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(71) Applicant: **Unilever N.V.**
3013 AL Rotterdam (NL)

(72) Inventor: **KOEKKOEK, Marco**
Vlaardingen, 3133 AT (NL)

(74) Representative: **van Benthum, Wilhelmus A. J.**
Unilever Patent Group
Olivier van Noortlaan 120
3133 AT Vlaardingen (NL)

(54) **DISPENSING BAG**

(57) Dispensing bag comprising a first outer wall, a second outer wall and a membrane, adjacently oriented, wherein a product is present in the compartment between the membrane and the second outer wall, wherein the surface of the membrane facing the first outer wall is releasably connected to the first outer wall.

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Description

[0001] The present invention relates to a dispensing bag. The invention further relates to a method for emptying the dispensing bag.

Background of the invention

[0002] Several products, for example with a pasty texture, are often distributed before use via a dispensing apparatus. Examples are ice cream or sauces, such as dressings like mayonnaise, ketchup or mustard, that are sold via a vending machine. But also a personal care product, like e.g. liquid or pasty soap or skin cream could be dispensed with such a machine. The product is dispensed from the machine in an amount suitable for use or desired for consumption. The product to be dispensed is stored, e.g. in the dispensing apparatus, in a relatively large volume. Storage can for example be facilitated via a storage bag or storage container which contains the product to be dispensed, e.g. in a bag-in-box arrangement.

[0003] Although this has functioned reasonably well, this way of working faces some disadvantages in terms of sustainability. The packaging material of a container can be heavy, which adds to the price during transportation. Also, many types of bags and containers nowadays used are not emptied completely after use, and part of the product to be dispensed is discarded.

[0004] DE19513223 discloses a dual-container dispensing bag. It comprises a container for viscous product with two openings, an outer bag and an inner bag comprising the product to be dispensed.

[0005] A problem that maintains here is that much of the product to be dispensed from the inner bag, especially a more viscous product, remains in the bag. Especially in food industry where many restaurants use this dispensing bag, the total amount of product discarded adds up to significant amounts and costs.

Summary of the invention

[0006] Surprisingly, this problem has been solved by the device according to claim 1.

[0007] In a first aspect, the invention relates to a dispensing bag, comprising a first outer wall (1), a second outer wall (2) and a membrane (3), adjacently oriented, wherein

- the outer walls (1), (2) and the membrane are flexible,
- the membrane is connected at its periphery to the outer walls, dividing the volume of the dispensing bag in a first compartment (4) between the first outer wall and the membrane, and a second compartment (5) between the membrane and the second outer wall,
- wherein the first outer wall comprises a gas inlet (6), and
- wherein the second outer wall comprises a product outlet (7),
- wherein the dispensing bag comprises a first end (8) and a second end (9), wherein the gas inlet (6) and the product outlet (7) are located at opposite ends (8), (9), of the dispensing bag,
- wherein product is present in the compartment between the membrane and the second outer wall.

[0008] The dispensing bag is characterised in that the surface of the membrane (3) facing the first outer wall is releasably attached to the first outer wall.

[0009] In a further aspect, the invention relates to a dispensing apparatus comprising a dispensing bag according to the invention.

[0010] In another aspect, the invention relates to a method for emptying a dispensing bag according to the invention, the method comprising the steps of:

a) adding a gas to the first compartment (4),
b) allowing an amount of the product to be dispensed to dispense from the second compartment (5).

Detailed description

[0011] The invention relates to a dispensing bag. Consequently, no rigid (non-flexible) outer container is present, as the outer walls are flexible in the present invention. The flexible material of the outer walls (1,2) and membrane (3) of the dispensing bag provides for optimal emptying. During the emptying process, the membrane releases from the first outer wall (1) and aligns to the inside of the second outer wall (2), thereby pushing the product out of the first compartment.

[0012] The material for the outer walls (1,2) is known in the art, it can preferably be a laminate. Preferably, the outer wall comprises plastic, preferably with a barrier, e.g. to keep oxygen out. A preferred barrier is EVOH (ethylene vinyl alcohol), but aluminium, or other metal layer, or SiOx can be used as barrier. The plastic can preferably comprise polyolefine like preferably polyethylene or polypropylene. The plastic may further comprise low density polyethylene (LDPE). The material can further comprise polyamide (e.g. Nylon) to provide a strength to the bag. Combinations of these materials are preferred, such as most preferably a LDPE/PA/EVOH/PE material. The outer walls are flexible. They are preferably not elastic.

