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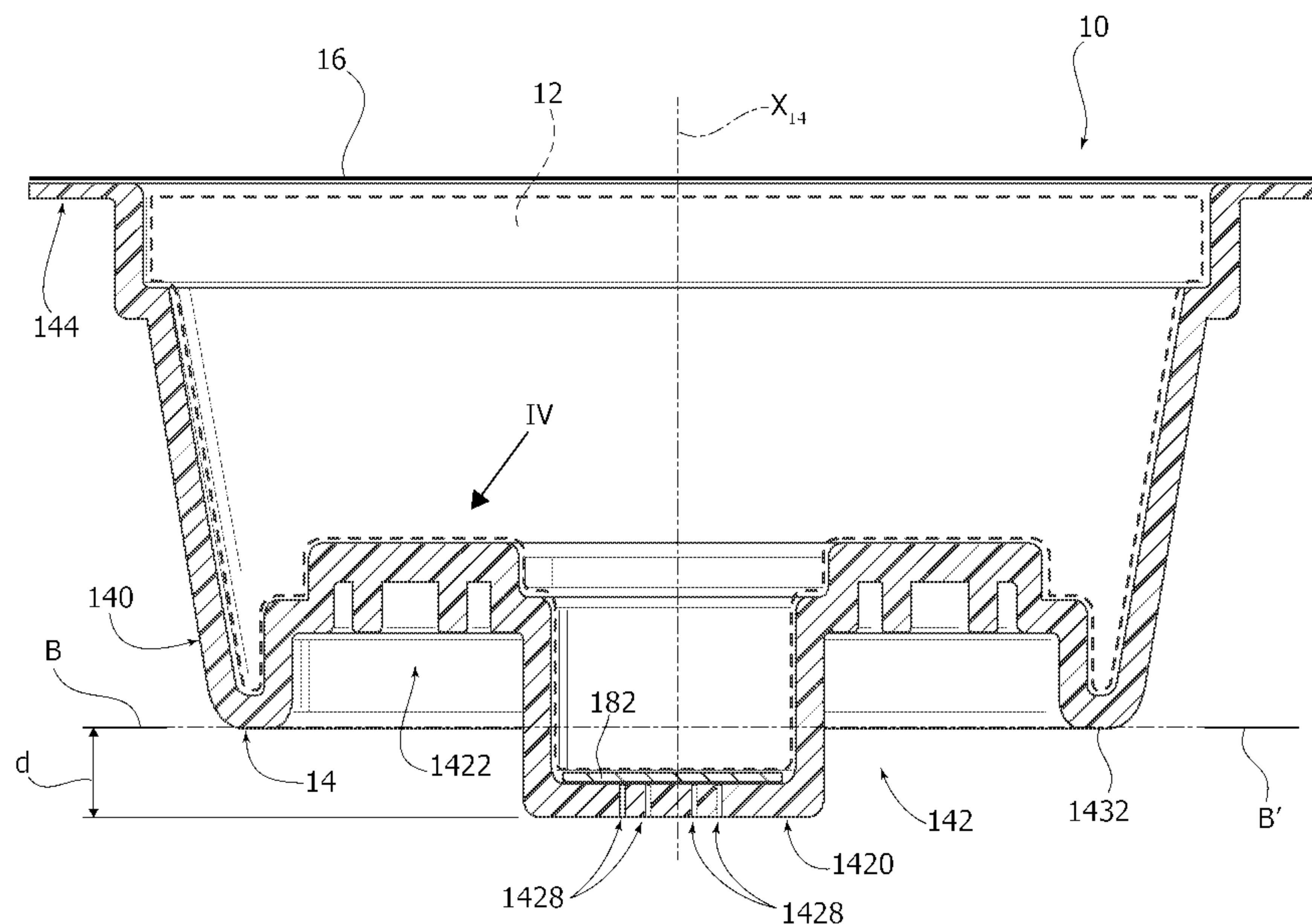
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(54) Title: CARTRIDGE FOR THE PREPARATION OF A LIQUID PRODUCT, AND CORRESPONDING ASSORTMENT

FIG. 3



(57) **Abrégé/Abstract:**

A cartridge (10) for the preparation of a liquid product by means of liquid and/or steam introduced into the cartridge (10) comprises a casing (14) with a central axis (X14), which has inside it a receiving chamber with a filling of a substance (12) for preparation of the liquid product. The casing has a bottom wall (142), through which the liquid product is able to flow out of the cartridge (10). The aforesaid bottom wall (142) has a peripheral rim (1432) lying in a plane (B-B') and has, when viewed from outside the cartridge (10), a protruding central portion (1420) that provides on its inside an extension of said receiving chamber with a filling of a substance for preparation of the liquid product. The central portion (1420) protrudes from the casing of the cartridge beyond (d) the plane (B-B') in which the peripheral rim (1432) lies and is surrounded by an annular portion (1422) of the bottom wall, which extends in a direction orthogonal to the central axis (X14) of the cartridge. At least one opening (1428) for outflow of the liquid product from the cartridge (10) is provided, located in the protruding central portion (1420), with the bottom wall (142) that, in the aforesaid annular portion (1422), is without openings (1428) for outflow of said liquid product from the cartridge (10).

