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(72) Inventors:
• **van Hellenberg Hubar, Rolf Wilhelmus Henricus B.**
5062 LP, Oisterwijk (NL)
• **Waldus, Bert**
8448 PH, Heerenveen (NL)

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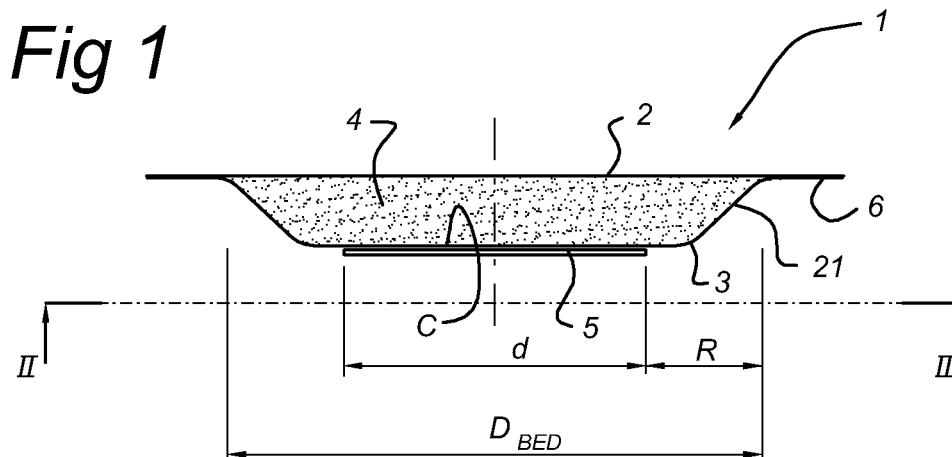
(74) Representative: **van Westenbrugge, Andries**
Nederlandsch Octrooibureau
Postbus 29720
2502 LS Den Haag (NL)

(71) Applicant: **Drie Mollen Holding B.V.**
5211 SH 's-Hertogenbosch (NL)

(54) **Coffee bag**

(57) The invention relates to a coffee bag (1) comprising: a first (2) and second (3) sheet, which are joined together while overlapping at the circumferential edges (6) in order to form a closed envelope of an inner space situated between the first (2) and second (3) sheet; and a coffee bed (4) with ground coffee that is present in the inner space.

The first and second sheet (2, 3) are water-permeable but not permeable to the ground coffee. The envelope is provided with a functional ingredient. The invention further relates to a container-bag assembly of a bag according to the invention and a bag container, to a coffee-making assembly comprising a coffee machine and a container-bag assembly; as well as to a process for manufacturing a bag according to the invention.



Description

Technical field of the invention

[0001] The present invention relates to a coffee bag that contains ground coffee and is suitable for use in a device that can make cups of coffee in a short time by extracting the contents of the coffee bag with hot water.

Background of the invention

[0002] Coffee bags that contain ground coffee and are suitable for such use are already known in the prior art, e.g. from WO 2005/072582. This international patent application also describes a coffee machine in which such a coffee bag can be extracted under a relatively low pressure. The use of said coffee bags in such coffee machines, such as the commercially available Severin® KA 5910, the Gustino® TKP3013 from Bosch® and the Senseo® from Philips®, wherein a pump-based pressure system (1-3 bar) makes it possible to ensure a brief contact time between hot water and ground coffee, offers the advantage that one or two cups of coffee can be made in a simple way and in a short space of time.

[0003] However, the quality of the coffee made in this way leaves something to be desired. This can be improved by adding a functional ingredient to the ground coffee. However, the inventors have found that the effect of the functional ingredient is disappointing, or at least leaves something to be desired.

[0004] The aim of the present invention is therefore to provide a coffee bag to which a functional ingredient with improved activity has been added.

Summary of the invention

[0005] According to the invention this aim is achieved by providing a coffee bag comprising:

- a first and second sheet, which are joined while overlapping at the circumferential edges so as to form a closed envelope of an inner space situated between the first and second sheet;
- a bed with ground coffee that is present in the inner space;

wherein the first and second sheet are water-permeable but not permeable to the ground coffee, characterized in that said envelope is provided with a functional ingredient.

[0006] By providing the functional ingredient on the envelope rather than in the coffee bed, it is prevented that the ground coffee in the coffee bed encloses and/or adsorbs the functional ingredient and hinders its leaving the bag. By providing the functional ingredient on the envelope, it is ensured that the hot water used in coffee making can readily reach and take up the functional ingredient. Furthermore, undesirable interactions between the

ground coffee and the functional ingredient are counteracted when the functional ingredient is provided on the envelope. Undesirable interactions may result in changed or decreased activity of the functional ingredient.

[0007] It is noted that from WO 2006/006112 a coffee bag is known according to the preamble of Claim 1. At the bottom, this coffee bag according to the variant from Figure 7 of this publication is provided with a turbulence generator 60. This, however, is a mechanical, constructive element, it is not a functional ingredient and neither does it deliver a functional ingredient to the coffee to be produced.

Detailed description of the invention

[0008] One aspect of the present invention therefore relates to a coffee bag comprising:

- a first and second sheet, which are joined while overlapping at the circumferential edges so as to form a closed envelope of an inner space situated between the first and second sheet;
- a coffee bed with ground coffee that is present in the inner space;

wherein the first and second sheet are water-permeable but not permeable to the ground coffee, characterized in that said envelope is provided with a functional ingredient.

It is the aim of the present invention to ensure that functional ingredients that, if included in the coffee bed, are poorly extracted when coffee is being made are still taken up to a high degree in the coffee extract. At a comparable dosage, the concentration of the functional ingredient in coffee made with the aid of the Gustino® TKP3013 coffee machine (a single cup) is preferably at least 50%, more particularly at least 80% and most preferably at least 100% higher if a coffee bag according to the invention is used than if a coffee bag is used where the functional ingredient is distributed homogeneously through the coffee bed.

[0009] According to the invention it is advantageous for the functional ingredient to be provided on the outside of the envelope. This is also understood to mean that the functional ingredient, having been applied from the outside, is absorbed in the envelope. By providing the functional ingredient on the outside, interaction of the functional ingredient with the ground coffee inside the envelope is prevented to a high degree, it is to a large extent ensured that the functional ingredient ends up in the final product (being already present on the outside, it does not have to pass through the sheet in order to leave the bag), and it is possible to apply the functional ingredient to the bag after the latter has been formed and filled with ground coffee.

[0010] According to the invention it is additionally advantageous for the functional ingredient to be provided

mainly on the second sheet of the envelope. This makes it possible to determine the moment at which the functional ingredient comes into contact with the hot water relative to the moment at which the hot water passes through the coffee bed. Depending on the properties of the functional ingredient, this may be before or after passage through the coffee bed. When the second sheet, during use, is the side of the bag where the hot water leaves the bag, this has the advantage that the envelope does not have to be permeable to the functional ingredient, which can be in dissolved or undissolved form. If the functional ingredient for example is a foaming agent, it is thus prevented that part or even all of the foam remains behind in the envelope, so that the foaming action of the foaming agent is substantially enhanced.

[0011] According to the invention, it is additionally advantageous here for the second sheet to comprise a central zone and a surrounding zone that lies around it, for the functional ingredient to be provided mainly in the central zone, and, seen in the direction in which the first and second sheet extend, for the bed to have a bed diameter that is larger than the diameter of the central zone. Relatively more hot water passes through the centre of the bag than through the peripheral zones, at any rate the hot water passing through the centre will be in more intimate contact with the ground coffee in the bag than the water passing through the peripheral zone. It is this (centre) part of the hot water where the effectiveness of the functional ingredient is relatively highest.

