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**(54) FILTER-BAG FOR INFUSION PRODUCTS AND METHOD FOR MAKING FILTER-BAG**

FILTERBEUTEL FÜR INFUSIONSPRODUKTE UND VERFAHREN ZUR HERSTELLUNG EINES FILTERBEUTELS

SACHET-FILTRE POUR PRODUITS D'INFUSION ET PROCÉDÉ DE FABRICATION DE SACHET FILTRE

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## Description

### Technical field

[0001] This invention relates to a filter-bag for infusion products and a method for making the filter-bag.

[0002] More specifically, the invention relates to a filter-bag for liquid infusion products, in particular hot liquids (such as, for example tea or chamomile), in powder, granules or leaves.

### Background art

[0003] There are currently two different types of filter-bag on the market: the so-called "traditional" filter-bag, which, in effect, has a substantially flat final configuration, and the filter-bags with different three-dimensional shapes, such as, for example, tetrahedral or spherical (when the filter-bag is obtained by thermoforming process).

[0004] The first type of filter-bags is obtained starting from one or more pieces of filter material which are suitably folded and joined to make one or more chambers, each containing a dose of product intended for infusion in liquid (water).

[0005] The filter-bag thus formed may be combined with a string which is joined at one end to the filter-bag and at the other end to a tag, used to handle the filter-bag during infusion.

[0006] This type of filter-bag is, advantageously, extremely practical because it is relatively easy to make in current machines and it also quick and easy to package.

[0007] On the contrary, their shape (substantially flat) makes filter-bags of this kind unsuitable for containing infusion products of different, coarse-sized kinds, such as granules and leaves, which need a different containment chamber, that is to say, a larger chamber with more space for infusion to allow the passage of a larger amount of liquid and thus to obtain a better quality infusion.

[0008] The three-dimensional configuration makes these filter-bags not only attractive but also functional because they are easy to handle for infusion and have a large chamber where the product can come into contact with the liquid.

[0009] WO 2014/012731 discloses an infusion packet in accordance with the preamble of appended claim 1, comprising a thermoforming body, with filtration properties, having one chamber containing a dose of infusion product, and a second sheet to close the opening of the body.

[0010] WO 02/074661 discloses a device for preparing a brewed product comprising an external housing, an extraction chamber located inside the housing and a fluid introduction located inside the housing. The external housing has an extraction exit site (located under the extraction chamber). The extraction chamber has two different chambers divided by a filter wall and, each chamber has a bottom surface formed by a filter.

[0011] However, neither of the types of filter-bags described can, currently, satisfy all the needs which the current market lines and the specifications of the end user require.

[0012] More specifically, for many international markets one of the requirements is that of being able to use a base product (for example, tea or chamomile) combined, preferably only during infusion, with a flavoured product.

[0013] The current filter-bags are not designed and/or structured in such a way as to combine two separate products in a single filter-bag (except by means of a mixture of products prepared before packaging).

[0014] In addition, the filter-bags obtained by the thermoforming process do not allow a clear vision of the product contained therein (due to the intrinsic features of the structure of the material subjected to the thermoforming which make it, at the end of its process, substantially opaque) thereby possibly lowering the appearance quality of the filter-bag.

### Disclosure of the invention

[0015] The aim of this invention is to provide a filter-bag for infusion products which is able to overcome the drawbacks described.

[0016] A further aim of this invention is to provide a filter-bag which is able to give a direct vision of the product(s) contained and with a very attractive appearance.

[0017] A further aim of this invention is to provide a filter-bag which is able to contain several infusion products in a reduced space whilst maintaining the qualitative integrity of each individual product until the infusion.

[0018] A further aim is to provide a method for making the filter-bag for liquid infusion products.

[0019] These aims are fully achieved by the filter-bag for infusion products and by the method for forming the filter-bag according to this invention and as characterised in the appended claims.

[0020] More specifically, the filter-bag for liquid infusion products according to the invention comprises a thermoformed body with filtration properties having an inner volume defined by a bottom, a mouth, or opening, delimited on the perimeter by an upper flat edge and a connecting wall between the bottom and the upper edge.

[0021] Also according to the invention, the wall is provided with at least one rib extending from the bottom towards the upper edge in such a way as to define at least two chambers for containing corresponding infusion products separate from each other and included in the internal volume of the thermoformed body.

[0022] Also according to the invention, the filter-bag comprises a flat piece of non-thermoformable filter material, having transparency characteristics, that is which allows an observer to look through the piece, and associated with the upper edge of the thermoformed body for covering the opening and separating the chambers obtained in this way.

[0023] Advantageously, the non-thermoformable filter

material, for providing transparency characteristics, is of the "woven" or "non-woven" type.

**[0024]** Also, advantageously, the non-thermoformable filter material, for providing transparency characteristics, has air permeability values (UNI EN ISO 9237) greater than 1000 cm<sup>3</sup>/cm<sup>2</sup>·s.

**[0025]** Preferably, the non-thermoformable filter material has air permeability values between 1000 and 10000 cm<sup>3</sup>/cm<sup>2</sup>·s, more preferably between 3000 and 7000 cm<sup>3</sup>/cm<sup>2</sup>·s.

**[0026]** Thanks to a filter-bag structured in this way, it is possible to achieve particularly satisfactory results both for infusing the product (thanks to the three-dimensional volume of the thermoformed body) and with regards to the attractive appearance.

**[0027]** The structure of the filter-bag according to this invention makes it possible to obtain, advantageously, in a single component, the presence of two different infusion products (for example a main product and a flavouring product) separate from each other until the liquid infusion of the filter-bag.

**[0028]** The presence of the non-thermoformable transparent piece for closing the thermoformed body allows a clear and immediate vision of the type of products contained.

**[0029]** Preferably, the separating rib extends towards the upper edge to form at least one further inner wall in such a way as to interrupt the continuity of the bottom.

**[0030]** In light of this, the rib has an extension, calculated starting from the bottom, such as to allow at its upper end to come into contact with the piece of transparent filter material for closing the opening.

**[0031]** This characteristic ensures a complete separation of the inner chambers as well as an increase in the mechanical shape seal of the filter-bag.

#### Brief description of the drawings

**[0032]** These and other features of the invention will become more apparent from the following detailed description of a preferred, non-limiting embodiment of it, with reference to the accompanying drawings, in which:

- Figures 1 to 6 illustrate a first embodiment of a filter-bag for infusion products according to this invention, in, respectively, a perspective view from above, a side view, a front view, a plan view from below, a perspective view from above without products and a perspective view from below;
- Figures 7 to 12 illustrate a second embodiment of a filter-bag for infusion products according to this invention, in, respectively, a perspective view from above, a side view, a side view from the side opposite the previous one, a plan view from above, a perspective view from above without products and a perspective view from below;
- Figures 13 to 17 illustrate a third embodiment of a filter-bag for infusion products according to this in-

vention, in, respectively, a perspective view from above, a plan view from below, a side view, a perspective view from above without products and a perspective view from below;

- 5 - Figures from 18 to 24 illustrate corresponding steps for making a filter-bag for infusion products according to this invention, in particular the forming of the filter-bag of Figures 1 to 6, all being schematic front views with some parts in cross section in order to better illustrate certain details.

#### Detailed description of preferred embodiments of the invention

15 **[0033]** With reference to the accompanying drawings, in particular Figures 1 to 17, the filter-bag according to the invention (denoted in its entirety by the numeral 100) is used for containing liquid infusion products.

20 **[0034]** More specifically, the filter-bag 100 is used for liquid infusion products, in particular hot liquids, such as tea or chamomile (in powder, granules or leaves).

25 **[0035]** According to the invention, the filter-bag 100 for liquid infusion products comprises a thermoformed body 1 with filtration properties having an inner volume defined by a bottom 2, a mouth delimited on the perimeter by an upper flat edge 3 (with a closed extension as described below) and at least one connecting wall 4 between the bottom 2 and the upper edge 3.

30 **[0036]** Also according to the invention, the wall 4 is provided with at least one rib 5 extending from the bottom 2 towards the upper edge 3 in such a way as to define at least two chambers 6, 7 for containing corresponding infusion products P1, P2 separate from each other and included in the internal volume of the thermoformed body 1.

35 **[0037]** Also according to the invention, the filter-bag 100 comprises a flat piece 8 of non-thermoformable filter material, having transparency characteristics, and associated with the upper edge 3 of the body 1 for covering the opening and separating the chambers 6, 7 obtained in this way. Advantageously, the filter material is of the "woven" type.

**[0038]** Alternatively, the filter material is of the "non-woven" type.

45 **[0039]** The non-thermoformable filter material having transparency characteristics makes it possible to see the product contained inside the bag.

**[0040]** It should be noted that, preferably, the above-mentioned two infusion products P1 and P2 may be, respectively, a so-called basic product (tea or chamomile) and a flavouring product (for example, fruit and/or plant-based flavours).

50 **[0041]** Preferably, the rib 5 extends towards the upper edge 3 to form at least one further inner wall 5a in such a way as to interrupt the continuity of the bottom 2 (see Figures 1 to 17).

**[0042]** In other words, the rib 5 extends from the base 2 and modifies the extension of the wall 4 generating one

or more walls inside the original volume of the body 1, thus separating both the bottom 2 and the wall 4.

