing 14 and the closing member 15 and a transfer position leaving an opening through which a used capsule 1 can be removed from the housing 14 and a fresh capsule 1 can be positioned in the housing 14. The piercing elements 13, which are arranged for, in use, piercing a bottom portion 3 of the capsule body 2 inside the housing 14 in several piercing locations 16 (in principle a single piercing element for piercing in a single location would be possible as well; in this example three piercing elements are provided which lay on a circle such that each of the piercing elements pierces the capsule just outside a central part of the bottom).

Such coffee machines are commercially available and therefore not described in more detail.

In operation, the capsule 1 is positioned in the housing 14 and clamped between the housing 14 and the closing member 15 with perforations 17 for
5 allowing brewed beverage outputted through the cover 7 to flow away from the capsule 1. A bottom portion 3 of the capsule body 2 inside the housing 14 is pierced and pressurised injection fluid, such as hot water, is fed into the housing 14, causing the injection fluid to penetrate the capsule 1 through at
10 least one hole 16 pierced in the bottom 3. The hole may also have been provided in the bottom prior to placing the capsule in the housing, e.g. during manufacturing.

Then, the cover 7 is caused to be torn, preferably under the influence of fluid pressure in the capsule 1 and a flow of the injection fluid is passed at
15 least partially through the screen 10, into and through the substance and through the cover so that a brewed beverage exits the capsule; and the brewed beverage is guided to a receptacle.

Since the passages 23 are dimensioned to allow particles of the substance 9 to pass through in solid form, an appreciable amount of the particles will pass to the outside of the capsule body 2 after the piercing
20 elements 13 have been retracted and pressure is no longer applied to the capsule 2. Thus, the user can see and better smell some of the substance from which the beverage has been brewed, which enhances the similarity to and association with brewing coffee in a manually filled brewing apparatus such as a conventional espresso machine that has to be filled with ground coffee
25 manually.

For radial distribution of water, it is preferred that at least some of the passages 23 are located peripherally of the location or locations of the piercings 16 or of openings pre-fabricated in the bottom.

In the system according to the invention, the attachment zones 12 are
30 located peripherally of the piercing location or piercing locations 16 only. Thus, it is ensured that the piercing elements contact the screen 10 in an area

surrounded by and located centrally relative to the attachment zones 12, so that the screen 10 can on the one hand move along with the tips of the piercing elements 13 contacting the screen 10 while on the other hand being retained in place in several positions surrounding the piercing elements 13, so that
5 substance 9 is reliably prevented from reaching piercing locations 16, by circumventing the screen 10 or by being entrained with a piercing element 13 as it is retracted.

For this purpose, it is moreover preferred that the attachment zones 13 are all arranged at a distance from the centre 11 of more than 60% or, more
10 preferably, more than 70% of the radial size of the screen 10 in a direction from the centre 11 to the respective attachment zone 13. Also for this purpose, and for ease of manufacturing, it is preferred that the number of attachment zones 12 is less than 25 and, more preferably, less than 20 or 15. Thus the screen is attached to the capsule only at the attachment zones which are
15 spaced from the centre and circumferentially spaced from each other. The screen is not attached to a centre area of the bottom. The screen is arranged to move away from the centre area of the bottom under influence of fluid injected via openings in the bottom which openings are created by means of an apparatus wherein the capsule is positioned for brewing coffee and/or under
20 influence of piercing elements by means of which, in use, openings are pierced in the bottom of the capsule for injecting fluid into the capsule.

A particularly reliable fixation along the periphery of the screen 10 can be achieved if, as in the present example, the attachment zones 12 are located directly adjacent to a transition 20 from the bottom 3 to the side wall 4. For
25 reliable fixation, it is moreover preferred that the number of attachment zones is at least three and, more preferably, at least four, five or six.

In Fig. 3 a second example of a capsule 51 according to the invention is shown. In principle, only features of this capsule 51 that differ significantly from the capsule 1 shown in Figs. 1 and 2 are described. For illustrative
30 purposes, the cover 57 in Fig. 3 is shown as a transparent member.

In this capsule 51, the attachment zones 62 are at least partially located in a transition 70 from the bottom 53 to the side wall 54. This allows the screen 60 to be attached further from the centre 61 of the capsule 51. In the present example, this is taken to an extreme by arranging the attachment
5 zones 62 in end portions near the bottom 53 of flutes 68 bulging outwardly of the general conical shape of the sidewall 54.

In this example, the passages 73 through the screen 60 that are large enough to allow particles of the substance 59 to pass through in solid form are arranged in a single circle instead of in two concentric circles as the example
10 shown in Figs 1 and 2.

In Fig. 4 yet another example of a screen 110 for a capsule according to the invention is shown. In this example, the passages 123 are not of a circular shape, but of an elongate, triangular shape. By providing elongate passages, such a slots, oval passages or rhombus-shaped passages, water, relatively
15 large areas of reduced resistance are provided, without proportionally allowing more of the substance to pass through. The attachment zones 112 are arranged in an annular zone outside of the annular zone in which the passages 123 are located. Thus, even if the position of the attachment zones 112 is fixed in rotational sense about the centre 126 of the screen 110, the screen can be
20 attached to the capsule body in any position in rotational sense about that centre, because the attachment zones are always outside of the passages 123.

In Fig. 5, a further example of a screen 160 for a capsule according to the invention is shown. In this example, the passages 173, 174, 175 are arranged in three annular zones concentric around the centre 176 of the screen
25 160. The passages 173, 174 in the inner rings are formed by openings in the material of the screen 160, which openings are circumferentially bounded by material of the screen 160. The passages 175 in the outer annular zone are formed by bays in the outer circumferential edge of the screen 160. The bays form areas of reduced flow resistance where water can pass between the
30 perimeter of the screen 160 and the side wall of the capsule body.

