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(54) **Improved container for powder and granules**

(57) A container for powders and granular material (1), such as homopolymers and copolymers, comprises a body (2) defined by a bottom (3) from which a wall (4) is upwardly extended and by an opening (5) delimited by the wall, a closure or cover element (7) being adapted to be arranged on such opening (5), the body (2) having an external flange (11) projecting from the aforesaid wall and spaced from said opening and with which a flanged end edge (19) of said cover (7) cooperates, said edge (19) projecting from a lateral wall (10) of the cover. The lateral wall (10) is sealingly coupled with a wall portion (15) of the body (2) placed between the opening (5) and the external flange (11) of the body, such expedient creating the only seal existing directly between the cover (7) and the body (2), the flanged edge (19) of the cover (7) abutting against the aforesaid flange (11) in a discrete manner and without seal, so as to allow the passage of air between the edge (19) and the flange (11).

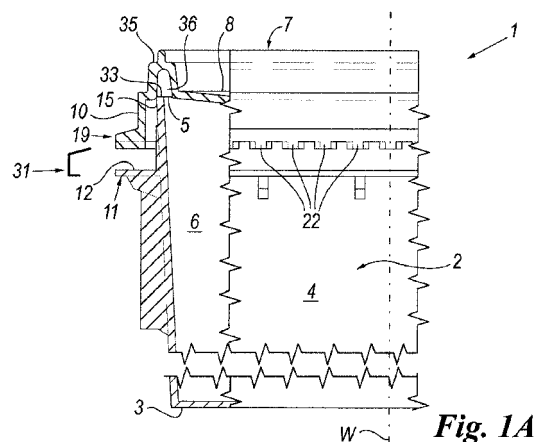


Fig. 1A

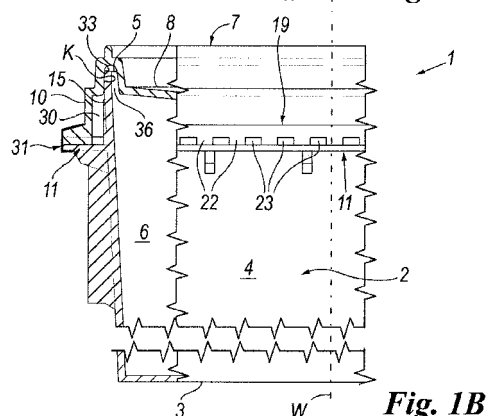


Fig. 1B

Description

[0001] It is the object of the present invention a container for powders and granular material or granules according to the preamble of the main claim.

[0002] As it is known, in the industrial field for the production of homopolymers and copolymers of tetrafluoroethylene (TFE) or the like, made of powder and granular material, cylindrical containers made of fiber, kraft paper and plastic material are used for the packaging thereof. These have various shape, the most common of which is the "vessel" shape (or slightly conical shape).

[0003] The aforesaid containers generally comprise a body, to which a closure cover is coupled. The body comprises a bottom, from which a perimeter wall is upwardly extended delimiting the opening of the body on which the cover is placed. The cover has a central part adapted to be arranged above such opening and a perimeter wall, which is separated from such part, adapted to externally enclose the body. Such wall is provided with a flanged perimeter end edge that is adapted to cooperate with an external flange of the body, externally projecting from the perimeter wall of the latter and lying on a plane orthogonal to the longitudinal axis of the body itself. The flanged edge of the cover has one or more annular projections projecting towards the external flange of the body and adapted to cooperate with the latter.