**[0043]** Preferably, the rib 5 has an extension, calculated starting from the bottom 2, such as to allow its upper end 9 to come into contact with the piece 8 of transparent filter material for closing the opening.

**[0044]** In light of this, the rib 5 has its upper end 9 substantially coplanar with the upper edge 3 of the body 1.

**[0045]** In a first embodiment of the filter-bag 100 (Figures 1 to 6), the upper edge 3 is circular in shape and the rib 5 is configured to obtain a diametric separation of the body 1 in such a way as to define two chambers 6 and 7 of similar volume through the formation of a bottom 2 with a twin lobed shape.

**[0046]** In light of this, the rib 5 has a rectilinear extension of its upper end 9 in such a way as to form two separate parallel inner walls starting from the bottom 2 and projecting towards the upper edge 3.

**[0047]** It should be noted that to obtain this shape, the rib 5 consists of two walls spaced from each other by a distance D (see Figure 3) which is then the width of the upper end 9 of the rib 5.

**[0048]** In a second solution of the filter-bag 100, illustrated in Figures 7 to 12, the upper edge 3 is circular in shape and the rib 5 has an undulating extension of its upper end 9 in such a way as to define two separate walls with an undulating extension parallel to each other starting from the bottom 2 and projecting towards the upper edge 3.

**[0049]** It should be noted that the extension of the rib 5 is in the shape of an "S" and allows the two chambers 6 and 7 to have a substantially identical volume.

**[0050]** In light of this, the bottom 2 and the wall 4 are interrupted by the two walls with an undulating extension which define an S-shaped channel along the bottom 2 and up to the upper edge 3 thus defining a corresponding inner wall of each chamber 6 and 7.

**[0051]** It should be noted that the rib 5 comprises the two undulating walls spaced from each other by a constant mutual distance which is the width of the upper end 9 of the rib 5.

**[0052]** Preferably, the rib 5 has its upper end 9 coplanar with the upper edge 3 and connected at the edge 3 in at least two points which are opposite each other on the circumference formed by the edge 3 to define a further upper auxiliary edge.

**[0053]** This configuration makes it possible to increase both the seal between the two chambers 6 and 7, and the mechanical seal of the thermoformed body 1.

**[0054]** In a third solution of the filter-bag 100 (Figures 13 to 17), the upper edge 3 has a circular shape and the rib 5 is configured with an annular extension inside the perimeter of the upper edge 3 to obtain a circular separation of the inner volume of the body 1 and in such a way as to define two separate chambers 6, 7 of different volumes.

**[0055]** In light of this, the rib 5 is ring-shaped and concentric relative to the upper edge in such a way as to

define two chambers 6, 7 with annular extension. Preferably, the two chambers 6, 7 are obtained with one inside the other and concentric with each other.

**[0056]** It should be noted that the rib 5 is formed around the centre of the bottom 2 and in such a way as to create a chamber 7 with a reduced volume surrounded by the other chamber 6 with a volume greater than the chamber 7.

**[0057]** In this case, the rib 5 has a upper end 9 coplanar with the upper edge 3 but independent and without points of contact with the upper edge 3.

**[0058]** This invention also provides a method for making a filter-bag 100 for liquid infusion products of the type described above.

**[0059]** The method comprises the following steps:

- preparing a continuous strip S1 of thermoformable filter material (Figure 18);
- preparing a die 10 comprising a head 11 provided with a cavity 12 forming a volume for a body 1 of the filter-bag to be formed; the cavity 12 has a bottom 13, a mouth delimited on the perimeter by an upper flat edge 14 and at least one connecting wall 15 between the bottom 13 and the upper edge 14; the head 11 of the die 10 is equipped with at least one rib 16 extending from the bottom 13 towards the upper edge 14 in such a way as to define at least two chambers 17 and 18 which are separate from each other and included in the inner volume of the head 11 (Figure 18);
- preparing a punch 19 comprising a head 20 shaped to match the cavity 12 of the head 11 of the die 10 (Figure 18);
- positioning a portion of the continuous strip S1 of filter material between the die 10 and the punch 19 (Figure 18);
- hot plastic deforming of the portion of strip S1 of filter material by moving towards each other the corresponding heads 11 and 20 of the die 10 and of the punch 19 so as to obtain a body 1 having an inner volume defined by a bottom 2, a mouth delimited on the perimeter by an upper flat edge 3, at least one connecting wall 4 between the bottom 2 and the upper edge 3; the wall 4 being provided with at least one rib 5 extending from the bottom 2 towards the upper edge 3 in such a way as to define at least two chambers 6 and 7 for containing corresponding infusion products P1, P2 separate from each other and included in the internal volume of the body 1 (Figures 19 to 22);
- dosing a first infusion product P1 in a first chamber (6 or 7) of the at least two chambers formed (Figure 23);
- dosing a second infusion product in a second chamber (7, 6) still empty of the at least two chambers formed (Figure 23);
- preparing a flat piece 8 of non-thermoformable material (Figure 24);

- joining the piece of non-thermoformable material 8 on the edge 3 of the thermoformed body 1 to close the opening, in such a way as to form a filter-bag 100 (Figure 24).

**[0060]** Preferably, the flat piece 8 of non-thermoformable material has transparency characteristics (that is, it allows to an observer to look through the piece).

**[0061]** Advantageously, method according to the previous claim, wherein the step of preparing a flat piece of 8 of non-thermoformable filter material with transparency characteristics comprises preparing a flat piece 8 of non-thermoformable filter material with air permeability greater than  $1000 \text{ cm}^3/\text{cm}^2\cdot\text{s}$ , preferably between 1000 and  $10000 \text{ cm}^3/\text{cm}^2\cdot\text{s}$ , more preferably between 3000 and  $7000 \text{ cm}^3/\text{cm}^2\cdot\text{s}$ .

**[0062]** The above-described formation methods, although illustrated for forming a filter-bag 100 of the type shown in Figures 1 to 6 (first embodiment illustrated), are applicable for the other types of filter-bag 100.

**[0063]** The only variant of a structural type relates to the die and the punch which will be configured according to the shape of the corresponding filter-bag 100.

**[0064]** Preferably, the step of hot plastic deforming the portion of strip S1 of filter material is carried out by (that is, it comprises a step of) heating the head 20 of the punch 19.

**[0065]** Alternatively, the step of hot plastic deforming the portion of strip S1 of filter material is carried out by preheating the strip S1 of filter material and using the head 20 of the punch 19 not heated.

**[0066]** Preferably, after the step of hot deforming the portion of strip S1, there is a step of cutting of the thermoformed body 1.

**[0067]** This cutting step is achieved, preferably, by moving cutting means positioned between the die 10 and the punch 19 (not illustrated).

**[0068]** Preferably, the step of dosing the individual infusion products P1 and P2 may be performed simultaneously with independent dosers 21 and 22 (a doser for each product).

**[0069]** Alternatively, the dosing step is carried out in separate and successive phases, again with independent dosers 21 and 22 (a doser for each product).

**[0070]** Preferably, the piece 8 of filter material is associated, hot, on the upper edge 3 of the body 1.

**[0071]** Preferably, the piece 8 of filter material is unwound from a reel 23 of strip S2 of filter material and positioned on the edge 3 of the body 1.

**[0072]** In light of this, a head 24 having a heated edge 25 and cutting means 26 carry out the association on the edge 3 of the body 1 and a relative cut of the strip S2 to define the closing strip 8.

## Claims

1. A filter-bag for infusion products comprising

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- a thermoformed body (1) with filtration properties having an inner volume defined by a bottom (2), an opening delimited on the perimeter by an upper flat edge (3), and at least one connecting wall (4) between the bottom (2) and the upper edge (3); **characterised in that** the at least one wall (4) is provided with at least one rib (5) extending from the bottom (2) towards the upper edge (3) in such a way as to define at least two chambers (6, 7) for containing corresponding infusion products (P1, P2) separate from each other and included in the internal volume of the thermoformed body (1); and **in that**

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- a flat piece (8) of non-thermoformable filter material, having transparency characteristics, that is which allows an observer to look through the piece, preferably of the fabric type, is associated with the upper edge (3) of the thermoformed body (1) for covering the opening and separating the chambers (6, 7) obtained in this way.

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2. The filter-bag according to claim 1, wherein the at least one rib (5) extends towards the upper edge (3) to form at least one further inner wall (5a) in such a way as to interrupt the continuity of the bottom (2).

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3. The filter-bag according to any one of the preceding claims, wherein the at least one rib (5) has an upper end (9) and has an extension, calculated starting from the bottom (2), such that the upper end (9) comes into contact with the flat piece (8) of non-thermoformable filter material.

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4. The filter-bag according to any one of the preceding claims, wherein the upper edge (3) has a circular shape and the at least one rib (5) is configured to obtain a diametric separation diameter of the thermoformed body (1) in such a way as to define two chambers (6, 7) of volume substantially identical through the formation of a twin lobed bottom (2).

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5. The filter-bag according to claim 4, wherein the upper end (9) of the at least one rib (5) has a rectilinear extension in such a way as to define two separate further inner walls (5a), mutually parallel, starting from the bottom (2) and projecting towards the upper edge (3).