In Fig. 6, yet another example of a screen 210 for a capsule according to the invention is shown. In this example, the passages 223 (not all designated by a reference number) are arranged in a pattern that is uniform over the entire surface area of the screen 210. An advantage of passages arranged
5 according to a uniform pattern is that the screen material can be provided with the passages very efficiently before screens are severed out of the screen material. Then the screens can be cut or otherwise severed out of the patterned screen material.

In this example, the pattern is a uniform pattern of columns and rows at
10 uniform mutual distances. However, also other patterns, such a patterns in which successive rows are mutually staggered in longitudinal direction, e.g. by half of the pitch between successive columns, or a pattern in which the passages are centred on corners of imaginary hexagonal cells.

For effectively distributing water to radially outer portions of the
15 capsule and of the substance 59, it is advantageous if at least some of the passages 73 are arranged at a distance from the centre of more than 40% and more preferably more than 50% or more than 60% of the distance of a peripheral edge from the centre, measured in a direction from the centre to the respective passage. Radially outward water distribution is even further
20 enhanced if this applies to all of the passages.

Radially outward water distribution (which may also be achieved effectively using a screen with a uniform pattern of openings) is particularly relevant if, as for instance in the examples shown in Figs. 1-3. The capsule body 2, 52 has an internal cross-sectional area along a plane parallel to the
25 cover 7, 57, which is larger at the cover 7, 57 than at the bottom 3, 53. In such a capsule 1, 51, the cross-sectional area increases from the bottom 3, 53 to the cover 7, 57, i.e. in the direction of flow of water through the substance, so that the water will need to distribute over a larger cross-sectional area as it flows through the substance 9, 59. By leading a relatively large portion of the water
30 radially outwardly while incurring only a relatively small pressure loss at the

screen, it is ensured that water is also effectively distributed to outer regions of cross-sections of the substance close to the cover 7, 57.

Radially outward water distribution is even more relevant if a shoulder is provided in a side wall of said capsule body, the internal cross-sectional area being larger at a cover side of the shoulder than at a bottom side of the shoulder.

Particularly effective reductions of local flow resistance are achieved if at least some or all of the passages each have a cross-sectional surface area of at least 3 mm², for instance 3-7 mm², more preferably 4-5.5 mm² and/or a cross-sectional size of at least 1-4 mm. The cross-sectional size of the screen may for instance be 20-40 mm, for example 22-30 mm. The diameter of the bottom of the capsule may for instance be 20-40 mm, for example 22-30 mm. The diameter of the screen may be about the same as the diameter of the bottom at the inside of the capsule. The screen may for instance be provided with 4-30 passages, preferably about 15-25 passages. The screen area in which the passages are located may cover 50-100% of the bottom. In a practical embodiment the screen is provided with 15-18 passages each having a diameter of 1.5-2.5 mm, preferably 1.6-2.2 mm, more preferably of 1.6-1.8 mm.

The screen material may for instance have a specific weight of 20-200 g/cm², preferably 40-100 g/cm². The screen material may for instance have a thickness of 0.1-1 mm, preferably 0.2-0.5 mm. The screen material (without the passages) may for instance have an air permeability of 500 – 3000 l/(m²s) at a pressure drop of 100 Pa over the screen material, preferably between 1000 and 1500 l/(m²s) at a pressure drop of 100 Pa over the screen material.

The screen has a surface area that can be regarded as being composed of an inner surface area and an outer surface area surrounding the inner surface area, the inner surface area forming at least 25% of a total surface area of the screen and an inner portion of the passages in the inner surface area provide an open surface area of a first proportion of the inner surface area, while an outer portion of the passages in the outer surface area provides an open surface area of a second proportion of the outer surface area. It is then

advantageous for outward water distribution if the second proportion is larger than the first proportion. The inner surface area may for instance constitute at least 40%, 50% or 60% of the total surface area of the screen and the inner surface area may also be free of passages, at least prior to brewing. The inner
5 surface area may have a circular boundary, a centre of the screen forming the centre of the inner surface area.

The screen is preferably of water permeable material (e.g. one or more layers of fibrous material, such as filter paper, felt material or woven material), so that not all of the water flow is concentrated through the
10 passages. However, if the number of passages is sufficiently large and the passages are sufficiently evenly distributed, the screen may also be of water impermeable material.

Several features have been described as part of the same or separate embodiments. However, it will be appreciated that the scope of the invention
15 also includes embodiments having combinations of all or some of these features other than the specific combinations of features embodied in the examples.

Conclusies

1. Een capsule omvattende:
 - een capsulelichaam met een bodem, een zijwand, een uiteinde tegenover de bodem en een flens die zich van de zijwand naar buiten en rond het open uiteinde uitstrekt; en
 - 5 een afdekking die is bevestigd aan de zich naar buiten uitstreckende flens, waarbij de afdekking het uiteinde van het capsulelichaam tegenover de bodem afsluit;
 - waarbij het capsulelichaam en de afdekking een capsulekamer begrenzen, waarbij de capsulekamer bevat:
 - 10 een substantie die is gevormd door een massa van losse, vaste deeltjes, voor de bereiding van een drinkbare drank door het extraheren en/of oplossen van de substantie door middel van het verschaffen van een fluïdum onder druk in de capsule, en
 - een scherm, uit een materiaal dat ondoordringbaar is voor een
 - 15 overheersend gedeelte van genoemde deeltjes, waarbij genoemd scherm tussen genoemde substantie en genoemde bodem is geplaatst;
 - daardoor gekenmerkt dat genoemd scherm is voorzien van meerdere doorgangen die zo zijn gedimensioneerd dat ten minste een fractie van de substantie in vaste vorm door de doorgangen kan passeren.
 - 20
2. Een capsule volgens conclusie 1, waarbij genoemde doorgangen zijn aangebracht in een patroon dat uniform is over de volle oppervlakte van het scherm.
- 25 3. Een capsule volgens conclusie 1 of 2, waarbij genoemd scherm is bevestigd aan genoemd capsulelichaam langs bevestigingszones die op

afstand van het centrum en in omtrekszin op afstand van elkaar zijn gelegen.

