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- (71) Applicant (for all designated States except US): **S.M.P. S.R.L.** [IT/IT]; Via del Donatore, 4, I-23881 Airuno (LC) (IT).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **MONTANI, Fiorenzo** [IT/IT]; Via Gran Paradiso, 4/13, I-20020 Arese (MI) (IT). **STUCCHI, Diego** [IT/IT]; Via S. Pertini, 22, I-23881 Airuno (LC) (IT).
- (74) Agent: **COSENZA, Simona**; c/o Barzanò & Zanardo Milano S.p.A., Via Borgonuovo, 10, I-20121 Milano (IT).
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(54) Title: DEVICE WITH A CONTAINMENT TANK OF A FIRST SUBSTANCE FOR CLOSING A CONTAINMENT BOTTLE OF A SECOND SUBSTANCE TO BE KEPT SEPARATED FROM THE FIRST SUBSTANCE UNTIL THE MIXING MOMENT WITH IT

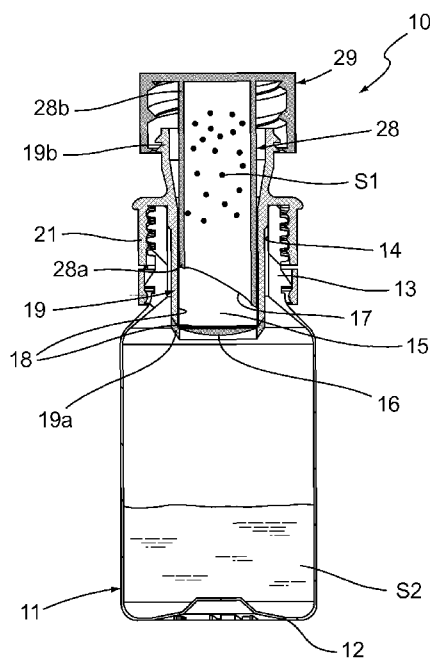


Fig. 2

(57) Abstract: A device (10) with a containment tank (15) of a first substance (S1) for closing the mouth (14) of a containment bottle (11) of a second substance (S2) to be kept separated from the first substance (S1) until the mixing moment with it, comprising a closing plug closed by a breakable base (16), and breaking means (17) of the breakable base (16) which can be actuated from the outside for breaking the breakable base, wherein the face of the breakable base (16) directed towards the inside of the tank (15) and at least one tubular portion of the internal lateral surface of the tank (15) are covered by a coating comprising a material impermeable to water vapour or other fluids, which covers the breakable base (16) and the lateral surface of the tank (15) without solution of continuity.



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DEVICE WITH A CONTAINMENT TANK OF A FIRST SUBSTANCE FOR
CLOSING A CONTAINMENT BOTTLE OF A SECOND SUBSTANCE TO
BE KEPT SEPARATED FROM THE FIRST SUBSTANCE UNTIL THE
MIXING MOMENT WITH IT

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The present invention refers to a device with a
containment tank of a first substance for closing a
containment bottle of a second substance to be kept
separated from the first substance until the mixing
10 moment with it.

With particular, but not exclusive, reference to the
field of pharmaceutical, dietary and cosmetic products,
products are known of the so called "extemporaneous"
preparation type, i.e. products which are made up of a
15 mixture or of a solution of substances which are kept
separated from one another until the moment in which
they are brought together before the use of such
products.

For such products packs are known comprising a bottle,
20 inside which one of the two substances to be mixed,
which, generally, is in the form of a liquid, pasta,
gel or syrup, is contained.

The mouth of the bottle is sealingly closed by a
container-plug inside which a containment tank of the
25 other one of the two substances to be mixed, which,
generally, is in the form of a powder, granules or
liquid, is defined.

The container-plug is made of a tubular body which, at
the end directed towards the bottom of the bottle, is
30 closed by a breakable base and which, at the opposite
end, is open. The inner volume of the container-plug
defines a containment tank of one substance. The base
of the container-plug keeps the substance contained

inside it separated from the one present in the bottle. A punch or shearer is inserted in an axially movable manner inside the container-plug, the punch or shearer, in turn, is made of a tubular body, the end of which
5 that is directed towards the base of the plug has a profile for perforating, cutting or shearing, and the opposite end of which projects beyond the open end of the container-plug.

The punch or shearer is axially mobile with respect to
10 the container-plug between a first and a second configuration.

In the first configuration, the punch perforating, cutting or shearing profile is retracted inside the container-plug at a certain distance from the integral
15 base of the latter, so that the substance contained in the container-plug itself is kept separate from that present in the bottle.

In the second configuration, the punch perforating, cutting or shearing profile is protracted towards the
20 base of the container-plug that is perforated, cut or sheared by it, so that the substance contained in the container-plug falls into the bottle, mixing with that present inside the latter.

Generally, moreover, in known packs a cap for covering
25 the end of the container-plug and punch group that projects from the bottle is provided.

The covering cap can be either of the type which can be removed at the moment of use, so as to allow access to the container-plug and punch group, or of the type
30 which can be screwed onto the neck of the bottle so as to act as a manoeuvring element of the punch itself.

Generally, both the container-plug and the punch are made through injection moulding of polymeric material,

such as, for example, polyethylene, polypropylene and the like.

It is possible for the tubular body and the base which constitute the container-plug to be made in one single
5 body, wherein the peripheral edge that joins the base to the corresponding end of the tubular body is weakened, for example through a pre-fracture line or a reduction of the material thickness, so as to facilitate its opening by means of the punch.

10 The punch has the end directed towards the base of the container-plug that is bevelled, so as to be able to tear the base at a portion of the weakened peripheral edge thereof.

Container-plugs are also known the base of which is
15 made up of a sheet or of a membrane that is impermeable to water vapour or other fluids and which is thermowelded or glued to the peripheral edge of the respective tubular body, like for example described in IT1362684 or in EP1623932.

20 These container-plugs of the known type, however, have some drawbacks.

In particular, it has been found that known container-plugs do not make it possible to ensure the insulation of the substance contained in them with respect to the
25 environment external to the tank and, in particular, with respect to the environment internal to the bottle, where water vapour or vapour of other fluids is generated, for sufficiently long time periods.

The vapours that penetrate into the tank of the
30 container-plug degrade the substance contained in it.

The vapours penetrate into the tank both through the lateral wall of the tubular body of the container-plug and through the breakable base constrained to the end

of such a tubular body.

Indeed, the polymeric material with which the tubular body of the container-plug is made, in any case, has a certain degree of porosity and permeability to the vapours, in particular in relation to the thickness of the material itself.

Where, moreover, the breakable base is formed in one single body with the tubular body of the container-plug, such porosity and permeability are even higher at the weakened peripheral edge which joins such a base to the end of the tubular body.

Where, on the other hand, the breakable base consists exclusively of a sheet or of a membrane that is thermowelded or glued to the end of the tubular body of the container-plug, over time the vapours can infiltrate through the junction area between the sheet or membrane and the corresponding end of the tubular body.

In this last case, moreover, the vapours which are generated inside the bottle can damage the sheet or membrane itself, jeopardising the integrity and impermeability characteristics thereof and, during use, such sheets or membranes tend to separate from the tubular body, being able to fall inside the bottle.

Finally, the application of such sheets or membranes requires a further process which is carried out in a machine that is separate from that for forming (moulding) the container-plug.

The purpose of the present invention is that of avoiding the drawbacks of the prior art.

