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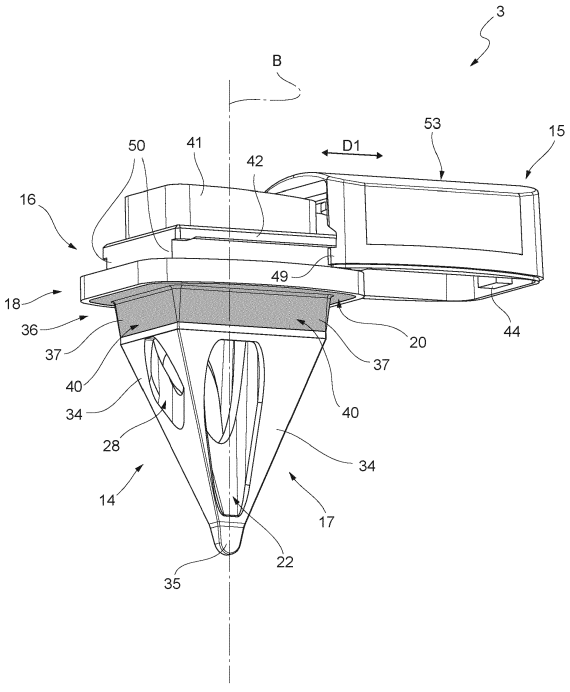
(54) **REUSABLE OPENING DEVICE FOR A PACKAGE AND PACKAGE HAVING A REUSABLE OPENING DEVICE**

(57) There is described a reusable opening device (3, 3', 3", 3‴, 3⁗) for a package (1) filled with a pourable product and having a designated pour opening surface area (7) . The opening device (3, 3', 3" , 3' ' , 3"") being configured to be removably connected to a main body (2) of the package (1) and comprises an outer body (16) configured to be placed outside of the main body (2) and having an outlet opening (21) configured to allow for an outpouring of the pourable product; and a piercing body (17) configured to pierce the designated pour opening surface area (7) and to be placed within the package (2). The opening device (3, 3', 3", 3‴, 3⁗) comprises a flow channel (23) extending between at least one inlet opening (22) and the outlet opening (21). The piercing body (17) carries and/or comprises the inlet opening (22), the inlet opening (22) allowing the inlet of the pourable product into the flow channel (23).

FIG. 3



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Description

TECHNICAL FIELD

[0001] The present invention relates to a reusable opening device for a package, preferentially a package filled with a pourable product, more preferentially a package filled with a pourable food product.

[0002] The present invention also relates to a package, preferentially a package filled with a pourable product, more preferentially a package filled with a pourable food product and having a reusable opening device removably connected to a main body of the package.

BACKGROUND ART

[0003] As is known, many liquid or pourable food products, such as fruit juice, UHT (ultra-high-temperature treated) milk, wine, tomato sauce, etc., are sold in packages made of sterilized packaging material.

[0004] A typical example is the parallelepiped-shaped package for liquid or pourable food products known as Tetra Brik Aseptic (registered trademark), which is made by sealing and folding a laminated packaging blank. The packaging blank has a multilayer structure comprising a fibrous base layer, e.g. of paper or cardboard, covered on both sides with layers of heat-seal plastic material, e.g. polyethylene. In the case of aseptic packages for long-storage products, such as UHT milk, the packaging blank also comprises a layer of oxygen-barrier material (an oxygen-barrier layer), e.g. an aluminum foil, which is superimposed on a layer of heat-seal plastic material, and is in turn covered with another layer of heat-seal plastic material forming the inner face of the package eventually contacting the food product.

[0005] Some kinds of such packages comprise an opening device fixedly mounted onto a main body of the package formed from the multilayer packaging material. Typically, such opening devices are formed from a polymer.

[0006] The recent years important steps have been achieved in reducing the quantity of polymers needed for the production of packages being provided with opening devices.

[0007] Even though the known packages and opening devices work very well, a desire is felt in the sector to identify alternative solutions allowing to further reduce the use of polymers.

DISCLOSURE OF INVENTION

[0008] It is therefore an object of the present invention to provide an improved opening device.

[0009] It is a further object of the present invention to provide an improved package.

[0010] According to the present invention, there is provided a reusable opening device according to the independent claim.

[0011] Further advantageous embodiments of the opening device are specified in the dependent claims.

[0012] According to the present invention, there is also provided a package according to claim 17.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] Non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a schematic perspective view of a package having a main body and an opening device according to the present invention, with parts removed for clarity;

Figures 2a to 2c are schematic views on how to couple the opening device of Figure 1 to the main body of Figure 1, with parts removed for clarity;

Figure 3 is a perspective view of a portion of the opening device of Figure 1, with parts removed for clarity;

Figure 4 is a sectioned view of the portion of the opening device of Figure 3, with parts removed for clarity;

Figure 5 is a perspective view of the opening device of Figure 1 with a detail being in an open position, with parts removed for clarity;

Figure 6 is a perspective view of a detail of the opening device of Figure 1, with parts removed for clarity; and

Figure 7 is a perspective view of an opening device according to a second embodiment of the present invention, with parts removed for clarity;

Figure 8 is a perspective view of an opening device according to a third embodiment of the present invention, with parts removed for clarity;

Figures 9a to 9c are perspective views of an opening device according to a fourth embodiment of the present invention partially coupled to the main body of a package and while coupling another portion of the opening device to the main body, with parts removed for clarity; and

Figure 10 is a view of a package comprising an opening device according to a fifth embodiment of the present invention.

BEST MODES FOR CARRYING OUT THE INVENTION

[0014] Reference numeral 1 indicates as a whole a package comprising a main body 2 and a reusable opening device 3 removably and/or releasably coupled to or removably and/or releasably couplable to main body 2.

[0015] Preferentially, main body 2 may be filled with a pourable product, more preferentially a pourable food product, such as water, pasteurized milk, milk products, yoghurt, yoghurt drinks, fruit juice, other kind of beverages, sauces, salt, sugar or the like.

[0016] Package 1, preferentially main body 2, may be

obtained from a multilayer packaging material having a multilayer structure (not shown).

[0017] The multilayer packaging material may comprise at least a layer of fibrous material, such as a paper or cardboard layer, and at least two layers of heat-seal plastic material, e.g. polyethylene, interposing the layer of fibrous material in between one another. One of these two layers of heat-seal plastic material may define an inner face of the respective package 1, preferentially the respective main body 2, eventually contacting the pourable product.

[0018] Preferentially, the multilayer packaging material may also comprise a layer of gas- and light-barrier material, e.g. aluminum foil or ethylene vinyl alcohol (EVOH) film, in particular being arranged between one of the layers of the heat-seal plastic material and the layer of fibrous material. Preferentially, the multilayer packaging material may also comprise a further layer of heat-seal plastic material being interposed between the layer of gas- and light-barrier material and the layer of fibrous material.

[0019] According to some preferred non-limiting embodiment, the multilayer packaging material may be provided in the form of a web or as single packaging blanks.

[0020] In more detail, in case of the multilayer packaging material being provided in the form of a web, the web may define a plurality of repeat units successively arranged from one another. Preferentially, each repeat unit may define a respective precursor of one respective main body 2.

[0021] With particular reference to Figure 1, package 2 may extend along a longitudinal axis A.

[0022] In more detail, package 2 may comprise a first wall portion 4, preferentially being transversal, more preferentially perpendicular, to axis A and, from which main body 2 extends along axis A. Most preferentially, first wall portion 4 may define a support surface of package 1, preferentially main body 2, which can be put in contact with a support, such as a shelf, e.g. when, in use, being exposed within a sales point or within a storage.

[0023] First wall portion 4 may define a bottom wall of package 1, preferentially main body 2, e.g. with package 1 being placed on the support and/or during an outpouring action of the pourable product from package 1.

[0024] Preferentially, main body 2 may also comprise a second wall portion 5 opposite to first wall portion 4.

[0025] Preferentially, second wall portion 5 may define a top wall of main body 2, e.g. with package 1 being placed on the support and/or during an outpouring action of the pourable product from package 1.

[0026] As shown, opening device 3 may be coupled to second wall portion 5.

[0027] According to the non-limiting example shown in Figure 1 and 2, first wall portion 4 and second wall portion 5 may be parallel to one another.

[0028] According to a non-limiting alternative embodiment, second wall portion 5 could be inclined with respect to first wall portion 4.

[0029] Additionally, package 1, preferentially main body 2, may also comprise a side wall 6 extending between along longitudinal axis A and between first wall portion 4 and second wall portion 5. Preferentially, side wall 6 may be connected to first wall portion 4 and second wall portion 5.

[0030] With particular reference to Figures 2a and 2b, package 1, preferentially main body 2, comprises a designated pour opening surface area 7 (only partially shown). Preferentially, pour opening surface 7 is configured to be opened and/or ruptured and/or cut so as to allow for the out-pouring of the pourable product from main body 2.

[0031] More preferentially, pour opening surface area 7 may comprise a separation membrane 8 covering a hole of main body 2 and being configured to be ruptured.

[0032] Preferentially, separation membrane 8 may be configured to separate an inner space 9 of main body 2 from an outer space 10.

[0033] According to some possible non-limiting embodiment, separation membrane 8 may comprise a gas- and light-barrier material, e.g. aluminum foil or a film comprising ethylene vinyl alcohol (EVOH).

[0034] According to a preferred non-limiting embodiment, separation membrane 8 may be defined by a portion of the multilayer packaging material, preferentially a portion of the layers of the web of packaging material being different from the layer of fibrous material.

[0035] Preferentially, pour opening surface area 7 may be provided on second wall portion 5.

[0036] According to the specific embodiment shown, pour opening surface area 7 may also comprise a plurality of weakening lines configured to break during the action of opening device 3.

[0037] Opening device 3 may be configured to be partially placed within package 1, preferentially main body 2.

[0038] In particular, opening device 3 can be removably connected to package 1, preferentially main body 2, more particular such that after use a user can detach opening device 3 from main body 2 and attach opening device 3 to a new main body 2.

[0039] In this way, one avoids to provide an opening device on each main body 2, which needs to be discharged together with main body 2.

[0040] Opening device 3 can be used on many main bodies 2 thereby allowing for an overall reduction of plastic consumption.

[0041] Opening device 3 may be configured to rupture designated pour opening surface area 7, preferentially separation membrane 8.

[0042] With particular reference to Figures 2a to 6, opening device 3 may comprise a main structure 14 configured to be removably coupled to main body 2. Preferentially, main structure 14 may extend along a longitudinal axis B.

[0043] Preferentially, opening device 3 may also comprise a closing element 15 coupled and/or couplable to main structure 14.

[0044] According to some preferred non-limiting embodiments, opening device 3, preferentially main structure 14, may comprise:

- an outer body 16 configured to be arranged and/or being arranged outside of package 1, preferentially main body 2, in particular with opening device 3 being coupled to main body 2; and
- a piercing body 17 configured to pierce designated pour opening surface area 7, preferentially separation membrane 8, and to be placed within or inside package 1, preferentially main body 2.