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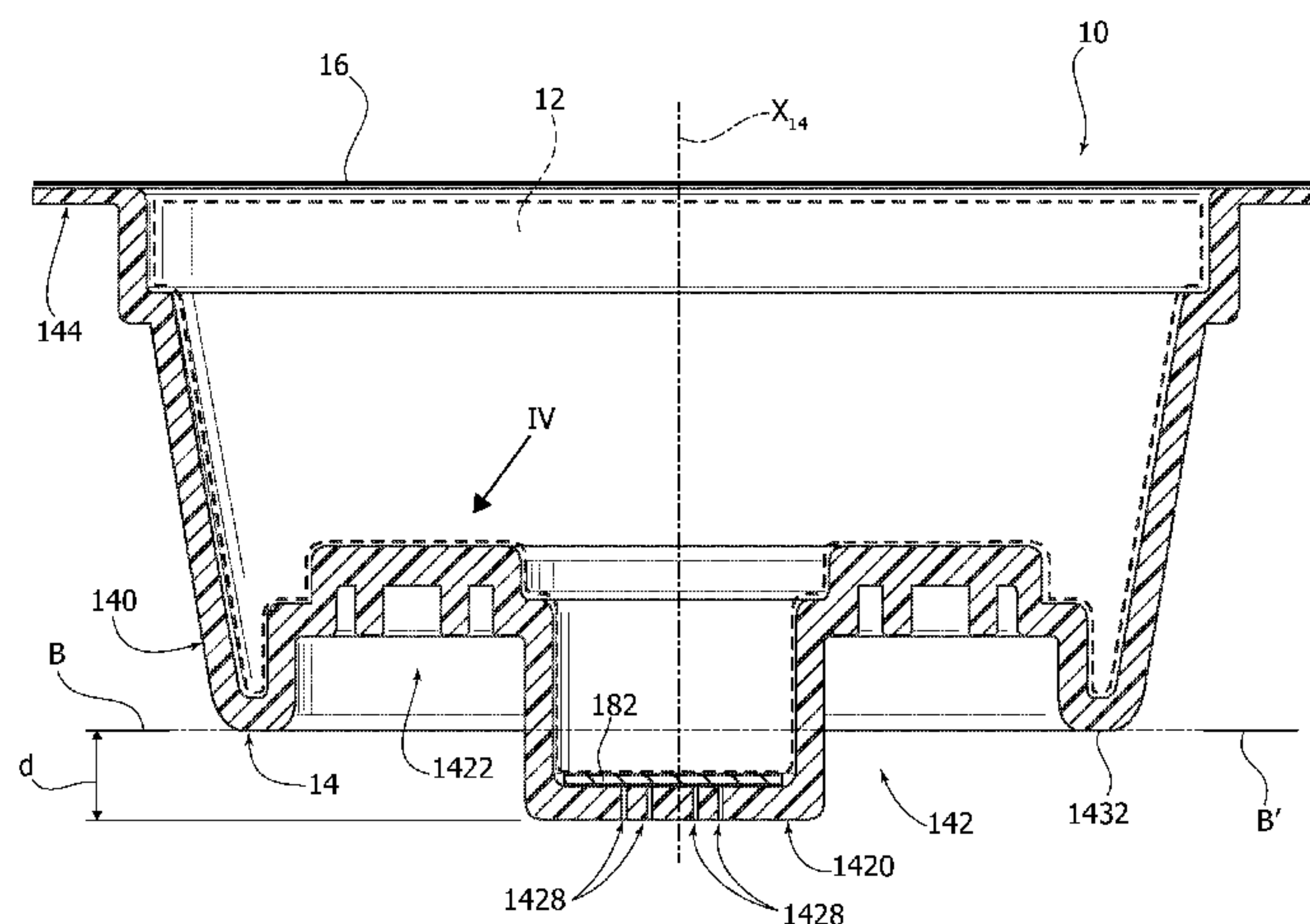
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(54) Title: CARTRIDGE FOR THE PREPARATION OF A LIQUID PRODUCT, AND CORRESPONDING ASSORTMENT

FIG. 3



(57) **Abstract:** A cartridge (10) for the preparation of a liquid product by means of liquid and/or steam introduced into the cartridge (10) comprises a casing (14) with a central axis (X14), which has inside it a receiving chamber with a filling of a substance (12) for preparation of the liquid product. The casing has a bottom wall (142), through which the liquid product is able to flow out of the cartridge (10). The aforesaid bottom wall (142) has a peripheral rim (1432) lying in a plane (B-B') and has, when viewed from outside the cartridge (10), a protruding central portion (1420) that provides on its inside an extension of said receiving chamber with a filling of a substance for preparation of the liquid product. The central portion (1420) protrudes from the casing of the cartridge beyond (d) the plane (B-B') in which the peripheral rim (1432) lies and is surrounded by an annular portion (1422) of the bottom wall, which extends in a direction orthogonal to the central axis (X14) of the cartridge. At least one opening (1428) for outflow of the liquid product from the cartridge (10) is provided, located in the protruding central portion (1420), with the bottom wall (142) that, in the aforesaid annular portion (1422), is without openings (1428) for outflow of said liquid product from the cartridge (10).



WO 2017/098350 A1

**"Cartridge for the preparation of a liquid product, and corresponding assortment"**

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Technical field

5       The present disclosure relates to cartridges for preparing liquid products.

Various embodiments may refer to cartridges for preparing beverages, for example coffee.

Technological background

10       Cartridges (or capsules or pods, according to other terms widely used) for preparing liquid products, such as a beverage, via introduction, into the cartridge, of liquid (possibly under pressure and/or at a high temperature) and/or steam constitute a  
15       technological sector that is extremely rich and articulated, as documented, for example, by FR-A-757 358, FR-A-2 373 999 (corresponding to which is US-A-4 136 202), FR-A-2 556 323, GB-A-938 617, GB-A-2 023 086, CH-A-406 561, US-A-3 403 617, US-A-3 470 812, US-A-3  
20       607 297 (corresponding to which is FR-A-1 537 031), WO-A-86/02 537, EP-A-0 199 953, EP-A-0 211 511, EP-A-0 242 556, EP-A-0 468 078, EP-A-0 469 162, EP-A-0 507 905, WO 2010/106516 A1, and EP-A-2 218 653.

