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(71) Applicant *(for all designated States except US)*: **DISPACK-PROJECTS NV** [BE/BE]; Admiraalhof 24, B-9070 Destelbergen (BE).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **WAUTERS, Albert, Marie** [BE/BE]; Admiraalhof 24, B-9070 Destelbergen (BE).

(74) Agent: **D'HALLEWEYN, Nele, Veerle, Trees, Gertrudis**; Arnold & Siedsma, Meir 24, B-2000 Antwerpen (NL).

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(54) **Title**: FIXATION OF A FITTING ON A CONTAINER

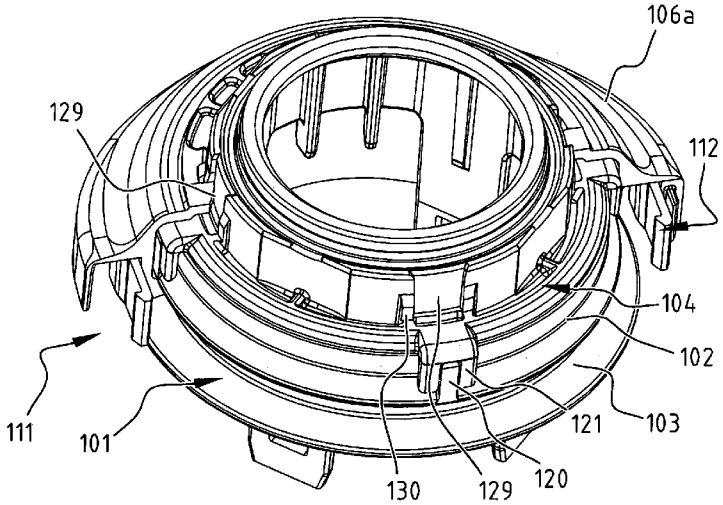

FIG. 1

(57) **Abstract**: Fixation of a fitting on a container Assembly for fixing a fitting on a plastic container (100) with a neck (101) provided with at least one thickened neck portion (102, 103) extending substantially along the periphery of the neck (101), wherein the assembly comprises: a fitting body (104) provided with a support flange (105) adapted to support on the neck (101); at least two ring sections (106a, 106b) which can be attached to each other to form a ring, which at least two ring sections (106a, 106b) are adapted to extend around the neck (101) of the container (100) and over the fitting body (104), and are provided on an inner side thereof with a protruding part (110) intended to engage under the thickened neck portion (102, 103).

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FIXATION OF A FITTING ON A CONTAINER

The present invention relates to an assembly for fixing a fitting on a container, typically a beer container, to a fitting body for use in such an assembly, and to a ring section for use in such an assembly. The invention further relates to a container on which such an assembly is mounted and a method for mounting such an assembly on a container.

EP0225035 A2 in the name of Johnson Enterprises describes a fitting for a beer container or the like. The fitting has a fitting body which is fixed on the neck of a bottle using a coupling ring 55 and a retaining ring 70. Coupling ring 55 is provided at the bottom with slots for the purpose of forming flexible tongues which can engage over a neck ring. Retaining ring 70 is slid over coupling ring 55 to lock the fitting firmly onto the neck.

The present invention has for its object to provide an improved assembly and an improved method for fixing a fitting on the neck of a container, with which a compact, easy to mount assembly is obtained which allows a firm fixing of a fitting on a container.

The assembly according to the invention is distinguished for this purpose in that the assembly comprises a fitting body provided with a support flange adapted to support on the neck; and at least two ring sections which can be attached to each other to form a ring round the neck of the container. The assembly is intended for co-action with a neck with a thickened neck portion. The at least two ring sections are adapted to extend around the neck of the container and over the fitting body. Provided on an inner side thereof is a protruding part intended to engage under the thickened neck portion.

A good retention of the fitting body on a neck of the container is in this way obtained using simple ring sections which can be attached to each other to form a ring. Attachment of the ring sections in a lateral plane is all that is necessary here, and no components need engage resilient parts on the neck of the bottle. Retaining rings and the like are thus not required.

According to an advantageous embodiment, the assembly comprises two ring sections extending through about 180 degrees around the neck. Variants with for instance three ring sections, each extending through about 120 degrees round the neck, can also be envisaged.

According to a simple embodiment, each ring section of the at least two ring sections is provided on its inner wall with a ring segment moulded thereon for the purpose of forming the protruding part which engages under a thickened neck portion, typically a neck ring. This ensures in suitable manner that the ring sections cannot slide off the neck.

According to an advantageous embodiment, the neck is provided with a number of protrusions and the fitting body is provided with a number of protrusion receiving parts in which the number of protrusions can be received. Such protrusions allow non-rotating positioning of the fitting body on the neck of the container. The protrusions are preferably arranged on a neck ring formed integrally with the neck, but can also be provided directly on the neck. The protrusion receiving parts are preferably formed on the fitting body in the form of downward protruding flanges with a recess having a shape complementary to the shape of the protrusions.

According to an advantageous embodiment, each ring section of the at least two ring sections is provided with a first connecting part and with a second connecting part. The first connecting part of each ring section of the at least two ring sections is adapted to co-act, preferably via a snap connection, with the second connecting part of an adjacent ring section of the at least two ring sections for mutual attachment of the at least two ring sections. According to a possible embodiment hereof, each first connecting part of each ring section comprises a resilient locking arm protruding outward from an outer end of this ring section. Each second connecting part of an adjacent ring section then comprises a recess in which the locking arm can be locked. Such a locking arm is preferably provided with a protruding part formed to engage behind a wall of the recess for the purpose of locking the locking arm in the recess.

According to a preferred embodiment, the second connecting part is identical to the first connecting part of each ring section. Each connecting part then has a resilient locking arm protruding outward from an outer end of this ring section and a recess in which the locking arm of an adjacent ring section can be locked. A double locking can in this way be obtained between adjacent ring sections, and the two or more ring sections can take an identical form.

According to a further aspect of the invention, the fitting body is provided along its periphery with a profiling and the at least two ring sections are provided with a complementary profiling for non-rotating positioning of the at least two ring sections relative to a fitting placed on the neck of the container. According to an advantageous embodiment hereof, the fitting body has a substantially cylindrical upright jacket part and the profiling is

provided on this jacket part. The ring sections can then have an upper part with a cylindrical inner wall provided with the complementary profiling.

According to yet another aspect of the invention, the fitting body for each ring section is provided with an upward protruding part, and each ring section is provided at the outer ends thereof with a recess with a shape adapted to receive the upward protruding parts. Each upward protruding part can in this way be received in mutually connecting recesses of adjacent ring sections. This will allow non-rotating positioning of the at least two ring sections on the fitting body.

The invention further relates to a container on which an assembly according to any of the above described embodiments is mounted. The container has a neck provided with at least one thickened neck portion extending substantially along the periphery of the neck, typically a neck ring which is formed integrally with the neck and under which extends the protruding part of the at least two ring sections. The container and the assembly are preferably adapted to store a liquid under a pressure lying between 0.25 bar and 10.00 bar, preferably between 0.50 bar and 3.50 bar. Although the container according to the invention is particularly intended to store carbonated liquids under pressure - envisage a beer container - such a container can advantageously also be employed to store gases and solid substances.

The invention also relates to a fitting body and a ring section for use in an assembly according to any of the above described embodiments. Such a fitting body can particularly be embodied with one or more of the above described measures

thereof. The same applies for the ring section according to the invention.

Finally, the invention relates to a method for fixing a fitting body on a container with a neck provided with at least one thickened neck portion extending substantially along the periphery of the neck. The method is distinguished in that it comprises the following steps. The fitting body is positioned on the neck, wherein a part of the fitting body protrudes into the interior of the container. According to an advantageous embodiment, the fitting body is placed non-rotatably on the neck. At least two ring sections are selected which can be attached to each other to form a ring which is adapted to extend around the neck of the container and over the fitting body, and which is provided with a protruding part intended to engage under the thickened neck portion. The at least two ring sections are arranged around the neck of the container and over the fitting body, with the protruding part under the thickened neck portion.

The invention also relates to a disc spring, preferably for use in a fitting for a container according to any of the above described embodiments. The disc spring has a substantially conical disc body manufactured from plastic. The disc body is provided with a number of recesses for passage of a fluid.

According to an advantageous embodiment, the disc spring is manufactured from a PET material such that it is easy to recycle. The number of recesses are preferably distributed at regular intervals over the periphery of the substantially conical disc body. The recesses preferably further have a form such that they do not affect the resilience of the disc spring too much.

According to yet another aspect, a fitting is provided having a number of disc springs. The fitting further typically comprises a fitting body with a suction tube for drawing fluid under pressure into the container and a valve body for passage of the fluid out of the container, the valve body being resiliently mounted using the disc springs. According to a possible embodiment, the disc springs are mounted around the suction tube. According to another option, a cylindrical chamber is provided in line with the suction tube, and the spring assembly is received in this cylindrical chamber.

The present invention relates to a pressure relief valve, in particular a pressure relief valve for use in a container of a fluid under pressure, typically a beer container.

Existing pressure relief valves have the drawback of usually not being very compact and comprising several components which are difficult to recycle.

The invention has for its object to provide a pressure relief valve which is compact and reliable, and is particularly recyclable.

The pressure relief valve is distinguished for this purpose by the measures of claim 29.

Advantageous embodiments are described in the dependent claims.

According to yet another aspect, the invention relates to a container for a fluid under pressure, preferably a beer container, comprising a fitting with a suction tube for drawing fluid into the container, wherein a pressure relief valve is mounted in an upper end of the suction tube. Such

an embodiment has the advantage that the pressure relief valve can be mounted in a convenient manner in the fitting and that the container itself need not be modified. The pressure relief valve can for instance be embodied as described above, but can also be embodied in other manner, as will become apparent hereinbelow.

According to a possible embodiment, the suction tube is provided with one or more openings for passage of fluid out of the container and the pressure relief valve is arranged substantially above the one or more openings.

According to an advantageous embodiment, the upper end of the suction tube is closed by a closing cap with a hole. When the pressure relief valve opens, the fluid can flow out through this hole.

According to an advantageous embodiment, the pressure relief valve comprises a clamping block received in sealing manner in the hole of the closing cap. According to an alternative, the upper end of the suction tube is open and the clamping block is received in sealing manner in this open end. The hole and the clamping block preferably have a shape such that the clamping block can be pressed out of the closing cap from the inside of the container.

According to an advantageous embodiment, the pressure relief valve comprises a spring support and a spring means. The clamping block is connected to the spring support and the spring means acts between the spring support and the closing cap such that, when the pressure in the container exceeds a critical value (for instance a value between 5 and 7 bar), the spring support presses the clamping block outward counter to the action of the spring means. The spring support is preferably an integral piece, for instance

manufactured by injection moulding, comprising a base and a connecting shaft directed upward from the base, which connecting shaft is mounted on or in the clamping block. The clamping block can for instance be provided for this purpose with a recess into which the outer end of the connecting shaft can be pressed, wherein the shape of the recess and of the outer end are such that the connecting shaft is secured in the clamping block. The connection between the clamping block and the connecting shaft can for instance be a dovetail connection.

According to an advantageous embodiment, the clamping block is manufactured from a plastic material which is more compressible than the plastic material from which the spring support is manufactured. The clamping block can for instance be manufactured from an EPDM (ethylene propylene diene monomer) material or an NBR (nitrile butadiene rubber) material, preferably with good sealing properties, while the spring support can for instance be manufactured from a harder plastic material such as PET.

According to an alternative embodiment, the clamping block and the spring support are manufactured from the same material. A separate seal is in this case arranged around the clamping block, for instance a separate O-ring or an overmoulded elastic rubber, this guaranteeing the seal. The clamping block and the spring support can then be manufactured from for instance a PET material.

According to yet another possible embodiment, the pressure relief valve comprises a housing mounted in sealed manner in an upper end of the suction tube. The housing is provided at the bottom with a lower opening and at the top with an upper opening. A closing part is resiliently mounted in the housing in order to close the lower opening. The mounting is

such that this closing part can be pressed in the housing counter to the spring action when the pressure in the container exceeds a determined critical value. Such a critical pressure lies for instance between 5 and 7 bar.