In such a general purpose, a first purpose of the present invention is that of providing a device with a containment tank of a first substance for closing a

containment bottle of a second substance to be kept separated from the first substance until the mixing moment with it, which makes it possible to improve the insulation of the tank with respect to the environment external to it and, in particular, with respect to the environment internal to the bottle.

Another purpose of the present invention is that of providing a device with a containment tank of a first substance for closing a containment bottle of a second substance to be kept separated from the first substance until the mixing moment with it, which is structurally and constructively simple and that can be made with a small number of operations.

Another purpose of the present invention is that of making a device with a containment tank of a first substance for closing a containment bottle of a second substance to be kept separated from the first substance until the mixing moment with it, that is particularly simple and functional, with low costs.

These purposes according to the present invention are achieved by making a device with a containment tank of a first substance for closing a containment bottle of a second substance to be kept separated from the first substance until the moment of mixing with it as defined in claim 1.

Further characteristics are provided in the dependent claims.

The characteristics and the advantages of a device with a containment tank of a first substance for closing a containment bottle of a second substance to be kept separated from the first substance until the mixing moment with it, according to the present invention shall become clearer from the following description,

given as an example and not for limiting purposes, with reference to the attached schematic drawings, in which:

figure 1 is a side elevation view of a bottle with the closing device according to the present invention,
5 in the configuration of containment of the first substance, applied to it;

figure 2 is a section view of figure 1 according to the plane II-II;

figure 3 is a side elevation view of a bottle
10 with, applied to it, the closing device according to the present invention in the release configuration of the substance contained in it into the bottle itself;

figure 4 is a section view of figure 3 according to the plane IV-IV;

15 figures 5 and 6 show in enlarged scale a detail of figures 2 and 4, respectively;

figures 7 and 8 show a section view of a first alternative embodiment of the closing device according to the present invention in the containment
20 configuration and in the release configuration of the substance contained in it, respectively;

figures 9 and 10 show, in axonometric and section view, respectively, a second alternative embodiment of the closing device according to the present invention
25 in the containment configuration of the substance contained in it;

figure 11 shows a section view of a third alternative embodiment of the closing device according to the present invention in the containment
30 configuration of the substance contained in it.

With reference to the attached figures, the reference numeral 10 wholly indicates a device with a containment tank of a first substance S1 for closing the mouth of a

bottle 11 for containing a second substance S2 to be kept separated from the first substance S1 until the mixing moment with it.

The bottle 11 comprises a container that is closed at the bottom 12 and that projects in a neck 13, at the top of which a mouth 14 is defined.

In general terms, the device 10 comprises a closing plug which is associable with the mouth 14 and in which a tank 15 for containing the first substance S1 is defined, wherein the tank 15 has an end which, considering the device 10 in assembly configuration on the bottle 11, is directed towards the bottom 12 of it and that is closed by a base 16 of the breakable type.

The plug is, moreover, provided with breaking means 17 of the base 16, which can be actuated from the outside for breaking the base 16 itself and for the consequent pouring of the substance S1 into the body of the bottle 11, where it mixes with the substance S2 present in it. According to a peculiar characteristic of the present invention, both the face of the base 16 which is directed towards the inside of the tank 15, and at least one tubular portion of the internal lateral surface of the tank 15 and, in particular, the portion of the internal lateral surface of the part of the tank 15 which extends inside the neck and the body of the bottle 11, are covered by a coating comprising a material that is impermeable to water vapour or other fluids.

For the purpose of the present description, by "material impermeable to water vapour or other fluids", in particular gases and vapours that are generated by the substances contained in the bottle 11, it is intended to indicate a material which, at normal

conditions of use of the bottle 11, has a low permeability to such vapours and fluids, of the type, for example of aluminium or similar.

In one embodiment, such a coating is made of a sheet 18
5 that comprises at least one layer made up of said material impermeable to water vapour or other fluids, in particular of aluminium.

The sheet 18 is, advantageously, of the multilayer type and comprises, in addition to the layer of impermeable
10 material (aluminium), at least a further layer of polymeric material, of the polyethylene or other polymer type, in particular having characteristics of affinity with the polymer with which the plug (tank 15 and base 16) is made, and that defines the surface of
15 the sheet 18 which comes into contact with the base 16 and the internal lateral surface of the tank 15.

In one preferred embodiment, the sheet 18 comprises at least three layers mutually superimposed, of which the inner layer is made of aluminium and the outer layers
20 are made of polymeric material.

With particular reference to the embodiment represented in the attached figures, the plug of the device 10 comprises a first tubular body 19 which can be sealingly inserted in the mouth 14 of the body of the
25 bottle 11 and which has a first end 19a which, considering the device 10 in the assembly configuration on the bottle 11, is directed towards the bottom 12 of it and a second end 19b which is opposite the first end 19a and which is open.

30 The base 16 is constrained to the first end 19a of the first tubular body 19 and is made up of a bottom that is formed integral in a single body with the first tubular body 19 for example by means of injection

moulding of polymeric material of the polyethylene or other kind of polymer type preferably of the polyolefin group.

The peripheral edge of the base 16 is weakened for example by means of a reduction of the thickness or a pre-fracture line, wherein such a weakening exclusively involves the bottom in plastic which forms the base 16 and not also the sheet 18 which, as specified later on, covers without solution of continuity, i.e. without any interruption or junction, both the base 16, that is the internal face thereof, and the internal lateral surface of the tank 15.

The first tubular body 19, moreover, is provided with means for constraining to the neck of the bottle 11.

In the embodiment shown, such constraining means comprise an inner threading 20 which is formed in a tubular jacket 21 that is coaxial and outside the first tubular body 19 to which it is connected by means of a collar 22.

The inner threading 20 engages with an outer threading 23 formed on the neck 13 of the bottle 11.

At the edge of the tubular jacket 21 directed towards the bottom 12 of the bottle 11, an anchoring band 25 is constrained by means of junction bridges 24 of the breakable type, which anchoring band 25 has an enlarged inner ring 26 that engages with an annular tooth 27 which projects from the neck 13 of the bottle 11.

A second tubular body 28 is inserted inside the first tubular body 19 in an axially movable manner through sliding or through sliding and rotation and in a sealed manner, which second tubular body 28, in turn, has a first end 28a which, considering the device 10 in assembly configuration on the bottle 11, is directed

towards the bottom 12 of it and a second end 28b which is opposite the first end 28a and which projects outside the second end 19b of the first tubular body 19.

5 At the first end 28a of the second tubular body 28, the breaking means 17 for breaking the base 16 are formed which can be made up of a bevelled profile or by a protrusion that is capable of cutting, shearing or in any case opening the peripheral edge of the base 16 at
10 a portion thereof, so as to open the tank 15 and leave the base 16 constrained, at least at an intact portion of its peripheral edge, to the first tubular body 19, preventing it from falling into the bottle 11.

The first end 28a of the second tubular body 28 is open
15 and in communication with the inside of the first tubular body 19; the bevelled profile defining the breaking means 17 is defined along the perimeter of such a first end 28a.

The second end 28b of the second tubular body 28 is
20 closed by a cap 29 which comprises a tubular wall which extends outside a portion of the second tubular body 28 in a coaxial manner with it.

From the inside of said tubular wall an annular retaining tooth 30 projects out, said tooth 30 engaging
25 with corresponding annular retainment teeth 31 which project out from the external lateral surface of the second end 19b of the first tubular body 19 and which keep the second tubular body 28 "lifted" in the containment configuration described further on in the
30 description.