[0012] In addition, very many coffee bag containers commonly used in coffee machines have a bottom with a central dewatering section with one or more channels and/or discharge openings and surrounding it a peripheral zone that does not dewater. Examples from patent literature, on a chronological basis, include: US-3,610,132 (1970) Figures 6, 7 and 8 a central bottom section 72, 78 with in the middle a discharge opening 79 and channels situated between radial baffles 81; DE-74.30109 (1976) from Bosch, with in Fig. 3 a bottom with bores 102 in its central section; NL-84.03438 (1986) from Drie Mollen with a perforated plate 5 centrally in the bottom; EP-555.775 (1993) from Domel with a perforated plate 52 centrally in the bottom; EP-710.462 (1996) from IllyCaffe with a perforated plate 5A centrally in the bottom; EP-904.717 (1999) from Sara Lee/DE with in Figure 1 in a first embodiment a bottom with a central section provided with channel-formed grooves 14 and in Figure 7 in a second embodiment a bottom with a central section provided with pins 46 with a channel system 49 in between these; WO-2005/072573 (2005) from Bosch/Siemens with a central section 422 provided with pins 424 with a channel system in between them. Furthermore, it has been known already since 1985 - or earlier - to place coffee bags of filter paper filled with ground coffee in the basket - originally - intended for loose coffee in espresso machines. Examples of such baskets used as coffee bag container are shown inter alia in EP-496.688 item 10; US 5,447,631 Figs. 1-3; EP 727.164 item 4. All these baskets

(including other models not shown) have in common that the central bottom section, which is usually flat, is designed as a sieve by means of many small perforations (discharge openings) and that it is surrounded by a closed annular zone of the bottom which is usually slightly to strongly sloping. For such espresso baskets coffee bags are supplied inter alia in the form of so-called 'pods', wherein the coffee bed forms a hard, compressed mass, as well as in the form of so-called 'pads', wherein the coffee bed is a non-compressed loose mass whose shape is to some extent retained by enveloping filter paper. The central dewatering section in such coffee bag containers, too, has the effect that the effectiveness of the functional ingredient is relatively highest when this is provided mainly in the central section of the second sheet.

[0013] It is noted that, though coffee bags in practice - seen in the direction in which the sheets extend - are usually round, they can also - seen in the direction in which the sheets extend - be rectangular, square, hexagonal, octagonal or another shape. One skilled in the art will appreciate that, in the case of a non-round shape, the concept of 'diameter' should be interpreted as the dimension of the bag considered along a straight line extending through the centre of the bag and parallel to the direction in which the sheets extend.

[0014] When providing the functional ingredient mainly in the central zone of the second sheet, it is additionally advantageous according to the invention for the diameter of the central zone to be at least about 20% of the size of the bed diameter. The inventors have found that the effect of the functional ingredient is enhanced when the central zone, where the functional ingredient is mainly provided, is larger than 20% of the bed diameter. The inventors assume that when this central zone is taken to be smaller than 20%, relatively too much of the hot water passes the functional ingredient outside of said central zone. The inventors have further found that the effect of the functional ingredient is further enhanced when the diameter of said central zone is at least about 35%, such as at least about 40%, of the size of the bed diameter. The inventors assume that this has to do with the fact that application of the functional ingredient on the second sheet reduces the water permeability of said second sheet at the location of the functional ingredient, that as a result of this the hot water tends to want to pass the second sheet in the surrounding zone, and that the hot water is thus in reduced contact with the functional ingredient.

[0015] When providing the functional ingredient mainly in the central zone of the second sheet, it is additionally advantageous according to the invention when the diameter of the central zone is at most about 80%, such as at most about 70%, of the size of the bed diameter. Additionally, with reference to the previously discussed non-dewatering peripheral zones of commonly used coffee bag containers, no dewatering to the outlet of those coffee bag containers is provided at the level of the peripheral

eral area of the coffee bed below the bag. Indeed, as soon as the sheet-shaped envelope of the bag is wet, it will tend to sort of adhere to the underlying plane sections with which the respective sheet is in contact. At these 'adhesion' locations, the hot water will be hampered from leaving the coffee bag. As a result, the hot water will tend to want to pass the coffee bed through areas that overlap with places where the sheet of the bag that lies on the outlet side lies entirely or partly free. As a result, in the coffee bag containers commonly used in practice the hot water will hardly leave the coffee bed at the peripheral areas of the coffee bed, or it will not leave at all. Provision of the functional ingredient in this peripheral area is therefore less effective, and even not effective when the second sheet, during use, is the sheet situated on the outlet side of the bag.

[0016] With the aim of providing a universal coffee bag that can be applied in varying coffee bag containers commonly used, resulting in coffee of as much as possible identical quality, it is advantageous, also taking into account what has been explained in the preceding paragraph, when the diameter of the central zone is at most about 60%, such as about 50%, of the size of the bed diameter. The reason for this is that the inventors have found that the diameter of the central dewatering section of the bottom of commonly used coffee bag containers is almost always larger than 50% to 60 % of the diameter of said bottom, and that commonly used coffee bags as a rule always have dimensions that correspond to those of the bottom of the bag container for which they are meant.

[0017] According to the invention, it is additionally advantageous for the functional ingredient to be a functional ingredient that is rapidly taken up by hot water. The phrase "that is rapidly taken up by hot water" is understood to mean that the functional ingredient rapidly disperses and/or dissolves in water having a temperature of at least 80°C. Preferably at least 30 wt.%, more especially at least 60% and most preferably at least 80 wt.% of the functional ingredient is taken up if the coffee bag is used to make a cup of coffee in a Gustino® TKP3013 coffee machine or in a machine with similar extraction conditions, such as the Senseo® coffee machine or the Severin® KA 5910. The extraction conditions in said coffee machines can be summarized as follows: For 1 to 2 cups of coffee, 100 to 300 ml of water at a temperature of 70°C - 90°C is forced, in a time span of 20-60 seconds, through a coffee bag containing 6-16 grams of coffee, under a pressure, measured on the inlet side of the coffee bag, of 1-3 bar.

[0018] In practice, the extraction conditions differ for different types of coffee machine. Furthermore, coffee bags are on the market that contain slightly differing amounts of coffee. For the coffee bag as a rule a weight of about 7 grams can be used. The Severin® extraction conditions for one and two cups are, respectively: about 75°C; about 2 bar (according to the manufacturer); about 20 seconds for one cup and about 40 seconds for two

cups (according to the manufacturer); about 125 ml for one cup and about 250 ml for two cups (according to the manufacturer); 1 bag of about 7 grams for one cup and two bags of each about 7 grams for two cups. For the Senseo® these conditions for one cup and two cups are, respectively: about 80°C; about 1.5 bar (according to the manufacturer); about 25 seconds for one cup and about 40 seconds for two cups; about 120 ml for one cup and about 240 ml for two cups; 1 bag of about 7 grams for one cup and two bags of each about 7 grams for two cups. For the Gustino® these conditions for one and two cups are, respectively: about 70°C; about 2.5 bar (according to the manufacturer); about 36 seconds (according to the manufacturer) for one cup and about 48 seconds for two cups; about 125 ml for one cup and about 250 ml for two cups (according to the manufacturer); 1 bag of about 7 grams for one cup and two bags of each about 7 grams for two cups.

[0019] According to the invention, it is additionally advantageous when the first sheet and the second sheet define a first and second side, respectively, of the coffee bag and when said first and second side are made visually distinguishable. By making the first and the second side visually distinguishable, the user knows which side is which and how the coffee bag is to be placed in the bag container for correct use. A visual distinction can easily be obtained by providing the envelope with a mark. Marks on coffee bags are known as such in the state of the art. Sara Lee/DE, for instance, places the name "Senseo" on its filter paper coffee bags meant for the coffee machine based on, inter alia, EP-904.717. Furthermore, depending on the type of functional ingredient, the functional ingredient itself can also provide such a visual distinction. Taking into account that the activity of the functional ingredient will usually be most effective when the functional ingredient does not have to pass through the coffee bed, it is additionally advantageous when the first side, during use, is the inlet side of the bag and when the second side, during use, is the outlet side of the bag.