The present invention will be further elucidated on the basis of a number of by no means limitative exemplary embodiments of the assembly according to the invention, with reference to the accompanying drawings, in which:

figure 1 is a schematic perspective view of a first embodiment according to the invention of a fitting body and a ring section which are arranged on a neck of a container;

figure 2A is a schematic cross-section of a second embodiment of an assembly according to the invention, wherein the cross-section is taken through the plane in which a first ring section connects to a second ring section;

figure 2B is a detail view of the cross-section of figure 2A;

figure 2C is a view corresponding to the view of figure 2B, but in the opened position of the valve;

figures 3A and 3B illustrate a schematic perspective view of mutually attached ring sections according to an embodiment of the invention, as seen from respectively the upper side and from the underside;

figures 4A and 4B show a schematic perspective view of the one ring section of figure 3A as seen from respectively the upper side and from the underside;

figures 5A and 5B show a schematic perspective view of an embodiment of a fitting body according to the invention as

seen from respectively the upper side and from the underside;

figure 6 shows a schematic perspective view of a suction tube mounting piece of the embodiment of figure 2A;

figure 7 shows a schematic perspective view of a part of the suction tube of the embodiment of figure 2A;

figure 8 shows a schematic perspective view of the valve components of the embodiment of figure 2A;
figure 8A shows a cross-sectional detail view thereof;

figures 9A and 9B show a perspective view of the cap of the embodiment of figure 2A, as seen from respectively the upper side and from the underside;

figures 10A and 10B show an alternative embodiment of the cap of the embodiment of figure 2A, as seen from respectively the upper side and from the underside;
figure 11 shows a perspective view of a spring assembly according to the invention;

figure 12A shows a top view of a disc spring according to the invention; and
figure 12B shows a front view of the disc spring of figure 12A;

figure 13 is a schematic perspective cross-sectional view of a first embodiment of a pressure relief valve according to the invention;

figure 14 is a schematic cross-section of the pressure relief valve of figure 1;

figure 15 is a schematic cross-section of the pressure relief valve of figure 1 in the buckled position;

figure 16 shows respectively a schematic perspective view and a cross-section of a possible housing for a pressure relief valve according to the invention;

figures 17A and 17B illustrate a possible arrangement of the housing of figure 16 in the embodiment of the fitting assembly illustrated on the basis of figures 1-10;

figures 18 and 19 illustrate two other possible embodiments of a pressure relief valve according to the invention;

figure 20 illustrates a cross-section of an embodiment of a pressure relief valve according to the invention mounted in a suction tube;

figure 21 illustrates a cross-section of an embodiment of a pressure relief valve according to the invention mounted in a suction tube; and
figures 22A and 22B show respectively a cross-section and a perspective view of an embodiment of a pressure relief valve according to the invention mounted in a suction tube.

Figure 1 illustrates an assembly which is partially mounted on a container 100 of plastic, only the neck 101 of which is shown in figure 1. The neck is provided with two thickened neck portions, here in the form of neck rings 102, 103 formed integrally with neck 101 of container 100, extending along the periphery of the neck. Container 100 is typically manufactured by blow moulding, particularly by stretch blow moulding, preferably from one of the following materials: a PET material, in particular bottle grade PET, a PP material, a PE material or a PEN material. This latter is typically

used for reusable containers. The skilled person will appreciate that the invention is equally applicable to so-called one-way containers as to reusable containers. Container 100 is typically adapted to store a liquid under a pressure lying between 0.25 bar and 10.00 bar, preferably between 0.50 bar and 3.50 bar. According to an advantageous embodiment, the container is embodied as described in BE 2010/0302 in the name of applicant.

The assembly comprises a fitting body 104 and two ring sections 106a, 106b, of which only one ring section is shown in figure 1. The skilled person will appreciate that more than two ring sections can also be provided, wherein it is the intention that these two or more ring sections form a ring around neck 101.

Fitting body 104 is intended for the purpose of receiving different fitting components which make it possible for instance to supply a gas while liquid is being discharged from the container, as is shown in figure 2C. In figure 2A the following fitting components can be distinguished: a cap 131, a sealing ring 132 for the seal between fitting body 104 and neck 101, a suction tube 133, 134 for drawing the fluid into container 100, a suction tube mounting piece 135, a spring 136 for exerting a spring action against valve components 137 and 139, a pressure relief valve 138, valve components 137 and 139 and a seal 140 between pressure relief valve 138 and suction tube piece 133. This is only an example, and the skilled person will appreciate that the fitting can also be constructed in other manner.

Fitting body 104 is provided with a support flange 105 adapted to support on neck 101. The two ring sections 106a, 106b can be attached to each other so as to form a ring, as shown best in figures 3A and 3B and 4. Each ring section

106a, 106b is adapted to extend over fitting body 104, as best seen in figure 1 which shows that ring section 106a extends partially over support flange 105 of fitting body 104. On an inner side of each ring section 106a, 106b is a protruding part in the form of a ring segment 110 (see figures 2 and 3) intended to engage under neck ring 102. Note that it would also be possible to make ring sections 106a, 106b higher, wherein ring segments 110 could then engage under the lower neck ring 103. The skilled person will further appreciate that, instead of a continuous ring segment, one or more protruding parts can also be provided distributed along the periphery which are adapted to engage under a neck ring. As a result of the fact that ring sections 106a, 106b engage on the one hand under a neck ring and extend on the other over the fitting body, ring sections 106a, 106b will, after being attached to each other, hold fitting body 104 fixedly on neck 101 of the container. Ring sections 106a, 106b can for instance be manufactured from a PET material.

As best shown in figure 1, neck 101 is provided with a number of protrusions 120 and fitting body 104 is provided with a number of protrusion receiving parts 121 in which one protrusion 120 at a time can be received. Provided in the shown example are four protrusions distributed at regular intervals along the periphery, but there can be more or fewer protrusions which may or may not be distributed at regular intervals. Fitting body 104 can in this way be placed non-rotatably on neck 101 of container 100. Protrusions 120 are arranged on neck ring 102, but could for instance also be provided directly on the outer or upper wall of the neck. The protrusion receiving parts 121 are manufactured integrally with the fitting body in the form of downward protruding flanges with a recess having a shape complementary to the shape of protrusions 120.

Each ring section 106a, 106b is provided with a first connecting part 111 and with a second connecting part 112, as shown best in figure 1 and figures 4A and 4B. First connecting part 111 of ring section 106a, 106b is adapted to co-act with second connecting part 112 of ring section 106b, 106a for mutual attachment of the at least two ring sections. First connecting part 111 is adapted for connecting with a snap connection to second connecting part 112. In the illustrated variant the second connecting part 112 is identical to the first connecting part 111. First connecting part 111 of ring section 106a comprises a resilient locking arm 113a protruding outward from an outer end of ring section 106a and a recess 114a in which locking arm 113b of ring section 106b can be locked. Locking arm 113a can be received in similar manner in a recess 114b of ring section 106b, see figures 4A and 4B.

Fitting body 104 is further provided along its periphery with a profiling 124, see figure 5A, and the two ring sections 106a, 106b are provided with a complementary profiling 115 for non-rotating positioning of ring sections 106a, 106b relative to a fitting 104 placed on the container. Fitting body 104 has a substantially cylindrical or prismatic upright jacket part 123 and in the shown embodiment the profiling 124 is provided on this jacket part. Other variants in which the profiling is for instance provided on the upper side of support flange 105 can also be envisaged. Fitting body 104 can also be provided with a number of recesses for co-action with hook-like elements on the outer ends of the ring sections such that a first ring section 106 can be snapped onto the fitting and held fixedly thereon, after which the second ring section 106b can be placed. In the shown variant jacket part 123 is provided with recesses 129 distributed at regular intervals over the

periphery. A protrusion 130 is situated on either side of each recess. Each ring section is provided at each outer end thereof with a hook-like element 116a, 116b, see figure 3A. These hook-like elements 116a,b extend behind protrusions 130 and fix a ring section to fitting body 104. They further provide in simple manner for a correct positioning on fitting body 104. An additional rotation locking between ring sections on the one hand and fitting body on the other is also achieved.

The above illustrated embodiment is intended for co-action with a container coupling of the so-called A or G-type. The container coupling is the component which is mounted on the upper side of the fitting and will allow fluid, typically beer, to flow out of the container while gas flows in so as to keep the container pressurized. In addition to the A and G-container couplings, there are also container couplings of the S, D, U and M type. The fitting will be embodied somewhat differently for these types, although the skilled person will appreciate that the invention is equally applicable to such fittings.

An embodiment of the method will now be explained for the embodiment of figures 1-5. For the purpose of mounting fitting body 104 on neck 101 of a container 100 the following steps are performed:

- the fitting body is placed on the neck, wherein receiving parts 121 are positioned over protrusions 120;
- ring section 106a is placed round the upper end of neck 101 over fitting body 104, with ring segment 110 under neck ring 102, wherein the protruding parts 126 are positioned in recesses 116a, 117a;
- ring section 106b is arranged diametrically opposite ring section 106a, wherein ring section 106b is attached to ring section 106a by means of a snap connection 111, 112.

Figure 6 illustrates in detail the suction tube mounting piece 135. This piece is provided with a central opening 500 in which the suction tube part 133 illustrated in figure 7 can be fixed, as is shown best in figure 2A. The suction tube mounting piece is further provided at its periphery with receiving parts 502 for tongues 127 of fitting body 104. The downward directed tongues 127 are provided on the underside of fitting body 104 and are each provided with a hole 128 in which a protruding part 501 provided in receiving part 502 can engage in each case. The suction tube mounting piece 135 can in this way be locked in fitting body 104 on the underside thereof. The suction tube component 133 is provided with openings 504 for passage of fluid from the container, for instance beer, as illustrated schematically with arrow B in figure 2C.

Figures 8 and 8A illustrate valve components 137, 139 in detail. The annular valve component 139 is typically manufactured from a hard plastic, while the annular valve component 137 is manufactured from a soft plastic such as rubber. Valve component 139 is provided on its underside with a number of peripheral tongues 601. Valve component 137 of rubber is provided with a downward protruding inner edge 602 which extends over the whole inner periphery thereof. Tongues 601 allow a good positioning of spring 136.

Figures 9A and 9B illustrate a first embodiment variant of cap 131. Figures 10A and 10B illustrate an alternative embodiment of cap 131'. These caps 131, 131' are typically fixed against the upper side of the fitting by for instance welding or adhesion. The skilled person will appreciate that this cap can be modified in accordance with the desired container coupling.

Figure 11 shows an embodiment of a spring assembly 301 with a number of disc springs 302 according to the invention. Such a spring assembly can be used particularly in the fitting illustrated in figures 2A and 2B instead of spiral spring 136. Disc spring 302 is shown in more detail in figures 12A and 12B. Disc spring 302 has a substantially conical disc body 304 manufactured from plastic, typically a PET material. The skilled person will however appreciate that all food-grade plastics, such as polyethylene (PE), polypropylene (PP) etc., can in principle be used to manufacture the disc springs suitable for use in beverage containers such as beer containers. Depending on the chosen material, the embodiment will then possibly have to be modified to some extent to the mechanical properties of the chosen plastic.

The substantially conical disc body 304 is provided with a number of recesses 303 for passage of a fluid and has an upper edge 306 and a lower edge 305 in order to facilitate stacking of disc springs 302. Depending on the desired dimensions and resilience, disc springs 302 can be connected in series or in parallel or a spring assembly can be formed by a combination of series and parallel connections. Recesses 330 have the further advantage that the weight of the disc springs can be reduced.

Figure 13 illustrates an advantageous embodiment of a pressure relief valve for sealing a space under pressure. The pressure relief valve comprises a valve body 202 and a membrane 201. The valve body and the membrane are formed integrally from a plastic material, for instance a PET material. The skilled person will appreciate that all food-grade plastics, such as PE, PP, etc., can in principle also be employed for the pressure relief valve. Barrier additives can further be added to the plastic material in order to

reduce the permeability thereof to for instance oxygen and nitrogen. The embodiment can be modified to some extent subject to the mechanical properties of the plastic used.

Membrane 201 extends from valve body 202 in the direction of a space R under pressure, for instance the interior of a container under pressure, to a lowest point 203. This could also be a bottom surface, for instance a small circular surface. Such a design will ensure that the membrane will in the first instance buckle and then split apart (tear) when the pressure is higher than a determined critical pressure in the space R under pressure. Figure 15 shows the membrane in the buckled position.

Membrane 201 comprises a substantially conical part 204 with a top 203 and a radius R. Other shapes, such as a pyramid shape, a truncated pyramid or truncated cone shape and the like, are also possible. According to an advantageous embodiment, the thickness D of the substantially conical part 204 decreases to some extent in the direction of top 203, as best shown in figure 14 where the thickness varies from D2 to D1. The conical part connects to a substantially cylindrical part 205 with a height H which connects to valve body 202. The thickness of this cylindrical part typically also increases gradually from D2 to the thickness of a wall of the valve body. Conical part 204 has an angle of opening α lying typically between 5 and 45 degrees.

The membrane can be provided with a number of grooves, for instance four grooves 206. The depth of each groove of the number of grooves is preferably less than half the minimal thickness of the valve body. Providing such preferably radially directed grooves 206 will improve the certainty of tearing. These grooves are typically formed integrally with the membrane. Use can be made for this purpose of specific

injection moulding techniques, such as compression-injection moulding.

Valve body 202 comprises a substantially cylindrical part 207 and a clamping ring 208. Clamping ring 208 is intended to be clampingly received in a tubular piece, typically a suction tube of a fitting of a container such as a beer container. Depending on the application in which the valve is used, this clamping ring 208 can be omitted or clamping body 202 can be provided with differently formed parts for connection to the space under pressure for sealing. The substantially cylindrical part 207 has a lower end connecting to membrane 201.

Referring to figure 2A it is noted that pressure relief valve 138, which is provided in the shown embodiment at the top of the suction tube, could also be provided at one or more other locations. A number of pressure relief valves could for instance be provided against a wall of fitting body 104, for instance at the lower end thereof, wherein a suitable connection then has to be arranged in neck 101 of container 100.