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6. The filter-bag according to claim 4, wherein the upper end (9) of the at least one rib (5) has an undulating extension in such a way as to define two separate walls with an undulating extension and parallel with each other, starting from the bottom (2) and projecting towards the upper edge (3).

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7. The filter-bag according to any one of claims 4 to 6, wherein the upper end (9) of the at least one rib (5) is coplanar with the upper edge (3) and connected

at the edge (3) in at least two points which are opposite each other to define an upper auxiliary edge.

8. The filter-bag according to any one of claims 1 to 3, wherein the upper edge (3) has a circular shape and the at least one rib (5) is configured with an annular extension inside the perimeter of the upper edge (3) to obtain a circular separation of the inner volume of the thermoformed body (1) and in such a way as to define two separate chambers (6, 7) of different volumes.
9. The filter-bag according to any one of claims 1 to 3 and 8, wherein the at least one rib (5) is ring-shaped and concentric relative to the upper edge (3) in such a way as to define two chambers (6, 7) with annular extension.
10. The filter-bag according to any one of claims 1 to 3 and 8, wherein the at least one rib (5) is ring-shaped and concentric relative to the upper edge (3) in such a way as to define two chambers (6, 7) with annular extension one inside the other and concentric with each other.
11. The filter-bag according to any one of the preceding claims, wherein the flat piece (8) is made of non-thermoformable filter material with air permeability greater than  $1000 \text{ cm}^3/\text{cm}^2\cdot\text{s}$ , preferably between 1000 and  $10000 \text{ cm}^3/\text{cm}^2\cdot\text{s}$ , more preferably between 3000 and  $7000 \text{ cm}^3/\text{cm}^2\cdot\text{s}$ .
12. A method for forming a filter-bag (100) for infusion products **according to any of the previous claims, characterised in that** it comprises the steps of:
- preparing a continuous strip (S1) of thermoformable filter material;
  - preparing a die (10) comprising a head (11) provided with a cavity (12) forming an inner volume for a thermoformed body (1) of the filter-bag to be formed; the cavity (12) having a bottom (13), a mouth delimited on the perimeter by an upper flat edge (14) and at least one connecting wall (15) between the bottom (13) and the upper edge (14); the head (11) of the die (10) being equipped with at least one rib (16) extending from the bottom (13) towards the upper edge (14) in such a way as to define at least two chambers (17, 18) which are separate from each other and included in the inner volume of the head (11);
  - preparing a punch (19) comprising a head (20) shaped to match the cavity (12) of the head (11) of the die (10);
  - positioning a portion of the continuous strip (S1) of thermoformable filter material between the die (10) and the punch (19);

- hot plastic deforming of the portion of strip (S1) of thermoformable filter material by moving towards each other the corresponding heads (11, 20) of the die (10) and of the punch (19) so as to obtain a thermoformed body (1) having an inner volume defined by a bottom (2), a mouth delimited on the perimeter by an upper flat edge (3), at least one connecting wall (4) between the bottom (2) and the upper edge (3); the at least one wall (4) being provided with at least one rib extending from the bottom (2) towards the upper edge (3) in such a way as to define at least two chambers (6, 7) for containing corresponding infusion products (P1, P2) separate from each other and included in the internal volume of the thermoformed body (1);
- dosing a first infusion product (P1) in a first chamber (6, 7) of the at least two chambers;
- dosing a second infusion product in a second chamber (7, 6) of the at least two chambers;
- preparing a flat piece (8) of non-thermoformable filter material with transparency characteristics, that is which allows an observer to look through the piece;
- joining the piece of non-thermoformable material (8) on the upper edge (3) of the thermoformed body (1) to close the opening, in such a way as to form a filter-bag (100).

13. The method according to the previous claim, wherein the step of preparing a flat piece of (8) of non-thermoformable filter material with transparency characteristics comprises preparing a flat piece (8) of non-thermoformable filter material with air permeability greater than  $1000 \text{ cm}^3/\text{cm}^2\cdot\text{s}$ , preferably between 1000 and  $10000 \text{ cm}^3/\text{cm}^2\cdot\text{s}$ , more preferably between 3000 and  $7000 \text{ cm}^3/\text{cm}^2\cdot\text{s}$ .

#### 40 Patentansprüche

##### 1. Filterbeutel für Aufgussprodukte, umfassend:

- einen warmgeformten Hauptteil (1) mit Filtrungseigenschaften, aufweisend ein Innenvolumen, definiert durch einen Boden (2), eine Aussparung, die am Umfang durch einen oberen flachen Rand (3) begrenzt ist, und mindestens eine Verbindungswand (4) zwischen dem Boden (2) und dem oberen Rand (3), **dadurch gekennzeichnet, dass** die mindestens eine Wand (4) mit mindestens einer Rippe (5) versehen ist, die sich vom Boden (2) hinführend zum oberen Rand (3) erstreckt, sodass mindestens zwei Kammern (6, 7) definiert werden, um entsprechende Aufgussprodukte (P1, P2) separat voneinander und eingeschlossen im Innenvolumen des warmgeformten Hauptteils (1) zu enthalten;

- und dadurch, dass  
 - ein flaches Stück (8) aus nicht warmgeformtem Filtermaterial, aufweisend Transparenzeigenschaften, d. h., das einem Betrachter erlaubt, durch das Stück durchzusehen, vorzugsweise vom Gewebetyp, mit dem oberen Rand (3) des warmgeformten Hauptteils (1) assoziiert ist, um die Aussparung zu bedecken und die auf diese Weise ausgebildeten Kammern (6, 7) zu trennen.
2. Filterbeutel nach Anspruch 1, wobei sich die mindestens eine Rippe (5) hinführend zum oberen Rand (3) erstreckt, um mindestens eine weitere Innenwand (5a) zu formen, sodass die Kontinuität des Bodens (2) unterbrochen wird.
3. Filterbeutel nach einem der vorhergehenden Ansprüche, wobei die mindestens eine Rippe (5) ein oberes Ende (9) und eine Ausdehnung aufweist, die ausgehend vom Boden (2) berechnet ist, sodass das obere Ende (9) mit dem flachen Stück (8) aus nicht warmgeformtem Filtermaterial in Kontakt kommt.
4. Filterbeutel nach einem der vorhergehenden Ansprüche, wobei der obere Rand (3) eine Kreisform aufweist und die mindestens eine Rippe (5) ausgebildet ist, um einen diametrischen Trennungsdurchmesser des warmgeformten Hauptteils (1) zu erhalten, sodass zwei Kammern (6, 7) mit einem im Wesentlichen identischen Volumen durch die Bildung eines zweilappigen Bodens (2) definiert werden.
5. Filterbeutel nach Anspruch 4, wobei das obere Ende (9) der mindestens einen Rippe (5) eine geradlinige Ausdehnung aufweist, sodass zwei separate weitere Innenwände (5a) definiert werden, die parallel zueinander angeordnet sind, ausgehend vom Boden (2) und auskragend hinführend zum oberen Rand (3).
6. Filterbeutel nach Anspruch 4, wobei das obere Ende (9) der mindestens einen Rippe (5) eine wellige Ausdehnung aufweist, sodass zwei separate Wände mit einer welligen Ausdehnung definiert werden, die parallel zueinander angeordnet sind, ausgehend vom Boden (2) und auskragend hinführend zum oberen Rand (3).
7. Filterbeutel nach einem der Ansprüche 4 bis 6, wobei das obere Ende (9) der mindestens einen Rippe (5) mit dem oberen Rand (3) in der gleichen Ebene liegt und mit dem Rand (3) an mindestens zwei Punkten verbunden ist, die gegenständig zueinander angeordnet sind, um einen oberen Hilfsrand zu definieren.
8. Filterbeutel nach einem der Ansprüche 1 bis 3, wobei der obere Rand (3) eine Kreisform aufweist und die
- mindestens eine Rippe (5) mit einer ringförmigen Ausdehnung im Umfang des oberen Rands (3) ausgebildet ist, um eine kreisförmige Trennung des Innenvolumens des warmgeformten Hauptteils (1) zu erzielen, sodass zwei separate Kammern (6, 7) mit unterschiedlichen Volumina definiert werden.
9. Filterbeutel nach einem der Ansprüche 1 bis 3 und 8, wobei die mindestens eine Rippe (5) ringförmig und konzentrisch relativ zum oberen Rand (3) angeordnet ist, sodass zwei Kammern (6, 7) mit ringförmiger Ausdehnung definiert werden.
10. Filterbeutel nach einem der Ansprüche 1 bis 3 und 8, wobei die mindestens eine Rippe (5) ringförmig und konzentrisch relativ zum oberen Rand (3) angeordnet ist, sodass zwei Kammern (6, 7) mit ringförmiger Ausdehnung definiert werden, die ineinander und konzentrisch zueinander angeordnet sind.
11. Filterbeutel nach einem der vorhergehenden Ansprüche, wobei das flache Stück (8) aus nicht warmgeformtem Filtermaterial mit einer Luftdurchlässigkeit größer als  $1000 \text{ cm}^3/\text{cm}^2 \cdot \text{s}$ , vorzugsweise zwischen  $1000$  und  $10000 \text{ cm}^3/\text{cm}^2 \cdot \text{s}$ , noch bevorzugter zwischen  $3000$  und  $7000 \text{ cm}^3/\text{cm}^2 \cdot \text{s}$ , gefertigt ist.
12. Verfahren zum Formen eines Filterbeutels (100) für Aufgussprodukte nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** es die folgenden Schritte umfasst:
- Vorbereiten eines durchgehenden Streifens (S1) aus warmgeformtem Filtermaterial;
  - Vorbereiten eines Ausformwerkzeugs (10), umfassend einen Kopf (11), versehen mit einem Hohlraum (12), formend ein Innenvolumen für einen warmgeformten Hauptteil (1) des zu formenden Filterbeutels, wobei der Hohlraum (12) einen Boden (13), eine Öffnung, die am Umfang durch einen oberen flachen Rand (14) begrenzt ist, und mindestens eine Verbindungswand (15) zwischen dem Boden (13) und dem unteren Rand (14) aufweist, wobei der Kopf (11) des Ausformwerkzeugs (10) mit mindestens einer Rippe (16) versehen ist, die sich vom Boden (13) hinführend zum oberen Rand (14) erstreckt, sodass mindestens zwei Kammern (17, 18) definiert werden, die voneinander getrennt und im Innenvolumen des Kopfs (11) eingeschlossen sind;
  - Vorbereiten einer Stanze (19), umfassend einen Kopf (20), der passend zum Hohlraum (12) des Kopfs (11) des Ausformwerkzeugs (10) ausgebildet ist;
  - Positionieren des durchgehenden Streifens (S1) aus warmgeformtem Filtermaterial zwischen dem Ausformwerkzeug (10) und der