[0020] According to the invention, it is additionally advantageous for the first side to be mainly flat and, seen from the outside of the bag, for the second side to have a curved or, in other words, convex-like appearance. In this way, inter alia, a visual distinction is simply provided between the first and the second side.

[0021] The coffee bag according to the present invention is particularly suitable for improvement of the quality of so-called 1 to 2 portion bags. It is therefore additionally advantageous when the coffee bed has a weight between 5 and 20 grams, more in particular 6 to 8 grams or 12 to 16 grams. A commonly used weight for the coffee bed for a single portion of coffee is about 7 grams, and for two portions or a double portion this weight is about 14 grams.

[0022] According to the invention, the functional ingredient can simply be applied as a coating. The coating can be applied in various manners, such as by sprinkling, spraying, spreading by means of spreading means, print-

ing techniques, etc. The coating can be applied on the envelope after the latter has been formed and filled, but the coating can also have been applied prior to the forming and filling of the envelope on a sheet or strip of sheet material, from which the later sheet for the envelope is obtained. The first and second sheet can be made of a material chosen from the group consisting of paper, textiles and combinations thereof. Filter paper has the major advantage that it is cheap and easy to process.

[0023] In the case of a functional ingredient that is only slowly taken up in hot water if it is distributed through the coffee bed, the invention has the major advantage that its provision on the envelope ensures to a high degree that this functional ingredient still ends up in the product that eventually results, the cup of coffee. This advantage will be present in particular when the functional ingredient is provided on the outside and outlet side of the coffee bag, but may also be present when the functional ingredient is provided on the inlet side of the coffee bag. If the functional ingredient is poorly taken up in hot water or if the functional ingredient, after having been taken up in water, passes the envelope with difficulty, it may be particularly advantageous if the functional ingredient is provided on the outside and outlet side of the coffee bag.

[0024] The advantages of the present invention are particularly evident if the functional ingredient is poorly soluble in hot water. "Poorly soluble" is understood to mean that if 1 gram of the functional ingredient is added with a spoon to a glass previously filled with 150 ml of water at a temperature of 80°C, not more than 50% of the functional ingredient has dissolved after 2 minutes under static conditions, that is without stirring.

[0025] The present invention also brings within reach the use of a functional ingredient to which the envelope, after that functional ingredient has been taken up in water, has a low degree of permeability or is even non-permeable. "A low degree of permeability" is understood to mean that, if the amount of the functional ingredient present on the envelope is taken up in 150 ml of water at a temperature of 80°C, the envelope is less than 50%, preferably less than 30% permeable to the functional ingredient, if the resulting aqueous mixture is allowed to pass under the effect of gravity through one sheet of the envelope.

[0026] According to the invention the functional ingredient may comprise, inter alia:

- one or more milk components; and/or
- an effervescent agent; and/or
- egg white; and/or
- an aroma; and/or
- a thickening agent; and/or
- a colorant, for example to colour the foam or to colour the coffee extract; and/or
- an emulsifier; and/or
- fat; and/or
- combinations of the above.

[0027] Especially preferred is a functional ingredient chosen from the group consisting of milk components, egg white, fat, effervescent agent, emulsifier and combinations of these ingredients. An example of a milk component that can advantageously be applied as milk component is lactose-free whey powder, optionally supplemented with additional ingredients such as fat and emulsifier.

[0028] According to a particularly preferred embodiment of the invention, the functional ingredient is an effervescent agent. Egg whites, fat and/or emulsifiers can advantageously be employed as foaming agent. The term "foaming agent" denotes functional ingredients that enhance foam formation and/or stabilize formed foam.

[0029] The term "effervescent agent" refers to ingredients that form gas in contact with hot water and can thus contribute to foam formation. In addition, an effervescent agent can advantageously be combined with another functional ingredient since the effervescent action upon contact with water will contribute to this other ingredient being rapidly dispersed in the water, as a result of which it will more rapidly be taken up in the coffee made with the aid of the present coffee bag. As effervescent agent use can be made of compounds that decompose in the presence of water, with a gaseous decomposition product being formed. It is also possible to apply a mixture of compounds that react with each other in the presence of water to form a gaseous reaction product. The gas generated by the effervescent agent is preferably carbon dioxide, nitrogen, oxygen or a combination of one or more of these gases. Most preference is given to an effervescent agent that produces carbon dioxide gas under the influence of hot water. An example of effervescent agents that can advantageously be applied are mixtures of bicarbonate and water-soluble acid.

[0030] As emulsifier preferably an oil-in-water emulsifier is employed, that is an emulsifier that promotes the formation of an oil-in-water emulsion. Examples of emulsifiers that are advantageously employed as functional ingredient are: phospholipids, monoglycerides, diglycerides, esters of food acids and monoglycerides, esters of food acids and diglycerides and combinations hereof. Preferably, a phospholipid, monoglyceride, diglyceride or a mixture hereof is used as emulsifier.

[0031] The use of fat as functional ingredient has the advantage that the mouth feel and/or the foaming behaviour of the coffee made with the present coffee bag can be improved. As fat use can be made of a fat that is liquid at room temperature or a fat that is solid at room temperature. Preferably, a fat is applied that is solid at 20°C, more in particular a fat that contains at least 5%, most preferably at least 10% solid fat at that temperature.

[0032] The present invention also comprises the use of a mixture of two, three or more different functional ingredients. Preferably, these mixtures of functional ingredients are homogeneously mixed. Besides the one or more functional ingredients, the envelope can be provided with, for instance, a carrier material. The composition

containing one or more functional ingredients that is applied on the envelope preferably consists to at least 10 wt.%, more in particular to at least 30 wt.% and most preferably to at least 50 wt.% of one or more functional ingredients. With particular preference, the last-mentioned composition consists exclusively of materials that according to the EC directives are allowed for use in food, and in particular for use in coffee.

[0033] A particularly preferred embodiment of the present invention concerns a coffee bag of which the envelope is provided with a mixture of fat and egg white. When use is made of a suitable amount of fat and egg white, such a coffee bag can be used to obtain a coffee that in terms of appearance and taste is comparable to, for instance, "coffee with milk" or cappuccino. For optimal taste, it is preferred to use butter fat as functional ingredient. In addition, as egg white use is preferably made of a dairy egg white, more in particular whey egg white. Besides fat and egg white, emulsifier is advantageously applied as additional functional ingredient on the envelope. Preferably, use is made of mono- and/or diglycerides or an ester thereof.

[0034] Special preference is further given to a coffee bag of which the envelope is provided with a mixture of a foaming agent and fat, more in particular of a mixture of foaming agent, fat and emulsifier. When applying the foaming agent to the envelope, it is preferred not to use water as this will lead to premature gas formation. By dispersing the effervescent agent in fat, the resulting mixture can simply be applied around the envelope and be fixed, in particular when use is made of a dispersion of the foaming agent in melted fat and this fat solidifies at room temperature. The action of the effervescent agent will cause the fat to rapidly disperse upon contact with water. The rate at which the fat and the effervescent agent are dispersed can be improved even further by also applying an emulsifier, in particular an oil-in-water emulsifier, on the envelope besides the fat and the foaming agent.

[0035] According to a preferred embodiment the envelope of the present coffee bag is provided with the functional ingredient by applying an aqueous dispersion or solution of the functional ingredient on the envelope and subsequently removing the water, preferably by means of drying.