[0004] In order to suitably protect the product placed in the container from moisture, its cover is sealingly coupled to the body; this occurs through the presence of a gasket on the cover adapted to cooperate with the edge of the opening of the body itself, or through the obtainment of particular couplings between the cover and the perimeter wall of the latter which ensure a seal on such wall. EP1255680, which according to the Applicant constitutes the state of the art closest to the present invention, describes a container according to the preamble of claim 1 of the present document. According to such prior art, the container has a cover lacking sealing element but which, at least in the shut state, is abutted against the body in at least two sealing points that are spaced from each other. Such two sealing points have continuous circular form and are respectively constituted by the edge of the body (which delimits its opening) and by an annular groove in the lower side of the cover, as well as by the annular surface of the external flange of the body on which a rib is sealingly abutted; such rib is obtained on a flanged end part of the cover wall, integrally formed therewith and adapted to press against the surface of the flange. Such rib is movable on such surface when an annular tightening device is coupled to the aforesaid flange and to the flanged end part of the cover.

[0005] Such known solution, even if allowing an optimal seal of the cover on the body, has various drawbacks. For example, the seal attained through the abovementioned known solution results so hermetic that it can prevent the container from passing certain safety tests, which some airline companies perform in the airports

equipped with decompression chamber (hyperbaric chamber). Indeed, due to the severity of the anti-terrorism tests for air transport, according to which the container is subjected to a test in the hyperbaric chamber, a totally hermetic or very hermetic chamber causes the inward collapse of the wall of the hermetic container; therefore, the container does not pass the test.

[0006] In addition, the containers obtained according to the knowledge of the state of the art provide that the cover, without gasket, is specifically obtained in order to be sealingly connected to the body of the container through specifically provided form coupling parts (as is also described in the abovementioned patent EP1255680). On the other hand, the covers adapted to be sealingly coupled by means of gasket to the body normally lack the aforesaid specific coupling parts.

[0007] EP 328512 describes a device for closing container openings, said closure being obtained by means of the interposition of a gasket that presses on the edge of the container collar. The latter also provides for a sleeve adapted to be mounted on the collar of the container and adapted to be optionally used with various cover types. This prior art always provides for the use of the sealing gasket.

[0008] From that stated above, it follows that the producers of said containers for powder or granular products must produce different covers (and sometimes bodies) as a function of the fact that the seal of the coupling is reached by means of the presence of a gasket, or lack thereof. This leads to an increase of the production costs of the aforesaid containers and the need to have considerable spaces for storing the different container types or even just the covers.

[0009] Finally, there is also the need to avoid a direct contact between the cover and the edge of the body. This is particularly important when the product is placed in the body without the protection of a plastic bag. The aforesaid requirement is linked to the fact that a possible contact between the cover and the granules or powder located on the edge of the body could damage the granules, and if these fell into the body (mixing with the product present herein) they would "pollute" the contents thereof.

[0010] Therefore, the object of the present invention is to offer a container for powder or granular products that is improved with respect to the previously known containers and which faces and resolves at least one of the abovementioned problems.

[0011] In particular, the object of the invention is to offer a container of the type mentioned above which while having a high moisture seal, is capable of passing the safety tests of the airline companies, in which the container endures the hyperbaric chamber tests without collapsing.

[0012] A further object is to offer a container of the abovementioned type which has a generally usable cover, i.e. which can be sealingly closed on the body both with possible gasket and without.

[0013] Another object is to offer a container of the abovementioned type in which the cover cannot come

into contact with possible product particles or granules deposited on the edge of the body at the time of its filling.

[0014] These and other objects which will be evident to the man skilled in the art are achieved by a container according to the attached claims.

[0015] For greater comprehension of the present invention, the following drawings are enclosed as a merely non-limiting example, in which:

Figure 1A shows, partially in section, a first container obtained according to the invention in a closure phase;

Figure 1B shows, partially in section, the closed container of Figure 1A;

Figure 2A shows, partially in section, a variant of the container of Figure 1A in closure phase;

Figure 2B shows, partially in section, the closed container of Figure 2A;

Figure 3A shows, partially in section, a second variant of a container of Figure 1A, in closure phase;

Figure 3B shows, partially in section, the closed container of Figure 3A;

Figure 4A shows, partially in section, a variant of the container of Figure 3A, in closure phase; and

Figure 4B shows, partially in section, the closed container of Figure 4A.