The inner volume of the first tubular body 19 and which is delimited, at one end, by the base 16 and, at the other end, by the second tubular body 28, or better by

the cavity inside the latter and that communicates with the volume inside the first tubular body 19 by means of the first open end 28a, defines the containment tank 15 of the first substance S1.

5 According to a peculiar characteristic of the present invention, both the face of the base 16 directed towards the inside of the tank 15 and at least the tubular portion of the internal lateral surface of the first tubular body 19 and that delimits the tank 15 are
10 covered with a coating comprising a material that is impermeable to water vapour or other fluids, which, advantageously covers said face of the base 16 and said portion of the internal lateral surface of the first tubular body 19 without solution of continuity.

15 This coating is made up of the sheet 18 in the form of a single piece that is sheared and shaped so as to cover, without solution of continuity, the face of the base 16 directed towards the inside of the tank 15 and the portion of the internal lateral surface of the
20 first tubular body 19 which extends from the base 16 towards the second end 19b of the first tubular body 19 for the entire section thereof which is inserted in the bottle 11.

It is not excluded that at least one portion of the
25 internal lateral surface of both the first tubular body 19 and the second tubular body 28 be covered with such a coating, in particular in the form of a sheet 18.

Figures 7 and 8 show a first alternative embodiment of the device 10, in which the first tubular body 19 has a
30 first tubular section that is intended, in assembly configuration of the device 10 on the bottle 11, to be inserted in the neck 13 of the bottle 11 and that is internally covered by the sheet 18, and a second

tubular section with (internal and external) diameter that is greater than the (internal and external) diameter of the first tubular section to which it is joined by means of a joining surface 32. In assembly
5 configuration of the device 10 on the bottle 11, the second section of the first tubular body 19 projects outside the mouth 14.

The second tubular body 28 comprises a first portion having an external diameter that is constant and
10 substantially the same size as the internal diameter of the first section of the first tubular body 19 so as to be sealingly inserted in it with the possibility of relative movement. Such a first portion has a height that is greater than the height of the first section of
15 the first tubular body 19 so as to define an interspace 33 in cooperation with the second section of the first tubular body 19.

Near to the second end 28b of the second tubular body 28 the first portion of it enlarges into a tubular head
20 that is sealingly inserted into the second section of the first tubular body 19.

Between the second tubular body 28 and the second section of the first tubular body 19, or better in the interspace 33 defined between them, at least one
25 sealing gasket is interposed that is suitable for preventing gas, vapours or liquids from infiltrating from the outside the bottle 11 towards the inside the tank 15.

The sealing gasket is made up of an annular gasket (O-ring) 34 interposed between the internal lateral
30 surface of the second section of the first tubular body 19 and the external lateral surface of the first portion of the second tubular body 28.

The annular gasket (O-ring) 34 rests on an annular surface 35 projecting out from the external lateral surface of the second tubular body 28 and, advantageously, is defined by the head in which the first portion of the second tubular body 28 enlarges.

In consequence of the movement of the second tubular body 28 with respect to the first tubular body 19, the annular gasket (O-ring) 34 is pulled by the second tubular body 28 so as to slide along the internal lateral surface of the second section of the first tubular body 19 and in contact with it until it abuts against the joining surface 32 obtained at the mouth of the first section of the first tubular body 19 internally covered by the sheet 18.

Figures 9 and 10 show a second alternative embodiment of the device 10 in which the volume V of the second tubular body 28 defining the tank 15 is smaller with respect to the embodiments of figures 1 to 8 following a partial filling, during its formation, of its internal cavity at the second end 28b with plastic material.

By varying the height of the portion of the second tubular body 28 that has been filled or in any case obstructed, the volume V inside it, which helps to define the tank 15 in cooperation with the first tubular body 19, varies.

This makes it possible to size the volume V inside the second tubular body 28 as a function of the dose of the substance to be contained inside the tank 15 so as to prevent that, once the tank 15 has been filled with the desired dose, too much empty space is left in the tank 15 in which air or other gases could be present.

Advantageously, for the same height of the second

tubular body 28 the free volume V inside it and that is defined between its first open end 28a and its second closed end 28b varies between 0.5 ml and 1.2 ml.

Figure 11 shows a third alternative embodiment of the device 10 which corresponds to that of figures 9 and 10 in which there is also an annular gasket 34.

Both the first tubular body 19 and the second tubular body 28 are made from polymeric material, preferably of the group of the polyolefins and are formed by means of injection moulding or overmoulding.

According to the present invention, the application of the coating comprising a material impermeable to water vapour or other vapours and, in particular, in the form of a sheet 18, to the face of the base 16 directed towards the inside of the tank 15 and to at least one portion of the internal lateral surface of the first tubular body 19 (or of the second tubular body 28) occurs simultaneously to the forming of the latter by means of the overmoulding method.

In greater detail, a piece of sheet 18 is sheared, shaped and arranged inside the injection mould for the forming of the first tubular body 19, inside which is subsequently injected the polymeric material in the molten state which forms both the base 16 and the first tubular body 19.

However, alternative methods of application of the sheet 18 are not excluded. The sheet 18, for example, could also be applied to the first tubular body 19 and/or to the second tubular body 28 after they have been forming. If, for example, the sheet 18 were to be applied to the face of the base 16 directed towards the inside of the tank 15 and to at least one portion of the internal lateral surface of the tank 15, it could

be arranged on a punch and through this inserted inside the first tubular body 19, promoting heat adhesion.

Advantageously, the face of the sheet 18 destined to contact and to adhere to the polymeric material forming the first tubular body 19 and the base 16 is defined by
5 a layer also made in polymeric material, preferably selected from the polyolefins, which promotes the union of the sheet 18 to them.

The device 10 takes up a containment configuration of the first substance S1, shown in figures 1, 2 and 5,
10 and a release configuration of the first substance S1 into the bottle 11, shown in figures 3, 4 and 6.

In the containment configuration, i.e. in that of packaging before the use of the product resulting from
15 mixing the first substance S1 with the second substance S2, the first end 28a of the second tubular body 28 is retracted inside the first tubular body 19 with respect to the first end 19a of it so that the breaking means 17 are spaced from the base 16. The second tubular body
20 28 is held in such a position by the engagement of the retaining teeth 30 and 31.

The substance S1 is contained in the tank 15 and it is isolated from the environment external to the latter and, in particular, from the environment inside the
25 bottle 11, by the double barrier formed by the base 16 and by the lateral wall of the first tubular body 19 and by the coating, in particular in the form of the sheet 18, applied to the face of the base 16 directed towards the inside of the tank 15 and to the internal
30 lateral surface of the first tubular body 19, at least at the section thereof which is inserted inside the bottle 11.

At the moment of use, it is sufficient to exert an

axial force on the cap 29 so as to push the second tubular body 28 to slide towards the bottom 12 of the bottle 11.

Due to such an axial sliding, the first end 28a of the
5 second tubular body 28 intercepts the base 16 so that the breaking means 17 shear, tear or in any case open the base 16 at a portion of the peripheral edge thereof, leaving a portion of such a peripheral edge intact, so as to prevent the base 16 from completely
10 detaching and falling into the bottle 11.

In such a way the first substance S1 falls into the body of the bottle 11, where it mixes with the second substance S2 present inside it so as to form the product to be used.

15 By unscrewing the first tubular body 19 so as to break the bridges 24, it is possible to extract the entire plug, formed by the first tubular body 19 and by the second tubular body 28, from the neck 13 of the bottle 11 and dispense the product formed in it.