Such an embodiment is illustrated in figures 16, 17A and 17B. Figure 16 illustrates a housing 401 in which a pressure relief valve 201, 202 is received using a sealing ring 406. Housing 401 has a cylindrical receiving part 402 in which the pressure relief valve 201, 202 can be received. Body 401 further has an upright part 402 which leads to an outlet pipe 404 which can be mounted in a wall of the container, for instance in the neck of a container as illustrated in figures 17A and 17B. A seal, for instance a conical seal 405, can be provided between the neck wall and outlet pipe 404. Referring to figure 17B, one or more assemblies 400 can then be arranged in the container prior to placing of the

fitting body, wherein the outlet pipe is mounted in the neck wall with interposing of the conical seal. Fitting body 104 can then be placed. Fitting body 104 is advantageously provided with vertical, downward protruding ribs 407 (see also figure 5B), wherein upright part 402 can be received between the vertical ribs. These ribs 407 thus provide for a further retention and positioning of assembly 400.

Measurements have demonstrated that the parameters of the membrane illustrated in figure 14 influence Pcrit. More specifically, Pcrit decreases as:

- the thickness D becomes smaller;
- the angle α becomes larger;
- the radius R becomes larger;
- the height H becomes greater.

Suitably formed grooves do not affect Pcrit but do increase the ability to break after creation of the instability and the buckling resulting from this instability. The skilled person will appreciate that parameters D, α, R and H can be optimized in accordance with the desired Pcrit and the desired dimensions of the valve.

Figure 18 shows a variant of a pressure relief valve with a membrane 1201 which has a substantially rectangular periphery at its upper end, see the drawing on the left in figure 18. The membrane can then have a prismatic instead of a cylindrical upper part. Note that another, substantially polygonal base or an oval base and the like is also possible. The membrane can once again be embodied with a thickness which increases gradually from top 1203 to the prismatic upper part 1205. Finally, figure 19 illustrates yet another variant in which membrane 2201 ends at the bottom in a surface 2203 instead of a point.

Figures 20 and 21 illustrate two other embodiments of pressure relief valves according to the invention intended for mounting in a suction tube of a container for a fluid under pressure, typically a beer container. The container and fitting can for instance be embodied as has been described above, but can also take a different form. The pressure relief valve 138 is mounted in an upper end of the suction tube 133 for drawing the fluid into the container. Suction tube 133 is provided with openings 504 for passage of fluid from the container, and pressure relief valve 138 is arranged above openings 504. The upper end of the suction tube is closed by a closing cap 149 with a hole 141 through which fluid can escape when pressure relief valve 138 opens.

In the variant of figures 20 and 21 the pressure relief valve 138 comprises a clamping block 142 which is received in sealing manner in hole 141 of the closing cap. Hole 141 and clamping block 142 take a form such that the clamping block can be pressed out of closing cap 149 from the inside of the suction tube. Clamping block 142 can for instance be conical or pyramid-shaped. In the variant of figures 20 and 21 the pressure relief valve 138 further comprises a spring support 144 and a spring means 143. Clamping block 142 is connected to spring support 144 and spring 143 acts between spring support 144 and closing cap 149 such that, when the pressure in the container exceeds a critical value, spring support 144 presses clamping block 142 outward counter to the action of spring 143. Spring support 144 is preferably an integrally manufactured piece with a base 145 and a connecting shaft 146 which is directed upward from the base and mounted on or in the clamping block. The clamping block can for instance be provided with a recess 147 into which the outer end 148 of connecting shaft 146 can be pressed. The shape of the recess and the outer end are such that the connecting shaft is fixed in the clamping block. In the

illustrated embodiment the connection between the clamping block and the connecting shaft is a dovetail connection, although the skilled person will appreciate that other connections are also possible.

In the variant of figure 20 the clamping block is manufactured from a plastic material which is more compressible than the plastic material from which the spring support is manufactured, and the material of the clamping block itself provides the sealing. The clamping block is then for instance manufactured from an EPDM (ethylene propylene diene monomer) material or an NBR (nitrile butadiene rubber) material.

In the variant of figure 21 the clamping block and the spring support can be manufactured from the same material and a sealing ring 160 is arranged around the clamping block. Both spring support 144 and clamping block 142 can for instance be manufactured in this case from a PET material.

Figures 22A and 22B illustrate yet another embodiment of pressure relief valve 138. In this embodiment the pressure relief valve comprises a housing 150 which is mounted via a sealing ring 151 in an upper end of the suction tube. The housing is provided at the bottom with a lower opening 153 and at the top with an upper opening 154. A valve component 152 is mounted resiliently in the housing by means of a spring 155. Valve component 152 has a base part 156 adapted to close the lower opening 153 and a shaft part 152 which is directed upward from base part 156 and around which spring 155 is provided. Spring 155 acts between base part 156 and an upper wall 158 of housing 150. It will in this way be possible to press base part 156 inward counter to the spring action of spring 155 when the pressure in the container

exceeds a determined critical value, whereby fluid can escape from the container through lower opening 153 and via upper openings 154 and hole 141.

The skilled person will appreciate that the invention is not limited to the above illustrated exemplary embodiments and that many variants can be envisaged without departing from the scope of the invention, which is defined solely by the following claims.

Claims

1. Assembly for fixing a fitting on a plastic container with a neck provided with at least one thickened neck portion extending substantially along the periphery of the neck, **characterized in that** the assembly comprises:
a fitting body provided with a support flange adapted to support on the neck;
at least two ring sections which can be attached to each other to form a ring, which at least two ring sections are adapted to extend around the neck of the container and over the fitting body, and are provided on an inner side thereof with a protruding part intended to engage under the thickened neck portion.

2. Assembly as claimed in claim 1, **characterized in that** each ring section of the at least two ring sections is provided with a ring segment moulded thereon for the purpose of forming the protruding part.

3. Assembly as claimed in claim 1 or 2, **characterized in that** the neck is provided with a number of protrusions and the fitting body is provided with a number of protrusion receiving parts in which the number of protrusions can be received such that the fitting body can be placed non-rotatably on the neck of the container.

4. Assembly as claimed in claim 3, **characterized in that** the protrusions are arranged on a neck ring formed integrally with the neck, and that the protrusion receiving parts are moulded onto the fitting body in the form of downward protruding flanges with a recess having a shape complementary to the shape of the protrusions.

5. Assembly as claimed in any of the foregoing claims, **characterized in that** each ring section of the at least two ring sections is provided with a first connecting part and with a second connecting part, wherein the first connecting part of each ring section of the at least two ring sections is adapted to co-act with the second connecting part of an adjacent ring section of the at least two ring sections for mutual attachment of the at least two ring sections.

6. Assembly as claimed in claim 5, **characterized in that** each first connecting part of each ring section of the at least two ring sections is adapted to be connected by a snap connection to the second connecting part of an adjacent ring section of the at least two ring sections.

7. Assembly as claimed in claim 5 or 6, **characterized in that** each first connecting part of each ring section of the at least two ring sections comprises a resilient locking arm protruding outward from an outer end of this ring section, and that each second connecting part of an adjacent ring section of the at least two ring sections comprises a recess in which the locking arm can be locked.

8. Assembly as claimed in claim 7, **characterized in that** each locking arm is provided with a protruding part formed to engage behind a wall of the recess for the purpose of locking the locking arm in the recess.

9. Assembly as claimed in any of the claims 5-8, **characterized in that** the second connecting part is identical to the first connecting part of each ring section and comprises a resilient locking arm protruding outward from an outer end of this ring section and a recess in which the locking arm of an adjacent ring section can be locked.

10. Assembly as claimed in any of the foregoing claims, **characterized in that** the fitting body is provided along its periphery with a profiling and that the at least two ring sections are provided with a complementary profiling for non-rotating positioning of the at least two ring sections relative to a fitting placed on the neck of the container.

11. Assembly as claimed in claim 10, **characterized in that** the fitting body has a substantially cylindrical upright jacket part, wherein the profiling is provided on this jacket part, and that a or each ring section of the at least two ring sections has an upper part with a cylindrical inner wall provided with the complementary profiling.

12. Assembly as claimed in any of the foregoing claims, **characterized in that** a or each ring section of the at least two ring sections is provided in each case at their outer ends with a hook-like element and that the fitting body is provided along its outer periphery with a protrusion for each hook-like element, this such that each ring section can be mounted individually on the fitting body.

13. Assembly as claimed in any of the foregoing claims, **characterized in that** the fitting body for each ring section of the at least two ring sections is provided with an upward protruding part, and that each ring section is provided at the outer ends thereof with a recess, this such that each upward protruding part can be received in adjacent recesses of adjacent ring sections of the at least two ring sections and thus allows positioning of the at least two ring sections on the fitting body.

14. Assembly as claimed in any of the foregoing claims, **characterized in that** the fitting body is manufactured from

polyethylene terephthalate (PET), polyethylene (PE) or polypropylene (PP).

15. Assembly as claimed in any of the foregoing claims, **characterized in that** the at least two ring sections are manufactured from polyethylene terephthalate (PET), polyethylene (PE) or polypropylene (PP).

16. Container on which an assembly according to any of the foregoing claims is mounted, wherein the container has a neck provided with at least one thickened neck portion which extends substantially along the periphery of the neck and under which the protruding part of the at least two ring sections extends.

17. Container as claimed in claim 16, **characterized in that** the thickened neck portion is a neck ring formed integrally with the neck.

18. Container as claimed in claim 16 or 17, **characterized in that** the container is manufactured by blow moulding, particularly by stretch blow moulding, preferably from one of the following materials: a PET material, in particular bottle grade PET, a PP material, a PE material, a PEN material.

19. Container as claimed in any of the claims 16-18, **characterized in that** the container and the assembly are adapted to store a liquid under a pressure lying between 0.25 bar and 10.00 bar, preferably between 0.50 bar and 3.50 bar.

20. Fitting body for use in an assembly as claimed in any of the claims 1-15.

21. Ring section for use in an assembly as claimed in any of the claims 1-15.

22. Method for fixing a fitting body on a container with a neck provided with at least one thickened neck portion extending substantially along the periphery of the neck, comprising of:
- placing the fitting body in a predetermined position on the neck, wherein a part of the fitting body protrudes into the interior of the container;
- selecting at least two ring sections which can be attached to each other to form a ring which is adapted to extend around the neck of the container and over the support flange and which is provided with a protruding part intended to engage under the thickened neck portion;
- arranging the at least two ring sections around the neck of the container and over the fitting body, with the protruding part under the thickened neck portion.

23. Disc spring, particularly for use in a fitting body for a container, with a substantially conical disc body manufactured from plastic, wherein the substantially conical disc body is provided with a number of recesses for passage of a fluid.

24. Disc spring as claimed in claim 23, **characterized in that** the disc spring is manufactured from a PET material.

25. Disc spring as claimed in claim 23 or 24, **characterized in that** the number of recesses are distributed at regular intervals over the periphery of the substantially conical disc body.

26. Spring assembly comprising a number of disc springs as claimed in any of the claims 23-25.

27. Fitting for a container, comprising:
- a spring assembly as claimed in claim 26,
- a fitting body with a suction tube for drawing fluid under pressure into the container,
- a valve body for passage of the fluid out of the container, the valve body being resiliently mounted using the disc assembly.

28. Fitting as claimed in claim 27, **characterized in that** the disc assembly is mounted around the suction tube.

29. Fitting as claimed in claim 27, **characterized in that** a cylindrical chamber is provided in line with the suction tube, and that the spring assembly is received in this cylindrical chamber.

30. Pressure relief valve for closing a space under pressure, comprising a valve body and a membrane, wherein the valve body and the membrane are formed integrally from a plastic material,
which membrane extends from a peripheral wall of the valve body in the direction of the space under pressure to a lower point or surface such that the membrane will buckle and split apart when the pressure is higher than a determined critical pressure in the space under pressure;
wherein the membrane preferably has a thickness smaller than the thickness of the peripheral wall.

31. Pressure relief valve as claimed in claim 30, **characterized in that** the membrane comprises a substantially conical or pyramid-shaped part with a top, wherein the top of the conical or pyramid-shaped part corresponds to the lower point.

32. Pressure relief valve as claimed in claim 31, **characterized in that** the thickness of the substantially conical or pyramid-shaped part decreases in the direction of the top thereof.

33. Pressure relief valve as claimed in claim 31 or 32, **characterized in that** the conical or pyramid-shaped part has an angle of opening lying between 1 and 89 degrees, preferably between 5 and 45 degrees.

34. Pressure relief valve as claimed in claim 30, **characterized in that** the membrane comprises a part having substantially the form of a truncated cone or pyramid with a top surface, wherein the top surface corresponds to the lower surface.

35. Pressure relief valve as claimed in any of the claims 30-34, **characterized in that** the membrane comprises a substantially cylindrical or prismatic part which connects to the valve body.

36. Pressure relief valve as claimed in claim 35, **characterized in that** the thickness of the substantially cylindrical or prismatic part decreases from the valve body in the direction of the lower point or the lower surface.