Stanze (19);

- Warmumformen des Streifenabschnitts (S1) aus warmgeformtem Filtermaterial durch Bewegen der entsprechenden Köpfe (11, 20) des Ausformwerkzeugs (10) und der Stanze (19) 5  
hinführend zueinander, um einen warmgeformten Hauptteil (1) zu erhalten, aufweisend ein Innenvolumen, definiert durch einen Boden (2), eine Öffnung, die am Umfang durch einen oberen flachen Rand (3) begrenzt ist, und mindestens eine Verbindungswand (4) zwischen dem Boden (2) und dem oberen Rand (3), **dadurch gekennzeichnet, dass** die mindestens eine Wand (4) mit mindestens einer Rippe versehen ist, die sich vom Boden (2) hinführend zum oberen Rand (3) erstreckt, sodass mindestens zwei Kammern (6, 7) definiert werden, um entsprechende Aufgussprodukte (P1, P2) separat voneinander und eingeschlossen im Innenvolumen des warmgeformten Hauptteils (1) zu enthalten; 10  
- Dosieren eines ersten Aufgussprodukts (P1) in eine erste Kammer (6, 7) der mindestens zwei Kammern; 15  
- Dosieren eines zweiten Aufgussprodukts in eine zweite Kammer (7, 6) der mindestens zwei Kammern; 20  
- Vorbereiten eines flachen Stücks (8) aus nicht warmgeformtem Filtermaterial mit Transparenzeigenschaften, d. h., das einem Betrachter erlaubt, durch das Stück durchzusehen; 25  
- Zusammenfügen des Stücks aus nicht warmgeformtem Filtermaterial (8) am oberen Rand (3) des warmgeformten Hauptteils (1), um die Aussparung zu schließen, sodass ein Filterbeutel (100) geformt wird. 30

13. Verfahren nach dem vorhergehenden Anspruch, wobei der Schritt zum Vorbereiten eines flachen Stücks (8) aus nicht warmgeformtem Filtermaterial mit Transparenzeigenschaften das Vorbereiten eines flachen Stücks (8) aus nicht warmgeformtem Filtermaterial mit einer Luftdurchlässigkeit größer als 1000 cm<sup>3</sup>/cm<sup>2</sup>•s, vorzugsweise zwischen 1000 und 10000 cm<sup>3</sup>/cm<sup>2</sup>•s, noch bevorzugter zwischen 3000 und 7000 cm<sup>3</sup>/cm<sup>2</sup>•s, umfasst. 35

## Revendications

1. Sachet-filtre pour produits d'infusion, comprenant : 40

- un corps thermoformé (1) à propriétés de filtration ayant un volume intérieur défini par un fond (2), une ouverture délimitée sur le périmètre par un bord supérieur plat (3), et au moins une paroi de raccordement (4) entre le fond (2) et le bord supérieur (3) ; **caractérisé en ce que** l'au moins une paroi (4) est pourvue d'au moins 45

une nervure (5) se prolongeant du fond (2) vers le bord supérieur (3) de manière à définir au moins deux chambres (6, 7), servant à contenir des produits d'infusion (P1, P2) correspondants, séparées l'une de l'autre et incluses dans le volume interne du corps thermoformé (1) ;

### et en ce que

- une partie plate (8) de matériau filtrant non thermoformable, ayant des caractéristiques de transparence, c'est-à-dire permettant à un observateur de regarder à travers la partie, de préférence du type en tissu, est associée au bord supérieur (3) du corps thermoformé (1) pour recouvrir l'ouverture et séparer les chambres (6, 7) ainsi obtenues.

2. Sachet-filtre selon la revendication 1, dans lequel l'au moins une nervure (5) se prolonge vers le bord supérieur (3) pour former au moins une paroi intérieure (5a) supplémentaire de manière à interrompre la continuité du fond (2).

3. Sachet-filtre selon l'une quelconque des revendications précédentes, dans lequel l'au moins une nervure (5) comporte une extrémité supérieure (9) et comporte une extension, calculée à partir du fond (2), telle que l'extrémité supérieure (9) entre en contact avec la partie plate (8) de matériau filtrant non thermoformable.

4. Sachet-filtre selon l'une quelconque des revendications précédentes, dans lequel le bord supérieur (3) a une forme circulaire et l'au moins une nervure (5) est configurée pour obtenir un diamètre de séparation diamétral du corps thermoformé (1), de manière à définir deux chambres (6, 7) de volume substantiellement identique par la formation d'un fond à double lobes (2).

5. Sachet-filtre selon la revendication 4, dans lequel l'extrémité supérieure (9) de l'au moins une nervure (5) comporte une extension rectiligne de manière à définir deux parois intérieures séparées (5a) supplémentaires, mutuellement parallèles, partant du fond (2) et faisant saillie vers le bord supérieur (3).

6. Sachet-filtre selon la revendication 4, dans lequel l'extrémité supérieure (9) de l'au moins une nervure (5) comporte une extension ondulée de manière à définir deux parois séparées avec une extension ondulée et parallèles entre elles, en partant du fond (2) et en faisant saillie vers le bord supérieur (3).

7. Sachet-filtre selon l'une quelconque des revendications 4 à 6, dans lequel l'extrémité supérieure (9) de l'au moins une nervure (5) est coplanaire avec le bord supérieur (3) et reliée au bord (3) en au moins deux points étant opposés l'un à l'autre pour définir



un bord auxiliaire supérieur.

8. Sachet-filtre selon l'une quelconque des revendications 1 à 3, dans lequel le bord supérieur (3) a une forme circulaire et l'au moins une nervure (5) est configurée avec une extension annulaire à l'intérieur du périmètre du bord supérieur (3) pour obtenir une séparation circulaire du volume intérieur du corps thermoformé (1) et de manière à définir deux chambres séparées (6, 7) de volumes différents. 5 10
9. Sachet-filtre selon l'une quelconque des revendications 1 à 3 et 8, dans lequel l'au moins une nervure (5) est de forme annulaire et concentrique par rapport au bord supérieur (3) de manière à définir deux chambres (6, 7) à extension annulaire. 15
10. Sachet-filtre selon l'une quelconque des revendications 1 à 3 et 8, dans lequel l'au moins une nervure (5) est en forme d'anneau et concentrique par rapport au bord supérieur (3) de manière à définir deux chambres (6, 7) à extension annulaire l'une dans l'autre et concentriques entre elles. 20
11. Sachet-filtre selon l'une quelconque des revendications précédentes, dans lequel la partie plate (8) est constituée d'un matériau filtrant non thermoformable ayant une perméabilité à l'air supérieure à  $1\ 000\ \text{cm}^3/\text{cm}^2\cdot\text{s}$ , de préférence entre  $1\ 000$  et  $10\ 000\ \text{cm}^3/\text{cm}^2\cdot\text{s}$ , plus préférablement entre  $3\ 000$  et  $7\ 000\ \text{cm}^3/\text{cm}^2\cdot\text{s}$ . 25 30
12. Procédé de formation d'un sachet-filtre (100) pour produits d'infusion selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'il** comprend les étapes de : 35
- préparer une bande continue (S1) de matériau filtrant thermoformable ;
  - préparer une matrice (10) comprenant une tête (11) pourvue d'une cavité (12) formant un volume intérieur pour un corps thermoformé (1) du sachet-filtre à former ; la cavité (12) comportant un fond (13), une embouchure délimitée sur le périmètre par un bord supérieur plat (14) et au moins une paroi de raccordement (15) entre le fond (13) et le bord supérieur (14) ; la tête (11) de la matrice (10) étant pourvue d'au moins une nervure (16) se prolongeant du fond (13) vers le bord supérieur (14) de manière à définir au moins deux chambres (17, 18) étant séparées l'une de l'autre et incluses dans le volume intérieur de la tête (11) ;
  - préparer un poinçon (19) comportant une tête (20) façonnée pour correspondre à la cavité (12) de la tête (11) de la matrice (10) ;
  - positionner une partie de la bande continue (S1) de matériau filtrant thermoformable entre

la matrice (10) et le poinçon (19) ;