25       A fair share of the solutions described in the documents referred to above primarily regards preparation of liquid products constituted by beverages such as coffee, tea, chocolate, broth, soups, or various infusions.

30       As regards the preparation of coffee are solutions known (for example from EP-A-0 507 905) that enable preparation of espresso coffee.

35       There are likewise known and widely used solutions in which the consumer buys a machine (e.g., a coffee machine) and then purchases cartridges specifically designed and produced for functioning in combination

with that machine.

In this way, for the consumer, at the moment of purchase certain salient characteristics of the cartridge/machine system are defined and substantially  
5 can no longer be modified, these characteristics, for example, being:

- the outer shape of the cartridge for enabling it to be introduced into the machine;

- the configuration of the infusion chamber that  
10 contains the cartridge during the process of brewing of the liquid product, such as a beverage;

- the modalities of interaction of the material constituting the cartridge with the infusion chamber;

- the modalities of brewing of the beverage;

- the modalities of introduction of the cartridge  
15 at start of delivery; and/or

- the modalities of ejection of the cartridge at the end of delivery.

For instance, EP-A-0 507 905 describes a cartridge  
20 that is to be perforated by filtering tips as a result of the pressure of the liquid and/or steam introduced into the cartridge.

A solution of this type may be used, for example, for producing cartridges or capsules of a perforable  
25 type, in which:

- the top sealing foil of the cartridge (through which hot water and/or steam is introduced) is mechanically perforated by the delivery assembly via a first set of perforating tips; and

- the bottom of the cartridge (through which the  
30 beverage flows out) can be perforated by a second set of hollow tips (roughly resembling injection needles) with filtering characteristics.

Solutions of the above type are particularly  
35 suited for dispensing beverages of an espresso-coffee

type.

Documents such as EP 1 295 554 A1, WO 2006/005736 A2, or EP 1 886 942 A1 identify specific solutions regarding filtering tips, the mechanism of opening/closing/perforation by the perforating tips, and the type of cartridge, with corresponding system.

The document No. WO 2010/106516 A1 describes a type of cartridge such as to combine a filter paper and a biopolymer, the filter paper being positioned on the side of the outlet for the beverage (coffee).

This type of cartridge may be unusable in coffee machines provided with perforating tips. In fact, the bottom, which is pre-perforated (hence already pervious), has a plane shape that may be unsuited for use in combination with particular types of filtering tips, which may alternatively:

- first cut into the part of biopolymer and then cut into the paper, with the risk that, for example, the ground coffee under pressure used for preparing the beverage may be entrained with the beverage into the dispensing container (cup); or

- assume the shaped of a stocking, thus inhibiting delivery.

Added to this is the possible risk of the tips breaking, if they are subjected to repeated cycles of this sort.

Again, the document No. WO 2012/077066 A1 describes a cartridge in which the perforation is aided by the combination of a biodegradable/compostable polymer with material such as paper. It has on the other hand been noted that, in particular conditions of use, the paper contained in the cartridge may be soaked with water/beverage, thus undergoing softening and hence rendering problematical its ejection from the machine in which it is used.

Reference may again be made to the document No. WO 2010/137952 A1, where a cartridge or capsule is described configured for functioning in a machine (originally designed to function with a cartridge of a different type) provided with tips that are designed to  
5 tear the cartridge upon mechanical closing of the assembly for enabling entry of water into the cartridge through the tears made.

The cartridge according to the solution described  
10 in WO 2010/137952 A1 (which on the other hand does not mention the possible use of "bio" materials) is configured so as to not to interact with the perforating tips of the machine in so far as the tips in question do not touch the bottom of the cartridge.

15 The prior art moreover comprises EP 1 579 792 A1. One or more embodiments may refer to cartridges of the type described in WO 2014/097039 A1.

#### Object and summary

The object of the various embodiments is to  
20 provide further improvements over the solutions referred to above, for example as regards the possibility of using in succession one and the same machine for preparing different liquid products, reducing any possible effects of cross-contamination.

25 Various embodiments enable the above object to be achieved thanks to a cartridge having the characteristics recalled in the ensuing claims.

Various embodiments may also regard an assortment of cartridges with differentiated characteristics.

30 The claims form an integral part of the technical teaching provided herein in relation to the invention.

#### Brief description of the drawings

Various embodiments will now be described, purely by way of non-limiting example, with reference to  
35 annexed drawings, in which:

- Figure 1 is a general perspective view of a cartridge according to embodiments;

- Figure 2 is a perspective view from beneath of embodiments;

5       - Figure 3 is a cross-sectional view according to the line III-III of Figure 2, reproduced at an enlarged scale; and

10       - Figure 4 illustrates, at a further enlarged scale, the portion of Figure 3 indicated by the arrow IV.

#### Detailed description

Illustrated in the ensuing description are various specific details aimed at providing an in-depth understanding of various examples of embodiment. The  
15       embodiments may be implemented without one or more of the specific details, or with other methods, components, materials, etc. In other cases, known structures, materials, or operations are not illustrated or described in detail so that the various  
20       aspects of the embodiments will not be obscured. Reference to "an embodiment" or "one embodiment" in the framework of the present description is intended to indicate that a particular configuration, structure, or characteristic described in relation to the embodiment  
25       is comprised in at least one embodiment. Hence, phrases such as "in an embodiment", "in one embodiment", or the like that may be present in various points of the present description do not necessarily refer to one and the same embodiment. Furthermore, particular  
30       conformations, structures, or characteristics may be combined in any adequate way in one or more embodiments.

The references used herein are provided merely for convenience and hence do not define the sphere of  
35       protection or the scope of the embodiments.