4. Een capsule volgens conclusie 3, waarbij alle genoemde
5 bevestigingszones dicht, en bij voorkeur gelijkmatig, langs een perifere rand van het scherm zijn verdeeld.
5. Een capsule volgens conclusie 3 of 4, waarbij ruimtes in omtrekszin
tussen opeenvolgende bevestigingszones ten minste 30% in omtrekszin van
10 een omtrekszone waarin de bevestigingszones zijn gelegen, open laten.
6. Een capsule volgens één der voorgaande conclusies, waarbij ten
minste een aantal van de doorgangen zijn verschaft in de vorm van
inkepingen of uitsparingen in een perifere rand van het scherm.
15
7. Een capsule volgens één der voorgaande conclusies, waarbij ten
minste een aantal van de doorgangen zijn verschaft in de vorm van
openingen die rondom begrensd zijn door materiaal van het scherm.
- 20 8. Een capsule volgens één der voorgaande conclusies, waarbij ten
minste een aantal of alle van genoemde doorgangen een oppervlakte in
dwarsdoorsnede van ten minste 3.0 mm^2 hebben.
9. Een capsule volgens één der voorgaande conclusies, waarbij ten
25 minste een aantal of alle van genoemde doorgangen een kleinste grootte in
dwarsdoorsnede van ten minste 1.0 mm hebben.

10. Een capsule volgens één der voorgaande conclusies, waarbij ten minste een aantal van genoemde doorgangen zijn aangebracht op een afstand van het centrum van meer dan 40% en meer bij voorkeur meer dan 50% of meer dan 60 % van de afstand van een perifere rand vanuit het centrum, gemeten in een richting van het centrum naar de respectieve doorgang.
11. Een capsule volgens conclusie 10, waarbij alle van genoemde doorgangen zijn aangebracht op een afstand van het centrum van meer dan 40% en meer bij voorkeur meer dan 50% of meer dan 60% van de afstand van een perifere rand vanuit het centrum, gemeten in een richting van het centrum naar de respectieve opening.
12. Een capsule volgens één der voorgaande conclusies, waarbij het scherm een oppervlakte heeft omvattende een binnenoppervlakte en een buitenoppervlakte die de binnenoppervlakte omringt, waarbij de binnenoppervlakte ten minste 25% vormt van een totale oppervlakte van het scherm, waarbij een binnengedeelte van genoemde doorgangen in genoemde binnenoppervlakte een open oppervlakte verschaffen van een eerste proportie van genoemde binnenoppervlakte, waarbij een buitengedeelte van genoemde doorgangen in genoemde buitenoppervlakte een open oppervlakte verschaffen van een tweede proportie van genoemde buitenoppervlakte, en waarbij genoemde tweede proportie groter is dan genoemde eerste proportie.
13. Een capsule volgens conclusie 12, waarbij genoemde binnenoppervlakte ten minste 40% van de totale oppervlakte van het scherm vormt.

14. Een capsule volgens conclusie 12 of 13, waarbij genoemde binnenoppervlakte vrij is van genoemde doorgangen.
15. Een capsule volgens één der conclusies 12-14, waarbij genoemde
5 binnenoppervlakte een cirkelvormige grenslijn heeft, waarbij een centrum van het scherm het centrum van de binnenoppervlakte vormt.
16. Een capsule volgens één der voorgaande conclusies, waarbij het capsulelichaam een interne dwarsdoorsnedeoppervlak langs een vlak
10 parallel aan de afdekking heeft, dat groter is bij de afdekking dan bij de bodem.
17. Een capsule volgens conclusie 15, waarbij een schouder is voorzien in een zijwand van genoemd capsulelichaam, waarbij genoemde interne
15 dwarsdoorsnede-oppervlak groter is aan een afdekkingszijde van genoemd schouder dan aan een bodemzijde van genoemd schouder.
18. Een capsule volgens één der voorgaande conclusies, waarbij het scherm uit waterdoorlatend materiaal is.
20
19. Een capsule volgens conclusie 17, waarbij het scherm van één of meer lagen van vezelig materiaal is, zoals filterpapier, vilten materiaal of gewoven materiaal.
20. Een capsule volgens één der voorgaande conclusies, waarbij alle
25 bevestigingszones waar het scherm is bevestigd aan de capsule op afstand van het centrum zijn en in omtrekszin op afstand van elkaar zijn gelegen.

21. Een capsule volgens één der voorgaande conclusies, waarbij het scherm niet is bevestigd aan een centrumgebied van de bodem.
22. Een capsule volgens één der voorgaande conclusies, waarbij het
5 scherm is ingericht om weg te bewegen van het centrumgebied van de bodem onder invloed van perforatieelementen, waarmee in gebruik openingen worden geprikt in de bodem van de capsule om een fluïdum in de capsule te injecteren en/of onder invloed van een fluïdum dat is geïnjecteerd via openingen in de bodem, welke openingen worden gecreëerd door middel
10 van een koffiemachine waarin de capsule is gepositioneerd om koffie te zetten.
23. Een capsule volgens één der voorgaande conclusies, waarbij het scherm cirkelvormig is met een diameter van 20-40 mm.
15
24. Een capsule volgens één der voorgaande conclusies, waarbij het scherm in hoofdzaak het hele interne oppervlak van de bodem van het capsulelichaam bedekt.
- 20 25. Een capsule volgens één der voorgaande conclusies, waarbij het aantal genoemde doorgangen 4-30 is.
26. Een capsule volgens één der voorgaande conclusies, waarbij het schermmateriaal een gewicht van 20-200 g/cm² heeft.
25
27. Een capsule volgens één der voorgaande conclusies, waarbij het schermmateriaal zonder genoemde doorgangen een luchtpermeabiliteit

tussen 500 en 3000 l/(m²s) heeft bij een drukval van 100 Pa over het schermmateriaal.