[0036] According to another preferred embodiment, the envelope of the present coffee bag is provided with the functional ingredient by applying a liquid lipophilic substance on the envelope. This lipophilic substance preferably contains at least 20 wt.%, more in particular at least 40 wt.% of a lipid chosen from the group consisting of fat and emulsifiers. In addition, the lipophilic substance preferably contains a water-soluble effervescent agent. Preferably, this water-soluble effervescent agent is homogeneously dispersed in a lipid phase. This lipid phase preferably contains a mixture of fat and emulsifier, in particular an oil-in-water emulsifier.

[0037] According to a further aspect, the invention re-

lates to a container-bag assembly for use in a coffee machine for the preparation of coffee, comprising a bag container and a coffee bag according to the invention, in particular according to any one of Claims 1-23; wherein the bag container comprises a bottom; where the coffee bag rests on said bottom with the second sheet; wherein said bottom has a central drainage zone with at least a recess where the second sheet lies free from the bottom to allow coffee extract to flow out of the coffee bag; wherein said bottom has an annular zone that extends around the drainage zone and that is designed so that the second sheet, when the second sheet is moist during use, contacts the bottom along the annular zone; and wherein the second sheet, in particular the part of the second sheet that overlaps with the drainage zone, is provided with said functional ingredient. The advantages hereof have already been explained previously.

[0038] For reasons that have likewise been explained previously, it is advantageous here when the functional ingredient is provided mainly in the part of the second sheet that overlaps with the drainage zone.

[0039] With the container-bag assembly according to the invention it is additionally advantageous when, during use, with the aid of the coffee machine hot water is supplied under pressure to the side of the first sheet in the bag container so that it is forced from the first sheet through the bag for extraction of the ground coffee present in the bag and the coffee that is formed flows out of the coffee bag at the second sheet and wherein the functional ingredient is taken up in the outgoing flow.

[0040] According to the invention, it is additionally advantageous when the coffee machine is designed to supply the hot water under such a pressure that the pressure in the outlet of the supply line is higher than 0.5 bar, in particular 1 bar or higher. The inventors have found that, in particular in systems in which water is forced through the coffee bed under effectively applied pressure and hence in a relatively short time - as a rule within 10-30 seconds -, functional ingredients provided in the coffee bed come out of the coffee bed less well. This problem has been identified in particular at lower pressures, that is to say a pressure in the outlet that is lower than 3 bar. However, also in espresso systems, wherein pressures of normally 7-15 bar are used, the present invention offers major opportunities for improvement of the resulting product, the cup of coffee. The invention therefore also relates to systems where the pressure in the outlet is higher than 6 bar.

[0041] According to yet a further aspect, the invention relates to a coffee-making assembly comprising:

- a coffee machine; and
- a coffee bag according to the invention, in particular according to one of the preceding Claims 1-23,

wherein the coffee machine comprises a container that has a first side and an opposite second side, between which the bag can be inserted; wherein the first side of

the container is provided with an outlet of a supply for hot water and wherein the second side of the container is provided with a discharge for discharging coffee formed in the container; wherein the coffee machine is designed in such a way that hot water under pressure is supplied to the first side of the container during use, as a result of which said supplied hot water is forced through the bag in order to extract the ground coffee present in the bag and coffee thus formed flows out of the container via the discharge. The advantages hereof have already been explained previously.

[0042] For reasons that have likewise already been explained previously, the coffee machine is advantageously set up for the introduction of the hot water under such a pressure that the pressure in the outlet of the supply is higher than 0.5 bar, in particular 1 bar or higher. In particular, the pressure in the outlet will be lower than 3 bar, but also when espresso machines are used, that is when the pressure in the outlet is higher than 5 bar, in particular 7 to 15 bar, the quality of the resulting product can be improved substantially according to the invention.

[0043] In the coffee-making assembly according to the invention, in particular the first side of the container will be the top side of the container and the second side of the container will be the bottom side of the container.

[0044] According to yet another aspect, the invention relates to a process for manufacturing a coffee bag according to the invention, wherein a liquid that contains the functional ingredient is applied on the second sheet, or is at any rate applied on a sheet-like material from which the second sheet is formed, and is subsequently allowed to dry in. In particular, the liquid here is an aqueous suspension.

Detailed description of an embodiment of the invention

[0045] Below, the present invention will be elucidated with reference to an example schematically represented in the drawing. In this drawing:

Figure 1 schematically shows a cross section of a coffee bag according to the invention;

Figure 2, corresponding to arrow II in Figure 1, shows a schematic view of the bottom side of the coffee bag from Figure 1;

Figure 3, corresponding to arrow III in Figure 4, shows a schematic view of the top side of coffee bag container;

Figure 4 shows the same coffee bag container as in Figure 3, but now in cross section with at some distance above it the coffee bag from Figures 1 and 2; Figure 5 shows a strongly schematized representation of a coffee-making assembly according to the invention; and

Figure 6 schematically shows a cross section of a further coffee bag according to the invention.

[0046] Figures 1 and 2 show a coffee bag 1 according to the invention. This coffee bag has a first sheet 2 on the top side and a second sheet 3 on the bottom side. These sheets 2 and 3 are joined together at their circumferential edge by a sealed joint 6 to form a closed envelope with an inner space in it. In the inner space, a coffee bed 4 with ground coffee is present. As such, components other than just ground coffee may also be present in the coffee bed.

[0047] The sheets 2 and 3 are both permeable to water but not permeable to the ground coffee. The sheets 2 and 3 can be made of essentially any material having these properties. These materials in any case include paper and textiles. In practice, such coffee bags have so far been made of filter paper. Filter paper has since a very long time proven to be a suitable filter material in the preparation of coffee and is relatively cheap and easy to process. For this reason, the sheets 2 and 3 are made in particular of filter paper.

[0048] The filter bag shown in Figures 1 and 2 is a one-portion coffee bag. Depending on the coffee blend and the desired strength, the bag will normally contain about 7 grams of ground coffee for a 125-175 ml portion of normal coffee. For espresso coffee, cappuccino coffee, et cetera, the portions may have a different size and the number of grams of ground coffee may be different. In addition, the coffee bag may be suitable for a bigger, for instance double, amount of coffee per portion or for two portions. This, too, will give rise to different weights for the coffee bed. Based on one to two portions and taking into account different types of coffee, the weight of coffee in the coffee bag will generally lie in the range from about 5 grams up to and including about 20 grams.

[0049] Such coffee bags for one to two portions are in practice also known under the names of pouch, pad or pod.

[0050] In accordance with the invention, the envelope 2, 3 of the coffee bag 1 is provided with a functional ingredient. In Figures 1 and 2, this functional ingredient is schematically indicated as a layer 5 so as to illustrate the invention. Depending on the type of functional ingredient, in practice it may be barely visible to the naked eye to not visible or visible.

[0051] In accordance with the invention, the functional ingredient is in particular provided externally on the envelope, that is provided on, from, the outside of the envelope. Externally is understood to mean 'applied on' the outside of a sheet 2, 3 of the envelope, as suggested by means of layer 5 shown by way of illustration in Figure 1, as well as 'incorporated in' a sheet 2, 3 of the envelope, such as for instance absorbed or adsorbed. According to the invention, externally may here be fully 'applied on', or fully 'incorporated in', or a combination of 'applied on' and 'incorporated in'. 'Applied on' has the advantage that the functional ingredient is completely separated from the coffee bed up to use, and that, particularly when it is provided on the bag's outlet side, the functional ingredient can easily be released well and fully from the bag

and end up in the cup. 'Incorporated in' has the advantage that the functional ingredient is better protected against premature release from the bag, such as might for instance occur during transport due to mechanical influences in the case of 'applied on', that it can come into more intimate contact with the hot water because in the case of 'applied on' the sheet has an increased tendency to retain the functional ingredient, that release from the sheet, particularly when it is provided on the outlet side of the bag, is assured to a high degree because the functional ingredient has been applied from the outside and therefore will again want to be released in the direction of the outside. 'Applied on' in combination with 'incorporated in' has the advantage that it is thus possible to provide more functional ingredient per square cm of sheet area on the coffee bag. Furthermore, the properties of the filter paper will usually ensure that the functional ingredient is automatically readily incorporated in the filter paper if this functional ingredient is 'applied on'. It is possible to take additional measures to prevent this, but this is generally not necessary.