In the figures, the reference number 10 designates as a whole a cartridge (or pod, or capsule, these terms being used herein as being equivalent) for the preparation of a liquid product via introduction of liquid and/or steam into the cartridge.

In one or more embodiments, the cartridge 10 may contain a filling or dose 12 (represented schematically with dashed lines just in Figure 3) of a substance or ingredient for the preparation of a liquid product such as a beverage, chosen, for example, from: toasted and ground coffee, leaf tea, powdered or soluble milk, soluble coffee, soluble chocolate, soluble barley, sugar, soluble powdered flavourings, and combinations thereof.

In one or more embodiments, the liquid product in question may be obtained by introducing into the cartridge liquid and/or steam under pressure and at high temperature (i.e., hot).

In any case, the possible reference, in the framework of the present detailed description, to the preparation of a particular beverage is not to be understood as in any way limiting the scope of the description, which is altogether general.

In one or more embodiments, in the structure of the cartridge 10, which may be shaped like a tray or small cup, which contains the substance 12, there may be distinguished:

- a casing 14, comprising a side wall 140 and a bottom wall 142, which closes the casing 14 at one end of the side wall 140; and

- a sealing foil 16, for example of a peelable type, which closes the cartridge 10 at the end opposite to the bottom wall 142.

The sealing foil 16 is suited to being sealingly connected, for example by heat-sealing, to the side

wall 140 of the casing 14 of the cartridge, for example at a flange 144 that surrounds the mouth part of the casing 14.

5 In one or more embodiments, as represented in the figures, the casing 14 may have a central axis  $X_{14}$ , with respect to which the casing 14 may, for example, present a (cylindrical) symmetry of rotation.

10 In one or more embodiments, as represented in the figures, the casing 14 may be shaped like a tray diverging from the bottom wall 142 to the end closed by the sealing foil 16. In one or more embodiments, the diverging conformation may be frustoconical. This conformation is not on the other hand imperative in so far as the cartridge 14 may as a whole present  
15 different shapes, for example prismatic, frustopyramidal, square, etc.

Various embodiments may refer to the fact that the bottom 142 may present a sculptured structure, i.e., with alternating parts in relief and recessed, for  
20 example, according to the criteria illustrated in WO 2014/097039 A1 (already cited previously), to which the reader is referred for a more detailed description.

For the purposes of the present description, it may be noted that, in one or more embodiments, the  
25 bottom wall 142, through which the liquid product is able to flow out of the cartridge 10, may present, when viewed from outside the cartridge 10 itself, a protruding central portion 1420, surrounded by an annular portion 1422, which, albeit possibly having the  
30 aforesaid sculptured structure, has an overall plane conformation (i.e., not shaped like a funnel or a bowl) and extends in a direction orthogonal to the central axis  $X_{14}$  of the casing 14.

In one or more embodiments, the bottom part 142  
35 may present a peripheral rim 1432 substantially

coplanar to the aforesaid annular portion 1422 or, as in the embodiments exemplified here, protruding from the annular portion 1422.

5 In one or more embodiments, the bottom part 142 may likewise present one or more openings 1428 to enable outflow of the liquid product (e.g., a beverage) formed in the cartridge 10, said opening or openings being provided, exclusively in the central portion 1420, which protrudes from the bottom wall 142.

10 In other words, in one or more embodiments as exemplified here, the bottom wall 142, in the annular portion 1422 and, in general, in the portions that surround the protruding central portion 1420, may be without openings 1428 for outflow of the liquid product  
15 from the cartridge 10.

In one or more embodiments, as may be appreciated more fully in the cross-sectional view of Figure 3, thanks to the fact that the central portion 1420 of the bottom wall 142 protrudes towards the outside of the  
20 cartridge 10, within the cartridge 10 itself there can thus be present an "auxiliary" chamber located in the central portion 1420, which may receive a certain amount of the substance 12.

In one or more embodiments, the opening or  
25 openings 1428 may be made in the form of pervious through holes; conservation of the aroma and, in general, of the organoleptic qualities of the substance 12 may hence be favoured by inserting the cartridge 10 in a sealed sachet (for example, of the flow-pack  
30 type), which can be opened by the user for taking out the cartridge 10 to be used.

In one or more embodiments, a filter element 182 (e.g., comprising filter paper or nonwoven fabric) may be provided coupled to the opening or openings 1428  
35 provided in the protruding central portion 1420 of the

bottom wall 142.

In one or more embodiments, as exemplified here, the filter element 182 (and consequently the openings 1428) may be coupled to the distal end of the protruding portion 1420.

In one or more embodiments, as exemplified here, the filter element 182 can be coupled to the opening or openings 1428 on the inner side of the bottom wall 142 of the cartridge 10.

Figure 4, to which we shall return in what follows, highlights the fact that, in one or more embodiments, the outer surface in the bottom wall 142 of the cartridge 10 may come to face an array of tips P provided in certain brewing machines (according to known criteria, exemplified in various documents cited in the introductory part of the present description), which have the function of perforating the bottom wall of certain cartridges, different from the ones exemplified herein, and cause exit of the liquid product being prepared.

In one or more embodiments as exemplified here, whatever the outer profile of the bottom wall 142 (sculptured with cavities and reliefs, or plane), the latter may present the peripheral rim 1432 (coplanar with respect to the annular portion 1422 or protruding therefrom) that lies in a plane B-B' (see, for example, Figure 3).

In one or more embodiments as exemplified here, the central portion 1420 may protrude from the casing of the cartridge 10 beyond the plane B-B' in which the peripheral rim 1432 lies, for example by an amount denoted by d in Figure 3.