20 Alternative embodiments are not excluded, in which, for example, the opening of the base 16 occurs following a combined rotation and translation movement of the first tubular body 19, wherein, in such a case, the breaking means 17 could be made up of a cutting protuberance.

25 The device with a containment tank of a first substance for closing a containment bottle of a second substance to be kept separated from the first substance until the mixing moment with it, object of the present invention, has the advantage of improving the insulation of the
30 two substances preventing, in particular, the penetration from outside to inside of such a tank and vice versa of water vapour or other vapours or gas, thus preserving the integrity of the two substances,

wherein by the "environment external to the tank" it is meant, in particular, the environment inside the bottle 11.

In the device according to the present invention, indeed, the inside of the tank is isolated from the environment external to it by a double barrier made up of the lateral wall and the base that delimit the tank and by the coating that covers their surface directed towards the inside of the tank.

10 The use of a coating in the form of a multi-layer sheet, of which at least one layer is made from a material that is impermeable to water vapour or other vapours or gas such as, in particular, aluminium, ensures a good level of impermeability.

15 The use of one single piece of such a sheet for covering both the base, and the internal lateral surface of the tank makes it possible to obtain a coating without solution of continuity, which covers also the peripheral edge or other weakened areas of the base itself.

20 Such a sheet, moreover, is protected from possible damage or degradation generated by the vapours or other gases which are formed inside the bottle.

In a preferred embodiment, the method for producing the closing device according to the present invention, in which the portion of the plug defining the containment tank of the first substance is made by means of overmoulding of polymeric material to the sheet itself, is, finally, particularly simple and can be made in the same production plant as the plug itself and makes it possible to apply the protective sheet and form the tank in the same production line.

The interposition between the first tubular body and

the second tubular body of an annular gasket (O-ring) prevents the gas, vapour or liquid substances coming from the outside from entering the containment tank.

As already indicated, alternative production methods
5 are not excluded, in which, in particular, the sheet is applied to the tank after the forming thereof on the same or on a different production line.

The device with a containment tank of a first substance for closing a containment bottle of a second substance
10 to be kept separated from the first substance until the mixing moment with it thus conceived can undergo numerous modifications and variants, all covered by the invention; moreover, all details can be replaced by technically equivalent elements. In practice the
15 materials used, as well as the dimensions, can be any according to the technical requirements.

CLAIMS

1) A device (10) with a containment tank (15) of a first substance (S1) for closing the mouth (14) of a containment bottle (11) of a second substance (S2) to be kept separated from the first substance (S1) until the mixing moment with it, comprising a closing plug associable with said mouth (14) and in which a containment tank (15) of said first substance (S1) is defined, wherein said tank (15) has an end which, in assembly conditions of said device (10) on said bottle (11), is directed towards the bottom (12) of said bottle (11) and which is closed by a breakable base (16), and breaking means (17) of said breakable base (16) which are associated with said plug and which can be actuated from the outside for breaking said breakable base, characterised in that the face of said breakable base (16) directed towards the inside of said tank (15) and at least one tubular portion of the internal lateral surface of said tank (15) are covered by a coating comprising a material impermeable to water vapour or other fluids.

2) Device (10) according to claim 1, characterised in that said coating is continuous and covers without solution of continuity said face of said breakable base (16) directed towards the inside of said tank (15) and said at least one tubular portion of the internal lateral surface of said tank (15).

3) Device (10) according to claims 1 or 2, characterised in that said plug comprises:

- a first tubular body (19) which is insertable in a sealing manner into said mouth (14) and having a first end (19a) which, in assembly conditions of said device on said bottle (11), is directed towards the bottom

(12) of said bottle (11) and a second end (19b) which is opposite to said first end (19a) and which is open;

- a second tubular body (28) which is inserted in an axially movable manner and in a sealing manner inside of said first tubular body (19) through said second end (19b) of it and having in its turn a first end (28a) which, in assembly conditions of said device (10) on said bottle (11), is directed towards the bottom (12) of said bottle (11) and a second end (28b) which is opposite to the first and which is closable,

- wherein the first end (19a) of said first tubular body (19) is closed by said breakable base (16) so as to delimit, along with said first tubular body (19), said containment tank (15) of a first substance (S1), and wherein the first end (28a) of said second tubular body (28) is provided with said breaking means (17) of said breakable base (16),

- said device (10) assuming a containment configuration of said first substance (S1) wherein the first end (28a) of said second tubular body (28) is retracted inside said first tubular body (19) with respect to the first end (19a) of it, and, due to the relative axial movement of said second tubular body (28) with respect to said first tubular body (19), a release configuration of said first substance (S1), wherein the first end (28a) of said second tubular body (28) protrudes towards the first end (19a) of the first tubular body (19) for breaking said breakable base (16) by means of said breaking means (17), and

- wherein at least one tubular portion of the internal lateral surface of said first tubular body (19) and the face of said breakable base (16) directed towards the inside of it is covered by said coating made from

material impermeable to the water vapour or other fluids.

4) Device (10) according to claim 3, characterised in that the second end (28b) of said second tubular body
5 (28) is closed.

5) Device (10) according to one or more of the preceding claims, characterised in that said coating is made of a sheet (18) comprising at least one layer of said material impermeable to water vapour or other
10 fluids.

6) Device (10) according to claim 5, characterised in that said material impermeable to water vapour or other fluids is aluminium.

7) Device (10) according to claim 5 or 6, characterised
15 in that the surface of said sheet (18) destined to contact said breakable base (16) and said lateral surface of said tank (15) is defined by a layer of polymeric material.

8) Device (10) according to one or more of the claims
20 from 3 to 7, characterised in that said breakable base (16) comprises a bottom constrained to the first end (19a) of said first tubular body (19), wherein the face of said bottom directed towards the inside of said first tubular body (19) is covered by said coating.

25 9) Device (10) according to claim 8, characterised in that said bottom is integral with said first tubular body (19).

10) Device (10) according to claim 8 or 9, characterised in that said bottom has at least one
30 weakened portion for facilitating the breaking.

11) Device (10) according to one or more of the claims from 8 to 10, characterised in that said coating covers without solution of continuity said face of said bottom

and at least one tubular portion of the internal lateral surface of said first tubular body (19).

12) Device (10) according to claim 11 and one or more of the claims from 5 to 7, characterised in that said
5 coating is made of a single piece of said sheet (18).

13) Device (10) according to one or more of the claims from 3 to 12, characterised in that said first end (28a) of said second tubular body (28) is open and is in communication with the inside of said first tubular
10 body (19) so as to define, in cooperation with it, said tank (15).

14) Device (10) according to claim 13, characterised in that at least one tubular portion of the internal or external lateral surface of said second tubular body
15 (28) is covered with said coating.

15) Device (10) according to claim 13 or 14, characterised in that the inner volume (V) of said second tubular body (28) which develops between said first open end (28a) thereof and said second closed end
20 (28b) thereof varies between 0.5 ml and 1.2 ml.

16) Device (10) according to one or more of the claims from 3 to 15, characterised in that it comprises at least one annular sealing gasket interposed between said first tubular body (19) and said second tubular
25 body (28), wherein said sealing gasket is made up of an annular O-ring gasket (34) fitted on said second tubular body (28) and resting on an annular surface (35) projecting out from the external lateral surface of said second tubular body (28).