- effectuer une déformation plastique à chaud de la partie de bande (S1) de matériau filtrant thermoformable en rapprochant l'une de l'autre les têtes correspondantes (11, 20) de la matrice (10) et du poinçon (19) de manière à obtenir un corps thermoformé (1) ayant un volume intérieur défini par un fond (2), une embouchure délimitée sur le périmètre par un bord supérieur plat (3), au moins une paroi de raccordement (4) entre le fond (2) et le bord supérieur (3) ; l'au moins une paroi (4) étant pourvue d'au moins une nervure se prolongeant du fond (2) vers le bord supérieur (3) de manière à définir au moins deux chambres (6, 7), servant à contenir des produits d'infusion (P1, P2) correspondants, séparées l'une de l'autre et incluses dans le volume intérieur du corps thermoformé (1) ;
- doser un premier produit d'infusion (P1) dans une première chambre (6, 7) des au moins deux chambres ;
- doser un deuxième produit d'infusion dans une deuxième chambre (7, 6) des au moins deux chambres ;
- préparer une partie plate (8) de matériau filtrant non thermoformable ayant des caractéristiques de transparence, c'est-à-dire permettant à un observateur de regarder à travers la partie ;
- assembler la partie de matériau non thermoformable (8) sur le bord supérieur (3) du corps thermoformé (1) pour fermer l'ouverture, de manière à former un sachet-filtre (100) .

13. Procédé selon la revendication précédente, dans lequel l'étape consistant à préparer une partie plate (8) de matériau filtrant non thermoformable avec des caractéristiques de transparence comprend la préparation d'une partie plate (8) de matériau filtrant non thermoformable avec une perméabilité à l'air supérieure à  $1\ 000\ \text{cm}^3/\text{cm}^2\cdot\text{s}$ , de préférence entre  $1\ 000$  et  $10\ 000\ \text{cm}^3/\text{cm}^2\cdot\text{s}$ , plus préférablement entre  $3\ 000$  et  $7\ 000\ \text{cm}^3/\text{cm}^2\cdot\text{s}$ . 40 45 50 55

Fig.1

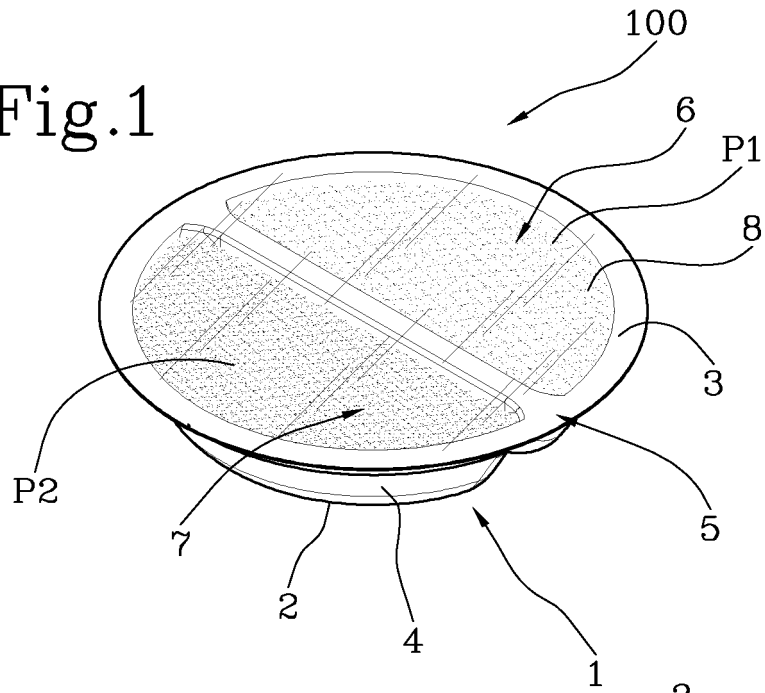


Fig.2

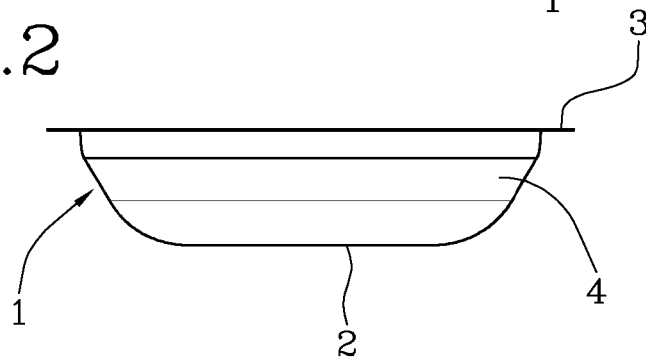
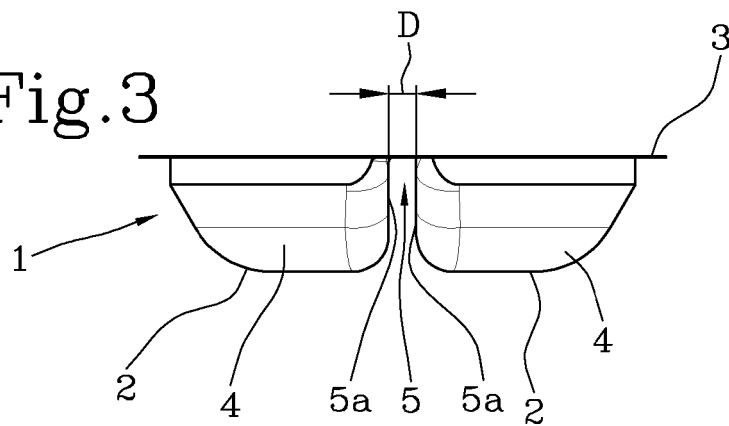


Fig.3



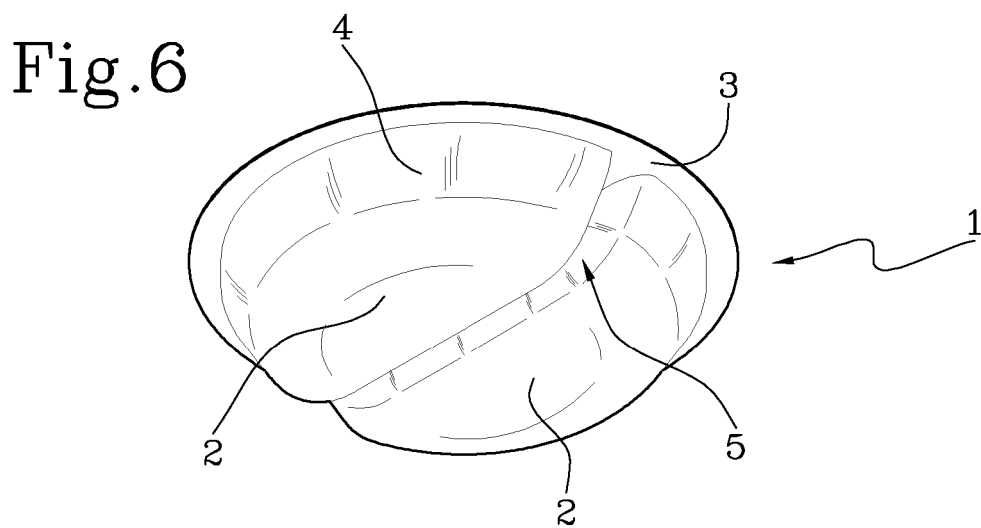
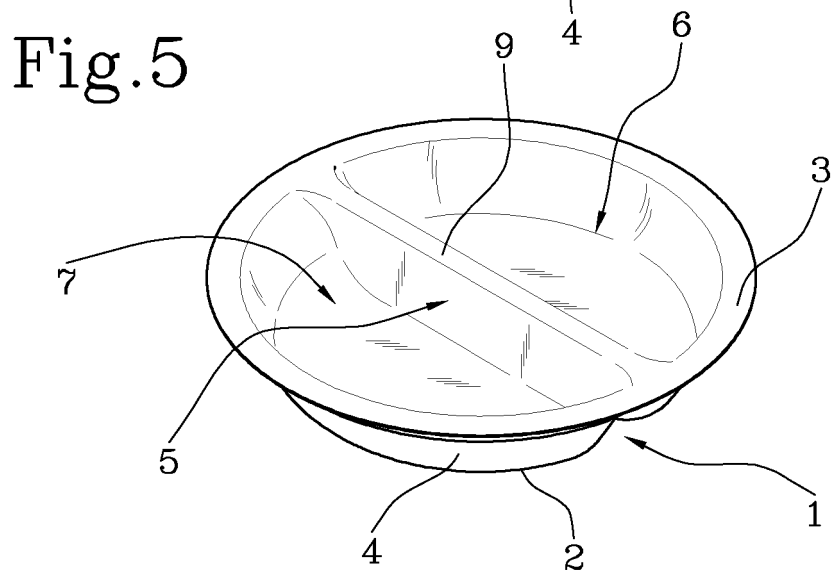
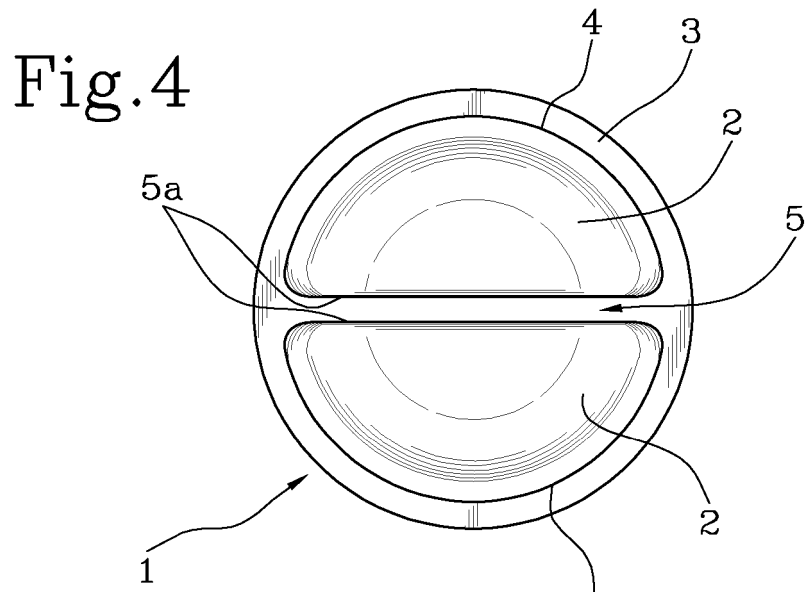