[0052] Referring to Figures 1 and 2, it can further be seen that the coffee bed has a diameter D_{BED} , which essentially coincides with the inner edge of the sealed joint 6. Furthermore, in the embodiment of the invention shown in Figures 1 and 2 the functional ingredient is provided in a central zone C of the second sheet 3, which central zone has a diameter d . This central zone C of the second sheet is surrounded by a surrounding zone 21 of the second sheet that lies around it. This surrounding zone 21 has an annular shape and extends across R from the external edge of the central zone C to the external edge of the coffee bed 4, which here coincides with the internal edge of the sealed joint 6. Seen in the horizontal direction of drawing according to Figure 1, the following then holds for the width R of the surrounding zone 21: $R = (D_{BED} - d) / 2$. Due to the curvature of sheet 2, the width measured along sheet 2 will be larger than R .

[0053] In the coffee bag according to Figures 1 and 2 the upper, first sheet 2 is flat in design. This has the advantage that the difference between the first sheet 2 and second sheet 3 is immediately perceivable and thus one knows, optionally after consulting directions for use, which sheet is the outlet sheet of the bag through which the water is to leave the bag if it is used correctly and which sheet is the inlet sheet via which the water is to be supplied to the bag. It is noted, however, that it is quite possible for the coffee bag according to the invention to have a first sheet 2 whose shape is about the same as the shape of the second sheet 3 but whose position will mirror that of the second sheet 3. The possibility of distinguishing between the first sheet and the second sheet of the bag can then be realized by means of a visually perceivable mark, such as an imprinted or impressed sign, a relief pattern or the use of a first sheet and a second sheet with different textures.

[0054] Figure 3 shows a cross section of an example of a bag container for a container-bag assembly accord-

ing to the invention and Figure 4 shows this container-bag assembly in cross section, but with the coffee bag suspended above the bag container rather than lying in it.

[0055] The bag container 7 is internally dish-shaped with a dish bottom 8, 9 and 10. The shape of the dish bottom corresponds to the shape of the sheet that lies on the outlet side of the bag, here the second sheet 3. The dimensions of the sheet 3 on the outlet side of the bag and the dish bottom 8, 9, and 10 will also correspond. However, correspond is not understood to mean that they must be exactly the same. As regards the shape it is for instance noted that the shape of a coffee bed that is not compressed can be adapted, or in other words the bed is not fully dimensionally stable. Furthermore, it will be clear that for instance the width of the sealed joint 6 can be slightly smaller than the width of the corresponding part 8 of the bottom; and that also the dimensions of the sheet 3 can be somewhat smaller than that of the dish bottom so as to make it possible to easily insert the coffee bag in the dish.

[0056] The dish bottom of the bag container 7 has an outer annular zone 8 and centrally a drainage zone 10. The drainage zone 10 forms a dewatering section where the hot water can first leave the bag and subsequently leave the bag container. The drainage zone 10 centrally has a discharge opening 12 for discharging coffee formed from the bag container 7. Around it there is a recessed bottom area 22, which preferably is set up to dewater in the direction of the discharge opening 12. In this bottom area 22 upright projections 11 are provided. In the example shown these are four radial ribs, but there may also be more or fewer of these ribs. The projections may also be pins, as for instance known from EP 904.717 Figures 7-10. The projections 11 ensure that the sheet 3 lies free from the bottom area 22 here so that the hot water can leave the bag without being hampered.

[0057] Around the drainage zone 10 lies an annular zone 9 that is designed in such a way that the second sheet 3 contacts this zone when the bag is in the bag container. This contact will be more intimate when the second sheet is moistened. To some extent depending on the flatness of the annular zone 9, a seal can then be formed since the second sheet 3 here as it were adheres to the annular zone 9. In this annular zone 9 no hot water will come from the bag, or at any rate considerably less than in the drainage zone. The contact and adhesion of the second sheet 3 to the annular zone 9 counteract this here.

[0058] In Figure 4 it can be seen that the diameter (d in Figures 1 and 2) of the central zone 5 with the functional ingredient is smaller than the diameter of the drainage zone 10. Thus it is ensured that no functional ingredient is present at the location of the annular zone 9, where its release from the bag would be hampered since here no or little water leaves the bag. As such, the diameter d of the central zone 5 may also be equal to the diameter of the drainage zone 10. In practice, the diameter d will be chosen in such a way that the bag can be applied with a

range of different bag containers in such a way that the central zone 5 as much as possible fits within all drainage zones of those different bag containers. In this respect, practice teaches that with most bag containers the drainage zone has a diameter that covers at least about 50 to 60% of the diameter of the coffee bed of the coffee bag to be used with that respective bag container. It follows that for universal applicability with different bag containers (for otherwise approximately similarly dimensioned bags) the diameter of the central zone provided with functional ingredient is at most about 60% of the diameter of the coffee bed.

[0059] In practice, a coffee bag as depicted in Figures 1, 2 and 6, for one portion of coffee will generally contain 6 to 8 grams of ground coffee, as a rule about 7 grams of ground coffee, and have a bed diameter D_{BED} of 60 to 65 mm, such as 62-63 mm.

[0060] Figure 5 very schematically shows a coffee-making assembly according to the invention. This coffee-making assembly comprises a container-bag assembly 7, 1 according to the invention with a coffee bag 1 according to the invention. The coffee-making assembly further comprises a coffee machine 30. The coffee machine 30 has a container 14, 7 in between which the coffee bag 1 can be inserted. The container here consists of a first part 14 and a second part 7, which is formed by the bag container 7. To the first part 14 of the container a supply line 16 for hot water is connected. This supply line has an outlet 15 via which the hot water arrives at the bag 1. The first part 14 and second part 7 together form, during use, a closed brewing chamber in which the bag 1 is present. The hot water comes from a water reservoir 19 or directly from the water mains and is heated by heating means 18 to a desired temperature and pumped by pump 17 under a pressure so that the pressure in the outlet 15 lies between 0.5 and 3 bar (measured as excess pressure relative to the atmospheric pressure). The hot water is then forced through the bag to form coffee in the bag and to also entrain functional ingredient when leaving the bag. Via discharge 12 of the second part of the container the product formed subsequently ends up in a cup.

[0061] Figure 6 shows a further coffee bag 101 according to the invention. For the coffee bag 101, the same reference numerals are used for corresponding parts as for the coffee bag 1, but in figure 6 these have been increased by 100.

[0062] This coffee bag 101, in contrast with the coffee bag 1 shown in Figure 1, is convex on both sides. It is noted, however, that the coffee bag 1 shown in Figure 1 may just as well be convex on two sides and that the coffee bag shown in Figure 6 may likewise have a flat top sheet, as shown in Figure 1. The coffee bed diameter D_{BED} and the coffee bed thickness of the coffee bag 101 will be about the same when they have to fit in the same coffee machine.