30 17) Device (10) according to claim 16, characterised in that said first tubular body (19) comprises a first tubular section which, in the assembly configuration of said device (10) on said bottle (11), is inserted into

said neck (13) and is covered on its inside with said coating and a second tubular section having internal and external diameters which are respectively greater than the internal and external diameter of said first tubular section and which, in the assembly configuration of said device (10) on said bottle (11), extends outwards from said neck (13), wherein between said second tubular body (28) and said second section of said first tubular body (19) an interspace (33) is defined wherein said annular sealing gasket (34) is housed.

18) Device (10) according to one or more of the claims from 5 to 17, characterised in that said plug is made in polymeric material.

15 19) Device (10) according to claim 18, characterised in that the portion of said plug defining said tank (15) is overmoulded on said sheet (18).

20) A method for producing a device according to claim 19, comprising:

- 20 - making said plug (19, 28);
- applying said coating to at least one portion of the internal lateral surface of its portion, defining said tank (15), wherein
- said applying occurs at the same time as said making, said portion defining said tank (15) being formed by overmoulding on said sheet (18).
- 25

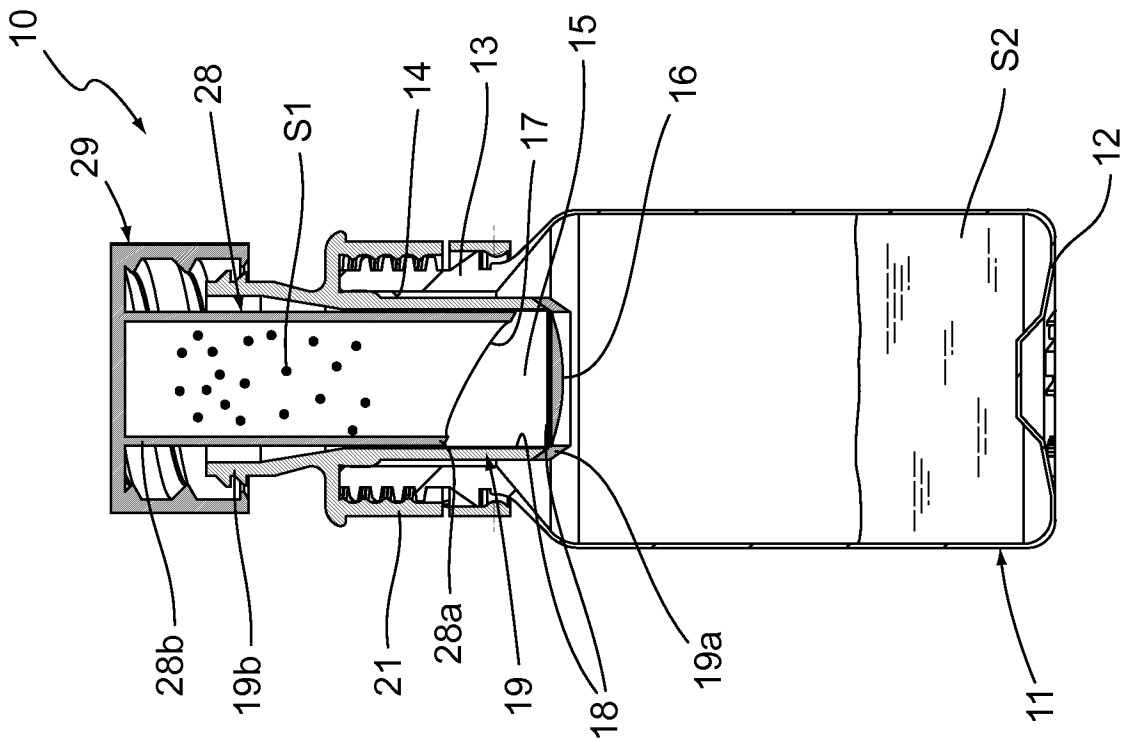


Fig. 2

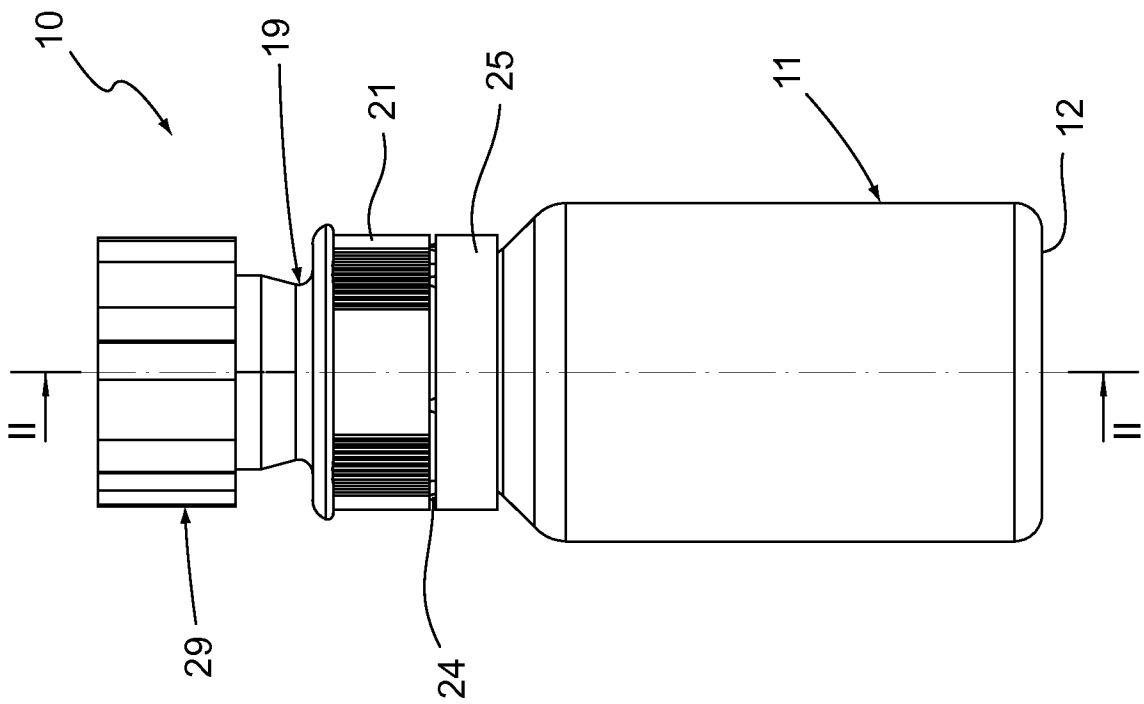