As already indicated in the introductory part of the present description, the preparation of a liquid product with a cartridge as exemplified here may

involve, according to criteria in themselves known:

- perforation of the top sealing foil 16 of the cartridge via a set of perforating tips of the brewing machine;

5       - entry into the cartridge 10, through the perforated foil 16, of hot water and/or steam, which produces with the substance 12 contained in the two chambers of the cartridge 10 a mechanism commonly defined (even if in a way perhaps not altogether  
10 correct) as infusion; and

- outflow of the resulting liquid product through the bottom wall 142 (e.g., through the opening or openings 1428 provided in the protruding portion 1420).

15       In one or more embodiments, the protruding central portion 1420 of the bottom wall 142 may be shaped like a spout for delivery of the aforesaid liquid product.

20       In one or more embodiments, the presence of the filter element 182 may facilitate the action of contrast to exit from the cartridge 10 of the substance 12 through the opening or openings 1428 provided in the protruding portion 1420 of the bottom wall 142.

25       As exemplified in Figures 3 and 4, the fact that, in one or more embodiments, the central portion 1420 protrudes from the casing of the cartridge beyond the plane B-B' in which the peripheral rim 1432 lies, makes it possible, together with the as a whole planar conformation in a direction orthogonal to the axis  $X_{14}$  (hence not shaped like a funnel or bowl) of the annular portion 1422, to keep the bottom wall 142 not in  
30 contact with the tips P, for example keeping it raised with respect to the tips P.

35       At the same time, the central portion 1420, which protrudes from the plane B-B', is made to extend at the centre between the tips P (which may be arranged in an annular array) so as to be able to perform its function

of delivery of the liquid product through the openings 1428.

5 In one or more embodiments, this result can be achieved without penalizing the contents of the dose 12 thanks to the fact that the protruding central portion 1420 provides inside it an extension of the receiving chamber for the dose 12 of the substance for preparation of said liquid product.

10 At the same time, in one or more embodiments, the fact that the liquid product can exit from the capsule 10 only through the opening or openings 1428 provided in the protruding portion 1420 of the bottom wall 142, makes it possible to limit any undesired phenomena of cross-contamination of the tips P by the substance 12  
15 used for preparing a certain product. The tips P may in fact subsequently be used for preparing liquid products, for example for preparing beverages in which the presence of said substance is not envisaged: consider purely by way of example the case of sugar.

20 In one or more embodiments, it is possible to envisage that the extension of the chamber for receiving the dose, which is formed, inside the chamber, by the protruding central portion, will constitute a distinct receiving chamber with a filling  
25 consisting of a second substance for preparation of the aforesaid liquid product and that, on the bottom wall 142, there will be applied a laminar filter element (e.g., filter paper or nonwoven fabric), which separates said second receiving chamber from the rest  
30 of the internal volume of the cartridge 10.

In this way, in one or more embodiments, the cartridge may comprise a casing 14 having inside it a first receiving chamber with a filling of a first substance (e.g., toasted and ground coffee, leaf tea,  
35 powdered or soluble milk) for preparation of the liquid

product, and a second receiving chamber with a filling of a second substance (e.g., soluble coffee, powdered milk, soluble chocolate, soluble barley, sugar, soluble powdered flavourings, and combinations thereof) that  
5 can be used together with the first substance for preparing said liquid product.

One or more embodiments may envisage providing assortments of cartridges such as those exemplified herein, the assortment comprising cartridges 10 of two  
10 or more different types, in which the central portion 1420 protrudes from the bottom wall 142 (and hence from the plane B - B') by a different amount d, for example by a first amount d' in a first type of cartridge, a second amount d'', different from the first, in a  
15 second type of cartridge, a third amount d''' in a third type of cartridge, and so forth.

This difference between the cartridges of the assortment may be reflected, for example, in different levels of presence of the substance 12 (represented by  
20 the greater or smaller volume of the "auxiliary" chamber defined by the internal volume of the protruding portion 1420), with the consequent possibility, for example, of preparing more or less strong beverages.

25 Of course, without prejudice to the underlying principles, the details of construction and the embodiments may vary, even significantly, with respect to what has been illustrated herein purely by way of non-limiting example, without thereby departing from  
30 the extent of protection.

The extent of protection is defined by the annexed claims.

**CLAIMS**

1. A cartridge (10) for the preparation of a liquid product by means of liquid and/or steam introduced into the cartridge (10), the cartridge including a casing (14) with a central axis ( $X_{14}$ ), said casing having therein a receiving chamber with a filling (12) of a substance for the preparation of said liquid product, said casing having a bottom wall (142) for said liquid product to flow from the cartridge (10), wherein said bottom wall (142) has a peripheral rim (1432) lying in a plane (B-B') and presents, when observed on the outer side with respect to the cartridge (10), a central protruding portion (1420) providing therein an extension of said receiving chamber with a filling of a substance for the preparation of said liquid product, wherein:

- said central portion (1420) protrudes from the casing of the cartridge beyond (d) the plane (B-B') where said peripheral rim (1432),
- said central portion (1420) is surrounded by an annular portion (1422) of said bottom wall (142) which extends in a direction orthogonal to said central axis ( $X_{14}$ ),
- at least one opening (1428) is provided for the outflow of said liquid product from the cartridge (10) located at said central protruding portion (1420), with said bottom wall exempt from apertures (1428) for the outflow of said liquid product from the cartridge (10) in said annular portion (1422).

2. The cartridge of claim 1, including a filter element (182) coupled with said at least one opening (1428) for the outflow of said liquid product from the cartridge (10) located at, preferably at the distal end of, said protruding central portion (1420).

3. The cartridge of claim 2, wherein said filter

element (182) is coupled to said at least one opening (1428) for the outflow of said liquid product from the cartridge (10) at the inner side of the bottom wall (142) with respect to the cartridge (10).