[0045] Preferentially, opening device 3, preferentially piercing body 17, may be configured to pierce designated pour opening surface area 7, preferentially separation membrane 8, by means of and/or during a translatory movement along a linear axis, and preferentially without any rotational movement.

[0046] In other words, with opening device 3 being coupled to main body 2, outer body 16 is arranged in outer space 10 and piercing body 17 is arranged in inner space 9.

[0047] Additionally, opening device 3 may comprise an intermediate body 18 interposed between outer body 16 and piercing body 17.

[0048] In more detail, intermediate body 18 may comprise a first face 19 and a second face 20 opposite to first face 19.

[0049] Furthermore, outer body 16 may protrude from first face 19 and piercing body 17 may protrude from second face 20. Moreover, outer body 16 and piercing body 17 may protrude in opposite directions from intermediate body 18, along longitudinal axis B.

[0050] Opening device 3, preferentially outer body 16, may comprise an outlet opening 21 configured to allow for an outpouring of the pourable product from package 1.

[0051] Additionally, piercing body 17 may carry and/or comprise at least one inlet opening 22, preferentially a plurality of inlet openings 22, in the specific case shown three.

[0052] Opening device 3, preferentially main structure 14, comprises a flow channel 23 extending between inlet opening(s) 22 or inlet openings 22.

[0053] In particular, each inlet opening 22 being configured to allow for the pourable product entering flow channel 23 (with piercing body 17 being placed within main body 2) and outlet opening 22 being configured to allow for the outflow of the pourable product out of flow channel 23 (and out of main structure 14).

[0054] In more detail, flow channel 23 may comprise a first section being arranged within piercing body 17 and a second section being arranged within outer body 16.

[0055] Additionally, flow channel 23 may comprise an intermediate section interposed between the first section and the second section and being arranged within intermediate body 18.

[0056] According to some preferred non-limiting embodiments, main structure 14 may be formed as a single piece, e.g. main structure 14 may be molded or 3D printed as a single piece.

[0057] According to some preferred non-limiting embodiments, opening device 3 may also comprise an auxiliary channel 27 configured to allow for an air flow between outer space 10 and inner space 9. In this way, one allows to improve the flow of the pourable product within flow channel 23 and out of outlet opening 21.

[0058] Auxiliary channel 27 may comprise and/or extend between a first opening 28 and a second opening 29.

[0059] According to some possible embodiments, second opening 29 may be arranged adjacent to outlet opening 21.

[0060] According to the example shown in Figures 2a to 6, main structure 14 may comprise auxiliary channel 24.

[0061] In more detail, outer body 16 may comprise second opening 29 and/or piercing body 17 may comprise first opening 28.

[0062] According to some preferred non-limiting embodiments, main structure 14 may comprise an intermediate wall 30 separating flow channel 23 and auxiliary channel 27 from one another. Preferentially, intermediate wall 30 may extend parallel to longitudinal axis B.

[0063] More specifically, intermediate wall 30 may comprise a first portion 31 and a second portion 32 located and/or extending within, respectively, piercing body 17 and outer body 16.

[0064] Additionally, intermediate wall 30 may also comprise an intermediate body 33 interposed between first portion 31 and second portion 32 and being located and/or extending within intermediate body 18.

[0065] In further detail, auxiliary channel 27 may comprise a first zone and a second zone extending within, respectively, piercing body 17 and outer body 16.

[0066] Additionally, auxiliary channel 27 may also comprise an intermediate zone interposed and extending between first zone and second zone.

[0067] Preferentially, the first section may be separated from the first zone by means of first portion 31 and the second section is separated from the second zone by means of second portion 32.

[0068] Moreover, the intermediate section may be separated from the intermediate zone by means of intermediate portion 33.

[0069] With particular reference to Figures 2a to 6, piercing body 17 may comprises a plurality of walls 34 being arranged as a pyramid and/or such to define a pyramid-shape.

[0070] According to the specific example shown, piercing body 17 may comprise four walls 34. Alternatively, piercing body 17 may comprise three walls 34 or even more than four.

[0071] It should be noted that the Applicant has observed to obtain excellent performances with piercing bodies 17 having three or four walls 34.

[0072] In more detail, at least one of walls 34 may com-

prise inlet opening 22. Preferentially, more than one wall 34 may comprise a respective inlet opening 22.

[0073] According to the specific embodiment shown, one of the walls 34 may comprise first opening 28, and preferentially each one of the other walls 34 may comprise one respective inlet opening 22.

[0074] In more detail, the wall 34 comprising first opening 28 may delimit together with first portion 31 the first zone of auxiliary channel 27.

[0075] According to some preferred non-limiting embodiments, piercing body 17 may comprise a tip 35, preferentially walls 34 may extend towards tip 35. Preferentially, each wall 34 may present a substantially triangular-shape tapering towards tip 35.

[0076] Preferentially tip 35 may have a rounded shape. The Applicant has found that providing a piercing body 17 with a rounded tip 35 significantly reduces the risk of a user hurting him- or herself during use of opening device 3.

[0077] According to some preferred non-limiting embodiments, piercing body 17 may also comprise a base 36, more preferentially connected to and protruding from intermediate body 18, along longitudinal axis B.

[0078] In more detail, walls 34 may extend from base 36 towards tip 35.

[0079] In further detail, base 36 may comprise a plurality of delimiting walls 37, each one extending from intermediate body 18.

[0080] Preferentially, delimiting walls 37 and walls 34 may describe, respectively, a first angle and a second angle with respect to longitudinal axis B. More preferentially, the second angle may be different from the first angle. Even more preferentially, the first angle may be larger than the second angle.

[0081] With particular reference to Figures 2a to 6, opening device 3 may comprise an engagement surface 40 configured to engage a rim of main body 2 delimiting designated pour opening area 7. In particular, engagement surface 40 may be configured such that interaction between engagement surface 40 and the rim is such that opening device 3 is connected to main body 2 by friction. In this way, one avoids spillage of the pourable product between opening device 3 and main body 2. Additionally, opening device 3 may not accidentally detach from main body 2 and a user needs to exert a certain force on opening device 3 in order to remove opening device 3 from main body 2.

[0082] Preferentially, opening device 3 may comprise a sealing layer having engagement surface 40. E.g. sealing layer may be of another material than main structure 14 for example rubber or silicon.

[0083] Preferentially, the sealing layer may be configured to seal an interface defined between the rim of main body 2 and opening device 3.

[0084] Preferentially, the sealing layer may be connected to main structure 14, e.g. to piercing body 17 and/or intermediate body 18.

[0085] According to the example shown, at least a portion of the sealing layer may be applied to delimiting walls 37, and preferentially another portion may be applied to second face 20.

[0086] According to some preferred non-limiting embodiments, the rim may form and/or evolve during the insertion of piercing body 17 into main body 2. Moreover, the shape of the rim may be defined by piercing body 17 and/or the weakening lines and/or the hole covered by separation membrane 8.

[0087] In further detail and with particular reference to Figures 3 to 6, outer body 16 may comprise a collar 41, preferentially extending from intermediate body 18. In detail, collar 41 may extend parallel to and/or about longitudinal axis B.

[0088] Preferentially, collar 41 may at least delimit outlet opening 21 and/or the second section of flow channel 23.

[0089] More preferentially, collar 41 may delimit together with intermediate wall 30, in particular second portion 32, outlet opening 21 and second opening 29 and/or the second section of flow channel 23 and the second zone of auxiliary channel 27.

[0090] According to some preferred non-limiting embodiments, outer body 16, preferentially collar 41, may comprise a delimiting rim 47 at least partially delimiting outlet opening 21, preferentially also second opening 29.

[0091] In more detail, delimiting rim 47 delimits outlet opening 21 and second opening 29 in collaboration with reinforcing wall 30.

[0092] Preferentially, delimiting rim 47 may lie within a plane.

[0093] Preferentially, the plane may be transversal to longitudinal axis B, and more preferentially thereby not being perpendicular to longitudinal axis B.

[0094] Most preferentially, the plane may define together with longitudinal axis an angle ranging between 3° to 15°, preferably between 3° to 10°, more preferably between 3° to 7°. According to the example shown, the angle is 5°.

[0095] In other words, a distance of delimiting rim 47 to first face 19 is a function of the annular position on delimiting rim 47.

[0096] In even other words, delimiting rim 47 and/or the plane may be inclined with respect to first face 19 and/or longitudinal axis B.

[0097] With particular reference to Figures 1 to 2c and 5, closing element 15 may be selectively controllable into a closed position (see Figures 1 to 2c and an open position (Figure 5) at which closing element 15 may be configured to, respectively, close and open outlet opening 21, and preferentially also second opening 29.

[0098] According to the embodiment of Figures 1 to 6, closing element 15 may be slidingly engaged to outer body 16, preferentially collar 41, and may be linearly moveable into a sliding direction D1 between the closed position and the open position.

[0099] Preferentially, outer body 16, more preferentially collar 41, may comprise a pair of (linear) tracks 42 and

closing element 15 may comprise a pair of grooves 43, each one slidingly engaging one respective track 42. In particular, interaction between tracks 42 and grooves 43 may define sliding direction D1.

[0100] In particular, closing element 15 may slide transversally, preferentially perpendicularly, with respect to longitudinal axis B. In other words, sliding direction D1 may be transversal, preferentially perpendicular, to longitudinal axis B.

[0101] Alternatively, closing element 15 may comprise grooves 43 and outer body 16, preferentially collar 41, may comprise tracks 42.

[0102] With particular reference to Figures 3 and 6, closing element 15 may comprise a first interaction element 44 and outer body 16, preferentially collar 41, may comprise a second interaction element 45.

[0103] In the specific case shown, first interaction element 44 may protrude from an inner face of closing element 15 and/or may be formed as a T.

[0104] Additionally, in the specific case shown, second interaction element 45 may be a groove, e.g. a groove having a T-shape, and preferentially being complementary to first interaction element 44.

[0105] According to some preferred non-limiting embodiments, closing element 15 may comprise one or more sealing elements 46 configured to engage outer body 16 and to seal outlet opening 21 and/or second opening 29 with closing element 15 being in the closed position. In particular, each sealing element 46 may protrude from an inner face of closing element 15 and/or the inner face may carry sealing element(s) 46.

[0106] First interaction element 44 and second interaction element 45 may be configured to engage with one another with closing element 15 being in the closed position and such to impede a movement of closing element 15 into a direction D2 transversal to sliding direction D1. In this way, one guarantees that closing element 15 correctly sits on outer body 16. This is in particular advantageous if closing element 15 comprises one or more sealing elements 46 as first interaction element 44 and second interaction element 45 guarantee the sealing effect of sealing elements 46.