Fig.7

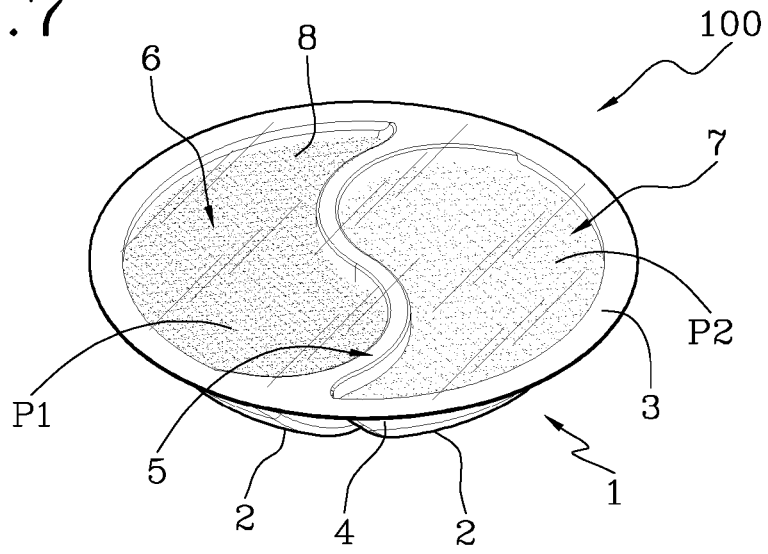


Fig.8

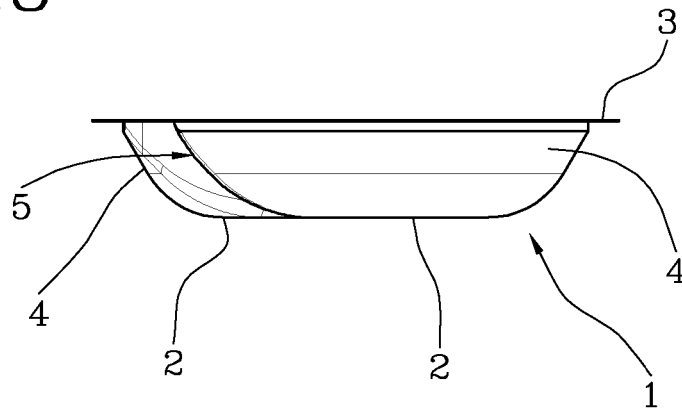


Fig.9

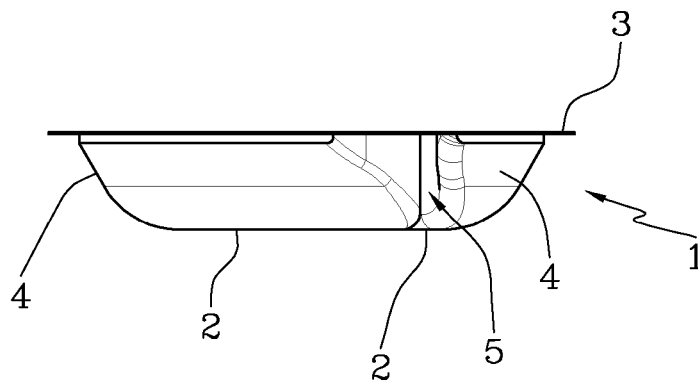


Fig.10

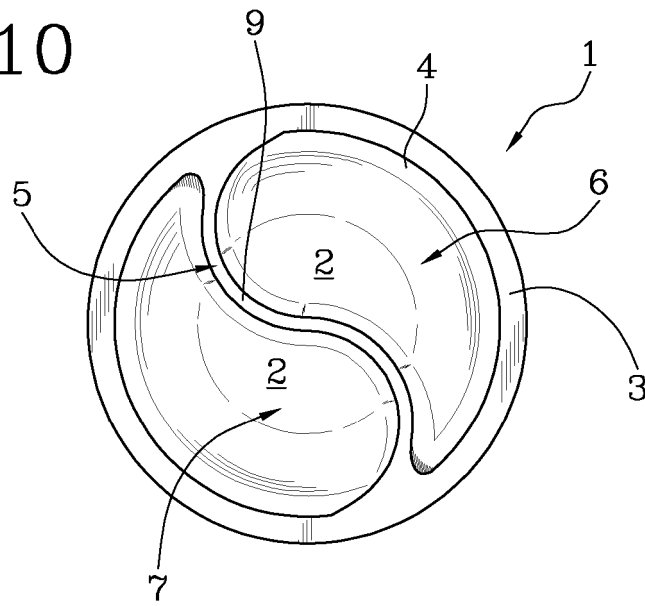


Fig.11

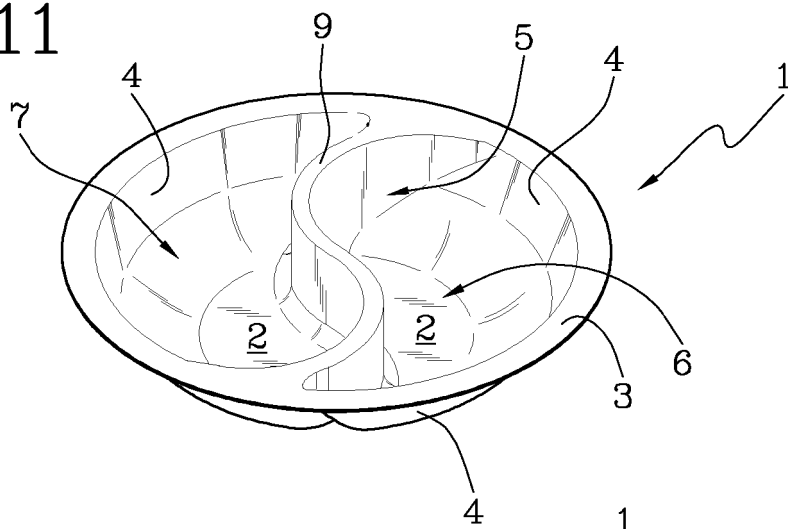
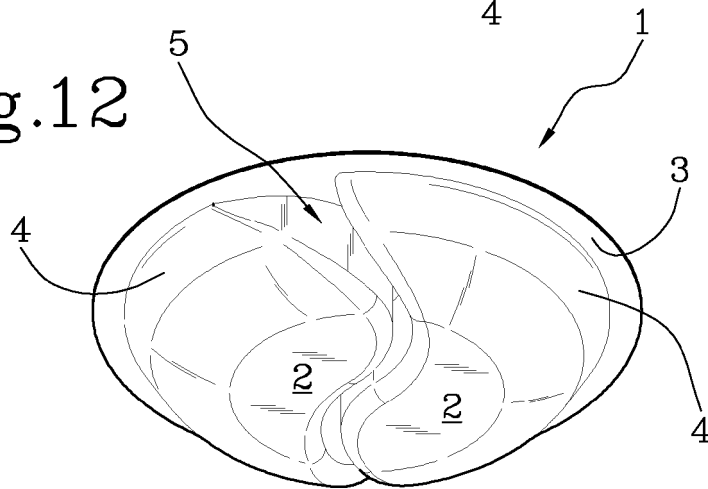