5           4. The cartridge of claim 2 or claim 3, wherein said filter element includes filter paper or a non-woven fabric.

          5. The cartridge of any of the preceding claims, wherein said central protruding portion (1420) of said  
10 bottom wall (142) includes a dispensing spout for said liquid product.

          6. The cartridge of any of the preceding claims, wherein said peripheral rim (1432):

- 15           - is substantially coplanar with said annular portion (1422) of said bottom wall (142), or
- protrudes from the casing of the cartridge with respect to said annular portion (1422) of said bottom wall (142).

          7. The cartridge of any of the preceding claims,  
20 wherein said substance (12) for preparing said liquid product is selected out of: powdered roasted and ground coffee, leaf tea, powdered or soluble milk, soluble coffee, soluble chocolate, soluble barley, sugar, powdered soluble flavourings, and combinations thereof.

25           8. The cartridge of any of the preceding claims, wherein the casing (14) of the cartridge (10) includes a sealing foil (16) closing the casing of the cartridge (10) at the end opposite said bottom wall (142).

          9. An assortment of cartridges according to any of  
30 the preceding claims, including at least a first and a second cartridge according to any one of the preceding claims, wherein:

- in said first cartridge, said central portion (1420) protrudes with respect to said bottom wall (142)  
35 of a first amount, and

- in said second cartridge, said central portion (1420) protrudes with respect to said bottom wall (142) of a second amount, said first amount and said second amount being different from each other.