Fig. 1

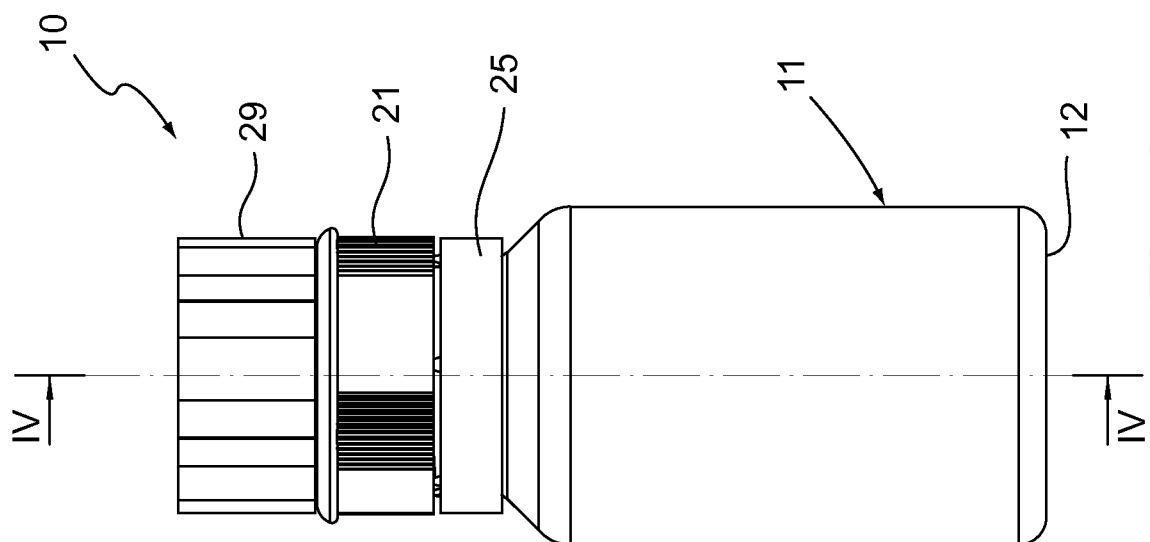


Fig. 3

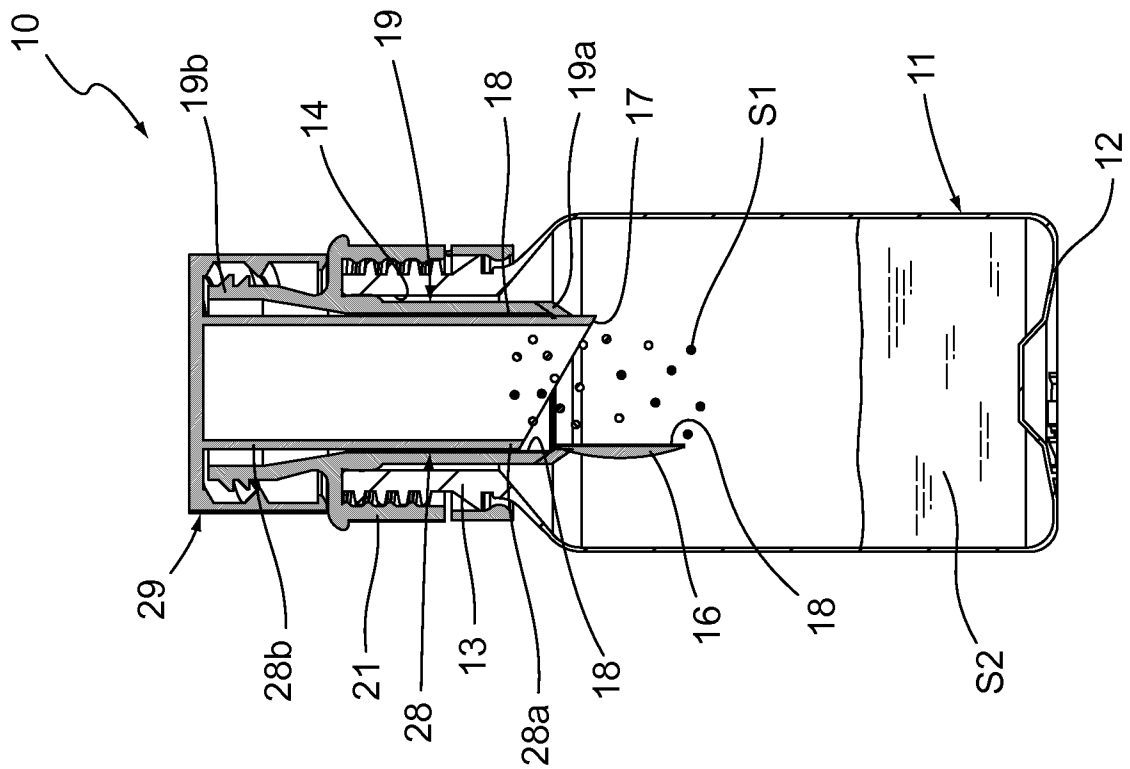


Fig. 4

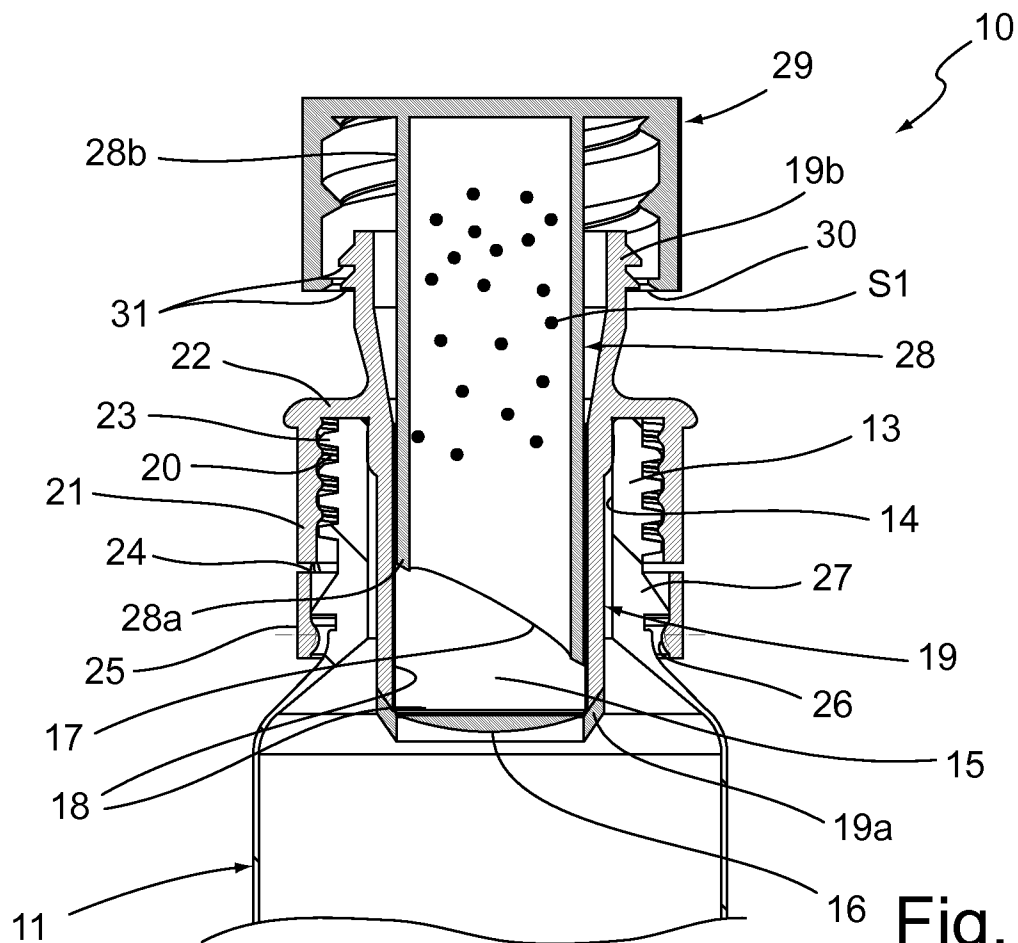


Fig. 5

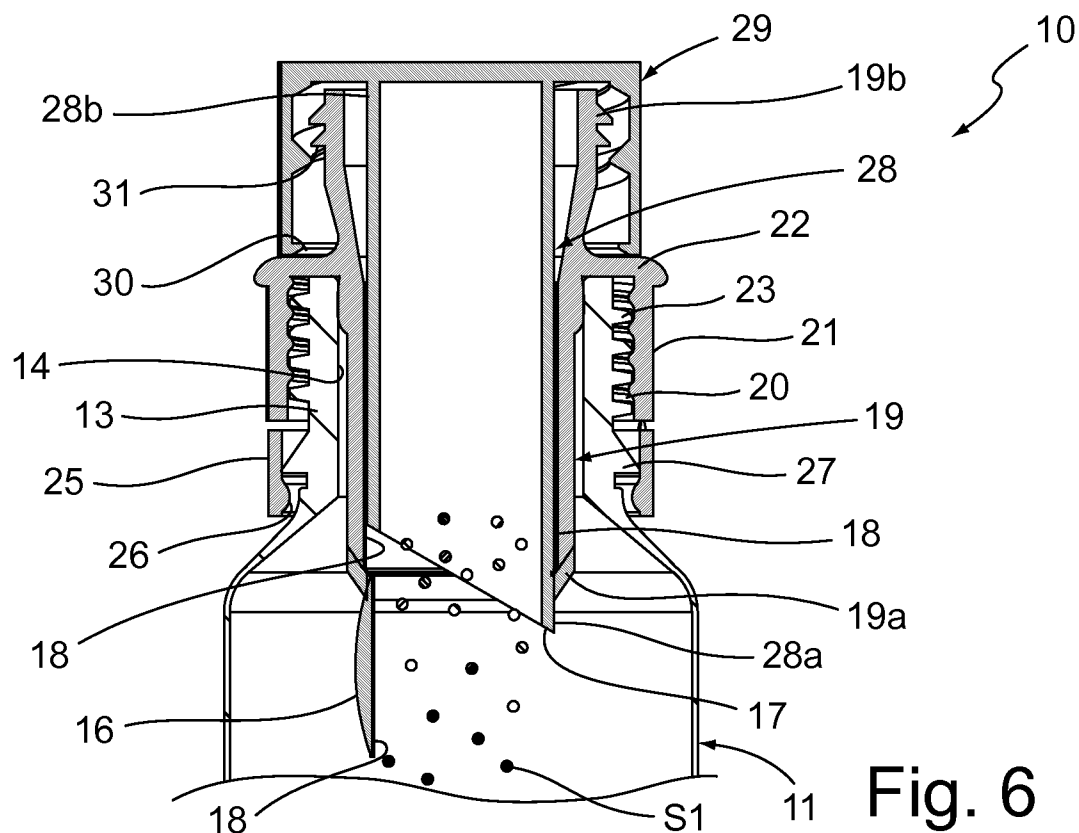


Fig. 6

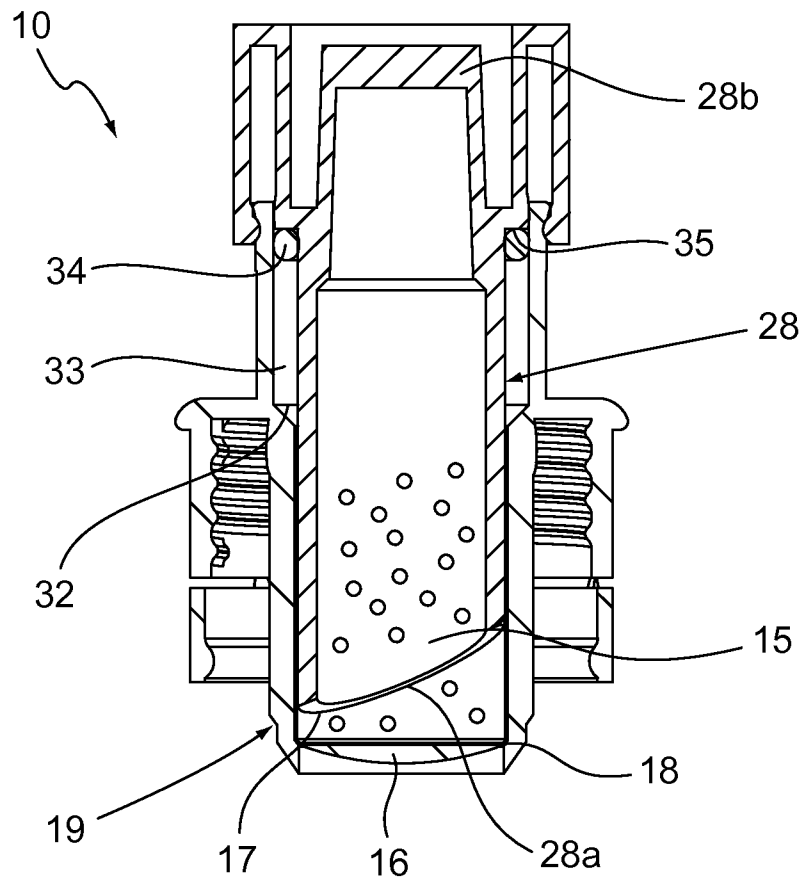


Fig. 7

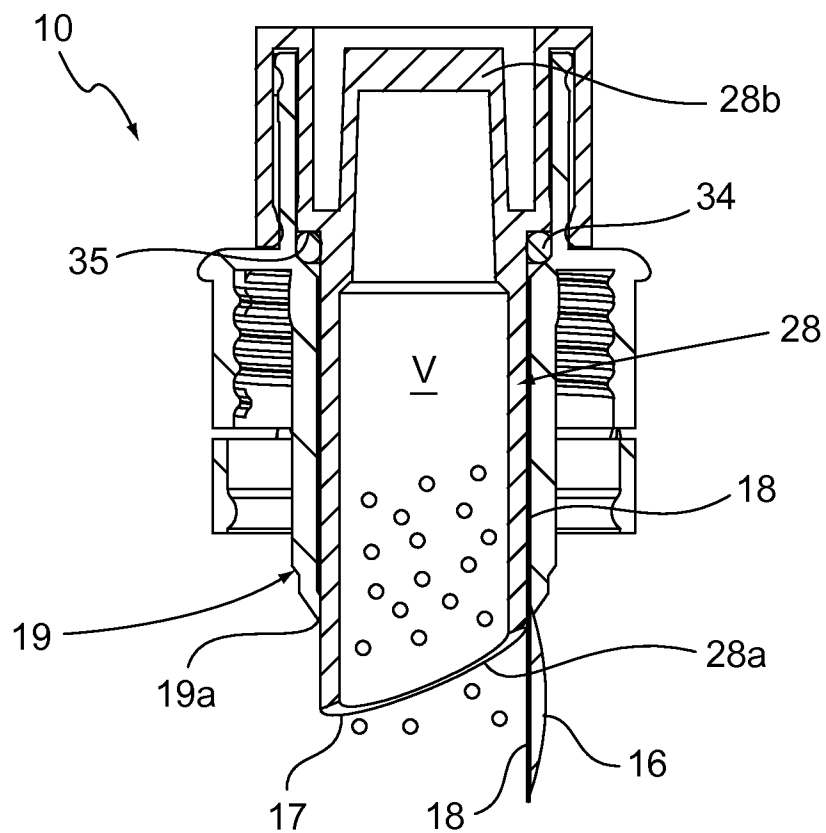


Fig. 8

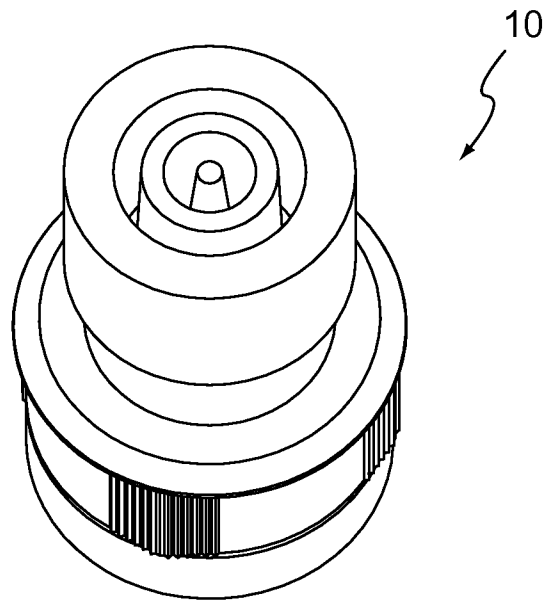


Fig. 9

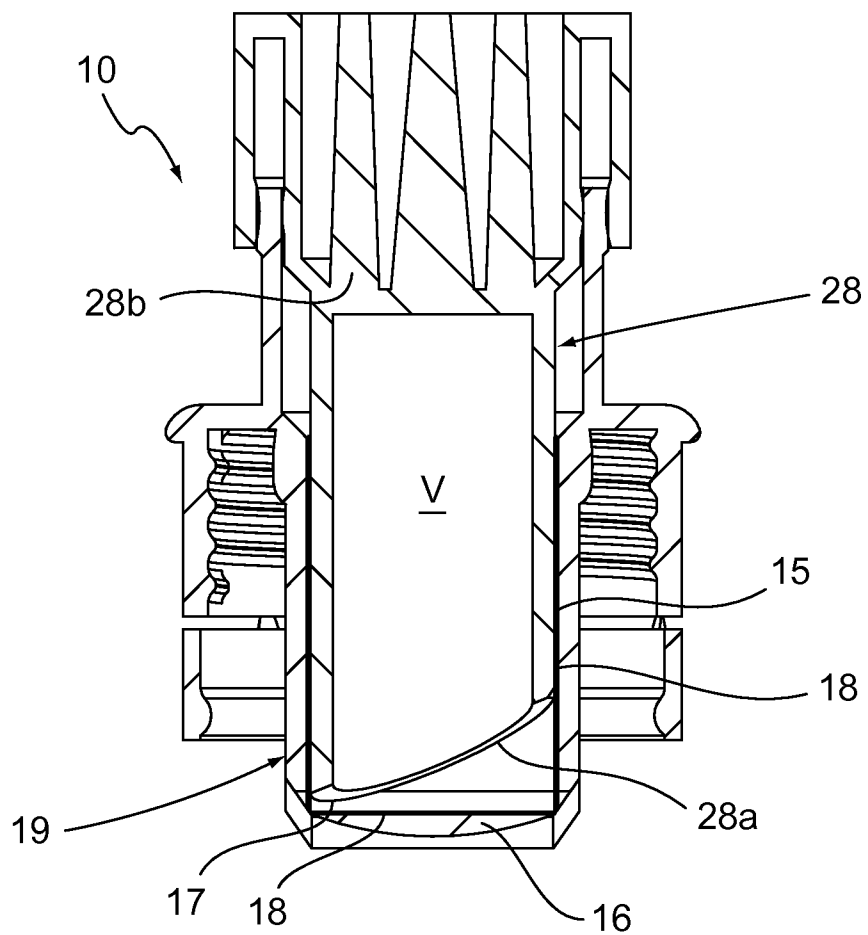


Fig. 10

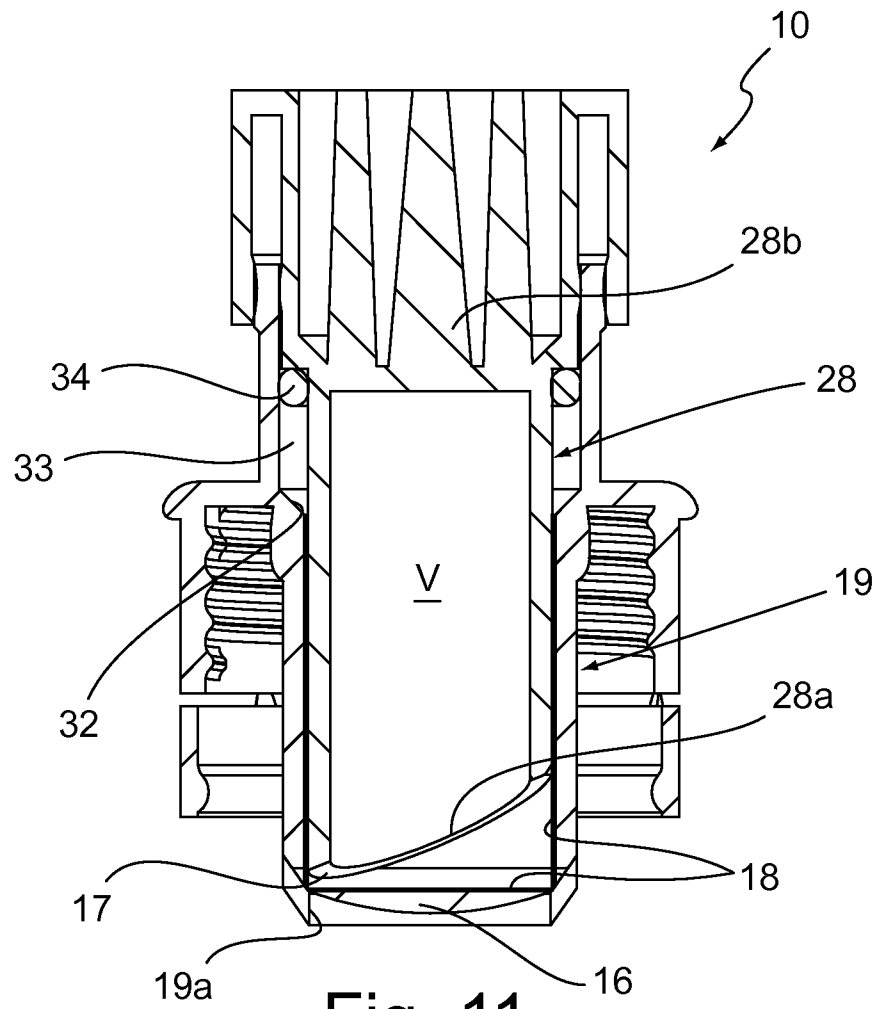


Fig. 11

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2012/053842

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65D51/28

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 2 154 081 A1 (MERIT 90 S N C DI FRANCESCO LA [IT]) 17 February 2010 (2010-02-17) paragraphs [0014], [0032], [0033], [0039], [0042], [0043]; figure 3 -----	1-20
Y	WO 2007/010560 A1 (BORMIOLI ROCCO & FIGLIO SPA [IT]; MORINI EMILIO [IT]) 25 January 2007 (2007-01-25) page 4, line 19 - page 5, line 27 page 6, lines 23-27; figures -----	1-20
A	WO 00/10884 A1 (SOANE DAVID S [US]) 2 March 2000 (2000-03-02) page 17, line 22 - page 18, line 6; claims 4-6; figures -----	1-20



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

19 November 2012

Date of mailing of the international search report

27/11/2012

Name and mailing address of the ISA/

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

Authorized officer

Vigilante, Marco

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2012/053842

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