Fig.12



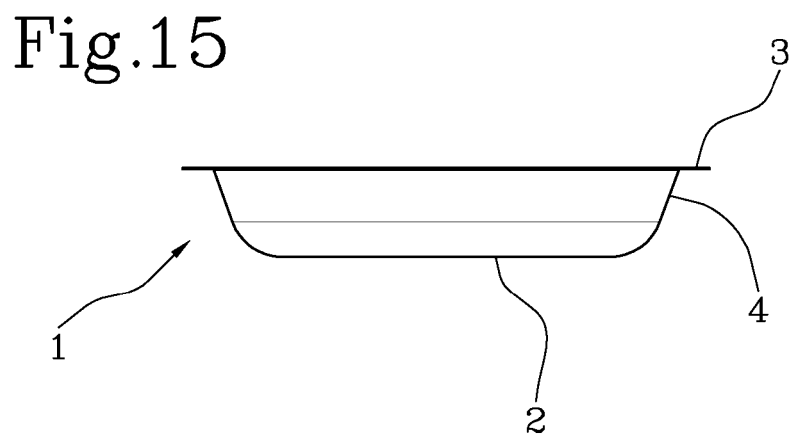
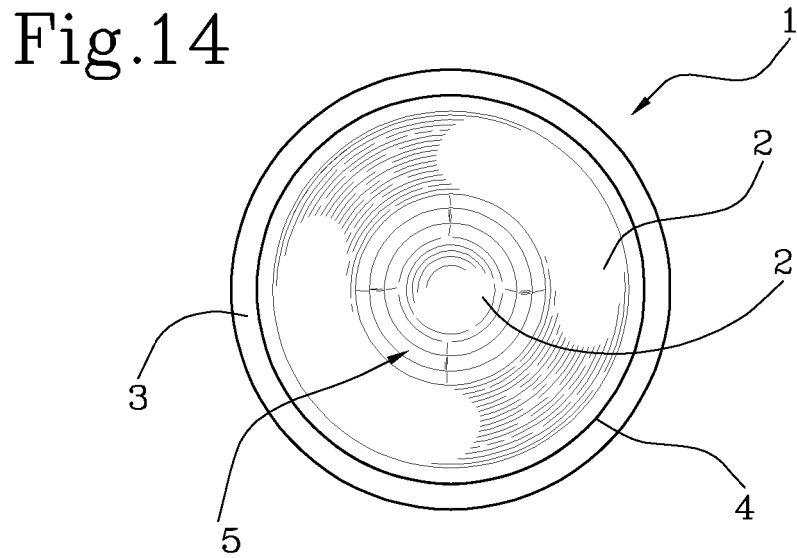
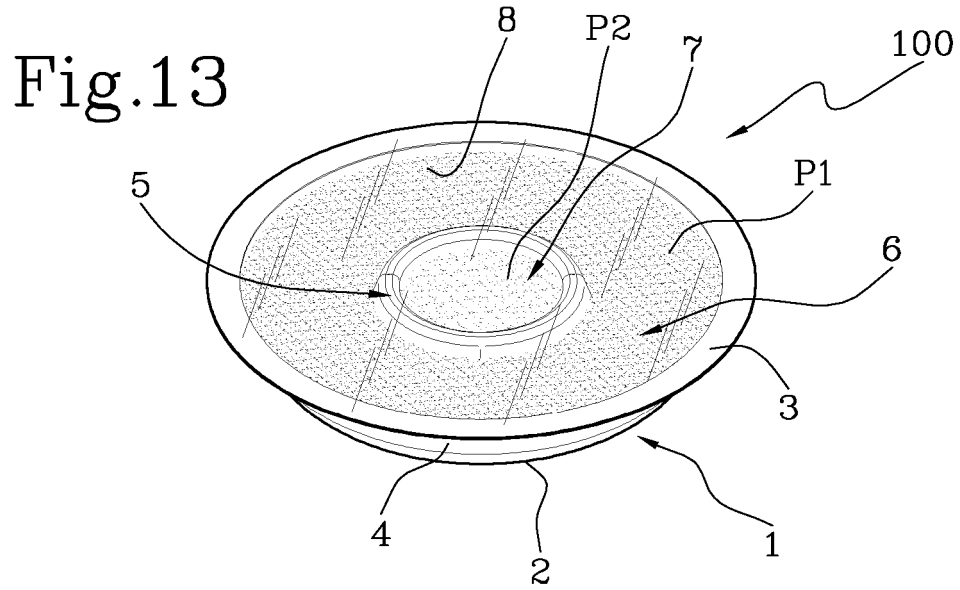