[0016] With reference to the abovementioned figures, a container according to the invention is generally indicated with 1. It comprises a body 2 preferably having vessel or frustoconical conformation, with a bottom 3 from which one wall 4 is upwardly extended and terminating with an opening 5, through which a powder or granular product (for example of PTFE) can be inserted in the internal volume 6 of the container.

[0017] The opening 5 is adapted to be sealingly closed by a cover 7 having one part 8 adapted to be arranged in the opening 5, closing it. A wall 10 projects from the part 8 of the cover 7, and such wall 10 is adapted to be arranged at the wall 4 of the body 2. The wall 4, at a distance from the opening 5, has a projecting external flange 11 with a surface portion (upper surface portion in the figures) 12 lying on a plane orthogonal to the longitudinal axis W of the body 2 (and of the container 1).

[0018] A portion 15 of the wall 4 of the body is placed between the opening 5 and the external flange 11. The wall 10 of the cover 7 is adapted to cooperate with such portion 15, on an annular surface or zone K preferably up to a distance of 5-10 mm from the opening 5, said cooperation occurring via interference and creating a moisture seal between the cover and the body, due in fact to the coupling between the portion 15 and the wall 10 on the annular surface of the wall 4 of length equal to 5-10 mm, as stated above. Such cooperation occurs via (slight) deformation of the body 2 (having conicity opposing with that of the wall 10) which at the wall portion 15 is bent towards the internal volume 6 (as is visible in the figures 1B, 2B, 3B and 4B) when it is coupled to the cover

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[0019] The above-described solution is simple to achieve, but allows attaining an optimal seal upon closure of the body 2 with the cover 7. Such seal is achieved without the addition of parts to such cover or to the body which facilitate such seal, and in particular without it being necessary to use gaskets on such cover and/or on the body. All this translates into a quicker obtainment of the container with reduced cost with respect to the known solutions.

[0020] The cover 7 also has a flanged end edge 19 at the end of its wall 10 adapted to abut against the surface portion 12 of the external flange 11 of the body in a discrete manner. For this reason, such flanged edge 19 has, towards the flange 11, a free end having a conformation such to obtain said discrete abutment on the surface portion 12 of the flange 11; for example, such conformation comprises a zigzag progression obtained with a plurality of projections 22 (which can have any shape and size) spaced from each other and projecting from such edge towards the external flange 11 (as in figures 1A-B and 2A-B) or a corrugated progression (as in figures 3A-B and 4A-B).

[0021] Due to such conformation of the flanged edge 19 of the cover 7, the coupling between the latter and the external flange 11 of the body does not create a seal on the latter, and through the spaces 23 which are created between the edge and the flange air can pass which is arranged in an air space 30 present between the wall 4 of the body and that 10 of the cover 7 (up to the annular contact zone). Due to such expedient, during the safety trials or tests performed by some airline companies, during which the body is subjected to pressure variation in a hyperbaric chamber, such body does not collapse on itself because the air present in said air spaces 30 (and that which can pass into the spaces 23) causes a deformation of the wall portion 15 and the consequent separation of the wall 10 from such portion; the "breaking" of the seal thus allows compensating for the pressure inside the container with the outside pressure, preventing the inward collapse of the wall 4 of the container itself and the failing of the test.

[0022] Therefore, due to the above-described solution, the container according to the invention, shown in particular in figures 1A-B and 3A-B, has an optimal seal closure (through the coupling of the wall portion 15 of the body 2 and the wall 10 of the cover 7 on the annular zone K) and at the same time it can resist the hyperbaric chamber test through the air that passes between the flanged edge 19 of the cover and the external flange 11 of the body 2.

[0023] It should be noted that, as normally occurs, a tightening ring 31 is coupled to such edge 19 and to the flange 11, so as to constrain them. Nevertheless, such ring 31 does not create a coupling seal and the air can still pass through the spaces or openings 23 between the aforesaid edge and the flange.