37. Pressure relief valve as claimed in any of the claims 30-36, **characterized in that** the membrane is provided with a number of grooves, preferably at least three grooves.

38. Pressure relief valve as claimed in claim 37, **characterized in that** the number of grooves extend substantially from the lower point or surface in the direction of the peripheral wall.

39. Pressure relief valve as claimed in any of the claims 30-38, **characterized in that** the valve body comprises a substantially cylindrical part with a lower end which connects to the membrane.

40. Pressure relief valve as claimed in any of the claims 30-39, **characterized in that** the membrane is adapted for a critical pressure between 3 and 10 bar and that the minimum thickness of the membrane is less than 1 mm, preferably less than 0.5 mm.

41. Pressure relief valve as claimed in any of the claims 30-40, **characterized in that** the membrane consists of a substantially cylindrical or prismatic part which connects to the valve body and, connecting to this part, a substantially conical or pyramid-shaped part with a top.

42. Pressure relief valve as claimed in claim 41, **characterized in that** the substantially conical or pyramid-shaped part has a thickness varying between a first thickness at the top of the conical part and a greater second thickness at the connection to the substantially cylindrical or prismatic part.

43. Pressure relief valve as claimed in claim 42, **characterized in that** the first thickness is less than 3 mm, and that the second thickness is less than 1 mm.

44. Pressure relief valve as claimed in any of the claims 30-43, **characterized in that** the valve body and the membrane are manufactured from one of the following materials: polyethylene terephthalate (PET), polyethylene (PE) or polypropylene (PP), optionally with addition of additives.

45. Container for a fluid under pressure, preferably a beer container, comprising a fitting with a suction tube (133, 134) for drawing fluid into the container, **characterized in that** a pressure relief valve (138) is mounted in an upper end of the suction tube.

46. Container as claimed in claim 45, **characterized in that** the suction tube is provided with at least one opening (504) for passage of fluid out of the container; and that the pressure relief valve is arranged above the at least one opening.

47. Container as claimed in claim 45 or 46, **characterized in that** the upper end of the suction tube is provided with a closing cap (149) with a hole (141).

48. Container as claimed in any of the claims 45-47, **characterized in that** the pressure relief valve comprises a clamping block (142) received in sealing manner in an opening (141) at the top of the suction tube, wherein the opening and the clamping block have a shape such that the clamping block can be pressed out of the closing cap from the inside of the container.

49. Container as claimed in claim 48, **characterized in that** the pressure relief valve further comprises a spring support (144) and a spring means (143), wherein the clamping block is connected to the spring support and the spring means acts between the spring support and the suction tube such that, when the pressure in the container exceeds a critical value, the spring support presses the clamping block outward counter to the action of the spring means.

50. Container as claimed in claim 49, **characterized in that** the spring support (144) is an integral piece comprising a

base (145) and a connecting shaft (146) directed upward from the base, which connecting shaft is mounted on or in the clamping block.

51. Container as claimed in claim 50, **characterized in that** the clamping block is provided with a recess (147) into which the outer end (148) of the connecting shaft can be pressed, wherein the shape of the recess and of the outer end are such that the connecting shaft is secured in the clamping block.

52. Container as claimed in claim 51, **characterized in that** the connection between the clamping block and the connecting shaft is a dovetail connection.

53. Container as claimed in any of the claims 49-52, **characterized in that** the clamping block is manufactured from a plastic material which is more compressible than the plastic material from which the spring support is manufactured.

54. Container as claimed in any of the claims 48-53, **characterized in that** the clamping block is manufactured from an EPDM (ethylene propylene diene monomer) material or an NBR (nitrile butadiene rubber) material, preferably with good sealing properties.

55. Container as claimed in any of the claims 49-52, **characterized in that** the clamping block and the spring support are manufactured from the same material and that a sealing means (160) is arranged around the clamping block.

56. Container as claimed in any of the claims 49-55, **characterized in that** the spring support is manufactured from PET.

57. Container as claimed in any of the claims 45-47, **characterized in that** the pressure relief valve comprises a housing (150) mounted in sealed manner (151) in an upper end of the suction tube, which housing is provided at the bottom with a lower opening (153) and at the top with an upper opening (154), wherein a valve part (152) is resiliently mounted in the housing in order to close the lower opening, this such that this valve part can be pressed in the housing counter to the spring action when the pressure in the container exceeds a determined critical value.

58. Container as claimed in any of the claims 45-47, **characterized in that** the pressure relief valve is a pressure relief valve according to any of the claims 30-44.

59. Container as claimed claim 58, **characterized in that** a seal (140) is provided between the pressure relief valve and the suction tube (133).