FIG. 1

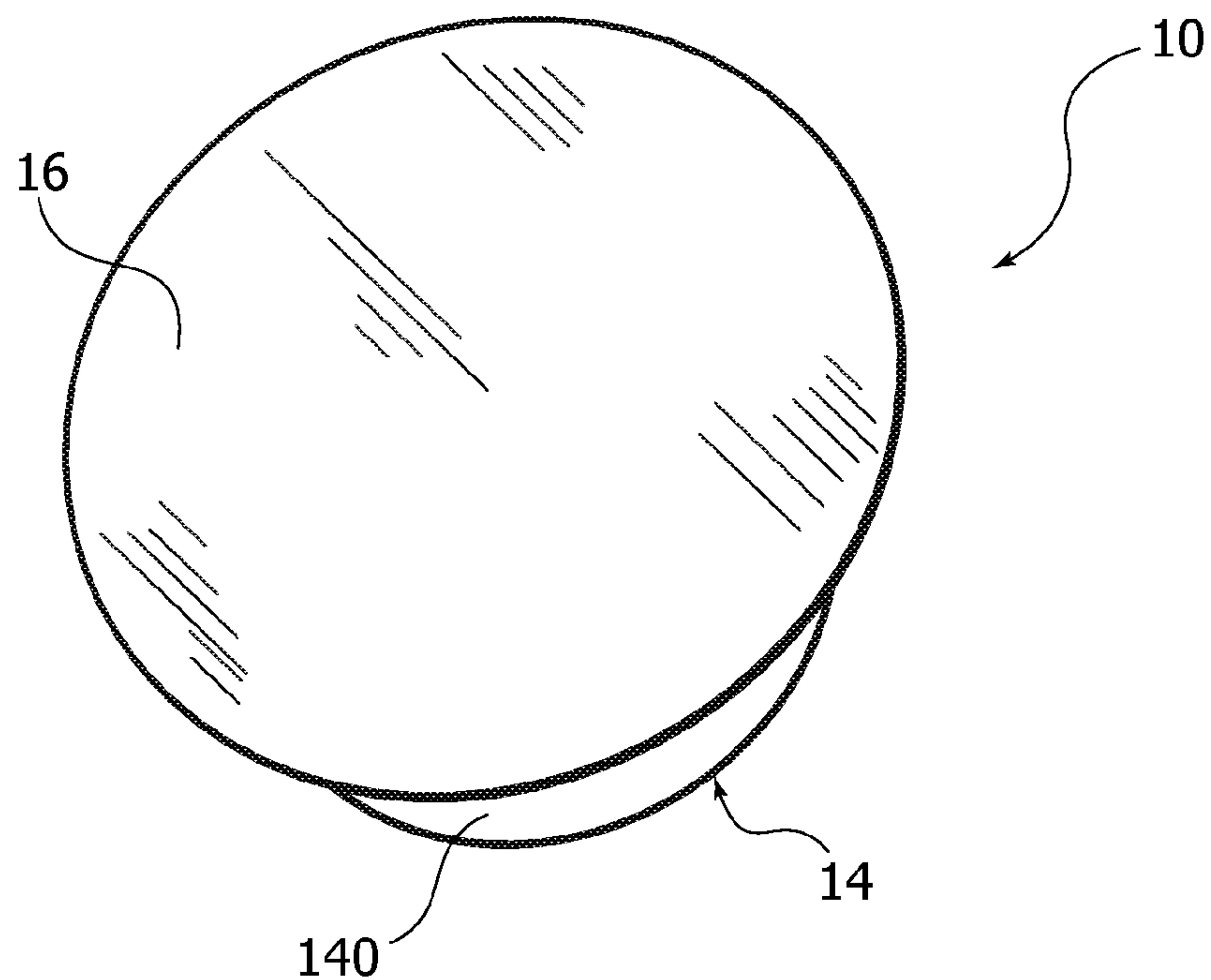


FIG. 2

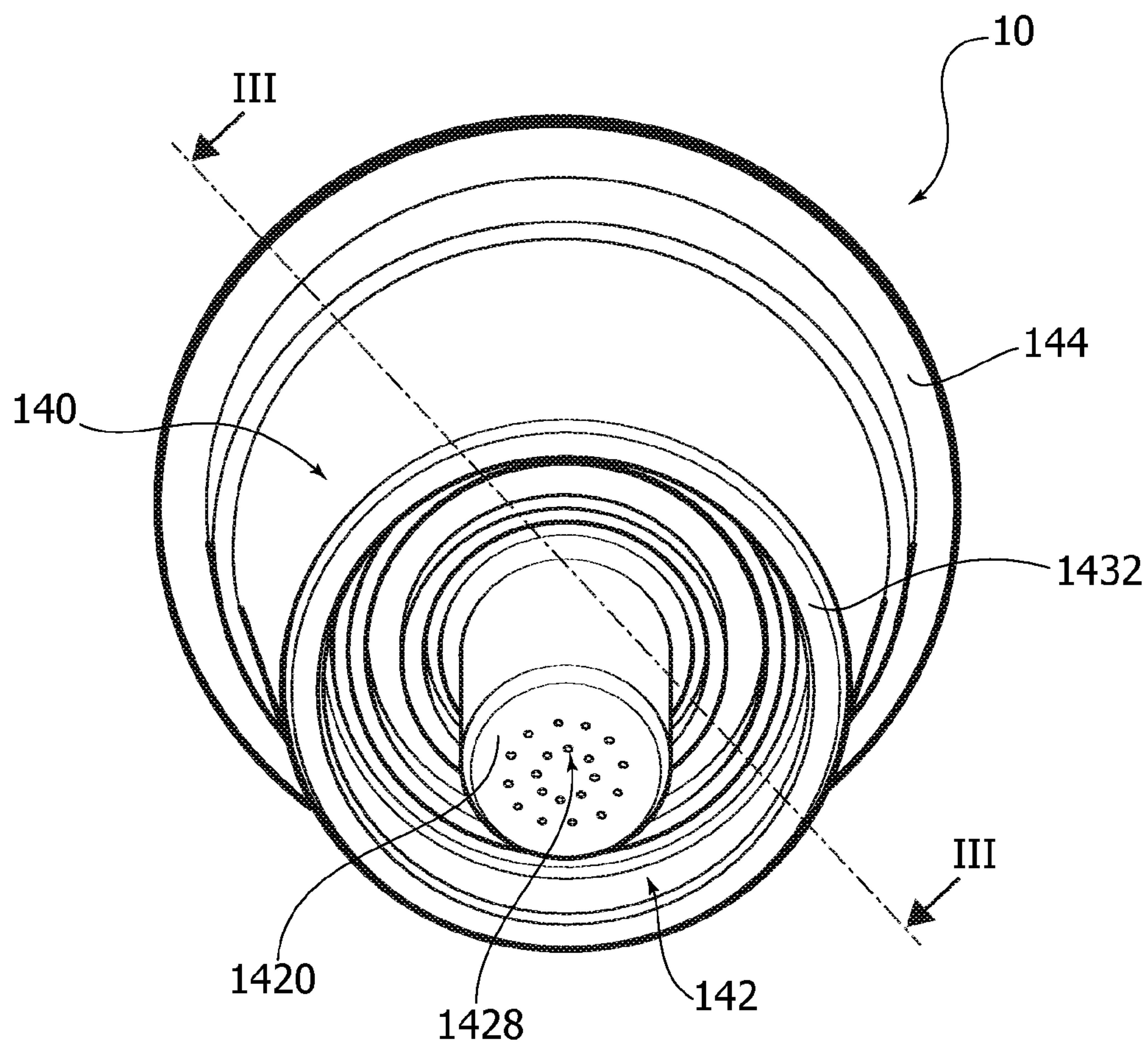