[0107] With particular reference to Figures 3, 5 and 6, opening device 3 may comprise a first locking group configured to lock closing element 15 in the closed position. In this way, one guarantees that no undesired sliding movement of closing element 15 may occur, which may compromise e.g. a sealing effect of at least outlet opening 21.

[0108] Additionally or alternatively, the one or more sealing elements 46 may interact with delimiting ring 47. Preferentially, by having delimiting ring 47 and/or the plane being inclined with respect to first face 19 and/or longitudinal axis B it is possible to improve locking of closing element 15 in the closed position.

[0109] More preferentially, a distance of delimiting ring 47 with respect to first face 19 increase into sliding direction D1 with respect to movement of closing element 15 from the open position to the closed position.

[0110] Additionally or alternatively, opening device 3 may comprise a second locking group configured to lock closing element 15 in the open position. In this way, one impedes that closing element 15 detaches from outer body 16.

[0111] Preferentially, the first locking group and the second locking group may be partially associated to outer body 16, preferentially collar 41, and partially associated to closing element 15.

[0112] Closing element 15 may comprise one or more engagement elements 49, in particular two, configured to engage respective surface portions 50 of outer body 16 with closing element 15 being in the closed position and such that movement of closing element 15 becomes possible only after disengaging engagement element 49 from the surface portion.

[0113] Accordingly, the first locking group may comprise surface portions 50 and engagement elements 49.

[0114] Preferentially, closing element 15 may comprise one or more slits 51, in particular two, and outer body 16 may comprise respective protrusion elements 52, each one being configured to engage into one respective slit 51 with closing element 15 being in the open position. In particular, thereby any further movement of closing element 15 which would lead to closing element 15 detaching from outer body 16 by protrusion elements 52 engaging into the respective slits 51.

[0115] With particular reference to Figure 5, closing element 15 comprises an outer face 53 facing away from outer body 16, preferentially with closing element 15 being in the closed position.

[0116] Preferentially, outer face 53 may be opposed to the inner face of closing element 15, the inner face facing outlet opening 21 and/or second opening 29, in particular with closing element 15 being in the closed position.

[0117] According to some preferred non-limiting embodiments, outer face 53 may comprise at least a curved portion, in particular such that in case that a user wanted to place outer face 53 onto a planar surface (e.g. a table, a working area in a kitchen, or the like), opening device 3 as a hole would fall sideways. In this manner, one reduces the risk of a user getting hurt by piercing body 17 pointing upwards.

[0118] The use of opening device 3 will be explained by particular reference to Figures 2a to 2c. Package 1, preferentially main body 2, has an intact designated pour opening area 7, preferentially an intact separation membrane 8. The user gets opening device 3, approaches piercing body 17 towards designated pour opening area 7 and starts to pierce designated pour opening area 7 by means of piercing body 17 (see Figures 2a to 2b). By further pressing piercing body 17 into inner space 9, at some point engagement surface 40 engages with the rim of main body 2 and opening device 3 is blocked to main body 2 by means of friction (see Figure 2c) .

[0119] In further detail, opening device 3 is configured

to be coupled to main body 2 by positioning opening device 3 with its longitudinal axis B parallel to longitudinal axis A of main body 2; thereafter pushing opening device 3 towards the designated pour opening area 7 in a direction parallel to longitudinal axis B and/or longitudinal axis A, until piercing body 17 pierces designated pour opening area 7 and then keep advancing opening device 3 parallel to longitudinal axis B and/or longitudinal axis A until engagement surface 40 engages with the rim of main body 2.

[0120] During use, the user may selectively control closing element 15 between the closed position and the open position.

[0121] If desired (e.g. after fully emptying main body 2) it is possible to remove opening device 3 from main body 2, preferentially to clean opening device 2, and to removably apply opening device 3 to a new main body 2. In order to remove opening device 3, the user needs to pull it in a direction parallel to longitudinal axis B and/or longitudinal axis A, away from main body 2.

[0122] With reference to Figure 7, number 3" indicates an alternative embodiment of an opening device according to the present invention; as opening device 3" is similar to opening device 3, the following description is limited to the differences between them, and using the same references, where possible, for identical or corresponding parts.

[0123] Opening device 3' differs from opening device 3 in that the respective closing element (not shown) is moveable between the respective closed position and the open position by a movement along a direction parallel to longitudinal axis B.

[0124] Alternatively, opening device 3' may also be void of a closing element.

[0125] Use of opening device 3' is similar to the use of opening device 3 with the difference that control of closing element 15 does not rely on a sliding movement but relies on moving the closing element 15 along the direction parallel to longitudinal axis B. In this embodiment, closing element 15 when being in the open position may be disconnected from main structure 14.

[0126] With reference to Figure 8, number 3" indicates an alternative embodiment of an opening device according to the present invention; as opening device 3" is similar to opening device 3, the following description is limited to the differences between them, and using the same references, where possible, for identical or corresponding parts.

[0127] Opening device 3" differs from opening device 3 in that closing element 15 is moveable between the closed position and the open position by means of an angular movement of closing element 15 about a hinge axis, preferentially being transversal, more preferentially perpendicular, to longitudinal axis B. In this embodiment, closing element 15 may be connected to the main structure 14 by a hinge connection that allows movement of closing element 15 (only) along the hinge axis, between the closed position and the open position. Therefore, closing element 15 cannot be dispersed when being in the open position.

[0128] Use of opening device 3" is similar to the use of opening device 3 with the difference that control of closing element 15 does not rely on a sliding movement but relies on an angular movement about the hinge axis.

[0129] With reference to Figures 9a to 9c, number 3‴ indicates an alternative embodiment of an opening device according to the present invention; as opening device 3‴ is similar to opening device 3, the following description is limited to the differences between them, and using the same references, where possible, for identical or corresponding parts.

[0130] Opening device 3‴ differs from opening device 3 in comprising a tubular structure 57 carrying and/or comprising auxiliary channel 27.

[0131] More specifically, tubular structure 57 may be spaced apart from main structure 14. In particular, main structure 14 does not comprise auxiliary channel 27 but auxiliary channel 27 is provided in a physical separate portion of opening device 3‴, namely tubular structure 57.

[0132] Moreover, tubular structure 57 may be configured to be partially placed within main body 2.

[0133] Moreover, main body 2 may comprise a further piercing area having a further separation membrane 58.

[0134] Tubular structure 57 may be configured to pierce the further piercing area, preferentially further separation membrane 58.

[0135] Additionally, opening device 3‴ may comprise a support frame 59 laterally protruding from main structure 14, preferentially intermediate body 18, and preferentially being configured to abut against main body 2, preferentially second wall portion 5.

[0136] Preferentially, support frame 59 may comprise a hole 60, which is configured to be aligned with the piercing area.

[0137] In the specific embodiment of Figures 9a to 9c, tubular structure 57 is separate from main structure 14 and support frame 59.

[0138] In use, while one intends to insert tubular structure 57 into inner space 9, tubular structure 57 needs also to be move through hole 60. Therefore, hole 60 may also be configured to allow for guiding tubular structure 57 while introducing tubular structure 57 into inner space 9.

[0139] In the specific embodiment of Figures 9a to 9c, opening device 3" ' comprises closing element 15 of the embodiment of Figures 1 to 6 (of opening device 3).

[0140] Alternatively, opening device 3" ' could comprise closing element 15 of opening device 3" of Figure 8 or the closing element of opening device 3' of Figure 7.

[0141] Figures 9a and 9c show the use of opening device 3‴, which differs from the use of opening device 3 in that after applying main portion 14 and support frame 59 on main body 2, tubular structure 57 needs to be partially inserted into inner space 9.

[0142] This is done by approaching tubular structure 57 to hole 60 and to press tubular structure 57 through

the piercing area.

[0143] With reference to Figure 10, number 3‴ indicates an alternative embodiment of an opening device according to the present invention; as opening device 3‴ is similar to opening device 3‴, the following description is limited to the differences between opening device 3‴ and opening device 3‴ and package 2‴, and using the same references, where possible, for identical or corresponding parts.

[0144] In particular, opening device 3‴ differs from opening device 3" ' in that tubular structure 57 is fixedly connected to support frame 59. In particular, tubular structure 57 cannot move neither with respect to support frame 59 nor with respect to main structure 14. In this embodiment, main structure 14 and support frame 59 may be realized as a single piece.

[0145] Use of opening device 3‴ differs from use of opening device 3" ' in that tubular structure 57 is introduced into inner space 9 substantially together with introducing of piercing body 17 into inner space 9.

[0146] The advantages of packages 2 and 2"' and/or of opening device 3, 3', 3", 3‴ and 3‴ according to the present invention will be clear from the foregoing description.

[0147] In particular, opening devices 3, 3', 3" , 3‴ and 3‴ allow to be used on different main bodies 2, which allows to avoid providing respective open devices on each main body 2. This should allow to reduce plastic consumption.

[0148] Clearly, changes may be made to package 2 and 2‴ and/or opening device 3, 3', 3", 3‴, 3‴ as described herein without, however, departing from the scope of protection as defined in the accompanying claims.

Claims

1. Reusable opening device (3, 3', 3", 3‴, 3‴) for a package (1) filled with a pourable product and having a designated pour opening surface area (7);

   the opening device (3, 3', 3", 3‴, 3‴) being configured to be removably connected to a main body (2) of the package (1) and comprising:

   - an outer body (16) configured to be placed outside of the main body (2) and having an outlet opening (21) configured to allow for an outpouring of the pourable product; and
   - a piercing body (17) configured to pierce the designated pour opening surface area (7) and to be placed within the package (2);

   wherein the opening device (3, 3', 3'', 3‴, 3‴) comprises a flow channel (23) extending between at least one inlet opening (22) and the outlet opening (21);

   wherein the piercing body (17) carries and/or comprises the inlet opening (22), the inlet opening (22) allowing the inlet of the pourable product into the flow channel (23).

2. Opening device according to claim 1, further comprising an auxiliary channel (27) configured to allow for an air flow between an outer space (10) and an inner space (9) of the main body (2).

3. Opening device according to claim 2, wherein the opening device (3, 3‴) comprises a main structure (14) comprising the outer body (16), the piercing body (17) and the flow channel (23);

   wherein the main structure (14) also comprises the auxiliary channel (27) and an intermediate wall (30) separating the flow channel (23) and the auxiliary channel (27) from one another; or the opening device (3‴, 3‴) further comprises a tubular structure (57) spaced apart from the main structure (14) and having the auxiliary channel (27) and being configured to be partially placed within the main body (2).

4. Opening device according to claim 2 or 3, wherein the auxiliary channel (27) comprises a first zone extending within the piercing body (17) and a second zone extending within the outer body (16).