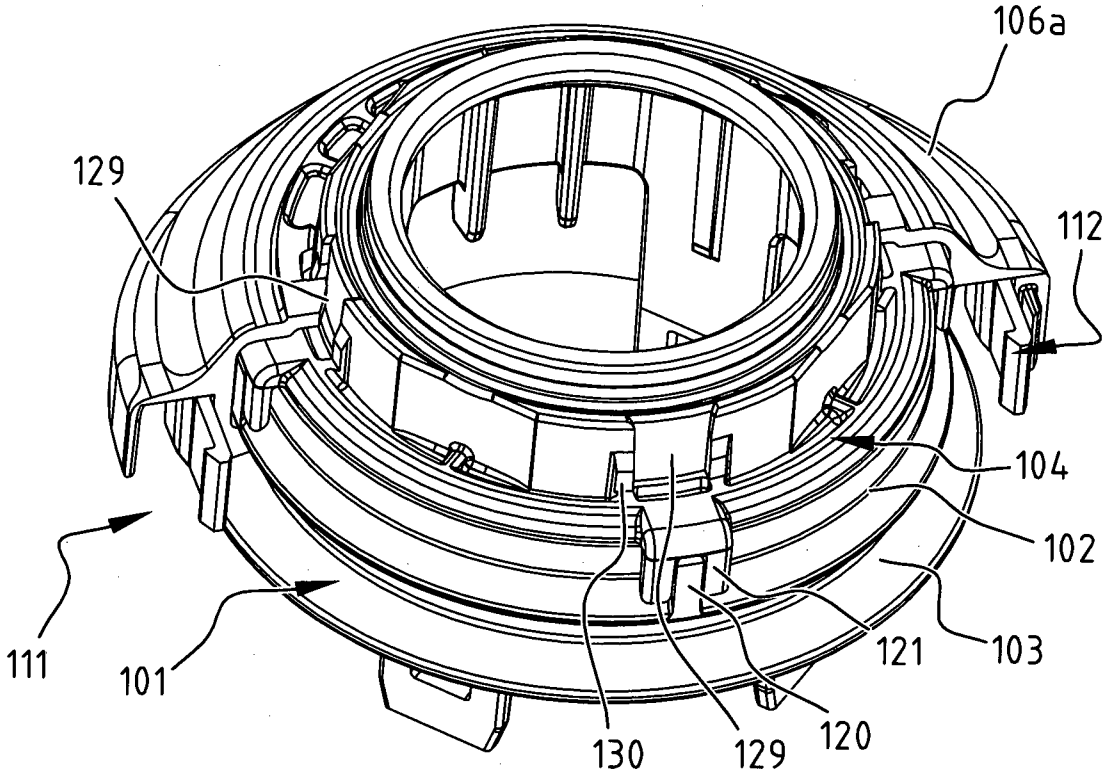

FIG. 1

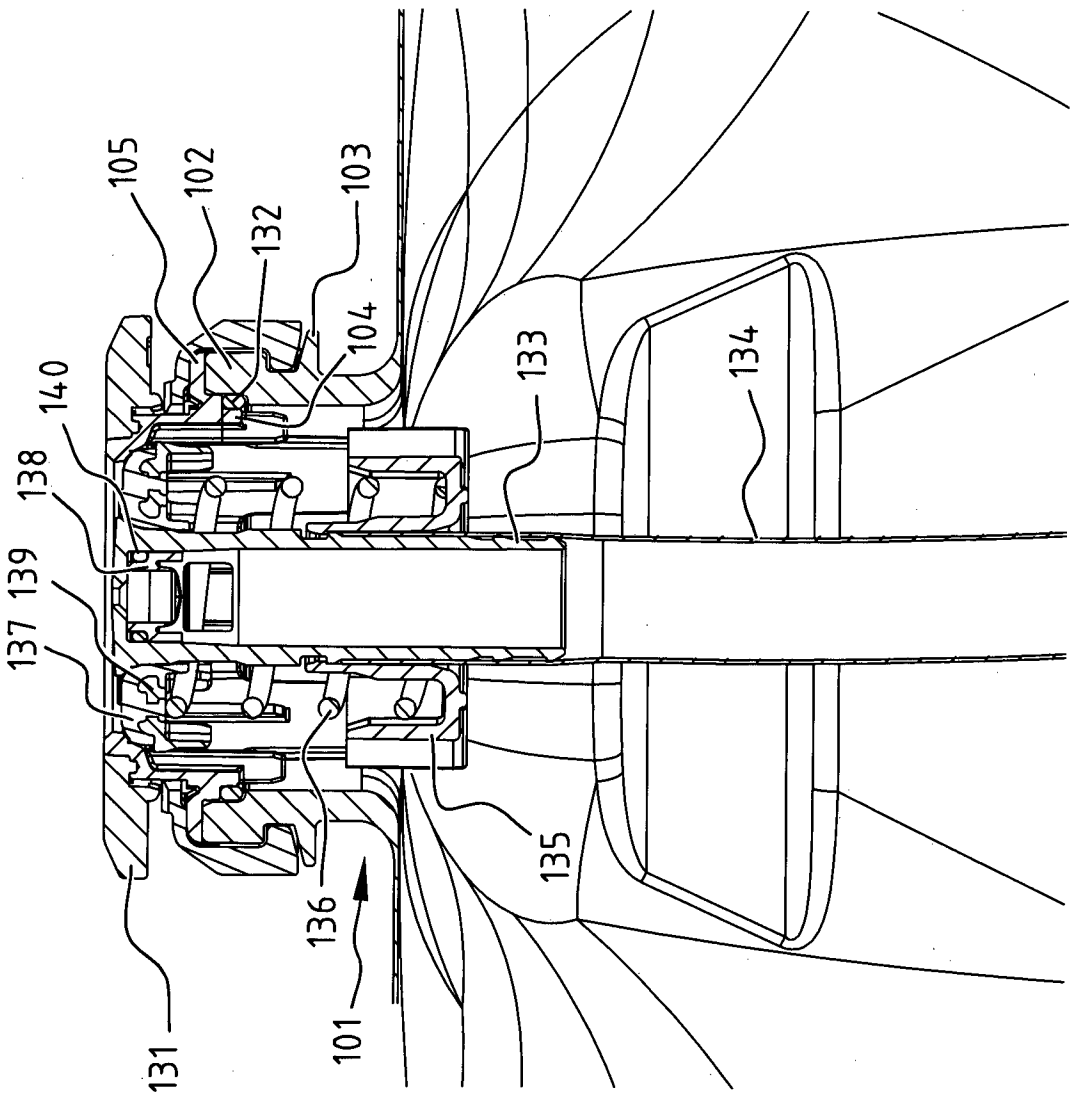

FIG. 2A

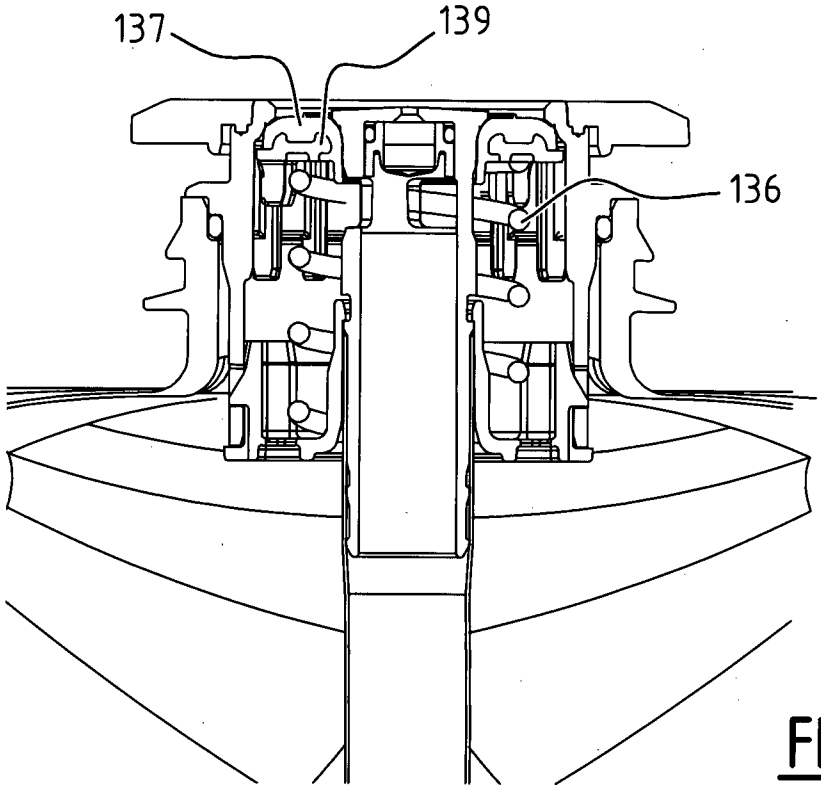

FIG. 2B

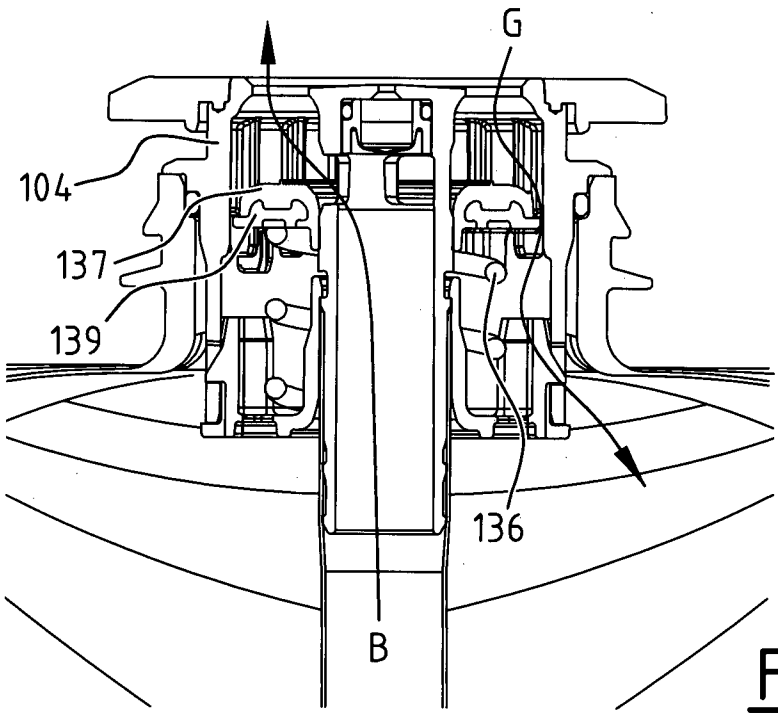

FIG. 2C

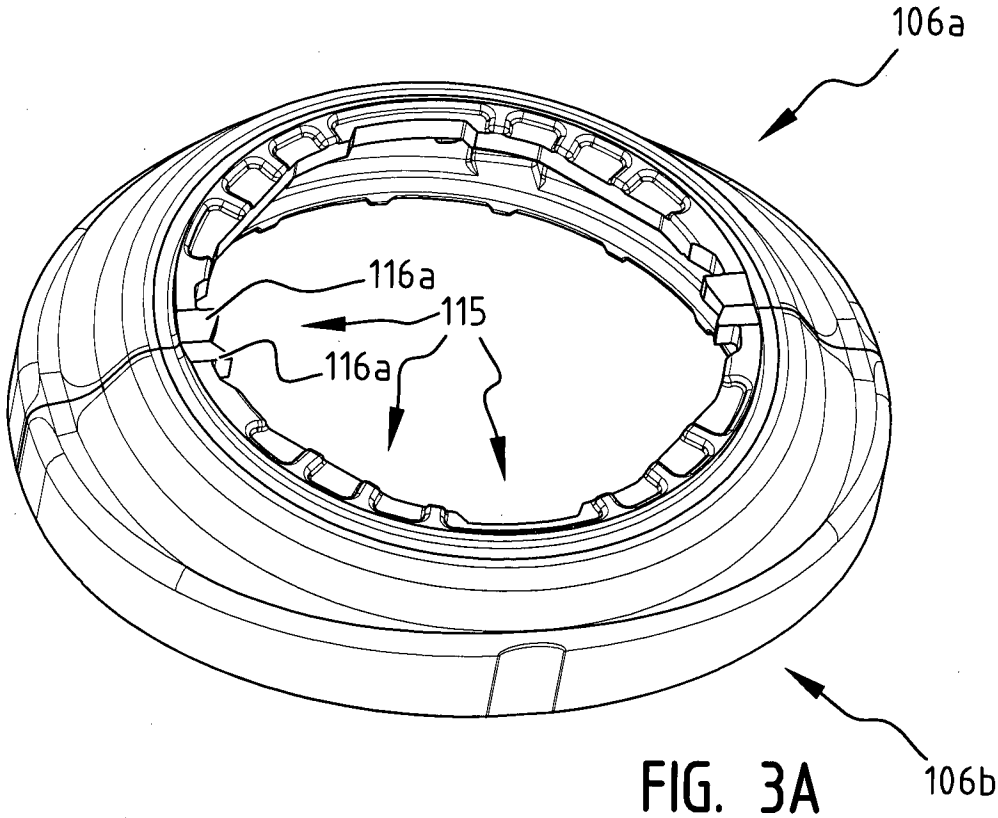

FIG. 3A

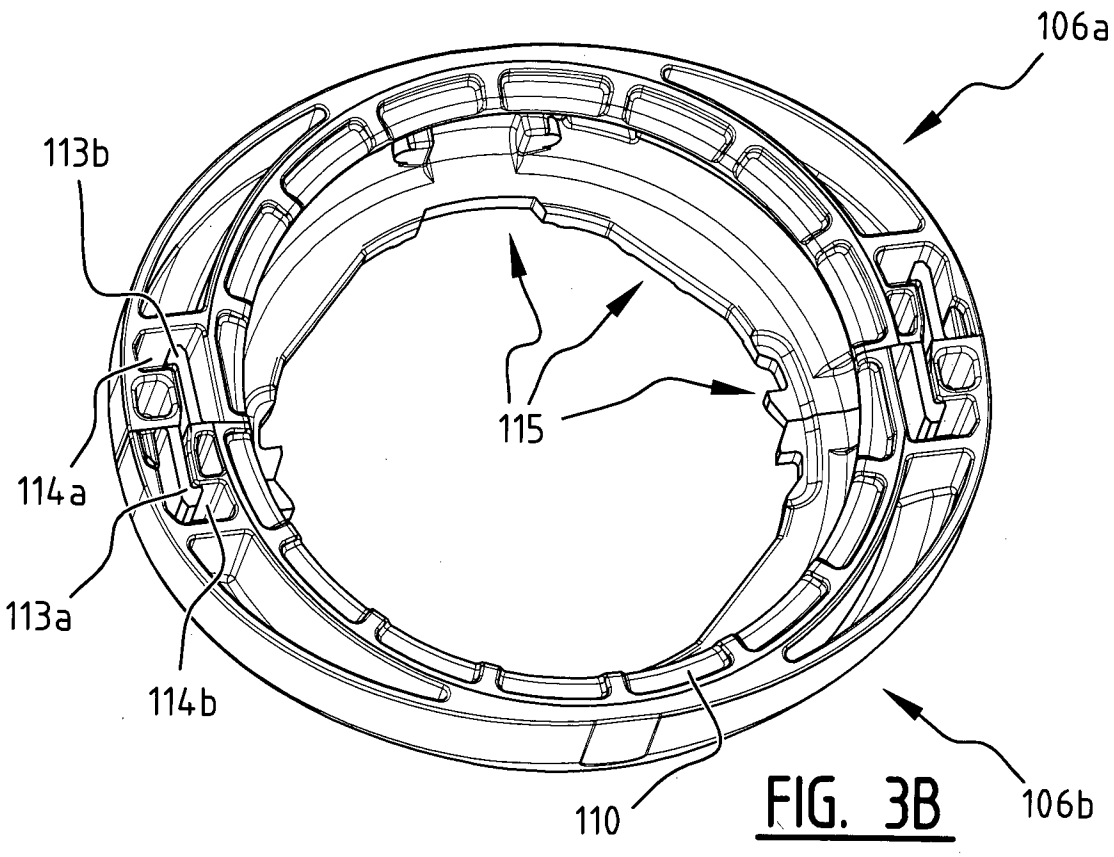

FIG. 3B

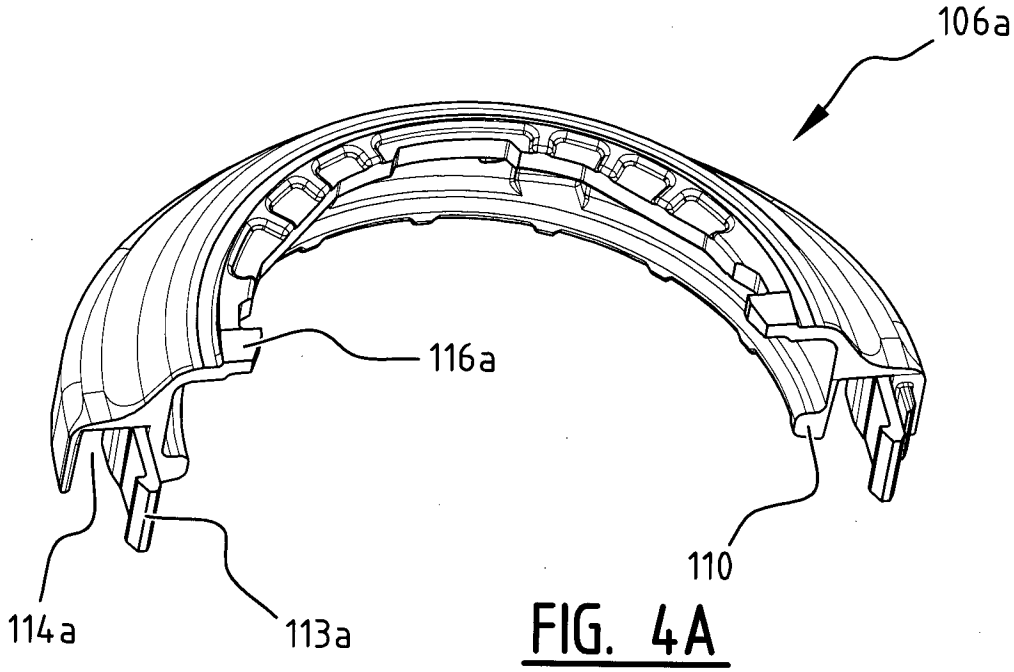

FIG. 4A

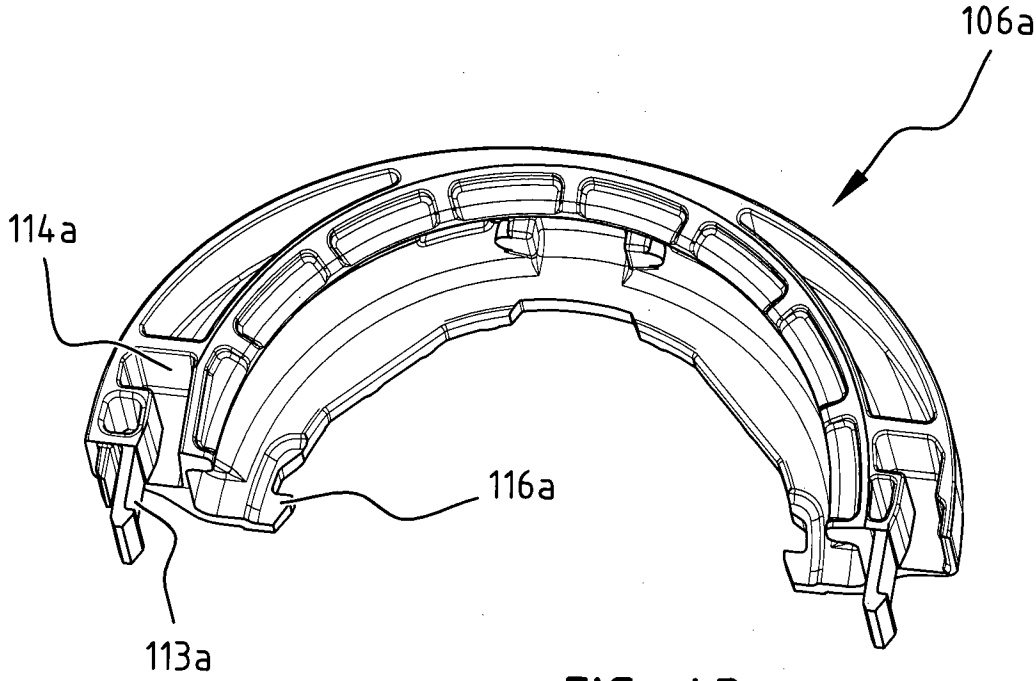

FIG. 4B