[0063] Figure 6 additionally shows that the envelope, in this case the second sheet 103 (but this could also be

the first sheet 102), is provided with a relief pattern with lowered sections 201, 203 and raised sections 202. The functional ingredient 105 is here situated mainly in the lowered sections and for at least a part on the second sheet 103. This has the advantage that the functional ingredient 105 is protected against mechanical effects by its lower location and is better retained in its place. The relief pattern may for instance be a circular impression in the sheet 103, which is for instance made of filter paper. This may be a large circular impression, which for instance covers 40% to 60% of the coffee bed diameter. In view of the sturdiness of the coffee bag and the protective action against mechanical influences, however, it is advantageous to design the relief pattern with several lowered sections. This may for instance be the annular lowered section 201 shown in Figure 6 with centrally a circular lowered section 203.

EXAMPLES

Example 1

[0064] Coffee bags of the type Gala® Regular (a mixture of 90% Arabica and 10% Robusta) containing 7 grams of ground coffee were prepared as follows:

Coffee bag A: A homogeneous 1:1 mixture of Hiprotal® 580 (whey egg white product from Borculo Domo®) and melted butter oil was added to the ground coffee and homogeneously distributed through it. The resulting mixture was then incorporated in the coffee bag. Per coffee bag 0.3 gram of the egg white/fat mixture was added.

Coffee bag B: On the bottom of an otherwise unchanged coffee bag 0.3 gram of the 1:1 mixture of Hiprotal® 580 and melted butter oil was applied.

[0065] With the aid of these coffee bags A and B each time one cup of coffee was made in a Senseo® coffee machine. The coffee was collected in a glass mug and subsequently evaluated for appearance and taste. It was found that the coffee obtained with coffee bag B showed great resemblance to cappuccino in terms of appearance and taste. In particular, this product had an attractive, large foam layer and the coffee was light-coloured, as is cappuccino. The height of the foam layer of the coffee obtained with the aid of coffee bag A, on the other hand, was considerably lower and the coffee was much darker.

Example 2

[0066] Coffee bags of the type Gala® Regular (a mixture of 90% Arabica and 10% Robusta) containing 7 grams of ground coffee were prepared as follows:

Coffee bag A: A hazelnut aroma in powder form was mixed homogeneously with the ground coffee before being incorporated in the coffee bag. Per coffee bag 0.15 gram of aroma was added.

Coffee bag B: A homogeneous 1:1 mixture of the hazelnut aroma and refined olive oil was added to the ground coffee and homogeneously distributed through it. The resulting mixture was then incorporated in the coffee bag. Per coffee bag 0.3 gram of the egg white/fat mixture was added.

Coffee bag C: On the bottom of an otherwise unchanged coffee bag 0.3 gram of the 1:1 mixture of hazelnut aroma and olive oil was applied.

[0067] With the aid of these coffee bags A, B and C in each case one cup of coffee was made in a Senseo® coffee machine. The coffee was subsequently evaluated in terms of its taste. It was found that the coffee obtained with coffee bag C possessed the most pleasant taste. The taste of the coffee obtained with coffee bag A was less appreciated and the coffee obtained with coffee bag B scored lowest in this test.

Claims

1. Coffee bag (1) comprising:

- a first (2) and second (3) sheet, which are joined while overlapping at the circumferential edges (6) so as to form a closed envelope of an inner space situated between the first (2) and second (3) sheet;
- a coffee bed (4) with ground coffee that is present in the inner space;

wherein the first and second sheet (2, 3) are water-permeable but not permeable to the ground coffee, **characterized in that** said envelope is provided with a functional ingredient.

2. Coffee bag (1) according to Claim 1, wherein the functional ingredient is provided on the outside of the envelope.

3. Coffee bag (1) according to one of the preceding claims, wherein the functional ingredient is provided mainly on the second sheet (3) of the envelope.

4. Coffee bag (1) according to Claim 3, wherein the second sheet (3) comprises a central zone (5) and a surrounding zone (21) that lies around it, wherein the functional ingredient is provided mainly in the central zone (5), and wherein, seen in the direction

in which the first and second sheet (2, 3) extend, the bed (4) has a bed diameter (D_{BED}) that is larger than the diameter (d) of the central zone (5).

5. Coffee bag (1) according to Claim 4, wherein the diameter (d) of the central zone (5) is at least about 20% of the size of the bed diameter (D_{BED}).

6. Coffee bag (1) according to Claim 5, wherein the diameter (d) of the central zone (5) is at least about 35%, such as at least about 40%, of the size of the bed diameter (D_{BED}).

7. Coffee bag (1) according to any one of Claims 4-6, wherein the diameter (d) of the central zone (5) is at most about 80%, such as at most about 70%, of the size of the bed diameter (D_{BED}).

8. Coffee bag (1) according to Claim 7, wherein the diameter (d) of the central zone (5) is at most about 60%, such as at most about 50%, of the size of the bed diameter (D_{BED}).

9. Coffee bag according to any one of the preceding claims, wherein the envelope, in particular the second sheet thereof, is provided with a relief pattern and wherein said functional ingredient (105) is present in the lowered sections (201) of the relief pattern on the envelope.

10. Coffee bag according to any one of the preceding claims, wherein the functional ingredient is a functional ingredient that is rapidly taken up by hot water.

11. Coffee bag (1) according to any one of the preceding claims, wherein the first sheet (2) and the second sheet (3) define a first (2) and second (3) side, respectively, of the coffee bag (1) and wherein said first (2) and second (3) side are made visually distinguishable.

12. Coffee bag (1) according to Claim 11, wherein the first side (2), during use, is the inlet side of the bag (1) and wherein the second side (3), during use, is the outlet side of the bag (1).

13. Coffee bag (1) according to any one of Claims 4-12, wherein the first side (2) is mainly flat and wherein, seen from the outside of the bag (1), the second side (3) has a convex appearance.

14. Coffee bag (1) according to any one of the preceding claims, wherein the weight of the coffee bed (4) lies between 5 and 20 grams, more in particular 6 to 8 grams or 12 to 16 grams.

15. Coffee bag (1) according to any one of the preceding claims, wherein the functional ingredient is applied

as a coating, in particular an external coating, on the envelope.

16. Coffee bag (1) according to any one of the preceding claims, wherein the first and/or the second sheet (2, 3) are made of filter paper.
17. Coffee bag (1) according to any one of the preceding claims, wherein the functional ingredient is poorly soluble in water.
18. Coffee bag (1) according to any one of the preceding claims, wherein the functional ingredient is an ingredient to which, after said functional ingredient has been taken up in water, the envelope is to a limited extent permeable.
19. Coffee bag (1) according to any one of the preceding claims, wherein the functional ingredient comprises milk components.
20. Coffee bag (1) according to any one of the preceding claims, wherein the functional ingredient comprises a foaming agent.
21. Coffee bag (1) according to any one of the preceding claims, wherein the functional ingredient comprises egg white.
22. Coffee bag (1) according to any one of the preceding claims, wherein the functional ingredient comprises fat and/or emulsifier.
23. Coffee bag (1) according to any one of the preceding claims, wherein the functional ingredient comprises an effervescent agent.
24. Container-bag assembly (1, 7) for use in a coffee machine (30) for the preparation of coffee, comprising a bag container (7) and a coffee bag (1) according to any one of the preceding claims; wherein the bag container (7) comprises a bottom (8, 9, 10); wherein the coffee bag (1) lies on said bottom (8, 9, 10) with the second sheet (3); wherein said bottom has a central drainage zone (10) with at least a recess (13) where the second sheet (3) lies free from the bottom (10) to allow coffee extract to flow from the coffee bag (1); wherein said bottom has an annular zone (9) that extends around the drainage zone (10) and that is designed in such a way that the second sheet (3), when the second sheet (3) is moist during use, contacts the bottom along the annular zone (9); and wherein the second sheet (3), in particular the part of the second sheet (3) overlapping with the drainage zone (10), is provided with said functional ingredient.
25. Assembly (1, 7) according to Claim 24, wherein the

functional ingredient is mainly provided in the part of the second sheet (2) that overlaps with the drainage zone (10).