[0024] In addition to that indicated above, if the product

is inserted in the container 1 without any protection (like that of a plastic bag which contains it), it is necessary to avoid that the particles of the product itself are situated at the upper edge 33 of the wall 4 of the body 2 which delimits the opening 5 and the cover 7 when the latter is placed on the body.

[0025] If the part 8 of the cover 7 is situated within the volume 6 of the body when the cover is coupled to the latter (as in the case shown in figures), it is important that there is no contact between said edge 33 and the aforesaid cover. For such reason, the latter has the part 8 with an edge 35 (raised in the figures, from which the wall 10 is projected) having, in one face thereof directed towards the body, an annular notch or loop 36 with depth such to allow the raised edge itself (and thus the cover) to be spaced from the edge 33 of the opening 5 when the cover is sealingly coupled to the body 2. Such loop 36, which at most partially contains the wall 10, has a rounded conformation (as in the figures), such that such raised edge 35 has a cross section conformation that is substantially U-shaped; nevertheless, such loop or notch can also have a conformation with acute angle so that the edge 35 assumes a V-shape in cross section.

[0026] The presence of the loop or notch 36 allows the cover 7 to be provided with a gasket 40 or to lack the latter (which is inserted in such notch, as is visible in the figures 2A-B and 4A-B), thus to allow the use with a body if the primary requirement of the product type contained in the latter is moisture protection.

[0027] Due to the above-indicated solution, it is no longer necessary to have different molds or equipment as a function of the type of cover or container that one wishes to obtain (with or without gasket). It is therefore possible to produce only one type of cover without gasket, the latter then being coupled to the notch 36 only if necessary. Such application can occur during the manufacturing of the container 1, at its producer, or at the user.

[0028] Due to the invention, a single mold for the cover is therefore necessary, with consequent reduction of the production costs. The container so obtained thus results "multipurpose", since it can be used with various product types which require a seal of the cover on the body attained with a gasket - or which do not require such seal.

[0029] In addition, as stated, such container is capable of overcoming the trials or tests in hyperbaric chamber, if these are necessary for the air shipment of the product.

[0030] Various embodiments of the invention have been described and mentioned above. Still others are nevertheless possible for the man skilled in the art with regard to the preceding description, embodiments which thus fall within the scope of the invention as defined by the following claims.

Claims

1. Container for powders and granular material (1), such as homopolymers and copolymers, comprising

a body (2) defined by a bottom (3) from which a wall (4) is upwardly extended and by an opening (5) delimited by such wall, a closure or cover element (7) being adapted to be arranged on such opening (5), the body (2) having an external flange (11) projecting from the aforesaid wall and spaced from said opening, with the flange being adapted to cooperate with a flanged end edge (19) of said cover (7), said edge (19) projecting from a lateral wall (10) of the cover (7) in turn projecting from a part (8) adapted to be arranged above the opening (5) of the body (2), **characterized in that** the lateral wall (10) of the cover (7) is sealingly coupled, via interference, with a wall portion (15) of the body (2) placed between the opening (5) and the external flange (11) of the body, said lateral wall (10) and said wall portion (15) having opposing concavity in a manner such that their coupling creates a moisture seal directly through the contact between the cover (7) and the body (2), the flanged edge (19) of the cover (7) abutting against the aforesaid flange (11) in a discrete manner and without seal so as to allow the passage of air between the edge (19) and the flange (11).