FIG. 3

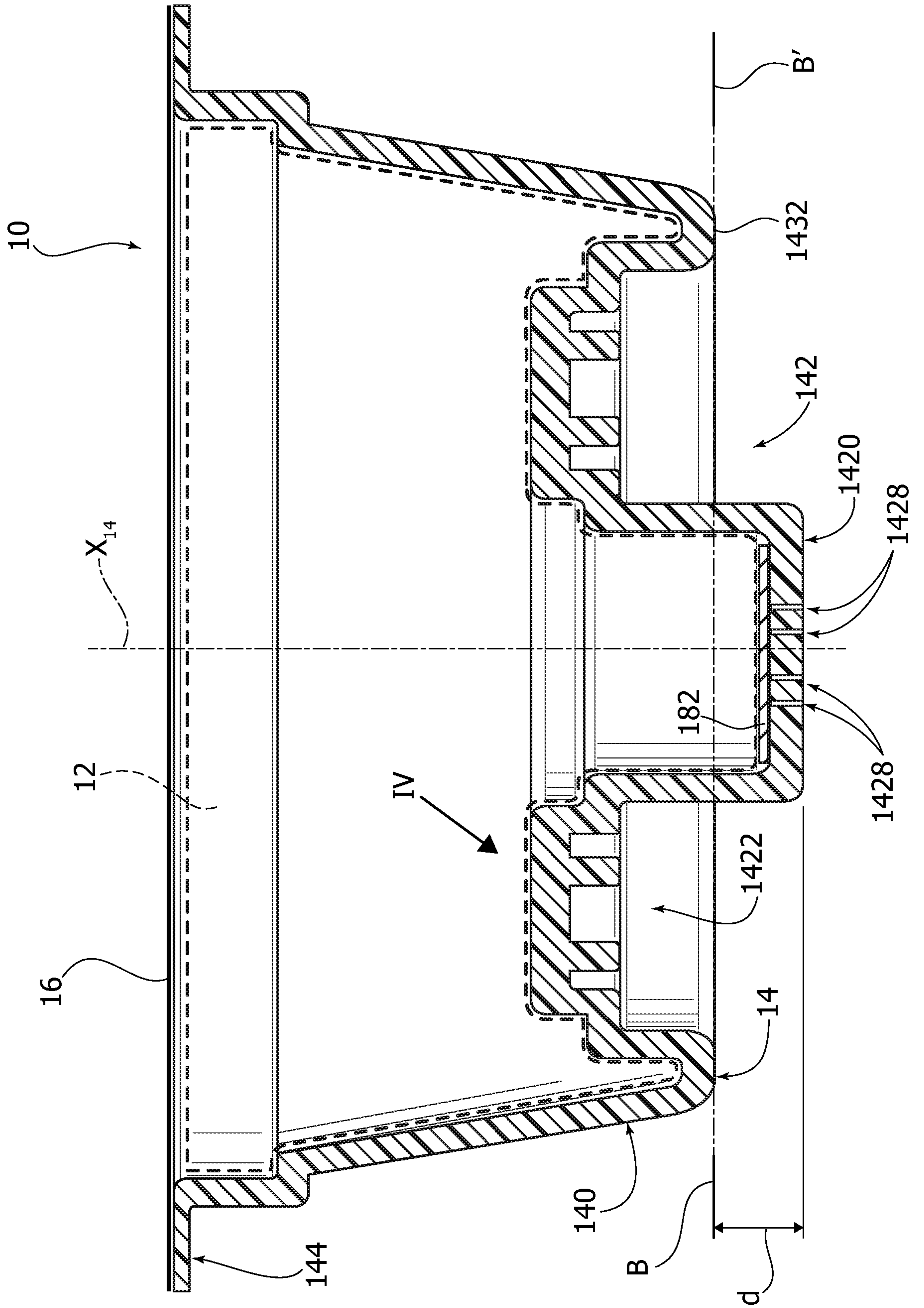


FIG. 4

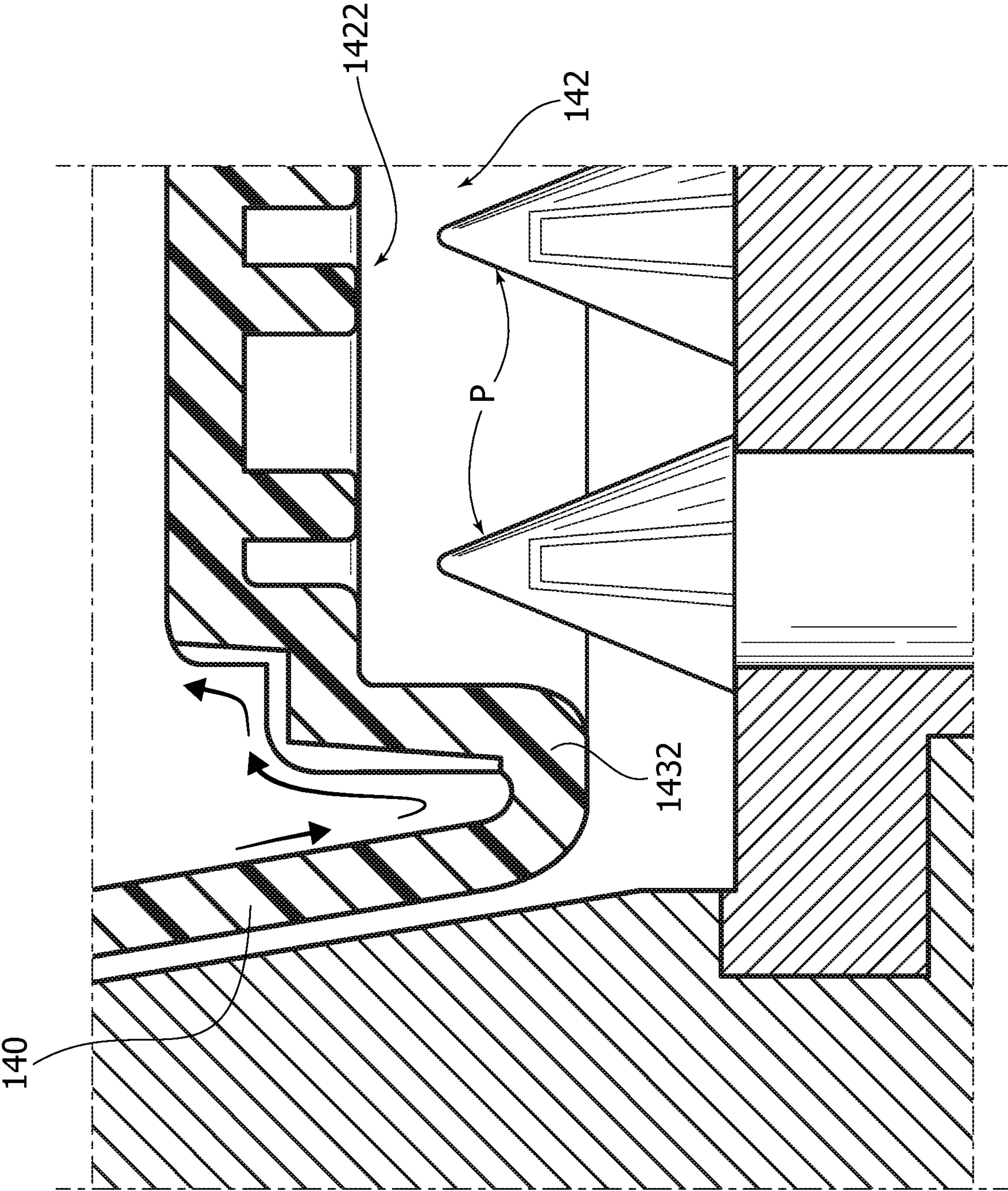


FIG. 3