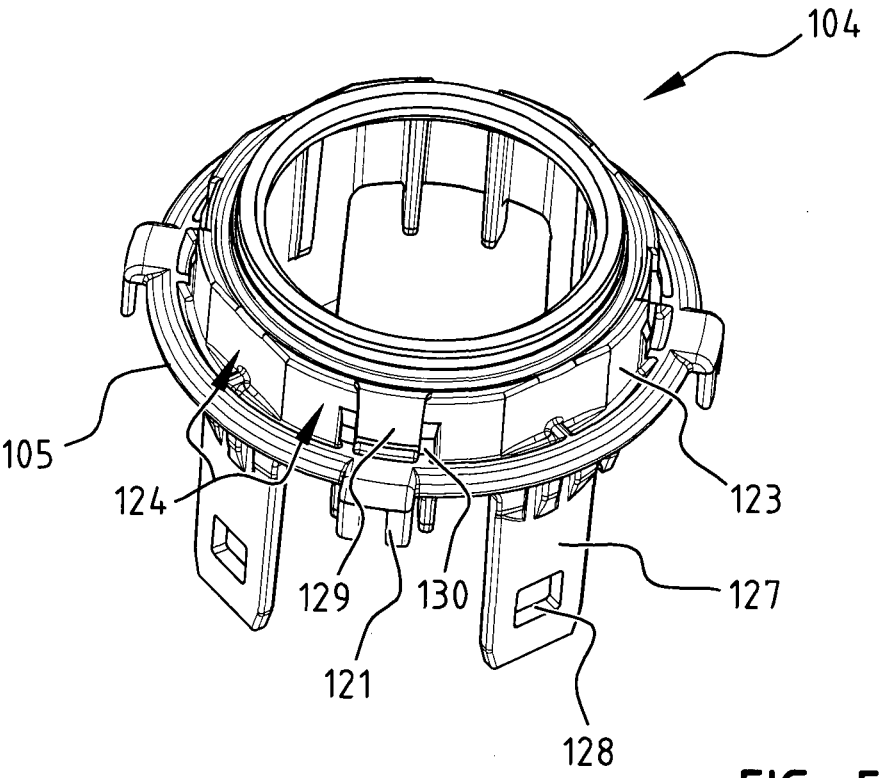

FIG. 5A

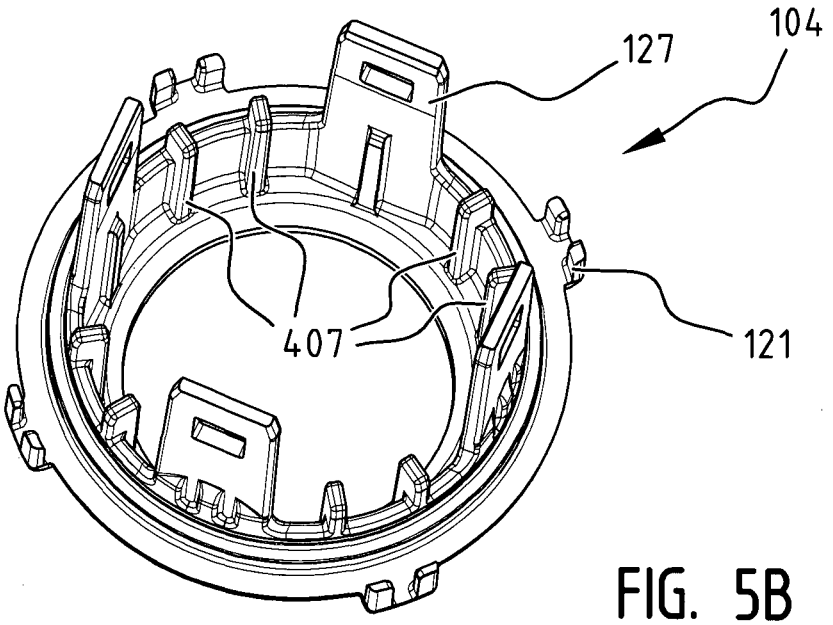

FIG. 5B

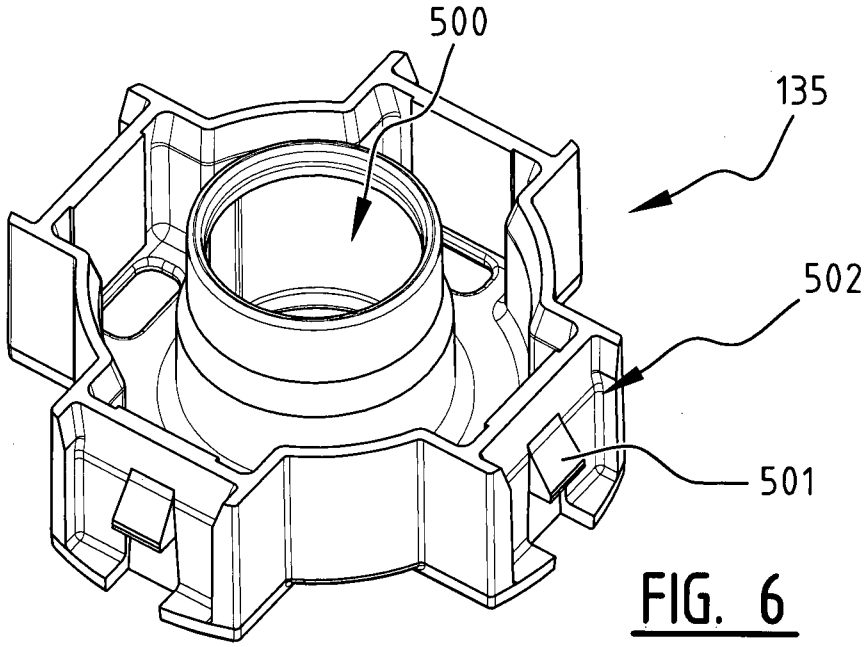

FIG. 6

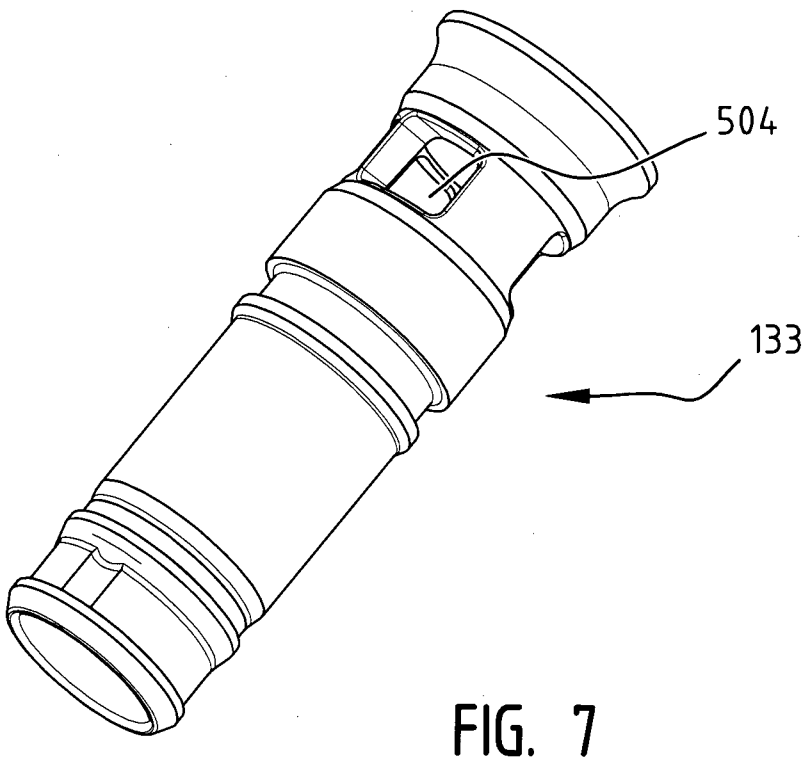

FIG. 7

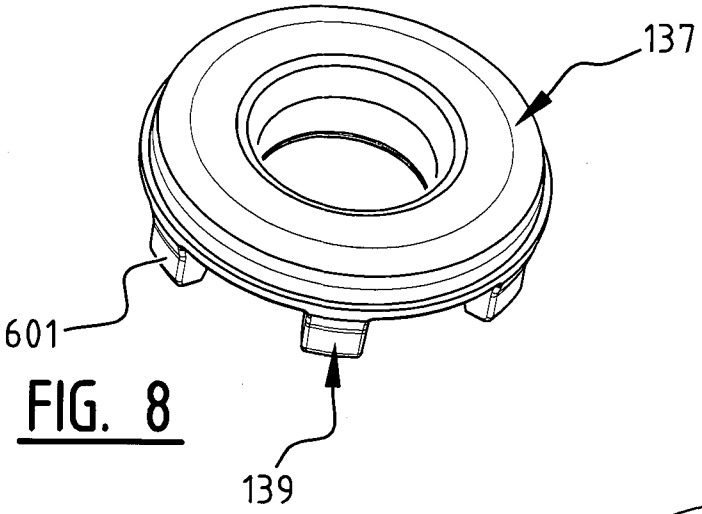

FIG. 8

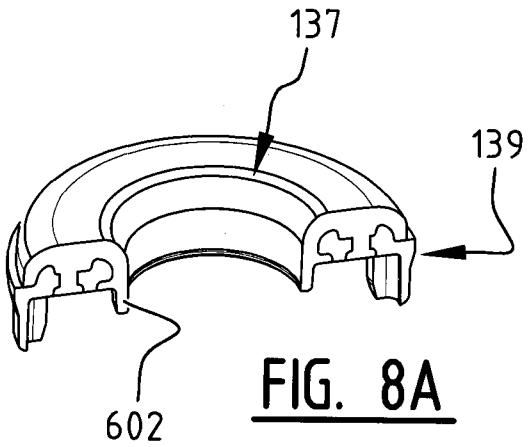

FIG. 8A

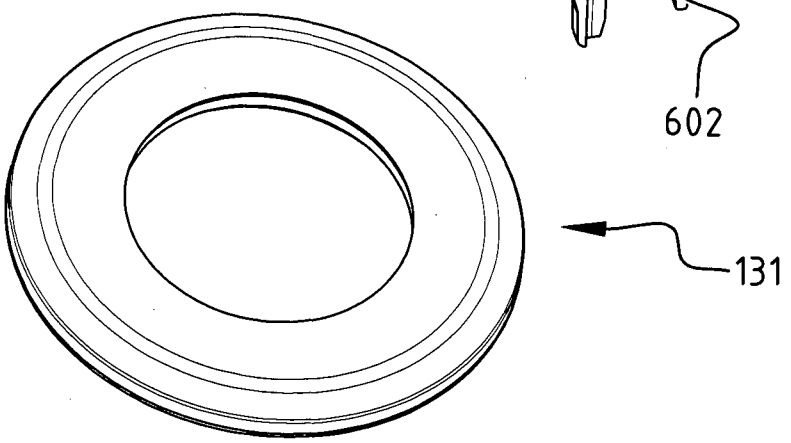

FIG. 9A

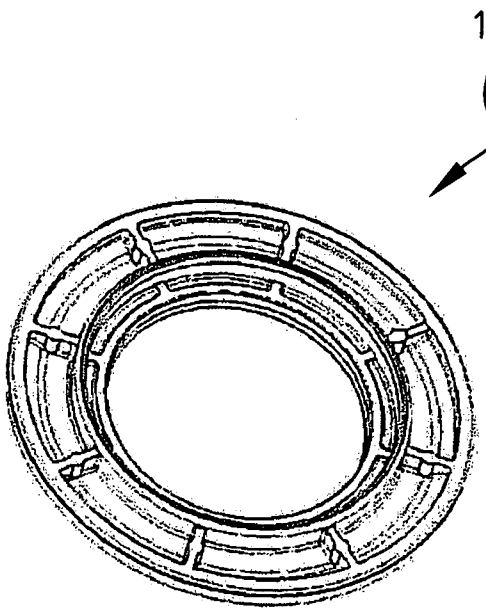

FIG. 9B