[0013] The membrane (3) is situated between the outer walls. It preferably comprises plastic. It preferably comprises one or more of the materials polyolefine like preferably polyethylene or polypropylene. The plastic may further comprise low density polyethylene (LDPE). It can

be preferred that a barrier is present. A preferred barrier is EVOH (ethylene vinyl alcohol), but aluminium, or other metal layer, or SiOx can be used as barrier. Although the presence of a strengthening layer is less relevant as it is for the outer walls, such a layer can be present, e.g. comprising polyamide. The membrane is flexible. It is preferably not elastic. The flexibility of the membrane is preferably higher than that of the outer walls, which allows the membrane to push more efficiently to the inner side of the second outer wall during the process of emptying the compartment comprising the product.

[0014] The constellation of the present dispensing bag provides for efficient dispensing of product wherein preferably the amount of product that is left behind in the bag is preferably minimal and preferably reduced compared to existing dispensing bags without the membrane-mediated emptying mechanism. During use, the pressure caused by the gas, such as air or CO_2, entering the first compartment (4) between the first outer wall and the membrane releases the membrane from the first outer wall in a progressive manner, starting from the area where the gas enters the first compartment (4). When gas enters the first compartment, , thereby creating and/or enlarging the first compartment, the membrane is progressively released and pushed towards the inner side of the second outer wall (2), generating the force that pushes out the product from the second compartment (5) between the membrane and second outer wall (2). In this respect, it is therefore preferred, that the force required to push out the product is less than the force required to release the membrane from the first outer wall. In this manner, the release of the membrane proceeds in an optimal way, following the level of product in the second compartment, reducing the risk of leaving product behind.

[0015] The gas preferably enters the dispensing bag at a side opposite to the side where the product leaves the bag. In this respect, it is desired that the gas inlet (6) to the first compartment is located at one end, the first end, (8) of the dispensing bag, and the outlet from the second compartment is located at the opposite end (9), the second end. The first end is normally referred to as the top side and the second end as the bottom side, reflecting the direction of flow of the product from top to bottom when used in a dispensing machine.

The shape of the dispensing bag is preferably longitudinal, or triangular, for an optimal emptying process. Most preferred is longitudinal. For example, when the bag is triangular, preferably the first end (8) is the base of the triangle and the second end (9) is the apex. The top side, or first end (8), is preferably understood as the 25% of the length (longest dimension) near the ending of the first outer wall. The bottom end, or second end (9), is preferably understood as the 25% of the length (longest dimension) near the ending of the second outer wall, opposite to the first end.

[0016] The dispensing bag preferably has a volume of from 0.5 to 10 dm^3, preferably of between 1 and 7 dm^3, even more preferably of between 2.5 and 6 dm^3. This volume refers to the maximum volume contained between the membrane and the second outer wall. The shape of the dispensing bag is preferably rectangular when empty. The dispensing bag is preferably composed of three adjacently arranged sheets of foil. These sheets are preferably sealed together at their peripheries, having an outer seal (10), in this manner providing two compartments.

The sheet in the middle, the membrane, is aligned to the first outer wall and releasable connected to it. The releasable connection preferably comprises sealing, to create a non-permanent seal (11). Applying non-permanent sealing is a technique well-known to the skilled person and may involves heat sealing, ultrasonic or induction sealing, wherein heat sealing is preferred. When the layers comprise a metal, like aluminium, ultrasonic or induction sealing may be preferred to create the non-permanent sealing. The sealing can be in the form of a sealing pattern of lines. The non-permanent sealing is preferably not over the entire surface. By applying more sealing lines, the force to separate the membrane from the first outer wall becomes higher. It is in the skill of the artisan to apply the seals, taking into account parameters such as the pressure applied during sealing, sealing time and sealing temperature and the materials to be sealed. For example, PE has a relatively low melting temperature, and will need a relatively small amount of energy during sealing, for example 160-180 °C during 1-4, preferably 2-3 seconds. PE can therefore be preferred as material in the membrane and/or outer wall. PP might need a slightly higher temperature. The skilled person will understand that the higher the temperature, the shorter the sealing time, to create non-permanent seals. The seals are preferably applied in lines, in the direction of the length of the bag, for optimal control of the release of the membrane during emptying of the bag.