28. Een systeem omvattende een capsule volgens één der voorgaande
5 conclusies en een koffiemachine, waarbij de koffiemachine heeft:
een behuizing waarin een voornaamste gedeelte van een
capsulelichaam kan worden ontvangen;
een sluitorgaan met doorgangen om een bereidde drank te laten
wegvloeien van de capsule, waarbij de behuizing en/of het sluitorgaan
10 beweegbaar is ten opzichte van de ander tussen een bedrijfsstand waarin de
flens van de capsule tussen de behuizing en het sluitorgaan is geklemd, en
een overdrachtsstand die een opening laat waardoor een gebruikte capsule
kan worden verwijderd van de behuizing en een verse capsule in de
behuizing kan worden geplaatst;
15 perforatieelementen die zijn ingericht om, in gebruik, een
bodemgedeelte van het capsulelichaam in de behuizing te perforeren op ten
minste één perforatielocatie; en
een watertoevoer om water toe te voeren naar genoemde
perforatielocatie en om het water te doen binnengaan in genoemde capsule
20 via genoemde geperforeerde bodem.

29. Een systeem volgens conclusie 28, waarbij zich ten minste een aantal
van de doorgangen perifeer van de ten minste ene perforatielocatie
bevinden.

25

30. Een werkwijze om een drank te bereiden met gebruikmaking van een
systeem volgens conclusie 28 of 29, omvattende:

het plaatsen van de capsule in een behuizing en geklemd tussen de behuizing en een sluitorgaan met perforaties om gebrouwde drank die door de afdekking wordt uitgevoerd, te laten wegvloeien van de capsule;

5 het toevoeren van onder druk staand injectiefluidum zoals heet water de behuizing in, zodat het injectiefluidum binnendringt in de capsule door ten minste één gat in genoemde bodem;

het doen scheuren van de afdekking bij voorkeur onder invloed van fluidumdruk in de capsule;

10 het ten minste gedeeltelijk door het scherm, in en door de substantie en door de afdekking drukken van een stroom van injectiefluidum, zodat een gebrouwde drank de capsule verlaat; en

het geleiden van de gebrouwde drank naar een houder.