26. Assembly (1, 7) according to Claim 24 or 25, wherein, during use, with the aid of the coffee machine (30) hot water under pressure is supplied to the side of the first sheet (2) in the bag container (7) so that it is forced from the first sheet (2) through the bag (1) for extraction of ground coffee present in the bag (1) and the coffee that is formed flows out of the coffee bag (1) at the second sheet (3) and wherein the functional ingredient is taken up in the outgoing flow.
27. Assembly (1, 7) according to Claim 26, wherein said pressure on the side of the first sheet (2) is higher than 0.5 bar, such as 1 to 3 bar.
28. Assembly (1, 7) according to Claim 27, wherein said pressure on the side of the first sheet (2) is 7 to 15 bar.
29. Coffee-making assembly comprising:
 - a coffee machine (30); and
 - a coffee bag (1) according to any one of the preceding Claims 1-22,
 wherein the coffee machine (30) comprises a container (7, 14) that has a first side (14) and an opposite second side (7), between which the bag (1) can be inserted; wherein the first side (14) of the container is provided with an outlet (15) of a supply (16) for hot water and wherein the second side (7) of the container is provided with a discharge (12) for discharging coffee formed in the container; wherein the coffee machine (30) is designed in such a way that hot water under pressure is supplied to the first side (14) of the container during use, as a result of which said supplied hot water is forced through the bag (1) in order to extract the ground coffee present in the bag and coffee thus formed flows out of the container via the discharge (12).
30. Assembly according to Claim 29, wherein the coffee machine (30) is designed to supply the hot water under such a pressure that the pressure in the outlet (15) of the supply (16) is higher than 0.5 bar, in particular 1 bar or higher.
31. Assembly according to Claim 30, wherein the pressure in the outlet (15) is lower than 3 bar.
32. Assembly according to Claim 30, wherein the pressure in the outlet (15) is higher than 5 bar.
33. Assembly according to any one of Claims 29-32, wherein the first side (14) of the container is the top side of the container and the second side (7) of the

container is the bottom side of the container.

- 34.** Process for manufacturing a coffee bag (1) according to any one of Claims 1-23,
wherein a liquid that contains the functional ingredient is applied on the second sheet, or at least is applied on a sheet-like material from which the second sheet is formed, and is subsequently allowed to dry in.
- 35.** Process according to Claim 34, wherein the liquid is an aqueous suspension.