5. Opening device according to claim 4, wherein the flow channel (23) comprises a first section and a second section extending, respectively, within the piercing body (17) and the outer body (16);
   wherein the first section is separated from the first zones by means of a first portion (31) of the intermediate wall (30) and the second section is separated from the second zone by means of a second portion (32) of the intermediate wall (30).

6. Opening device according to any one of claims 2 to 5, wherein the auxiliary channel (27) comprises and extends between a first opening (28) and a second opening (29); wherein the first opening (28) is configured to be placed within the main body (2) and the second opening (29) is configured to be arranged outside from the main body(2);
   wherein the second opening (28) is adjacent to the outlet opening (21) and/or is carried by the outer body (16) .

7. Opening device according to any one of the preceding claims, wherein the piercing body (17) comprises a plurality of walls (34) being arranged to form a pyramid and/or such to define a pyramid-shape;
   wherein at least one of the walls (34) comprises the inlet opening (28) and/or more than one of the walls (34) comprises a respective inlet opening (28).

8. Opening device according to any one of the preceding claims, wherein the piercing body (17) comprises a tip (35);
wherein the tip (35) presents a rounded-shape.

9. Opening device according to any one of the preceding claims, further comprising an engagement surface (40) configured to engage a rim delimiting the designated pour opening surface area (7).

10. Opening device according to claim 9, comprising a sealing layer having the engagement surface (40);
the sealing layer being configured to seal an interface defined between the rim and the opening device (3, 3', 3", 3‴, 3⁗).

11. Opening device according to claim 3 and 10, wherein the sealing layer is made of another material than a material in which the main structure (14) is made,

wherein the piercing body (17) comprises a base (36) and a plurality of walls (34), the walls (34) extending from the base (36) and being arranged as a pyramid and/or such to define a pyramid-shape,
wherein the base (36) comprises a plurality of delimiting walls (37),
wherein the opening device (3) further comprises an intermediate body (18) interposed between the outer body (16) and the piercing body (17), the intermediate body (18) comprising a first face (19) and a second face (20) opposite to the first face (19),
wherein at least a portion of the sealing layer is applied to the delimiting walls (37) of the base (36), and another portion of the sealing layer is applied to the second face (20) of the intermediate body (18).

12. Opening device according to any one of the preceding claims, further comprising a closing element (15) selectively controllable into a closed position and an open position at which the closing element is configured to, respectively, close and open the outlet opening (21).

13. Opening device according to claim 12, wherein the closing element (15) is slidingly engaged to the outer body (16) and is linearly moveable into a sliding direction (D1) between the closed position and the open position.

14. Opening device according to claim 13, wherein the closing element (15) comprises a first interaction element (44) and the outer body (16) comprises a second interaction element (45);
wherein the first interaction element (44) and the second interaction element (45) being configured to engage with one another with the closing element (15) being in the closed position and such to impede a movement of the closing element (15) into a direction transversal to the sliding direction (D1).

15. Opening device according to claim 13 or 14, comprising a first locking group configured to lock the closing element (15) in the closed position and/or a second locking group configured to lock the closing element (15) in the open position.

16. Opening device according to any one of claims 13 to 15, wherein the closing element (15) comprises an outer face (53) facing away from the outer body (16);
wherein the outer face (53) comprises at least a curved portion.

17. Package (1) for a pourable product comprising a main body (2) formed from a multilayer packaging material and a reusable opening device (3, 3', 3", 3‴, 3⁗) according to any one of the preceding claims.