Fig. 1

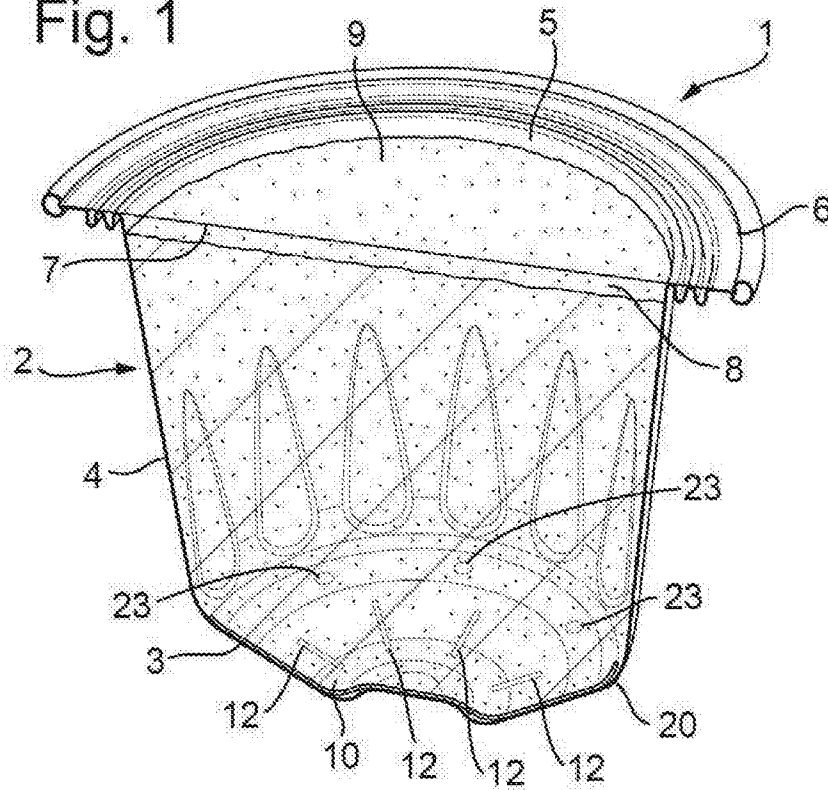


Fig. 2

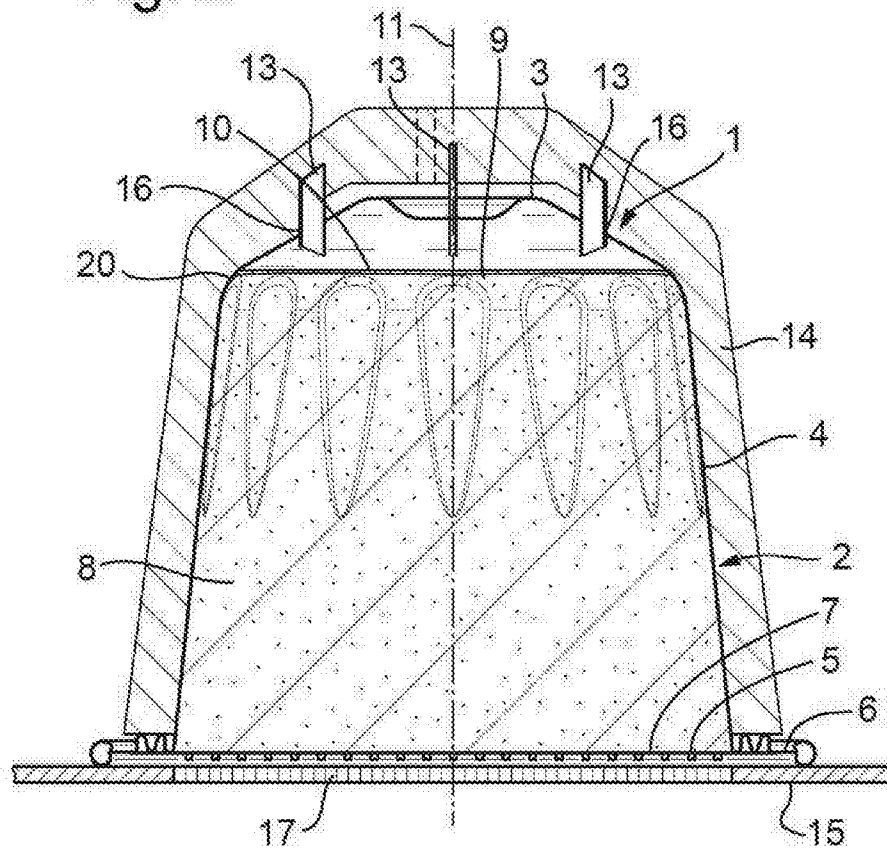


Fig. 3

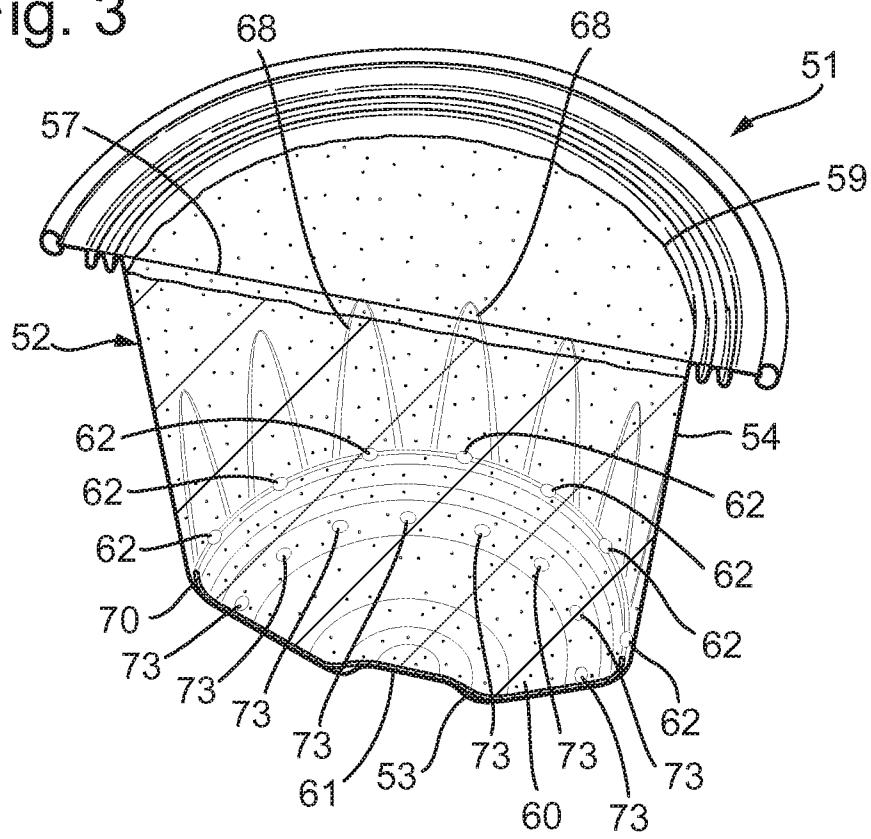