[0017] It can be preferred that instead of, or in addition to non-permanent seals, non-permanent adhesive is used to create the releasable connection. When using adhesive, connection of the membrane to the first outer wall can be in the form of connecting areas, like lines, or over the surface, and is preferably over its surface, preferably over its entire surface. The membrane is preferably attached by a releasable adhesive, as known in the art. Non-permanent seals are preferred over adhesive-mediated adherence. This is because the quality of the seals is more stable over storage time, and therefore a more predictable release behaviour is obtained.

[0018] The bag comprises product to be dispensed. The product is present in the second compartment (5) between the membrane and the second outer wall. The product is preferably liquid or pasty. The dispensing bag of the present invention is especially suitable for products that are in the form of a viscous liquid or in the form of a paste. Such products are more prone to stay behind in a dispensing bag than runny liquids.

[0019] The product is preferably a food product, pref-

erably a sauce, such as mayonnaise, ketchup or mustard; or an ice cream.
The product can be a personal care product, such as a liquid soap or a skin cream.

[0020] In case the product is a sauce, such as ketchup, mayonnaise or mustard, the viscosities are preferably in a preferred range, normal for these products. Such viscosities are preferably measured with a Brookfield measurement, according to the following protocol:

> 'Brookfield viscosity' measurements
> Semi-solid products, like mayonnaise, salad dressings, sauces have a 'Brookfield viscosity'. In this method, the resistance of a specified measuring spindle under specified conditions is translated to 'Brookfield viscosity'.

Measurement protocol:

[0021]

- The equipment used is a 'Brookfield DV2TRV'
- Temperature: room temperature (20° - 25° C)
- Measuring time: 30 sec
- No spindle guardleg
- Container: a beaker or jar with a diameter of approximately 60 mm and a height of approximately 65 mm

[0022] Typical 'Brookfield viscosities' [in mPas] for different products are:

- Mayonnaise: 10000-30000 mPas (spindle #7)
- Salad Dressings: 1500 to 6000 mPas (spindle #5)
- Ketchup: 3500 to 7000 mPas (spindle #5 or #6)
- Mustard: 7000 to 12000 mPas (spindle#6)
- Other Dressings (e.g. Mayonaise light, 40% fat): 8000 to 25000 mPas (spindle #7)

[0023] In case the product is ice cream, the yield stress at -20 °C is preferably of between 4000 Pa and 8500 Pa, preferably of between 5000 Pa and 6500 Pa.

[0024] The rheology of the ice cream is measured as follows:

> Preceding the rheological measurements, the samples in the rheology cups are equilibrated overnight in a portable freezer set at the temperature of interest.

[0025] All measurements are performed on an Anton Paar MCR 501 rheometer, which is connected to a double circulating bath for temperature control. The rheometer consists of a temperature controlled sample holder and a hood to cover the sample. Cold air is blown onto the sample, via the hood, to prevent condensation and frost formation. A vane 10-4V-8.8/116 geometry is used, which is a 4-blade vane with a diameter of 8.8 mm, a height of 10 mm and a shaft length of 116 mm.

[0026] Before insertion of the sample, the vane was lowered to the measurement position to equilibrate the vane, sample holder and hood to the test temperature - either -14, -16, -18, -20, or - 22 °C. The measurement position was set at 10 mm. After equilibration a rheology cup containing the sample was inserted into the sample holder and the hood was lowered until it touched the base. The wall of the rheology cup was serrated to prevent wall slip. The vane was then further lowered into the measurement position at a very slow speed of 100 μm per second to not damage the structure of the sample too much.

[0027] Before the measurement commenced, the sample is equilibrated for 20 minutes to allow for internal structure recovery and final equilibration to the test temperature. An oscillatory amplitude sweep test is performed on the sample, controlled by Rheoplus software. A strain range of 0.001% to 100% is imposed with 10 points per decade on a log scale at a frequency of 10 Hz. The measurement point duration is fixed at 20 s. All measurements are performed in triplicate with a new sample being used for every measurement.