FIG. 1

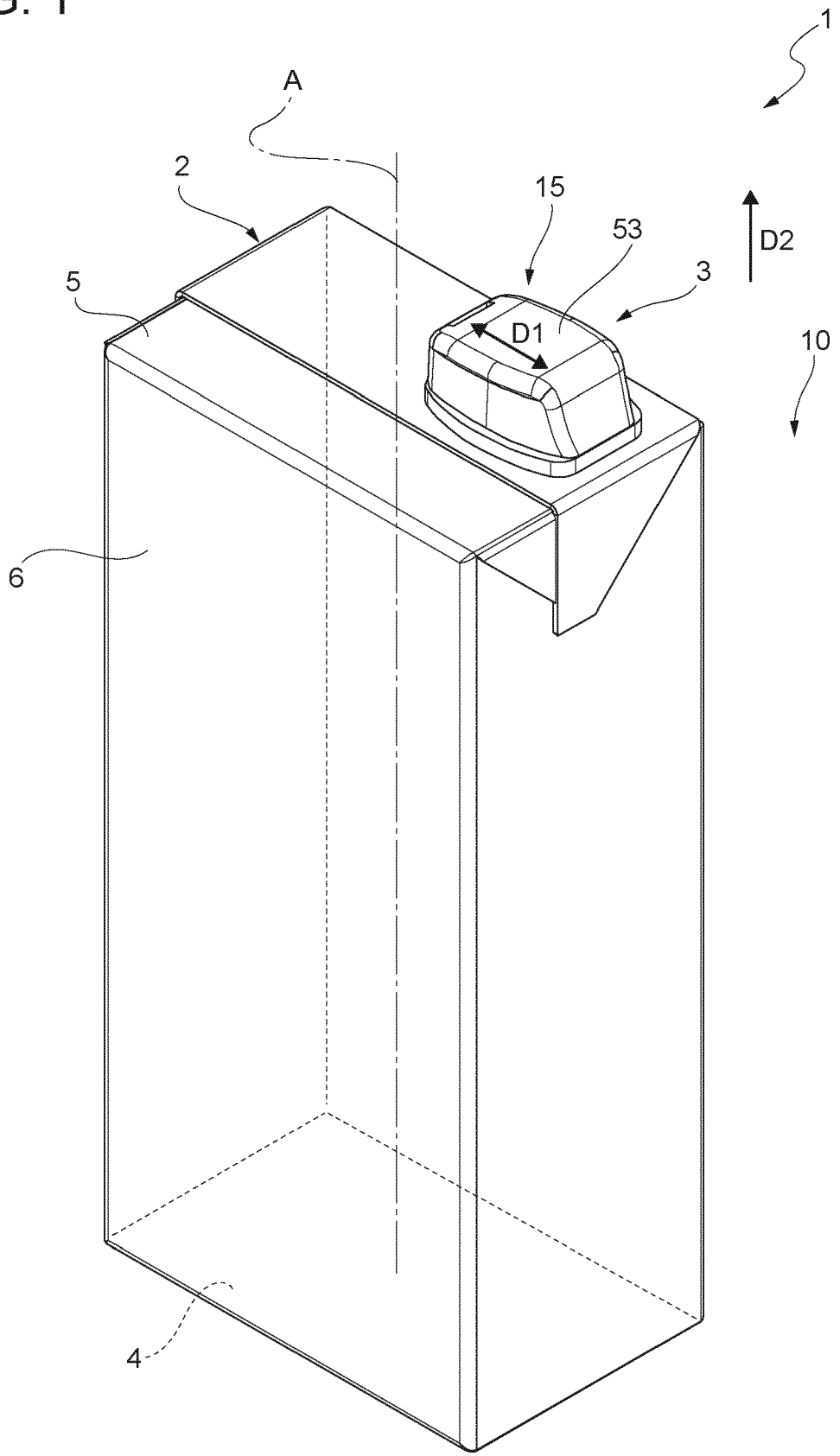

FIG. 2a

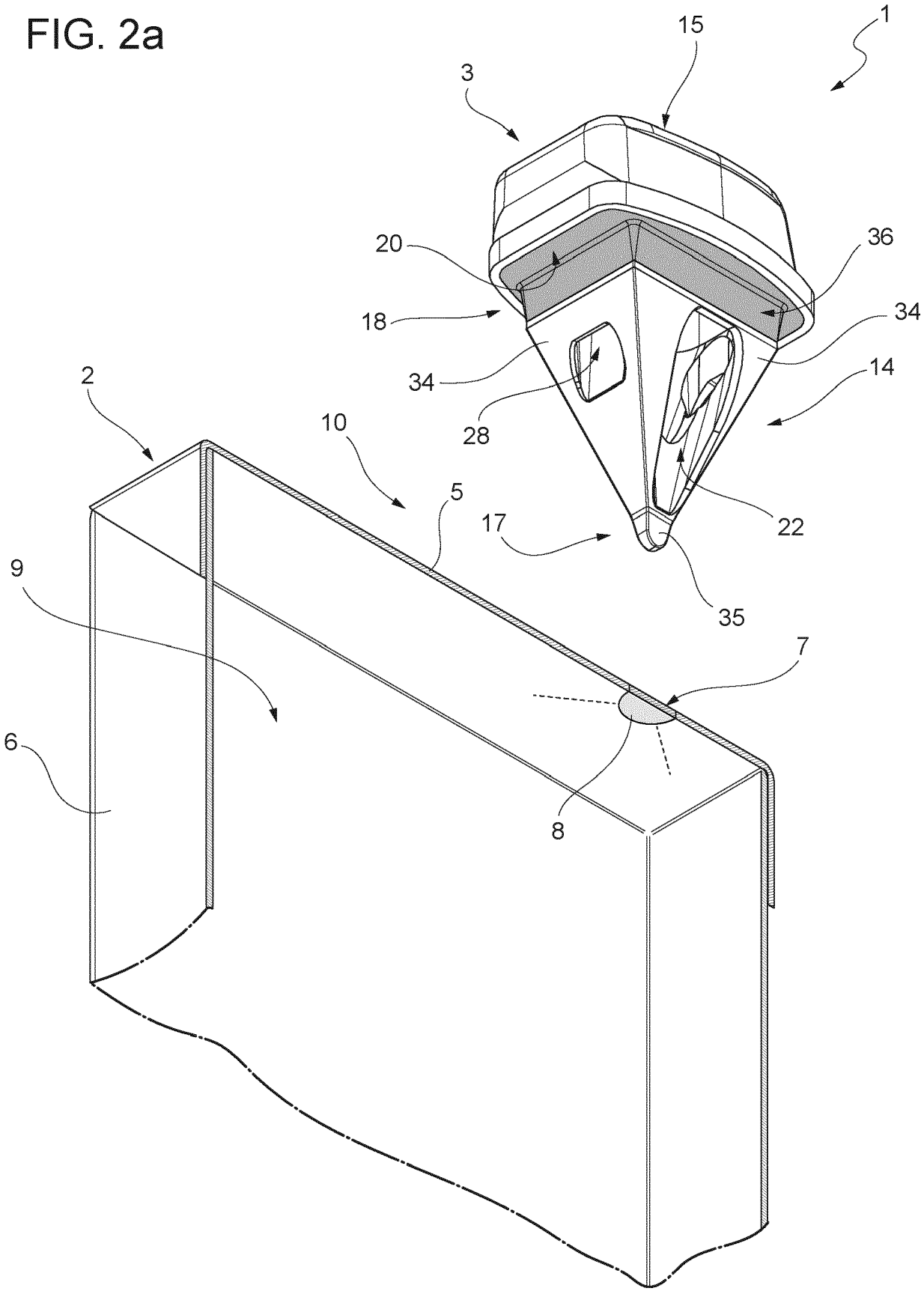

FIG. 2b

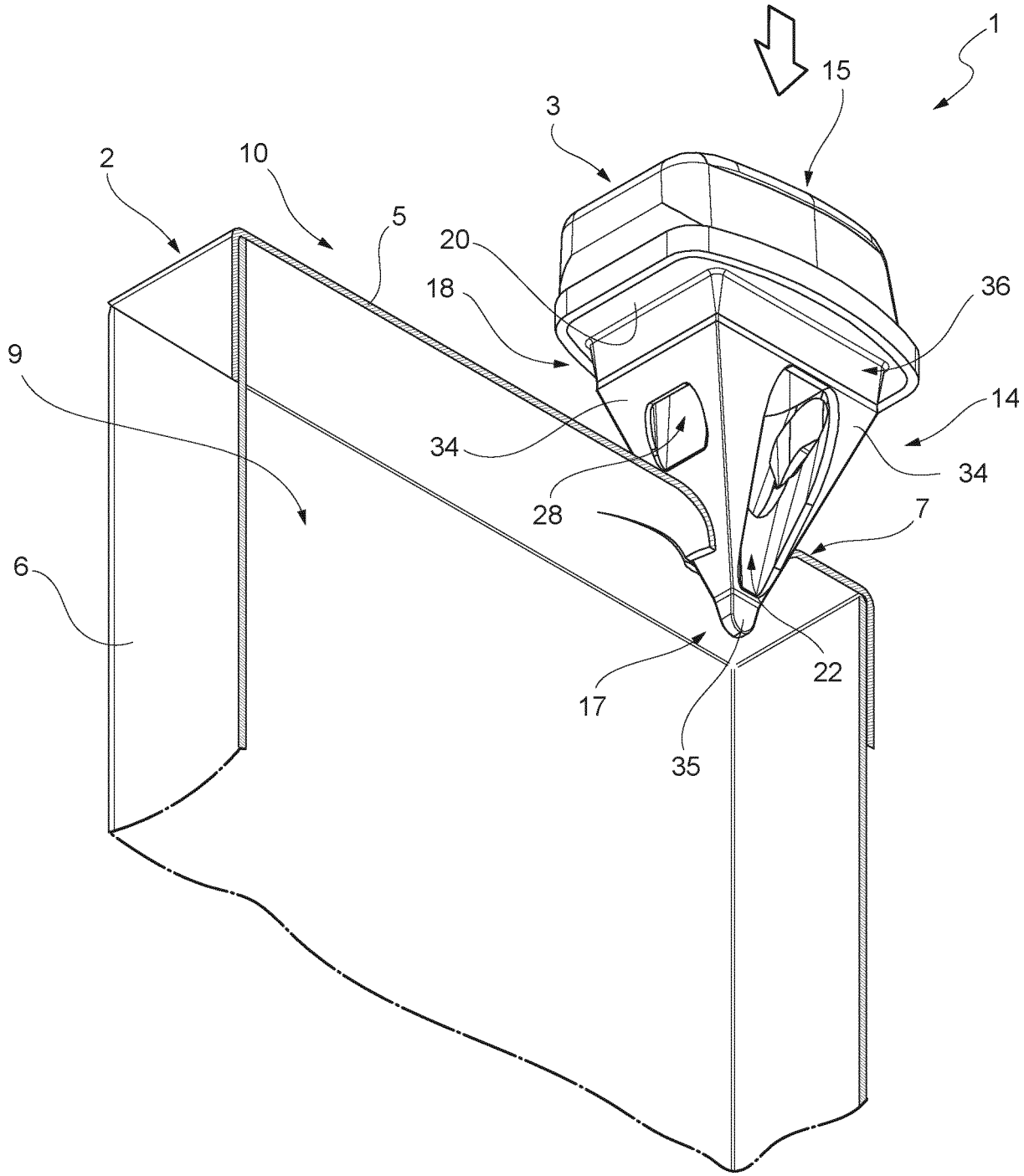

FIG. 2c

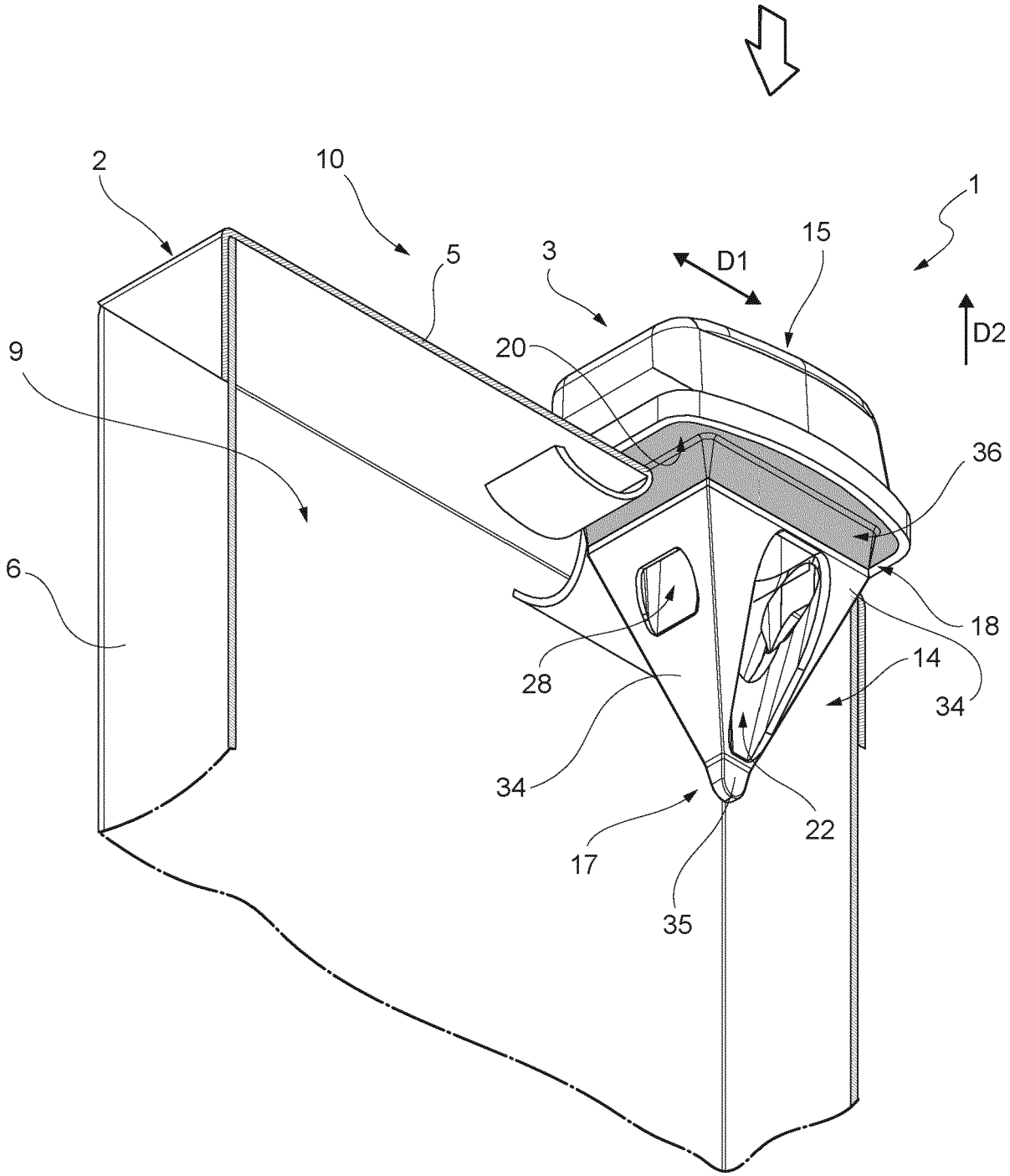

FIG. 3

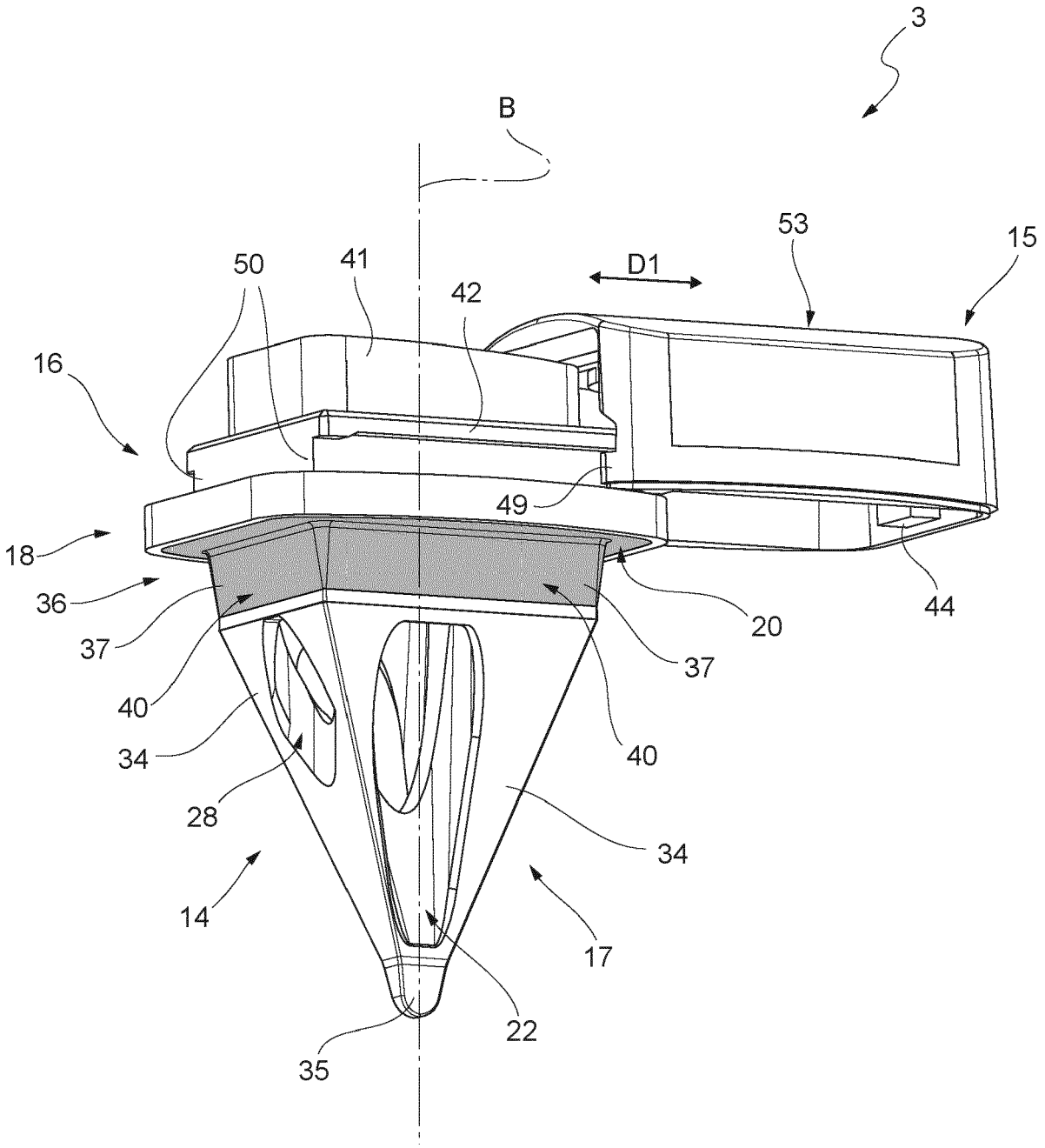

FIG. 4