2. Container according to claim 1, **characterized in that** it provides, on the wall portion (15) of the body (2), an annular surface or zone (K) in which there is the seal coupling between the cover (7) and the body (4) that has a width comprised between 5 and 10 mm.
3. Container according to claim 1, **characterized in that** the flanged edge (19) comprises, on a free end thereof, a plurality of projections (22) that are spaced from each other and abutting against the external flange (11) of the body (2) in a discrete manner.
4. Container according to claim 1, **characterized in that** the flanged edge (19) comprises a corrugated free end thereof, said edge abutting against the external flange (11) of the body (2) in a discrete manner when the cover (7) is coupled with the latter.
5. Container according to claim 2, **characterized in that** it has an air space (30) between the wall portion (15) of the body (2) and the wall (10) of the cover (7) when these are coupled together, into which air penetrates that is passing through the discrete contact points between the external flange (11) of the body and the flanged edge (19) of the cover, such air space terminating at the contact zone (K) between the cover (7) and the body (11).
6. Container according to claim 1, **characterized in that** the cover is spaced from an upper edge (33) of the wall (4) of the body delimiting the opening (5) of the latter.
7. Container according to claim 6, **characterized in**

that the cover has an edge (35) of a part (8) adapted to intercept the opening (5) of the body (4) from which the lateral wall (10) of the cover (7) is extended, such edge having, in one face thereof directed towards the body, an annular notch (36) adapted to be frontally positioned at the upper edge (33) of the wall (4), said notch at most partially containing such wall (4) of the body such that said upper edge (33) is spaced from the cover.

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8. Container according to claim 7, **characterized in that** said notch (36) alternatively has a rounded conformation or an acute angle conformation if seen in cross section.

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9. Container according to claim 7, **characterized in that** said annular notch (36) is adapted to contain a seal gasket if the container (1) contains a product that must be protected from moisture.

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10. Container according to claim 1, **characterized in that** it comprises a lateral tightening ring (31) adapted to be coupled to the edge of the body (11) and to the flanged edge (19) of the cover.