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Fig 1

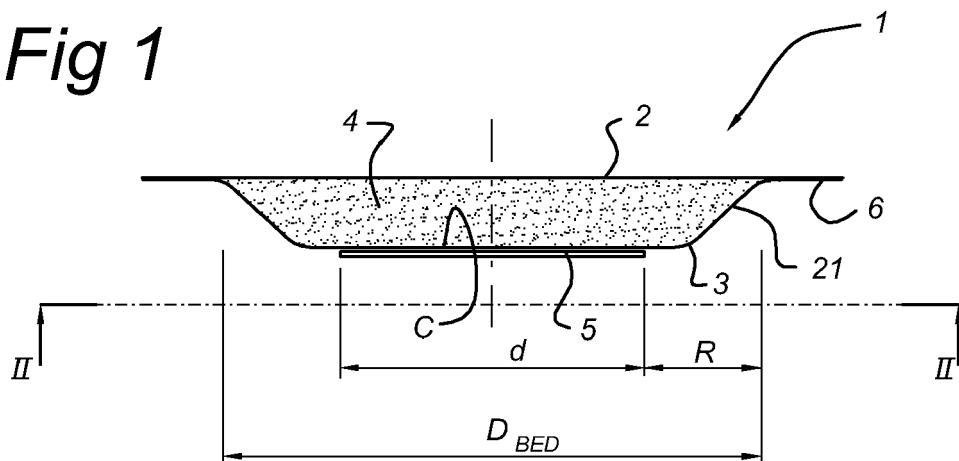


Fig 2

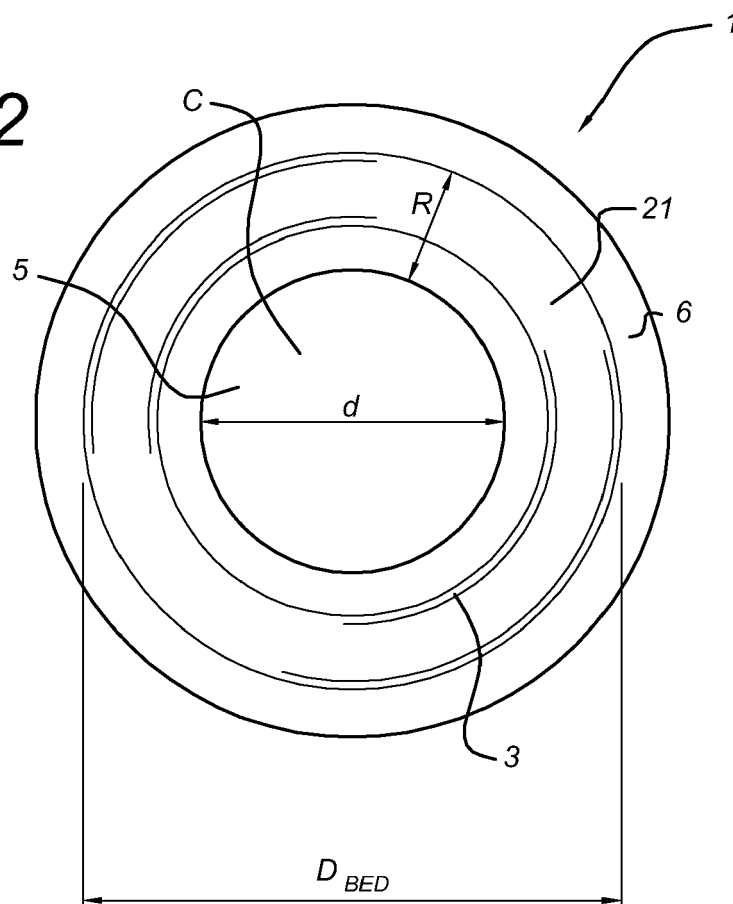


Fig 3

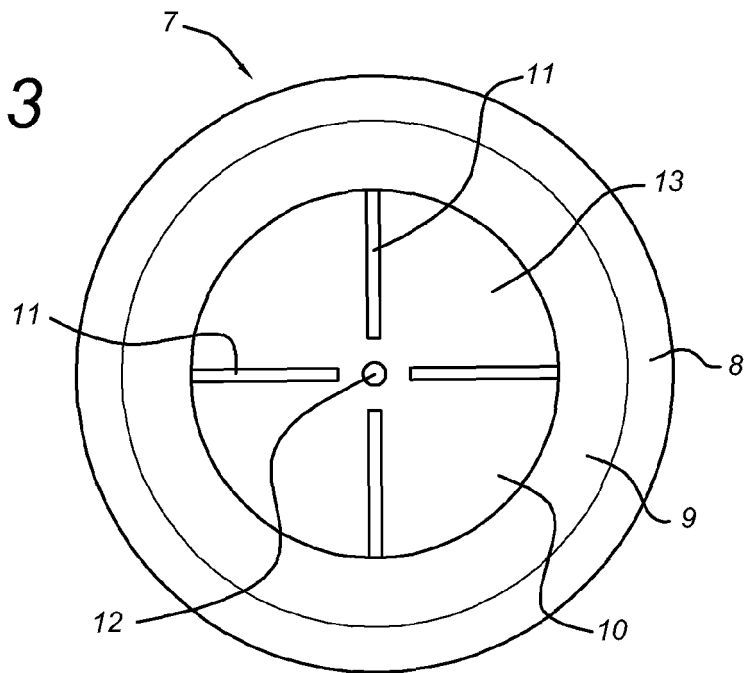


Fig 4

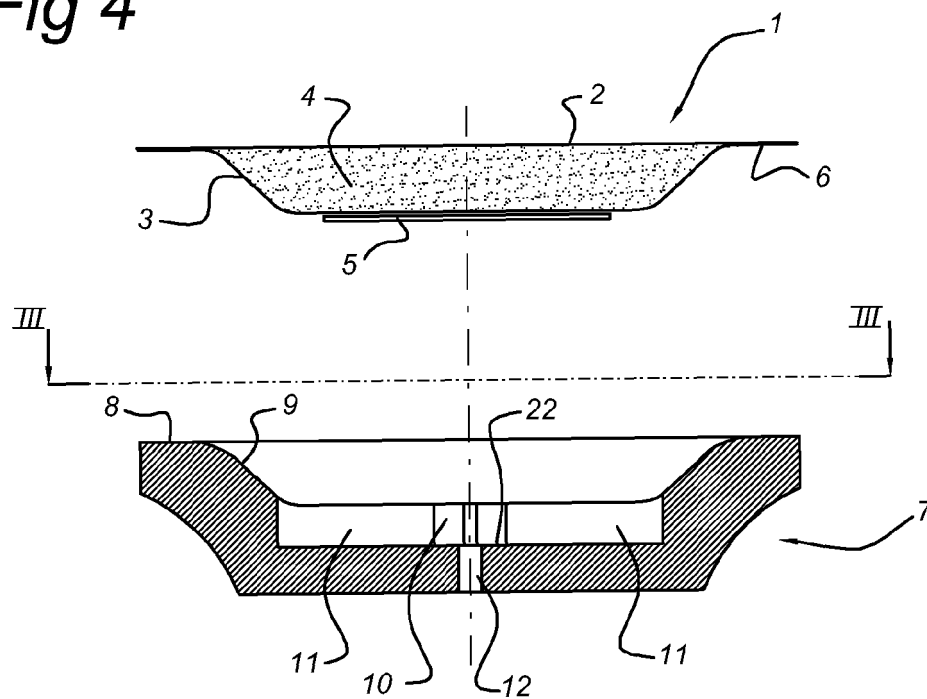


Fig 5

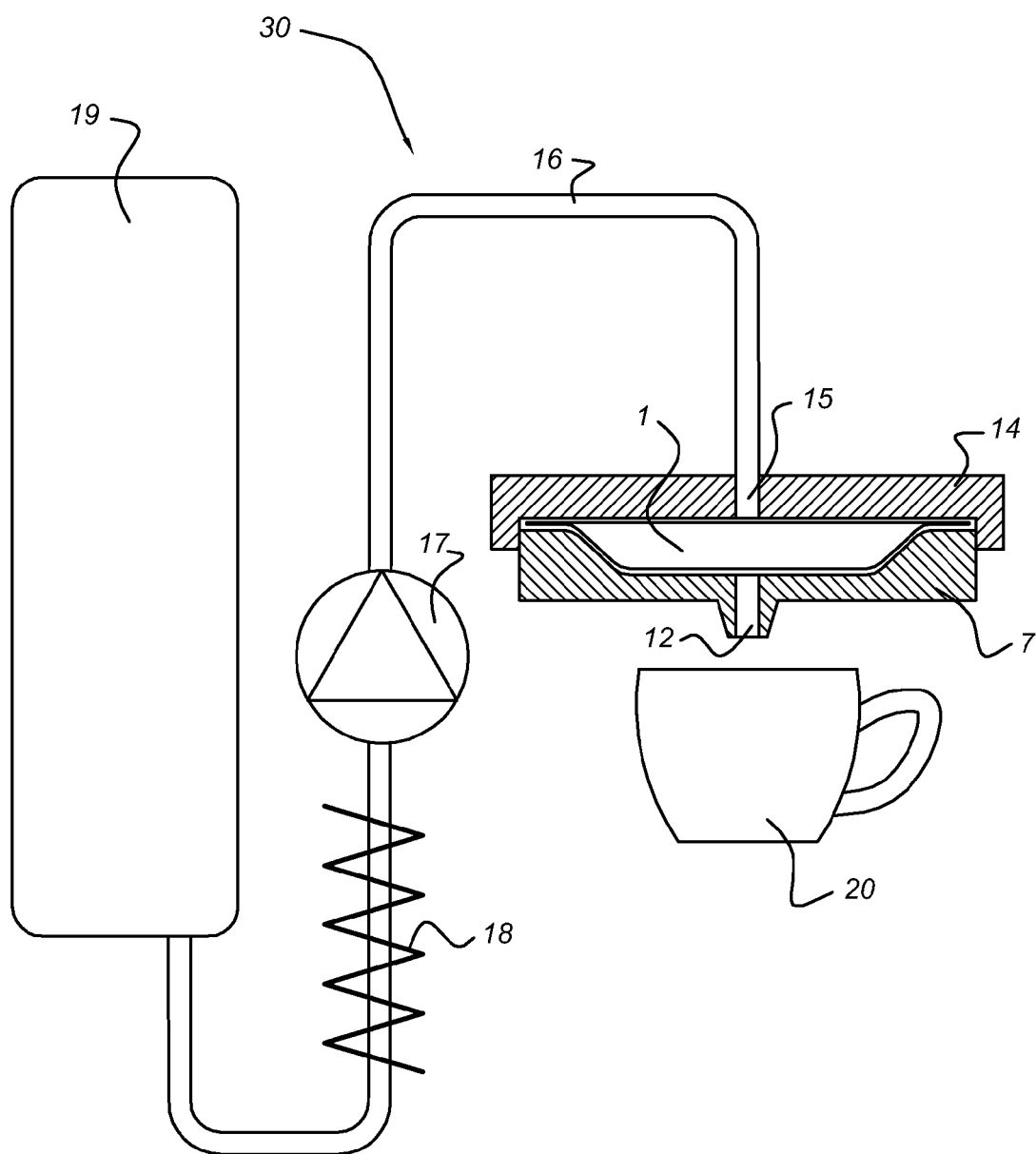
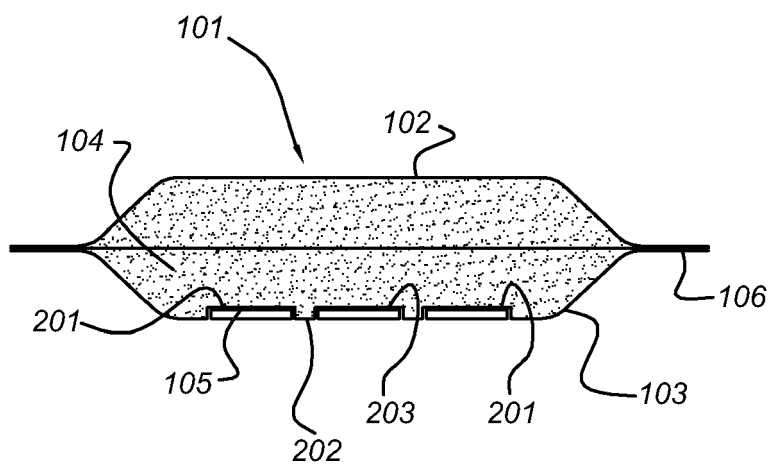


Fig 6



REFERENCES CITED IN THE DESCRIPTION

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