[0028] The yield stress is obtained from the data, as this is an indicator for the flowability of the ice cream. The yield stress is determined by finding the highest value of the elastic stress before the cross-over point between the elastic stress and the viscous stress. Elastic Stress is calculated by multiplying the storage (elastic) modulus by the strain and viscous Stress is calculated by multiplying the loss (viscous) modulus by the strain

[0029] In case the product in the bag is a personal care product, the following viscosities are normal in the art and preferably apply in the present in invention: 500 to 10000 mPa-s, preferably 1000 to 5000 mPa-s, more preferably 1500 to 4000 mPa-s. The average for lotions is ~2000 mPa-s, but can range from 300 (which would be like water) to 4000 mPa-s, which would actually be like a soft creme. Hence, more preferred is 1000 to 4000. The average for creams is ~4000 mPa-s, but could go from 2000 mPa-s up to 10,000 mPa-s. The values are measured in the following manner: The measurement is viscosity at a shear rate of $100s^{-1}$, measured on an ARES rheometer using 25 mm parallel plates at ambient temperature (23°C). This is a device-independent measurement. It can be done on any rheometer with parallel plates (but not on an "indexer" such as a Brookfield).

[0030] In a further aspect, the invention relates to a dispensing apparatus comprising a dispensing bag according to the invention. Such a dispensing apparatus is preferably a dispensing apparatus for ice cream, or sauce, such as ketchup, mayonnaise or mustard. It can be a dispensing apparatus for a liquid or pasty personal care product, such as liquid soap or skin cream.

[0031] In a further aspect, the invention relates to a method for emptying a dispensing bag according to the invention, characterised by the steps of:

> a) adding a gas to the compartment (4) between the

membrane and the first outer wall,
b) allowing an amount of the product to be dispensed to dispense.

The gas is preferably added in an amount sufficient to dispense the amount of product, preferably a food or personal care product, to be released from the compartment (5) between the membrane and the second outer wall. This can be easily judges by the user. The pressure used to add the gas, is preferably of between 0.1 and 1 atmosphere.

EXAMPLES

[0032] The invention is now illustrated with the following, nonlimiting example.
[0033] Figure 1 illustrates a dispensing bag and the process to release a food product from it.
[0034] Figure 1 shows a representation of 5 bags according to the invention. The first representation shows a dispensing bag wherein no product to be dispensed is present. The bag comprises a first outer wall (1), a second outer wall (2), membrane (3) sealed between the outer walls. The dispensing bag shows a first compartment (4) between the first outer wall (1) and the membrane (3), and a second compartment (5) between the membrane (3) and the second outer wall (2). In the second till the fifth representation, the second compartment contains product to be dispensed. The dispensing bag comprises a top part, or first end (8) and a bottom part, or second end (9). A gas entry (6) is present at the top part, a product outlet (7) is present at the bottom part. The second till the fifth representation show the emptying process of the dispensing bag, wherein the first compartment is filled with gas, and the second compartment is released due to pressure to the membrane. The membrane aligns along the inside of the second outer wall, and the product is released from the second compartment through the product outlet.
[0035] Figure 2 illustrates a dispensing bag of the invention wherein a seal pattern is applied. An outer seal (10) is a permanent seal that connects the first and second outer walls and the membrane at their periphery. Non-permanent seals (11) in the form of lines adhere the membrane to the first outer wall.

Claims

1. Dispensing bag comprising a first outer wall (1), a second outer wall (2) and a membrane (3), adjacently oriented, wherein

    • the outer walls (1), (2) and the membrane are flexible,
    • the membrane is connected at its periphery to the outer walls, dividing the volume of the dispensing bag in a first compartment (4) between the first outer wall and the membrane, and a second compartment (5) between the membrane and the second outer wall,
    • wherein the first outer wall comprises a gas inlet (6), and
    • wherein the second outer wall comprises a product outlet (7),
    • wherein the dispensing bag comprises a first end (8) and a second end (9), wherein the gas inlet (6) and the product outlet (7) are located at opposite ends (8), (9), of the dispensing bag,
    • wherein a product is present in the compartment between the membrane and the second outer wall,

    characterised in that the surface of the membrane (3) facing the first outer wall is releasably connected to the first outer wall.

2. Dispensing bag according to claim 1, **characterised in that** the inner membrane is connected to the outer wall via non-permanent seals (11), a releasable adhesive or a combination thereof.

3. Dispensing bag according to anyone of the preceding claims, **characterised in that** the flexibility of the membrane is higher than that of the outer wall.

4. Dispensing bag according to anyone of the preceding claims, **characterised in that** the force required to push out the food product is less than the force required to release the membrane from the first outer wall.

5. Dispensing bag according to anyone of the preceding claims, **characterised in that** the membrane is not elastic.

6. Dispensing bag according to anyone of the preceding claims, **characterised in that** the viscosity of the food product is of between 3500 and 30000 mPa.s at 20-25 °C measured with Brookfield viscometer and spindle size 6.