Fig. 4

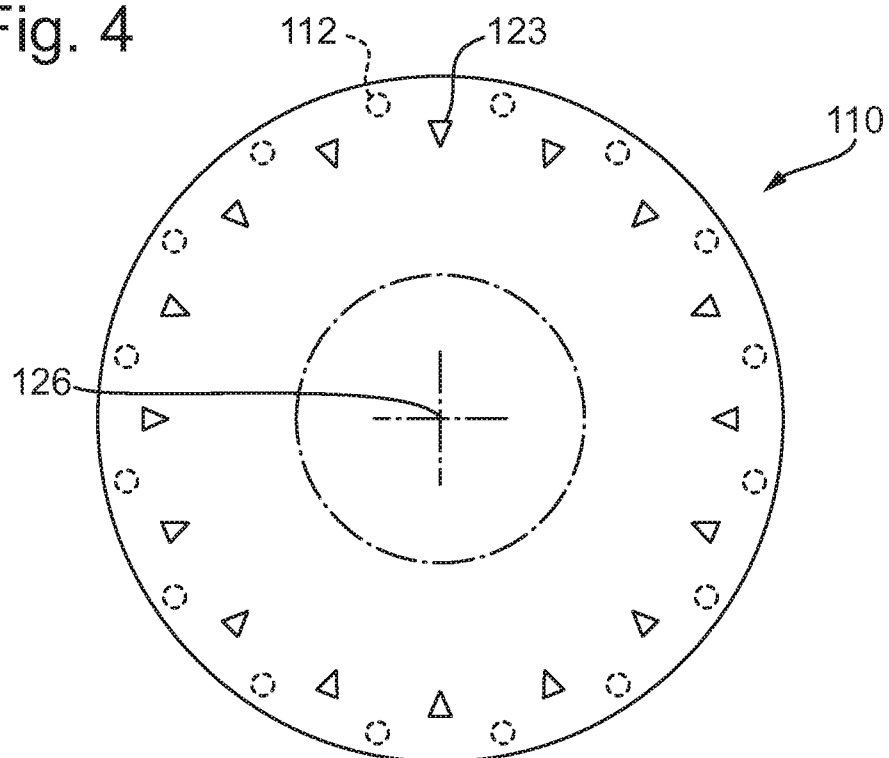


Fig. 5

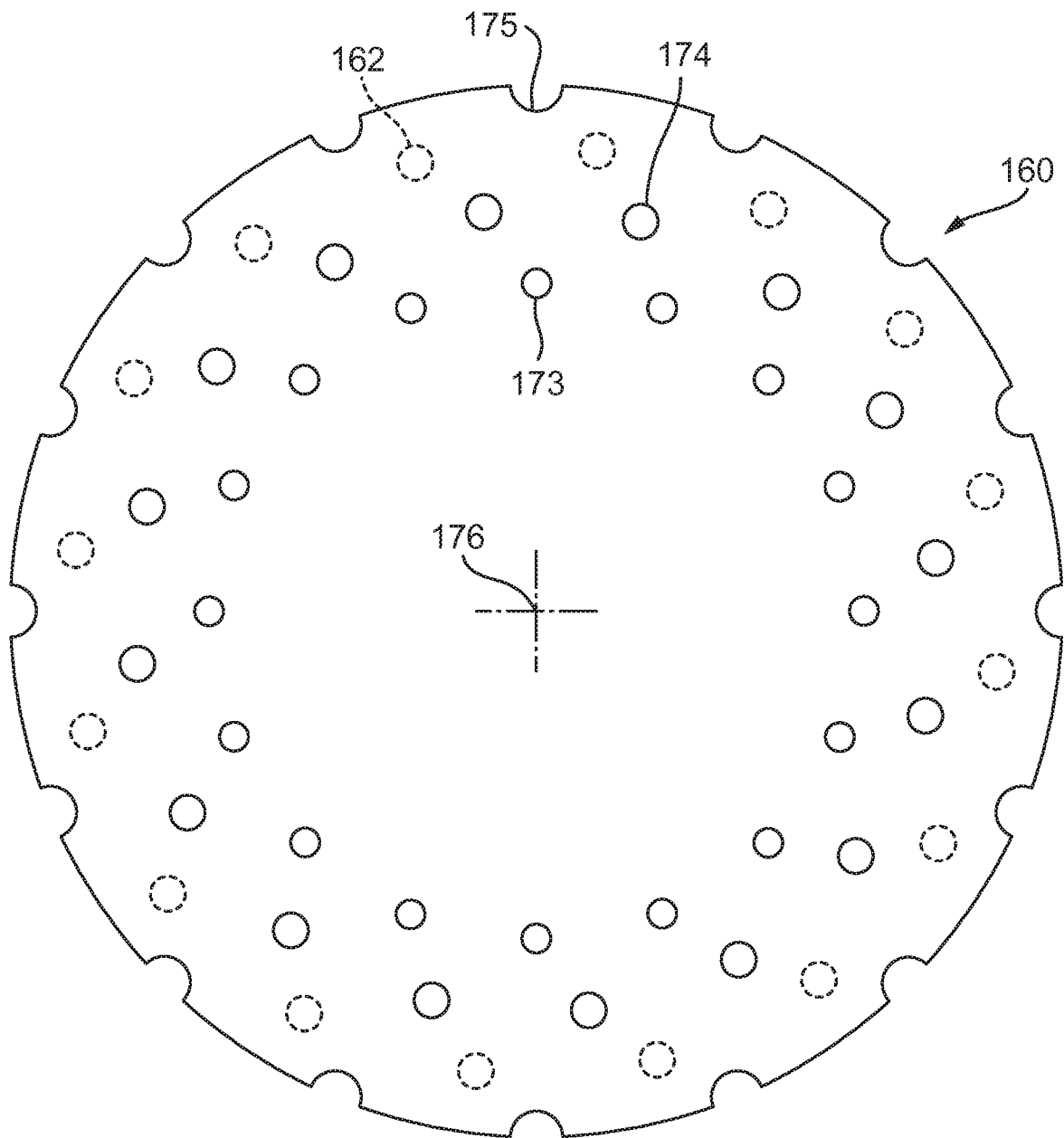
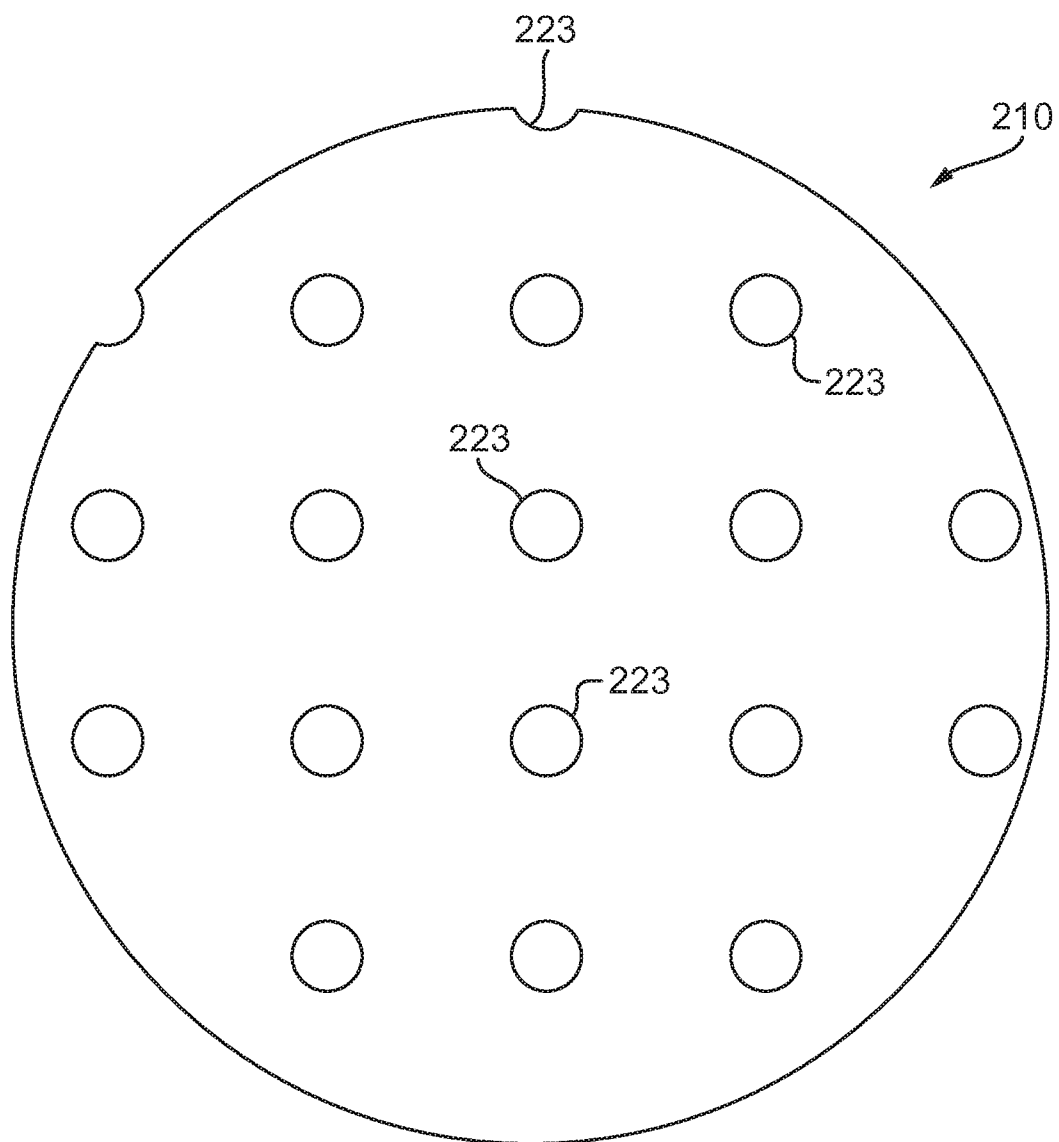