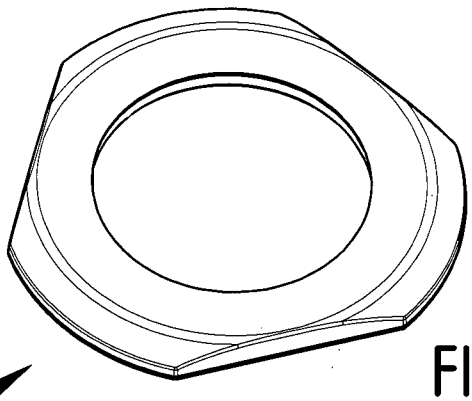

FIG. 10A

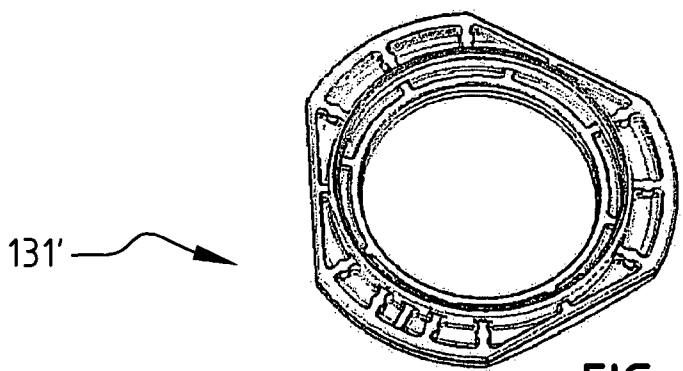

FIG. 10B

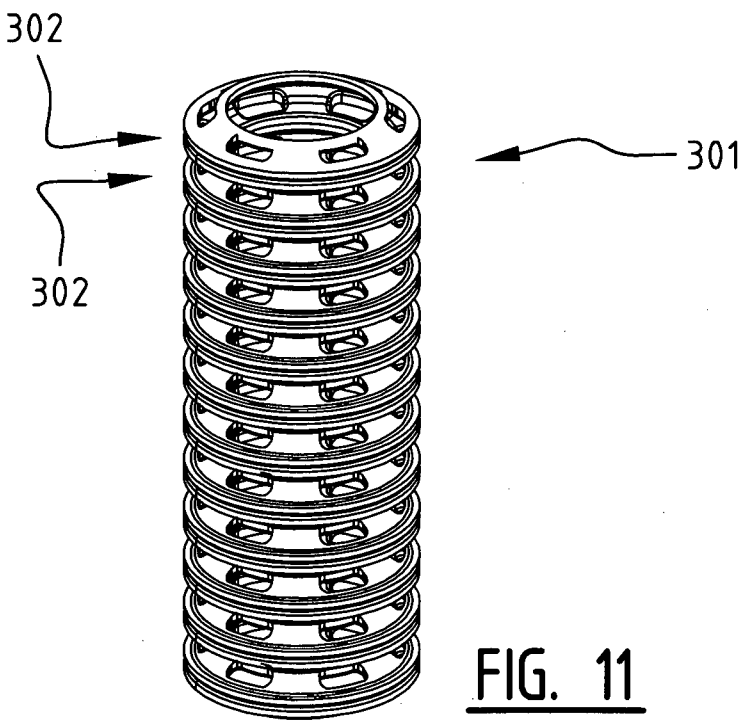

FIG. 11

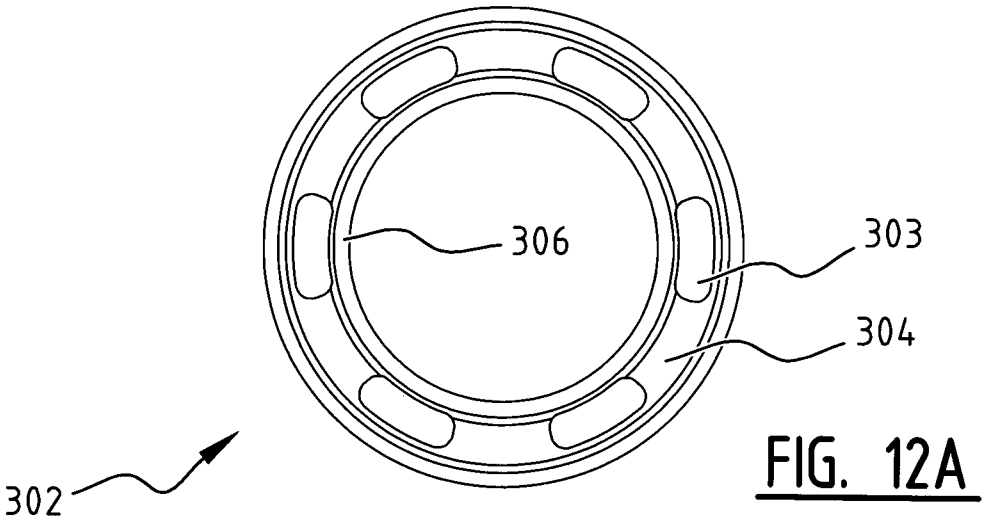

FIG. 12A

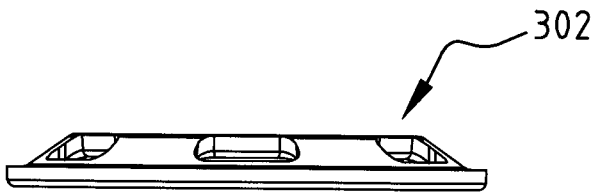

FIG. 12B

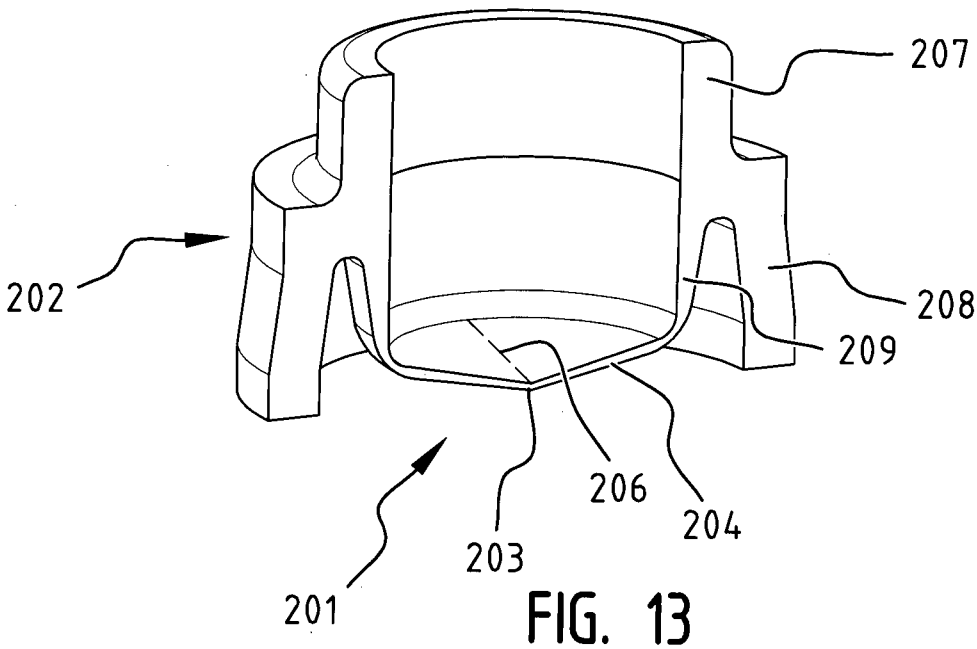

FIG. 13

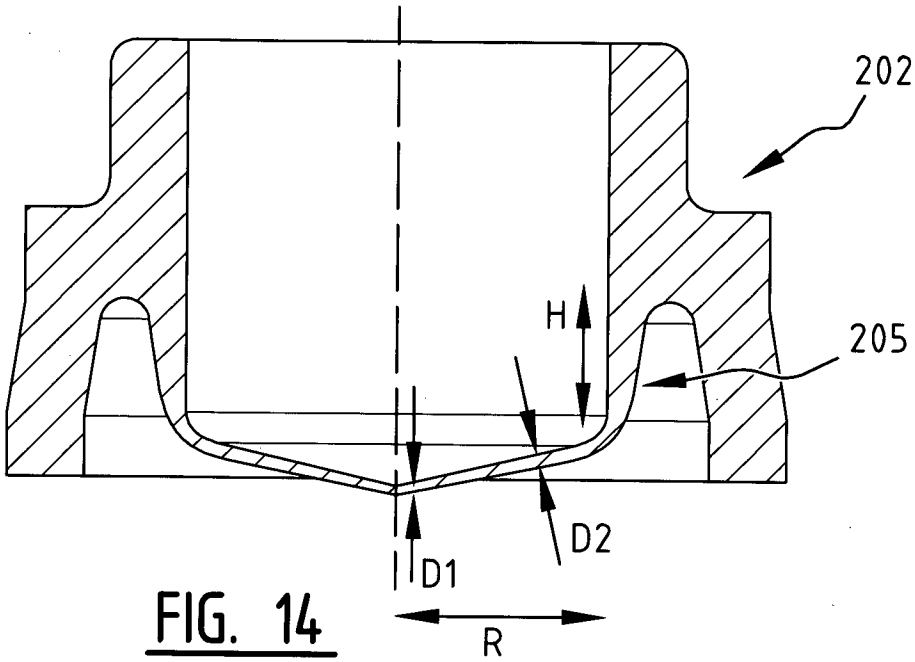

FIG. 14

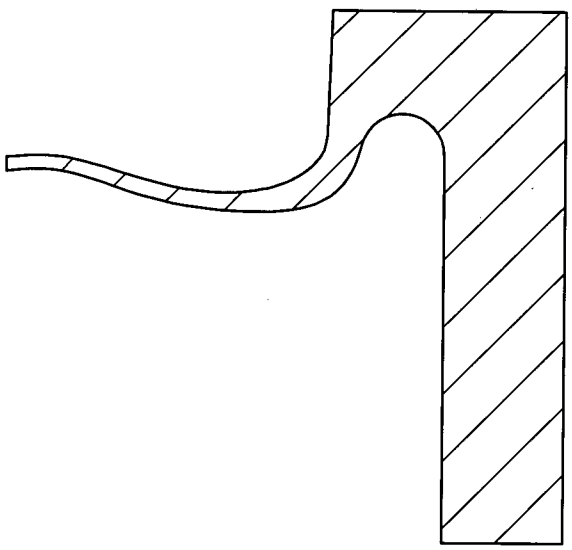

FIG. 15