Fig.16

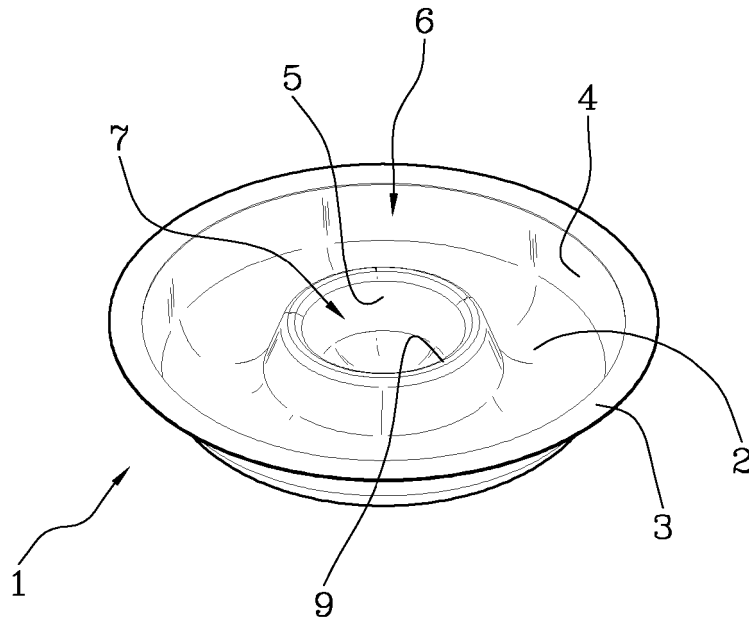


Fig.17

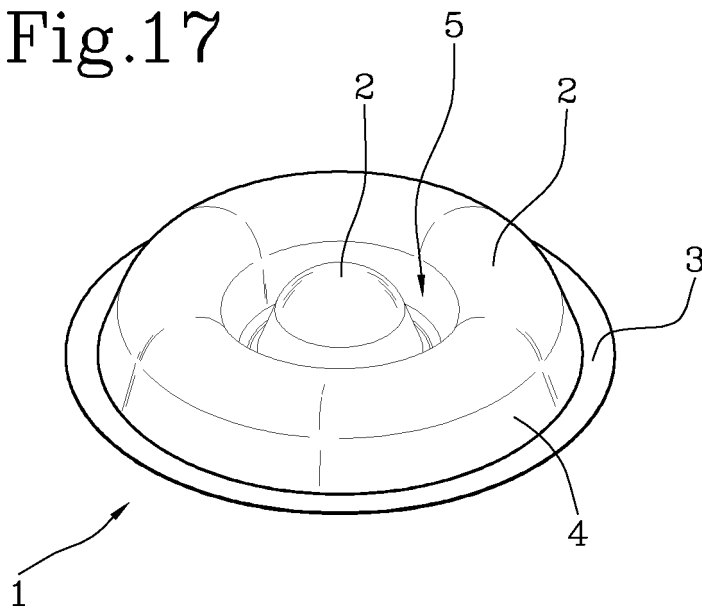


Fig.19

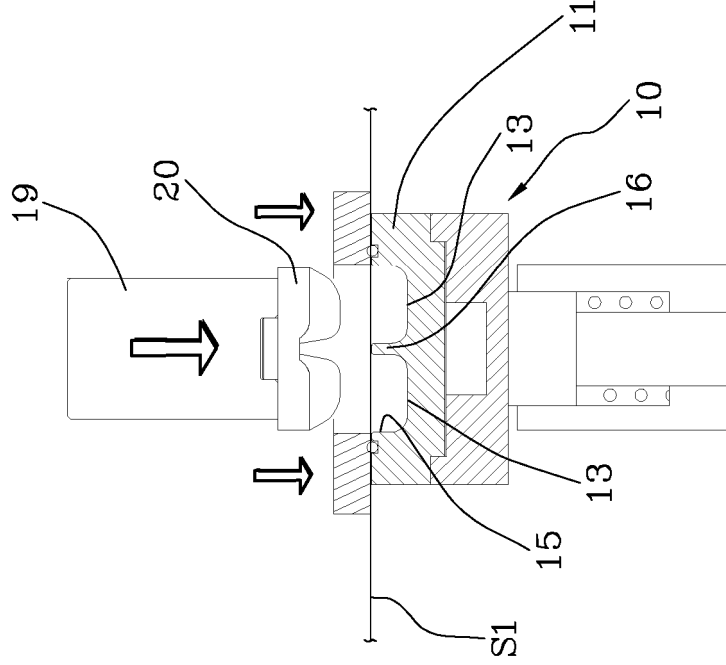


Fig.18

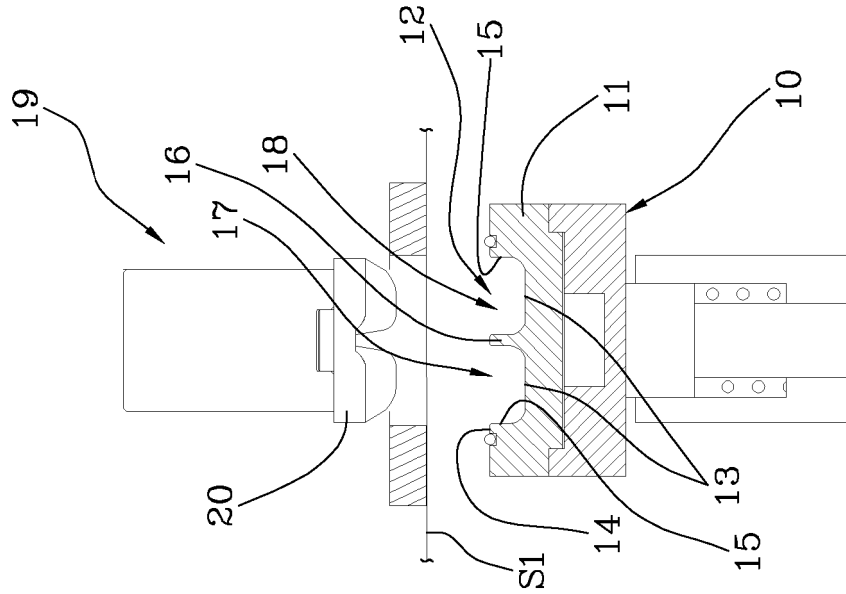




Fig.20

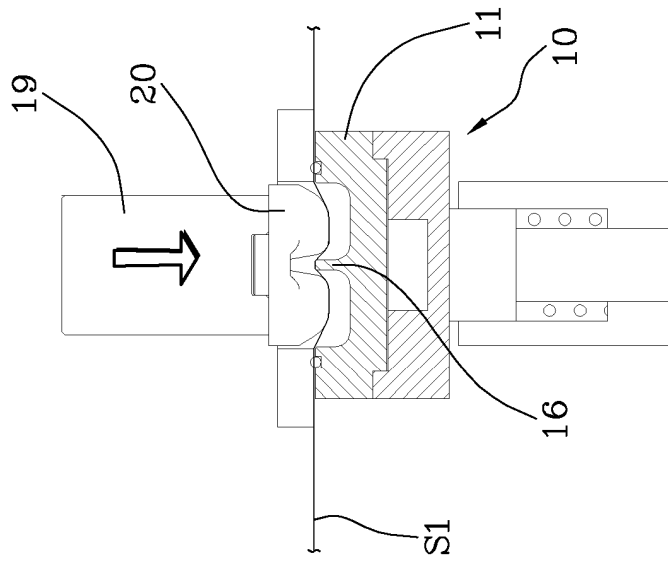


Fig.21

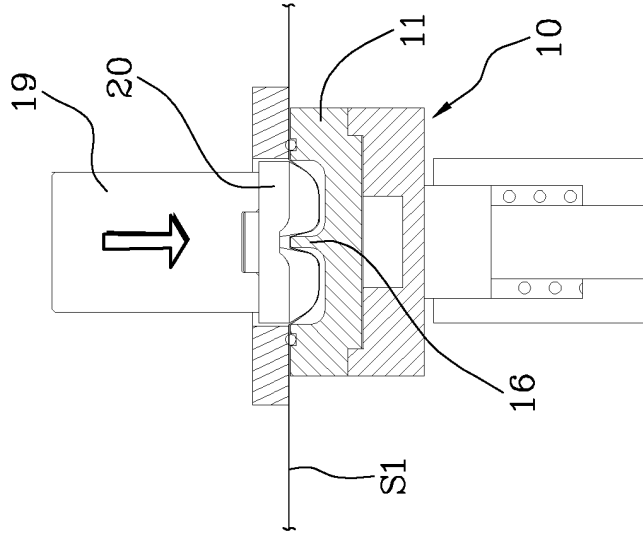


Fig.22

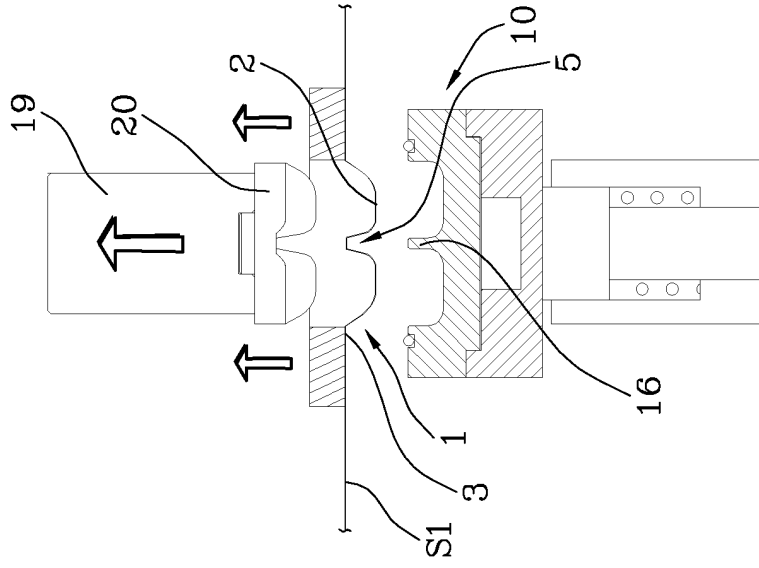


Fig. 23

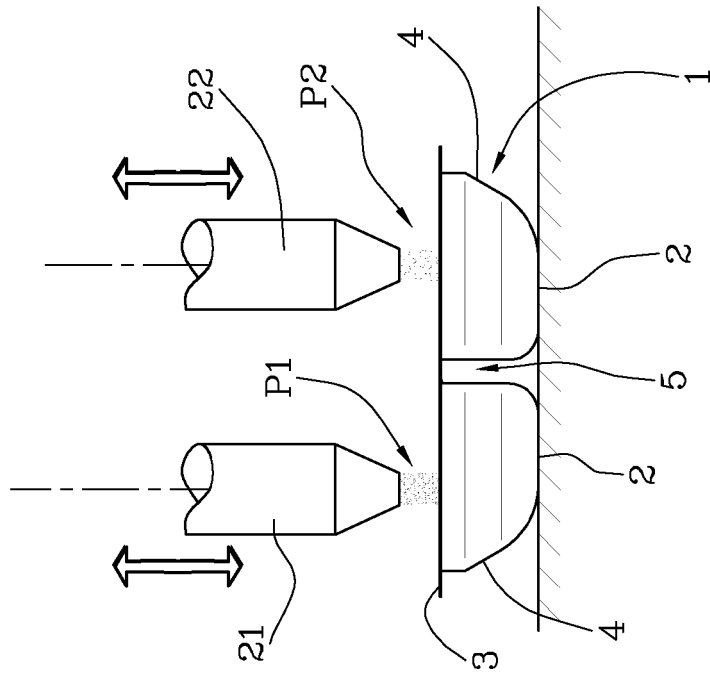
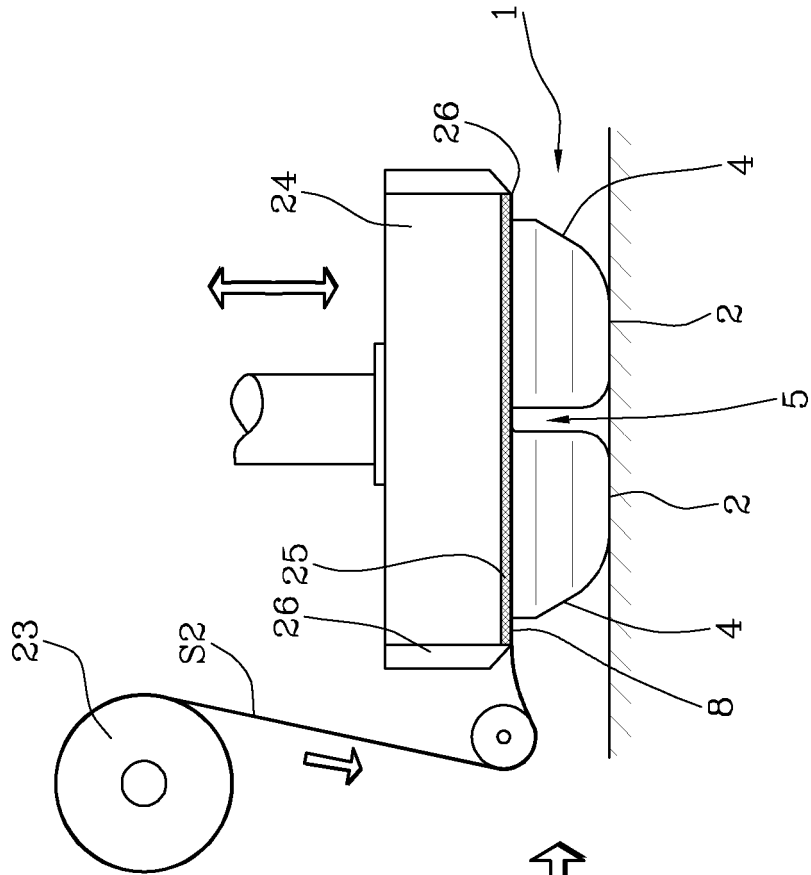


Fig. 24



**REFERENCES CITED IN THE DESCRIPTION**

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