Fig. 6



TITLE: Capsule, system and method for preparing a beverage

ABSTRACT

In a capsule containing a substance constituted by a mass of loose, solid particles, for the preparation of a potable beverage by extracting and/or dissolving the substance by means of supplying a fluid under pressure into the capsule, a screen, permeable to water and impermeable to a predominant portion of particles of the substance is positioned between the substance and the bottom. The screen is provided with a plurality of passages dimensioned so that at least a fraction of the substance can pass through the passages in solid form. A beverage brewing system comprising such a capsule and a method of use of such a capsule are described as well.

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE P112569NL00		
Nederlands aanvraag nr. 2017586	Indieningsdatum 07-10-2016		
	Ingeroepen voorrangsdatum		
Aanvrager (Naam) Koninklijke Douwe Egberts B.V.			
Datum van het verzoek voor een onderzoek van internationaal type 17-12-2016	Door de instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. SN67980		
I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)			
Volgens de internationale classificatie (IPC) B65D85/804			
II. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK			
Onderzochte minimumdocumentatie			
Classificatiesysteem	Classificatiesymbolen		
IPC	B65D		
Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen			
III.	☐	GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES	(opmerkingen op aanvullingsblad)
IV.	☐	GEBREK AAN EENHEID VAN UITVINDING	(opmerkingen op aanvullingsblad)

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Nummer van het verzoek om een onderzoek naar
de stand van de techniek

NL 2017586

A. CLASSIFICATIE VAN HET ONDERWERP
INV. B65D85/804
ADD.

Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.

B. ONDERZOCHETE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimum documentatie (classificatie gevolgd door classificatiesymbolen)

B65D

Onderzochte andere documentatie dan de minimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden)

EPO-Internal, WPI Data

C. VAN BELANG GEACHTE DOCUMENTEN

Categorie	Geëciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	WO 2012/038063 A1 (KRUEGER GMBH & CO KG [DE]; MAHLICH GOTTHARD [DE]) 29 maart 2012 (2012-03-29) * het gehele document *	1-30
X,D	WO 2010/115970 A1 (MITACA S R L [IT]; MACCHI EDOARDO [IT]) 14 oktober 2010 (2010-10-14) in de aanvraag genoemd * het gehele document *	1-30
X	WO 2012/122329 A1 (KRAFT FOODS R & D INC [US]; HANSEN NICHOLAS ANDREW [GB]) 13 september 2012 (2012-09-13) * het gehele document *	1-30

☐ Verdere documenten worden vermeld in het vervolg van vak C.