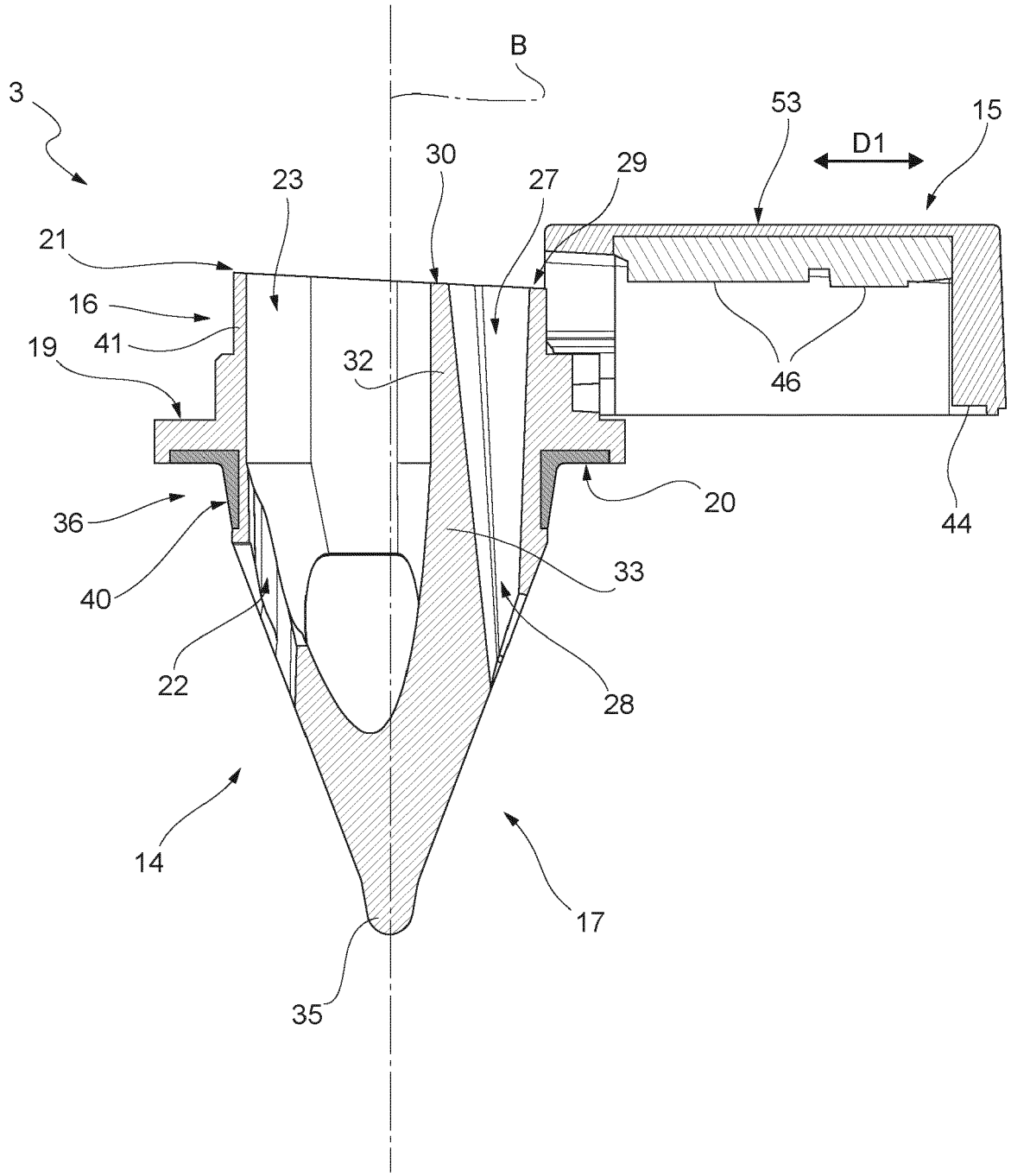

FIG. 5

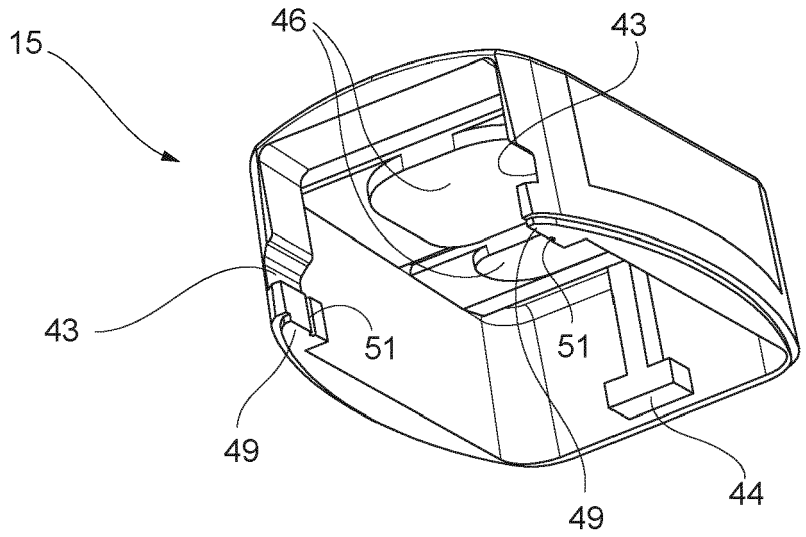
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FIG. 6

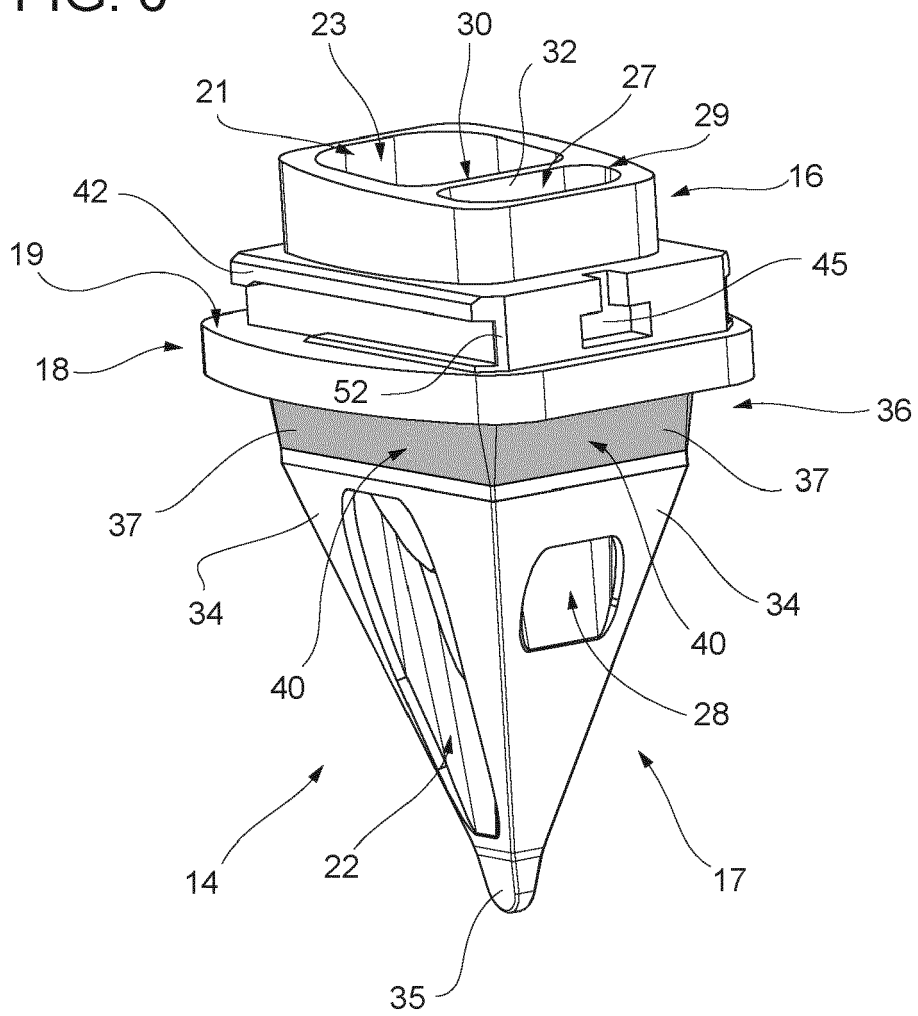
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FIG. 7