7. Dispensing bag according to anyone of the preceding claims, **characterised in that** the membrane comprises one or more of polyolefine, low density polyethylene (LDPE), a barrier material.

8. Dispensing bag according to anyone of the preceding claims, **characterised in that** outer wall comprises polyolefine, low density polyethylene (LDPE), polyamide, a barrier material.

9. Dispensing bag according to anyone of the preceding claims, **characterised in that** the space between the membrane and the second outer wall has a volume of between 0.5 and 10 d_{m3}.

10. Dispensing bag according to anyone of the preceding claims, **characterised in that** the food product is a sauce, ice cream, skin cream or liquid soap.

11. Dispensing bag according to anyone of the preceding claims, **characterised in that** the dispensing bag has rectangular or triangular shape.

12. Dispensing apparatus comprising a dispensing bag according to anyone of the preceding claims.

13. Method for emptying a dispensing bag according to anyone any one of the preceding claims, **characterised by** the steps of:

a) adding a gas to the first compartment (4),
b) allowing an amount of the product to be dispensed to dispense from the second compartment (5).

14. Method according to claim 13, wherein gas is added in an amount sufficient to dispense the amount of product to be released from the second compartment.

Fig. 1

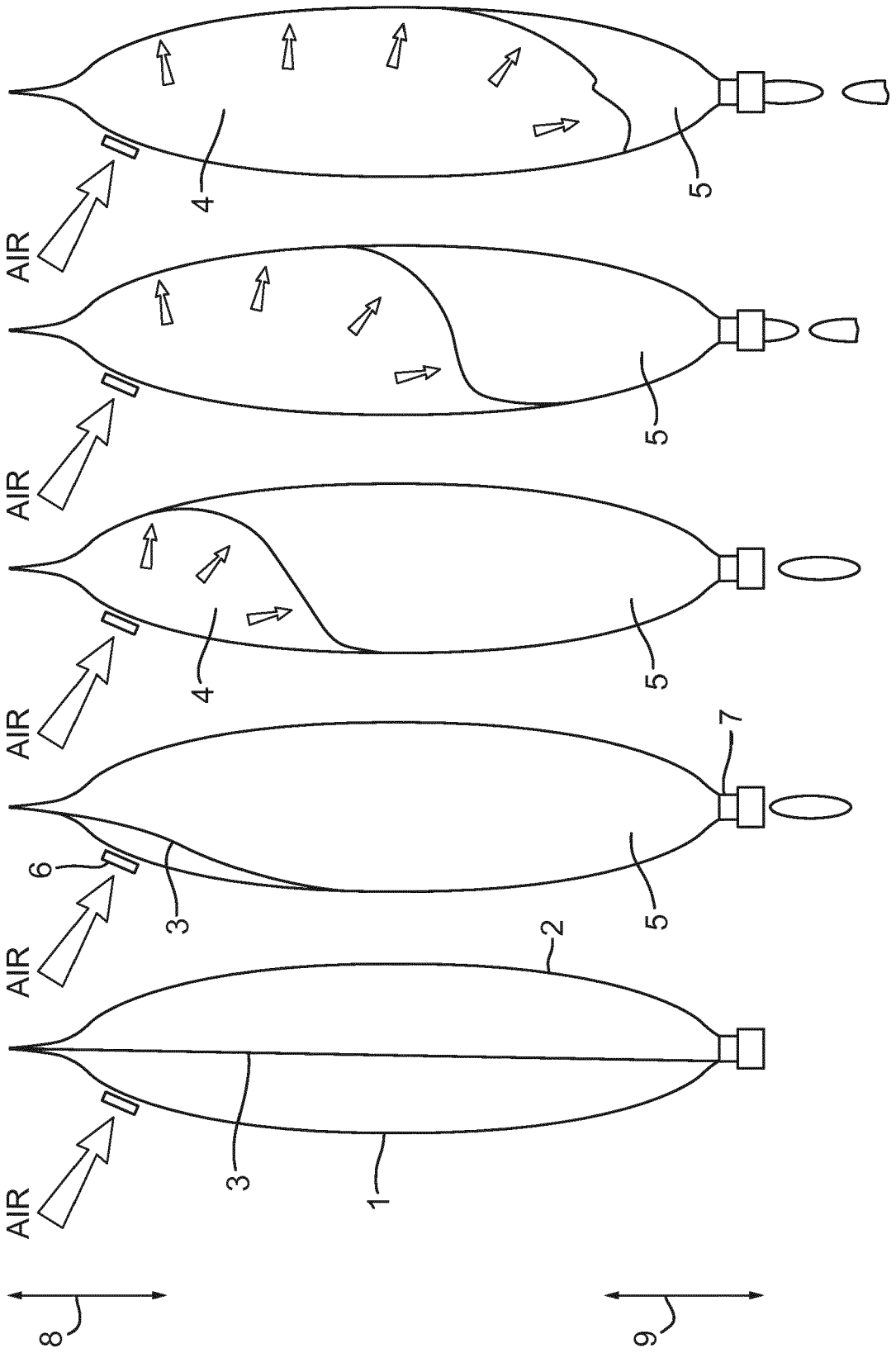
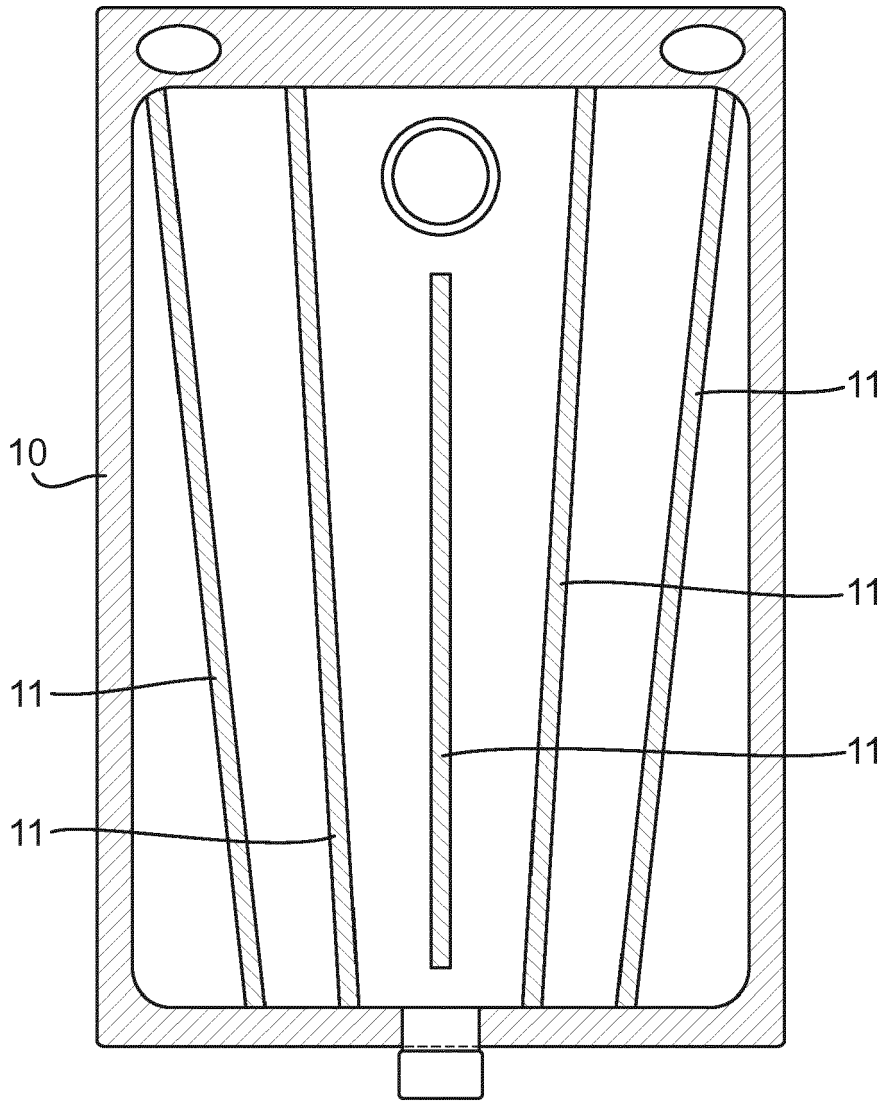


Fig. 2



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EUROPEAN SEARCH REPORT

Application Number
EP 17 19 1042

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	5 February 2018	Wimmer, Martin

CATEGORY OF CITED DOCUMENTS

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05-02-2018

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

REFERENCES CITED IN THE DESCRIPTION

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