☒ Leden van dezelfde octrooifamilie zijn vermeld in een bijlage

* Speciale categorieën van aangehaalde documenten

"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft

"D" in de octrooiaanvraag vermeld

"E" eerdere octrooi(aanvraag), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven

"L" om andere redenen vermelde literatuur

"O" niet-schriftelijke stand van de techniek

"P" tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur

"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvraag, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding

"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur

"Y" de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geëciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht

"Z" lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid

10 mei 2017

Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type

Naam en adres van de instantie

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040
Fax: (+31-70) 340-3016

De bevoegde ambtenaar

Brochado Garganta, M

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar
de stand van de techniek

NL 2017586

In het rapport genoemd octrooigescrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
WO 2012038063	A1	29-03-2012	
		AU 2011304736 A1	02-08-2012
		CA 2753230 A1	22-03-2012
		CN 102791595 A	21-11-2012
		CN 104957994 A	07-10-2015
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		DE 102011012881 A1	22-03-2012
		DK 2516296 T3	13-10-2014
		EP 2516296 A1	31-10-2012
		EP 2801538 A1	12-11-2014
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		US 2012070551 A1	22-03-2012
		US 2015079241 A1	19-03-2015
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		CN 102448853 A	09-05-2012
		EP 2417039 A1	15-02-2012
		ES 2604665 T3	08-03-2017
		HR P20161537 T1	24-03-2017
		IT 1393936 B1	17-05-2012
		JP 5449527 B2	19-03-2014
		JP 2012523259 A	04-10-2012
		LT 2417039 T	12-12-2016
		PL 2417039 T3	28-02-2017
		RU 2011145272 A	20-05-2013
		SI 2417039 T1	31-01-2017
		US 2012031280 A1	09-02-2012
		WO 2010115970 A1	14-10-2010
WO 2012122329	A1	13-09-2012	
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		CN 103502115 A	08-01-2014
		EP 2683625 A1	15-01-2014
		ES 2561091 T3	24-02-2016
		GB 2488799 A	12-09-2012
		HK 1188194 A1	07-04-2017
		JP 2014511253 A	15-05-2014
		KR 20140010127 A	23-01-2014
		RU 2013144826 A	20-04-2015
		US 2014037803 A1	06-02-2014
		WO 2012122329 A1	13-09-2012

WRITTEN OPINION

File No. SN67980	Filing date (day/month/year) 07.10.2016	Priority date (day/month/year)	Application No. NL2017586
International Patent Classification (IPC) INV. B65D85/804			
Applicant Koninklijke Douwe Egberts B.V.			

This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the application
- ☒ Box No. VIII Certain observations on the application

	Examiner Brochado Garganta, M
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WRITTEN OPINION

Application number

NL2017586

Box No. I Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing:
 - ☐ contained in the application as filed.
 - ☐ filed together with the application in electronic form.
 - ☐ furnished subsequently for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes: Claims	2-27, 29, 30
	No: Claims	1, 28
Inventive step	Yes: Claims	
	No: Claims	1-30
Industrial applicability	Yes: Claims	1-30
	No: Claims	

2. Citations and explanations

see separate sheet

WRITTEN OPINION

Application number

NL2017586

Box No. VII Certain defects in the application

see separate sheet

Box No. VIII Certain observations on the application

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

- D1 WO 2012/038063 A1 (KRUEGER GMBH & CO KG [DE]; MAHLICH GOTTHARD [DE]) 29 maart 2012 (2012-03-29)
- D2 WO 2010/115970 A1 (MITACA S R L [IT]; MACCHI EDOARDO [IT]) 14 oktober 2010 (2010-10-14) in de aanvraag genoemd
- D3 WO 2012/122329 A1 (KRAFT FOODS R & D INC [US]; HANSEN NICHOLAS ANDREW [GB]) 13 september 2012 (2012-09-13)

2. Novelty and inventive step

D1i discloses a capsule (1) comprising a capsule body (2) having a bottom (3), a side wall, an end opposite of the bottom and a flange (5) extending outwardly from the side wall and around the open end; and a cover (6) attached to the outwardly extending flange, the cover closing off the end of the capsule body opposite of the bottom; the capsule body and the cover bounding a capsule chamber (100), the capsule chamber containing a substance (101) constituted by a mass of loose, solid particles, for the preparation of a potable beverage by extracting and/or dissolving the substance by means of supplying a fluid under pressure into the capsule, and a screen (7), permeable to water and impermeable to a predominant portion of said particles, said screen being positioned between said substance and said bottom, said screen having a centre (see claims 1, 5 and 11-13 and figures 1, 4a, 4b and 6a).

The subject-matter of claim 1 is therefore not novel.

The characterizing portion, related to the fact that the screen is provided with a plurality of passages dimensioned so that at least a fraction of the substance can pass through the passages in solid form cannot confer novelty to the claim as a part of the substance will always pass any screen or filter. Depending on the filter or on the dimension of the particles the percentage of particles that will anyway pass through the screen can be variable. In any coffee mixture there is a Gaussian distribution of the particle size and the frequency of the particles. So in any mixture some of the particles are small enough to go through any screen.

Also D2 (see 4 in figure 2) and D3 (see 16 in figure 2) define a filter or screen positioned in the bottom of the capsule, wherein the passage of some particles in the filter is inevitable. Also these documents are novelty destroying for the subject-matter of claim 1.

The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent claim 28 which therefore is also not novel.

Dependent claims 2-27 and 29-30 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements in respect of novelty and/or inventive step. Their features are already disclosed in D1-D3 (see respectively, claims 1-13; claims 1-10; claims 1-15) or they are merely standard design deviations certainly known to the skilled person.

Re Item VII

Certain defects in the international application

1. The features of claims 1-30 are not provided with reference signs placed in parentheses.

Re Item VIII

Certain observations on the application

1. Claim 1 is not clear. Depending on the dimension of the particles so are the dimensions of the passages to be understood. The scope of protection is as such not precisely defined. Moreover, the features of the screen as defined in claim 1 are rather the result to be achieved than technical features.