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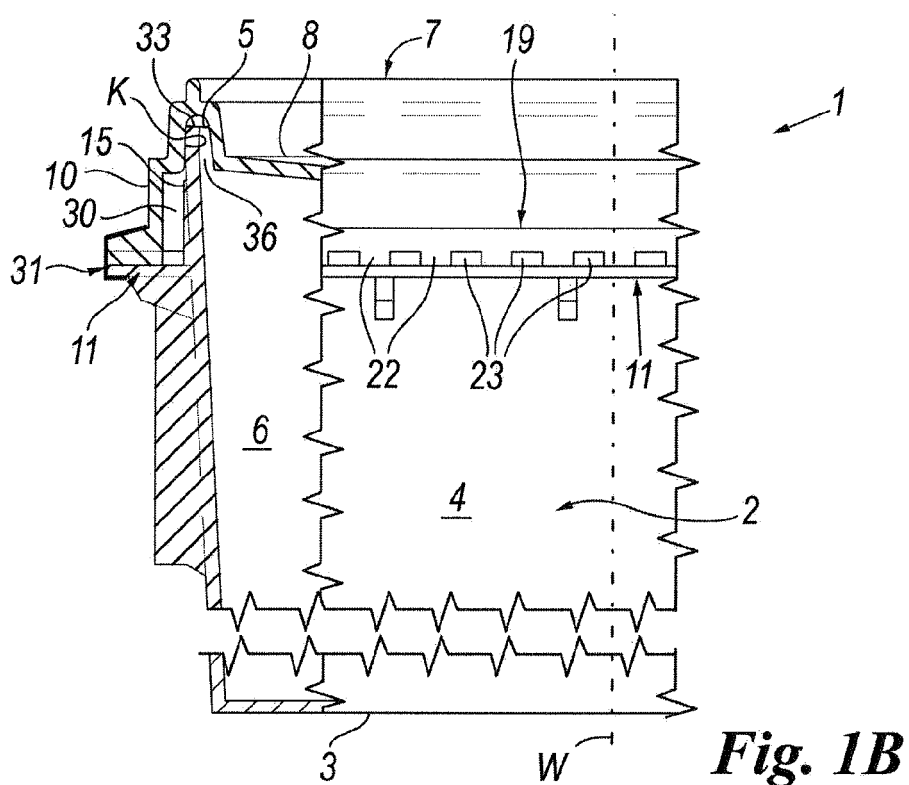
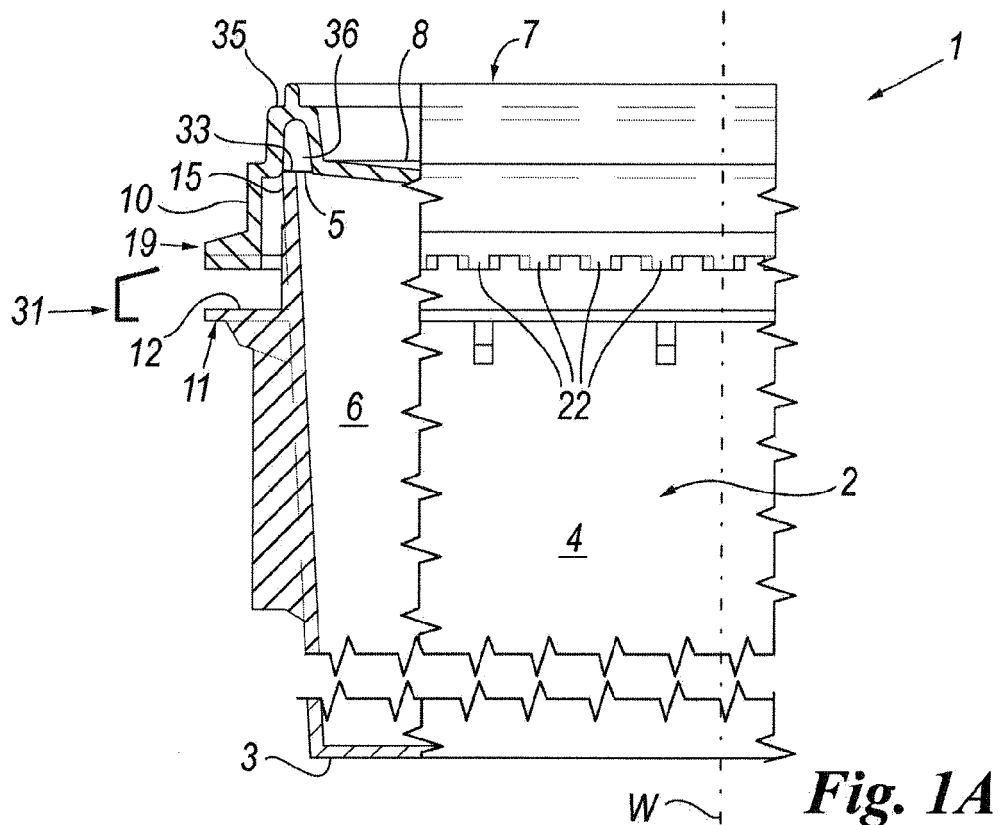
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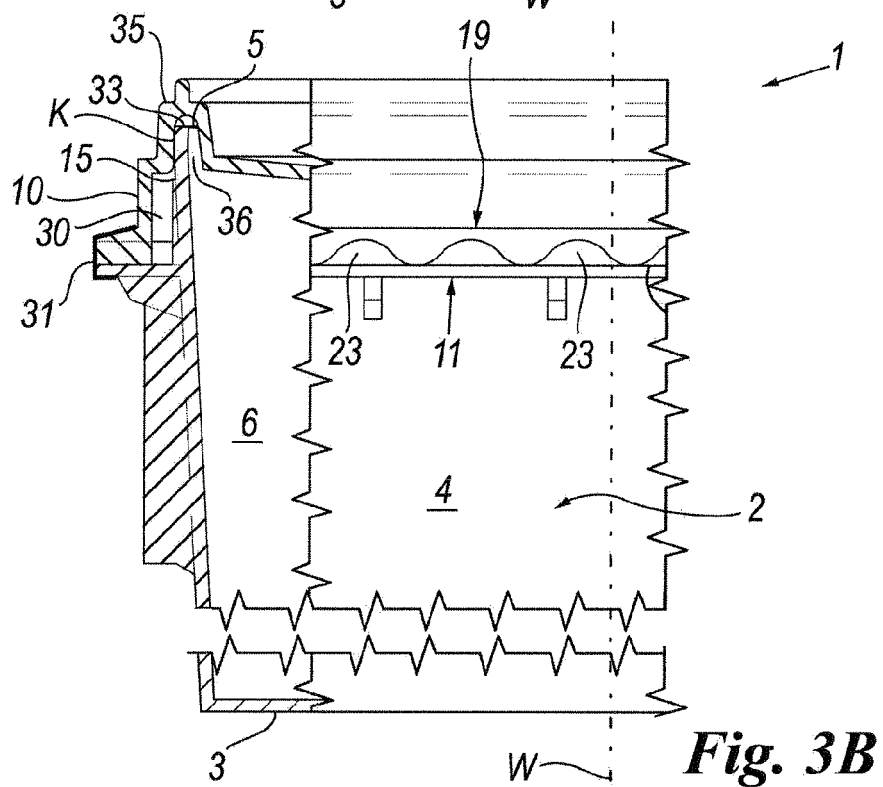
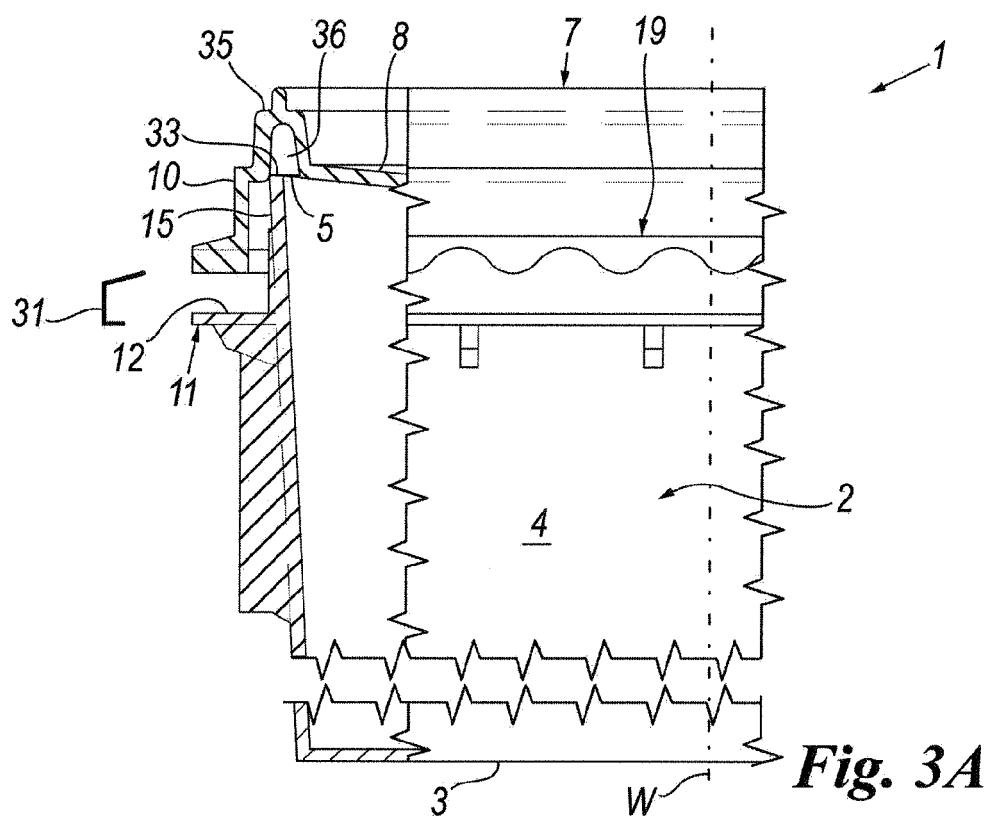
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Application Number
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 14 November 2012	Examiner Janosch, Joachim
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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