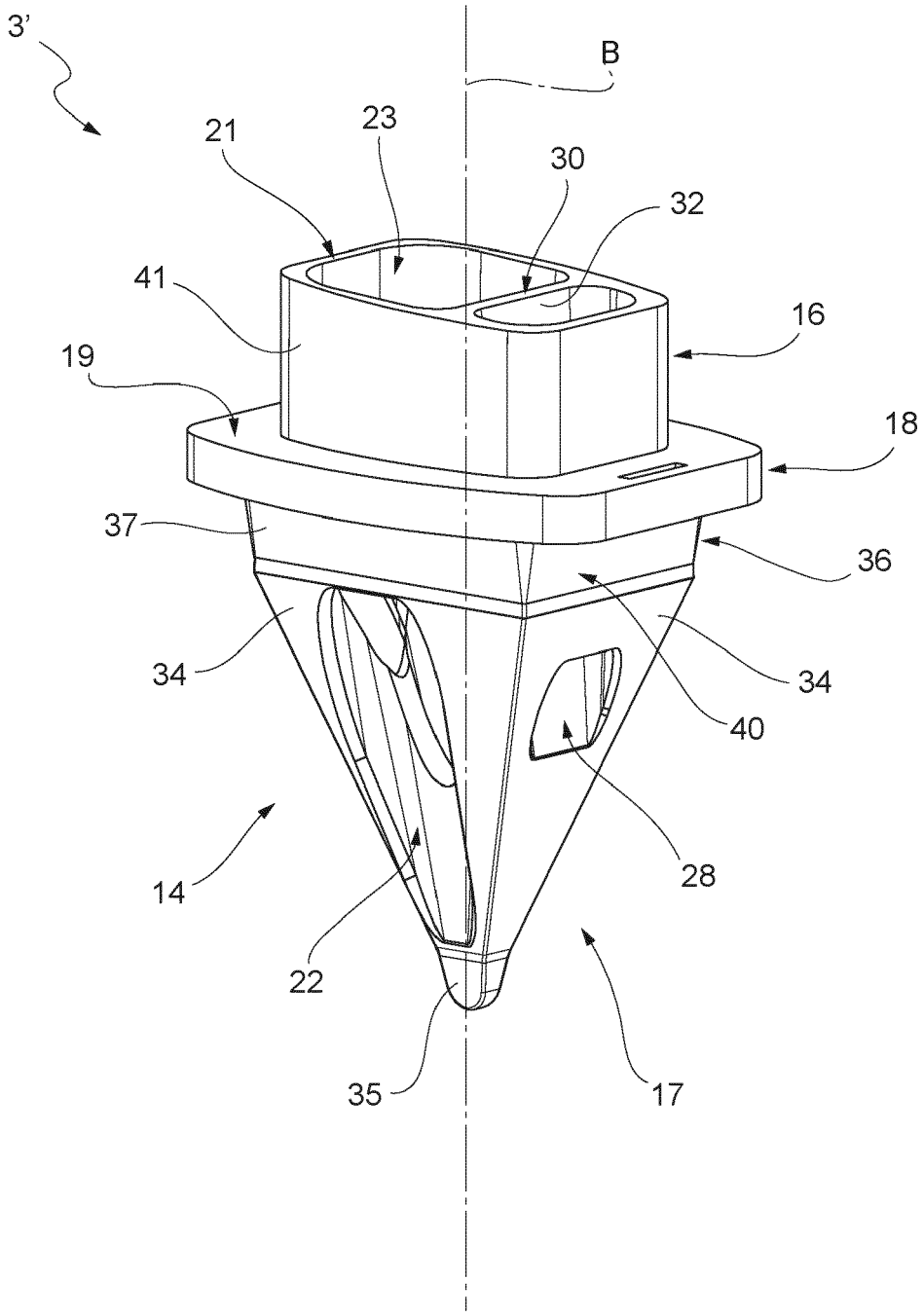


FIG. 8

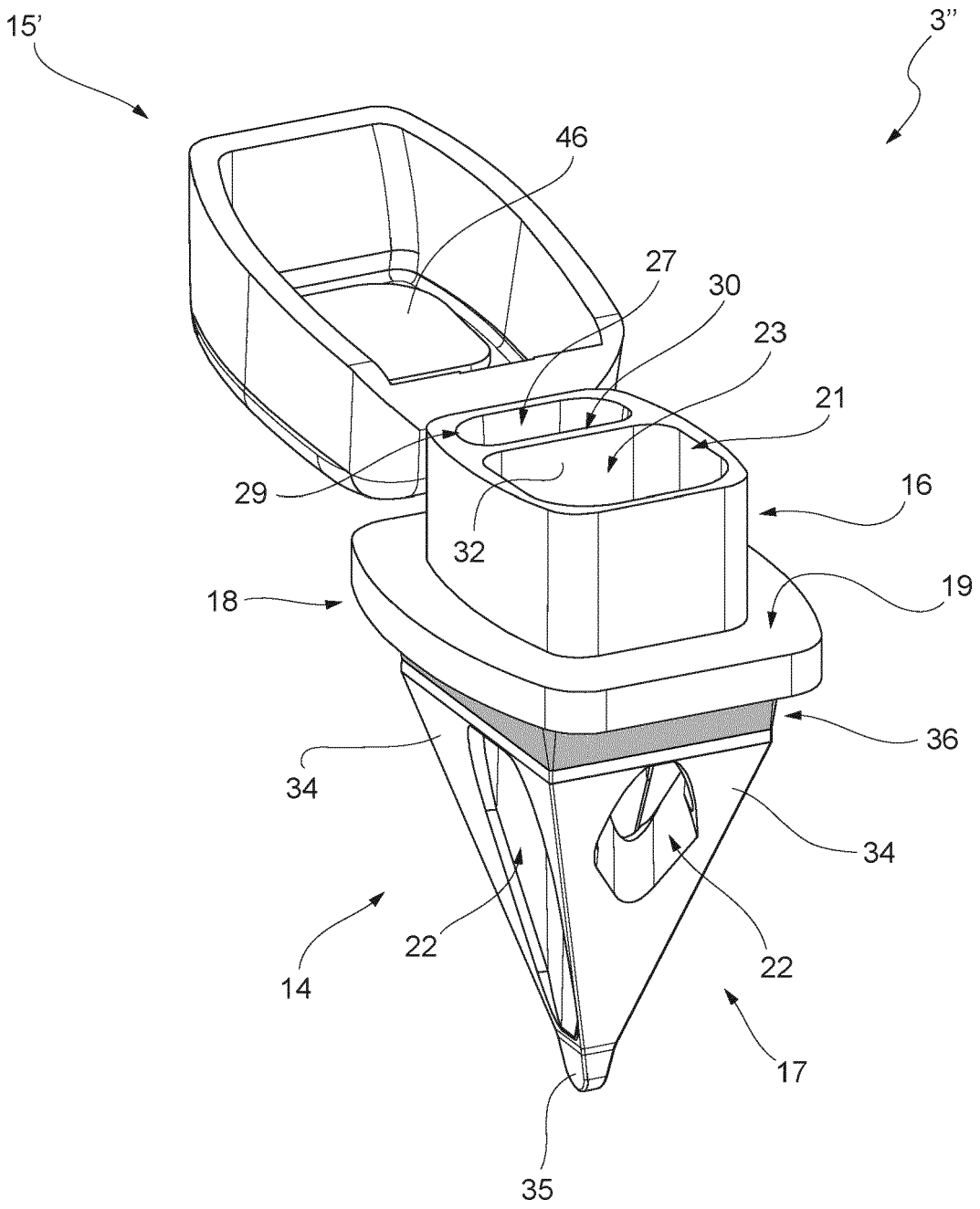


FIG. 9a

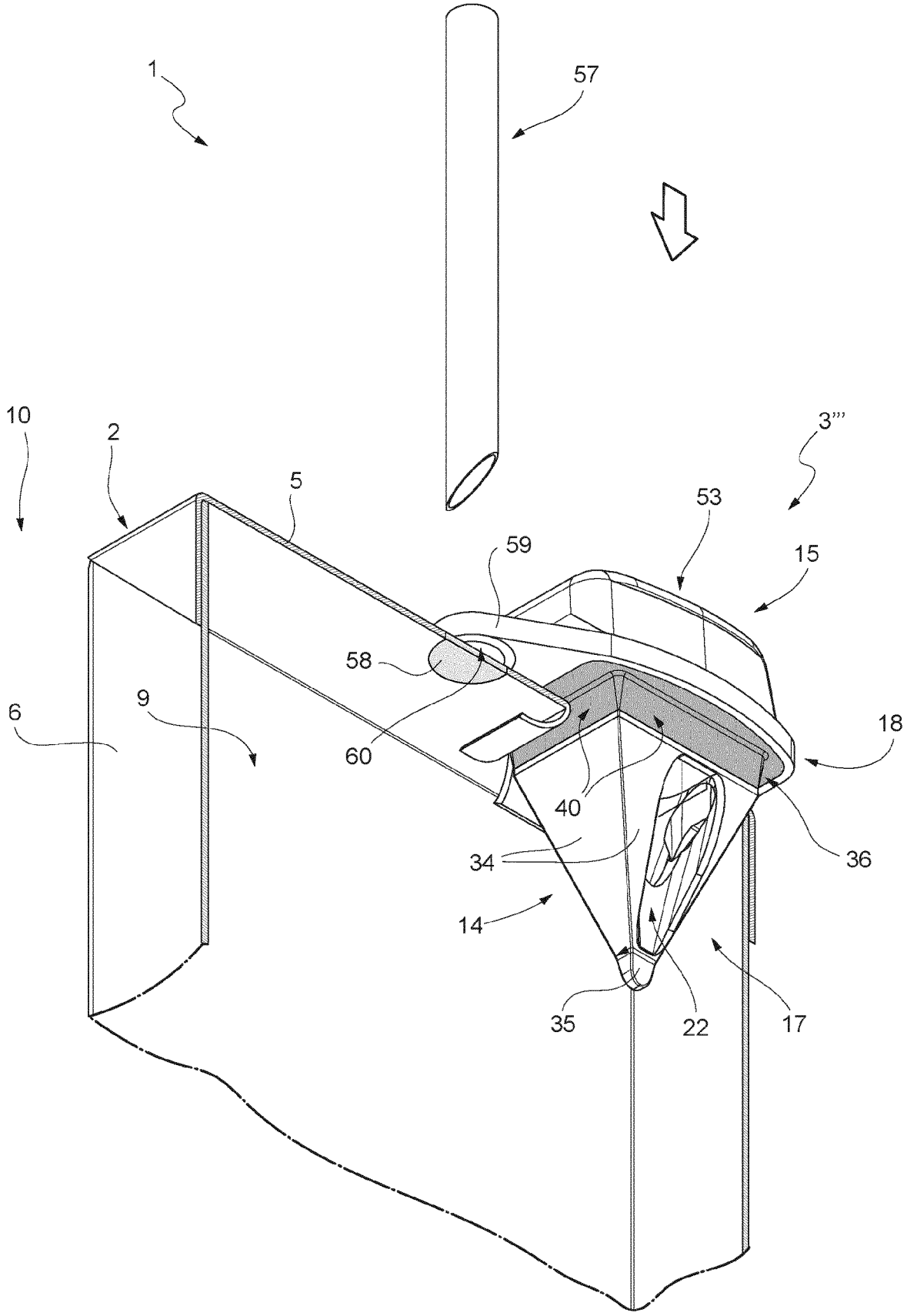


FIG. 9b

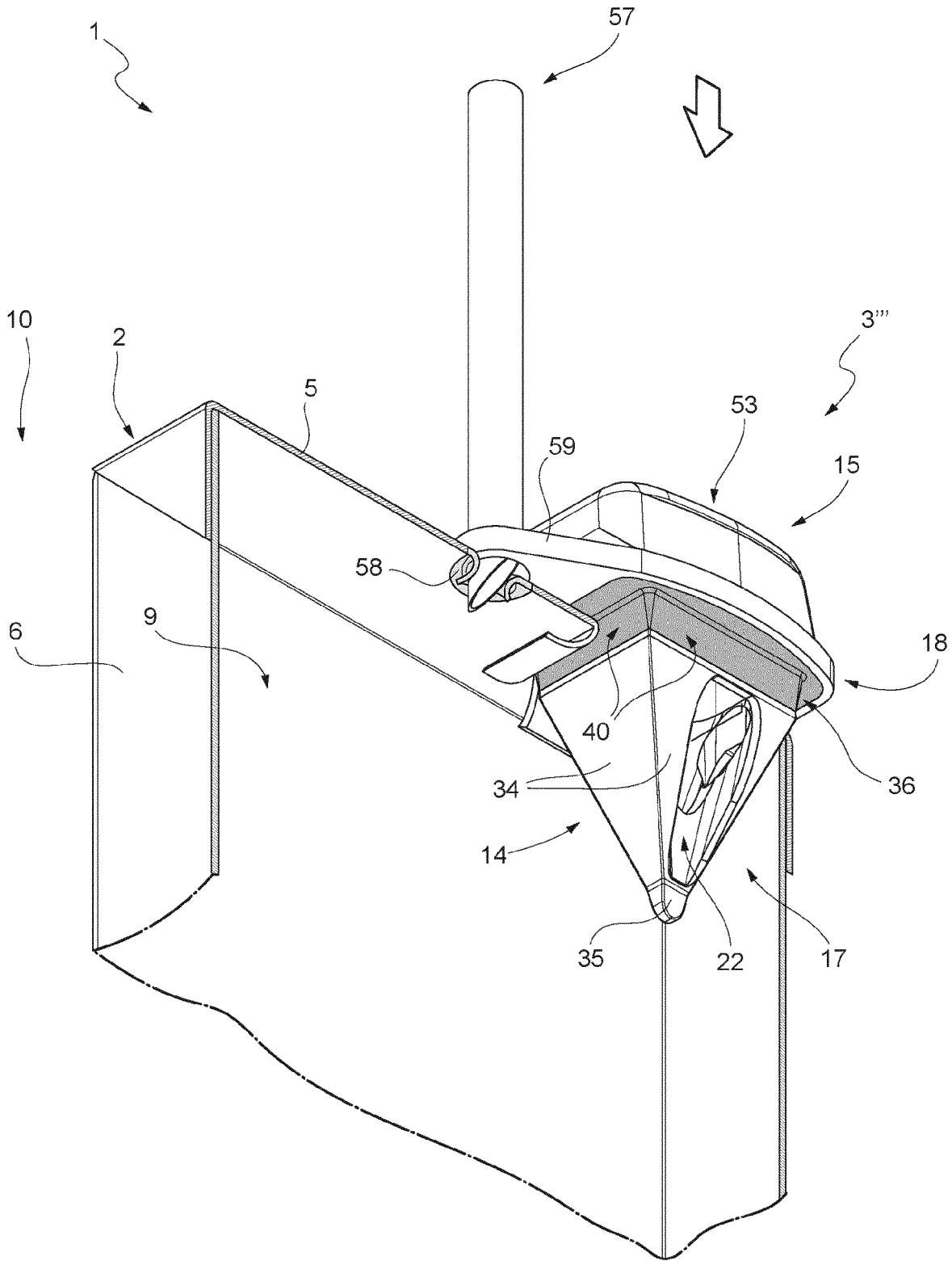


FIG. 9c

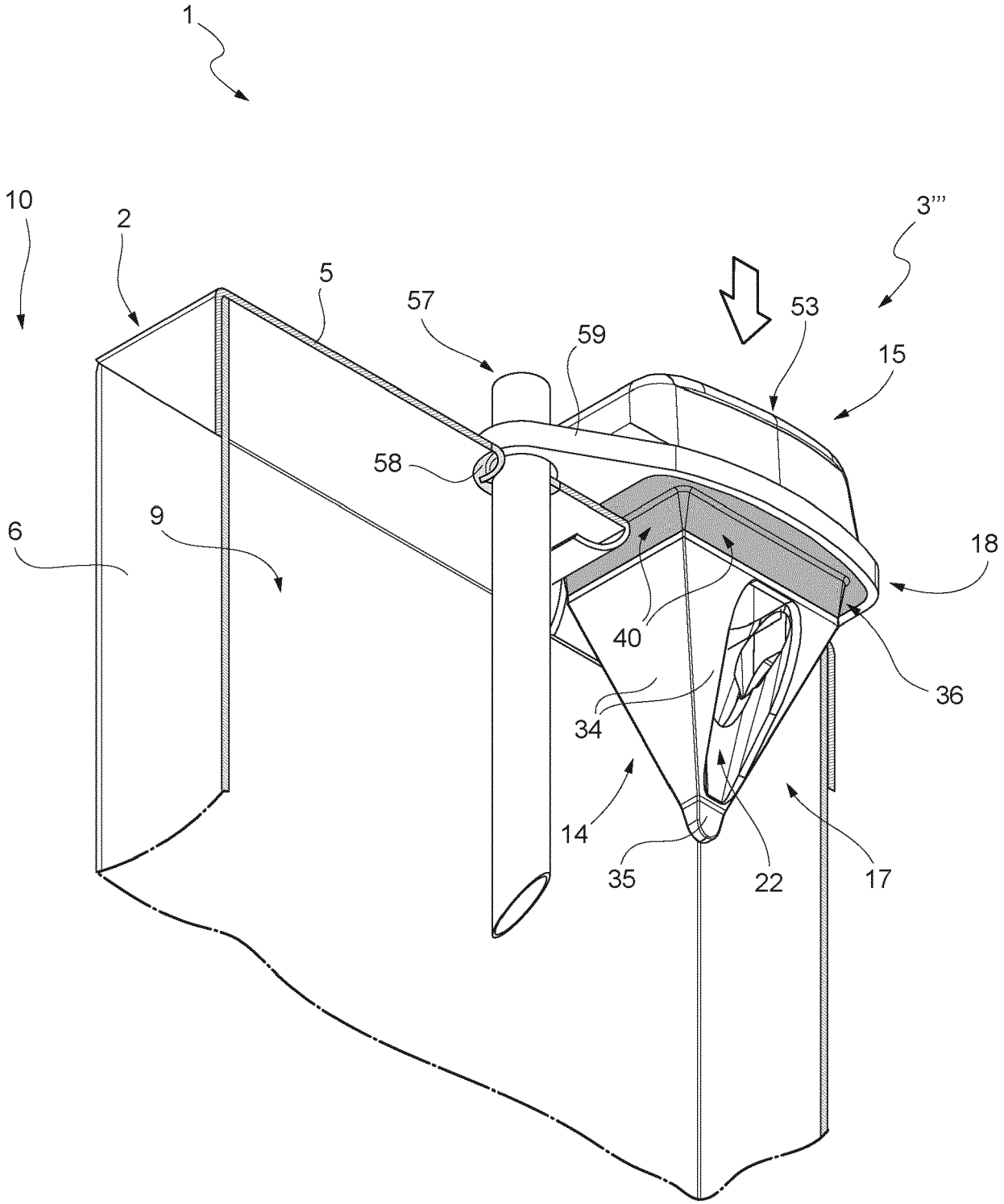
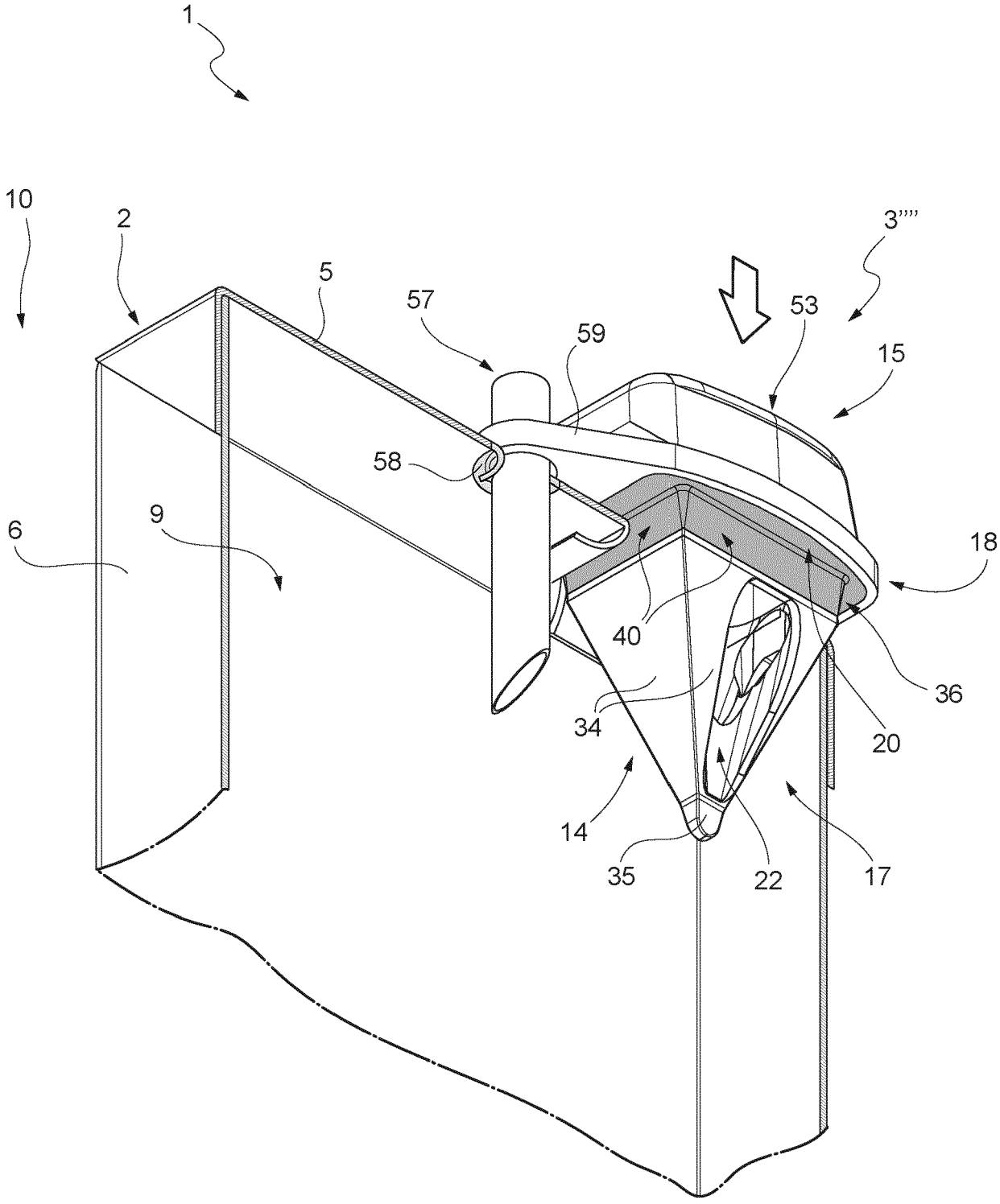


FIG. 10



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EUROPEAN SEARCH REPORT

Application Number
EP 24 17 0131

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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	31 July 2024	Leijten, René

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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

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