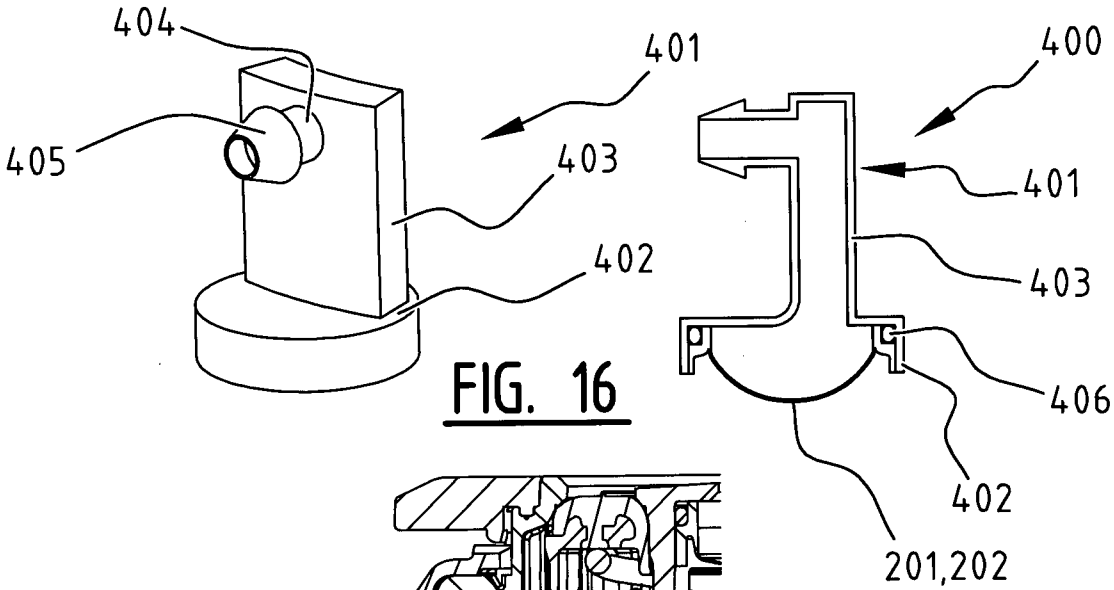

FIG. 16

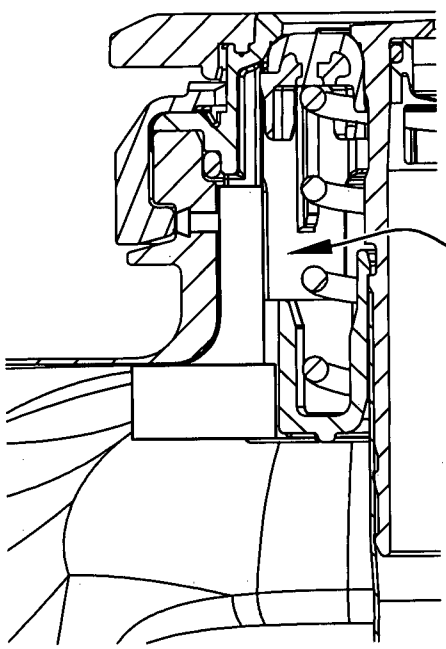

FIG. 17A

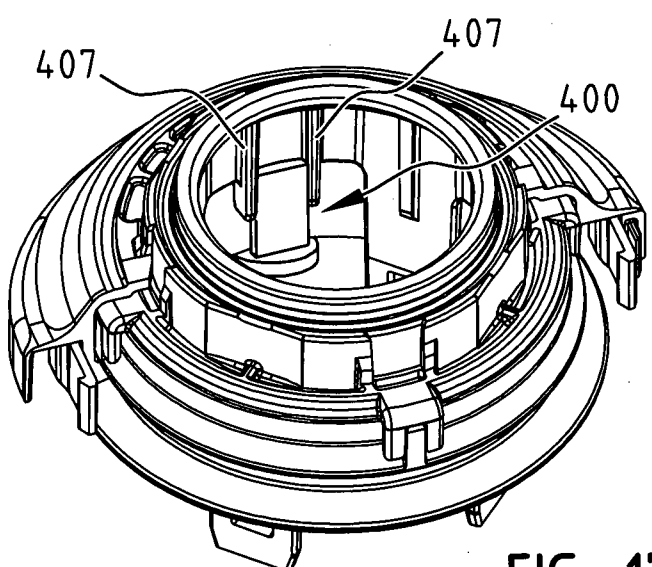

FIG. 17B

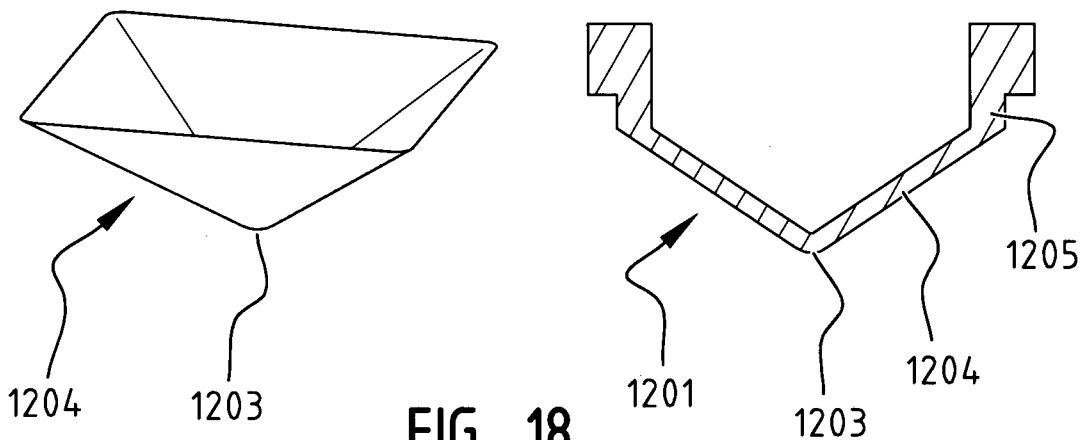

FIG. 18

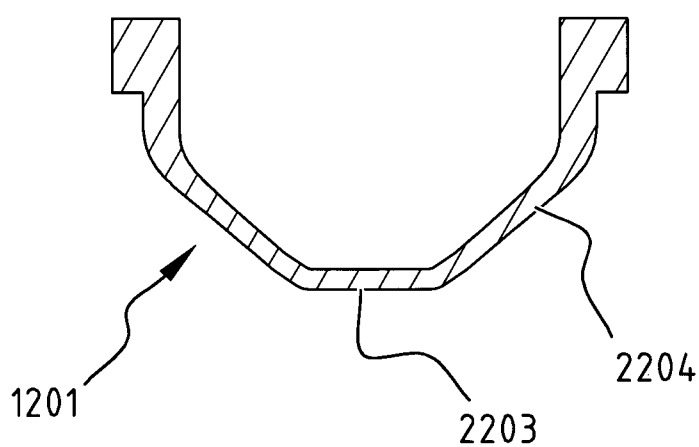

FIG. 19

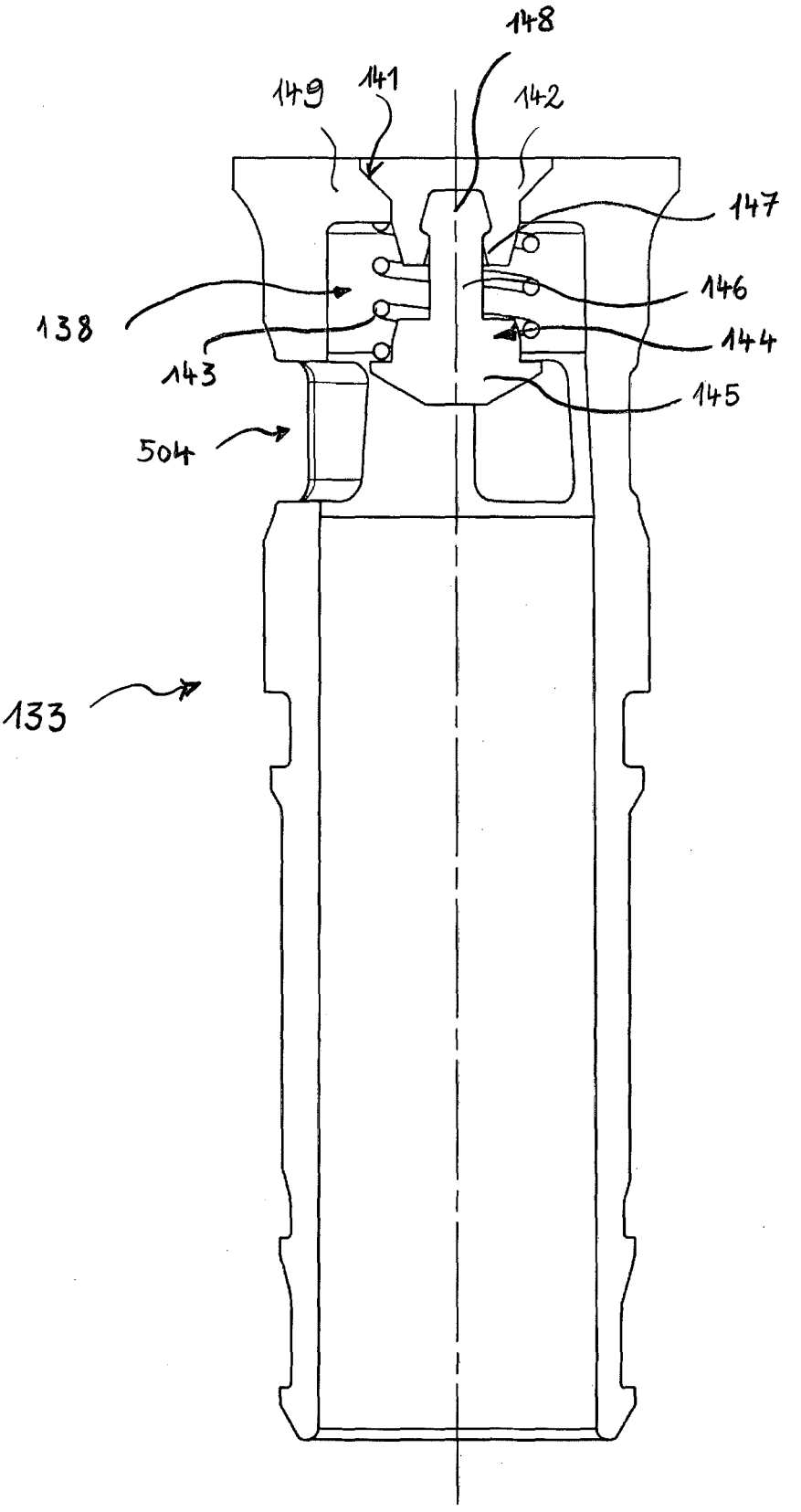

FIG. 20

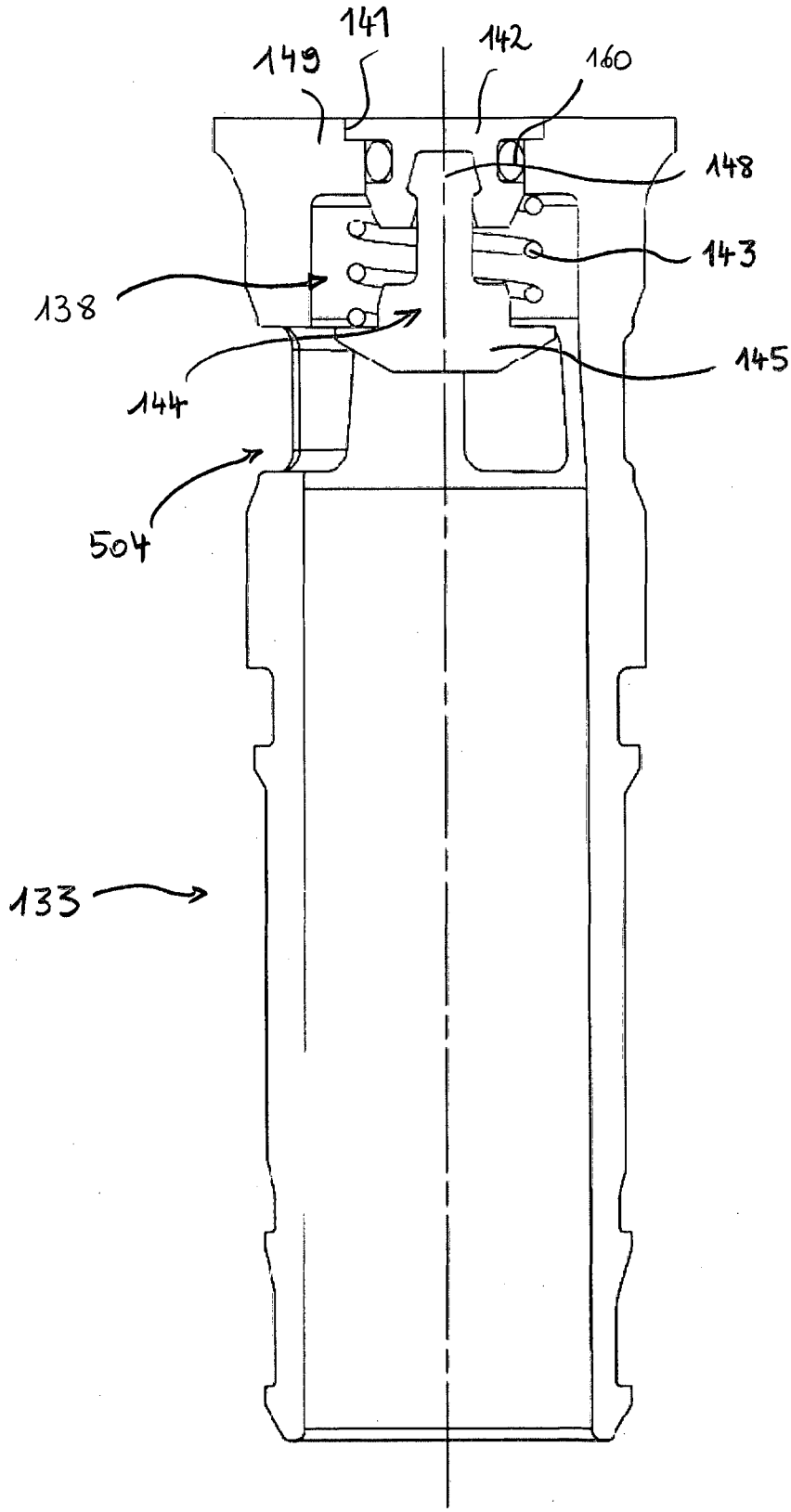

FIG. 21

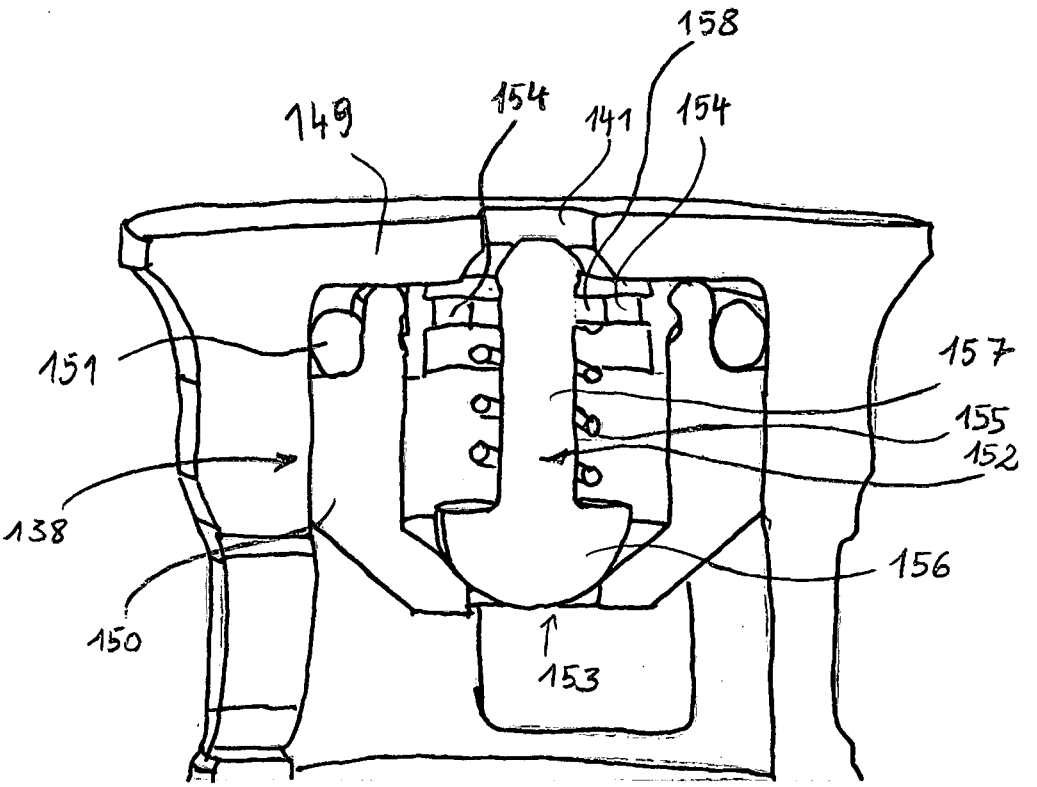

FIG. 22A

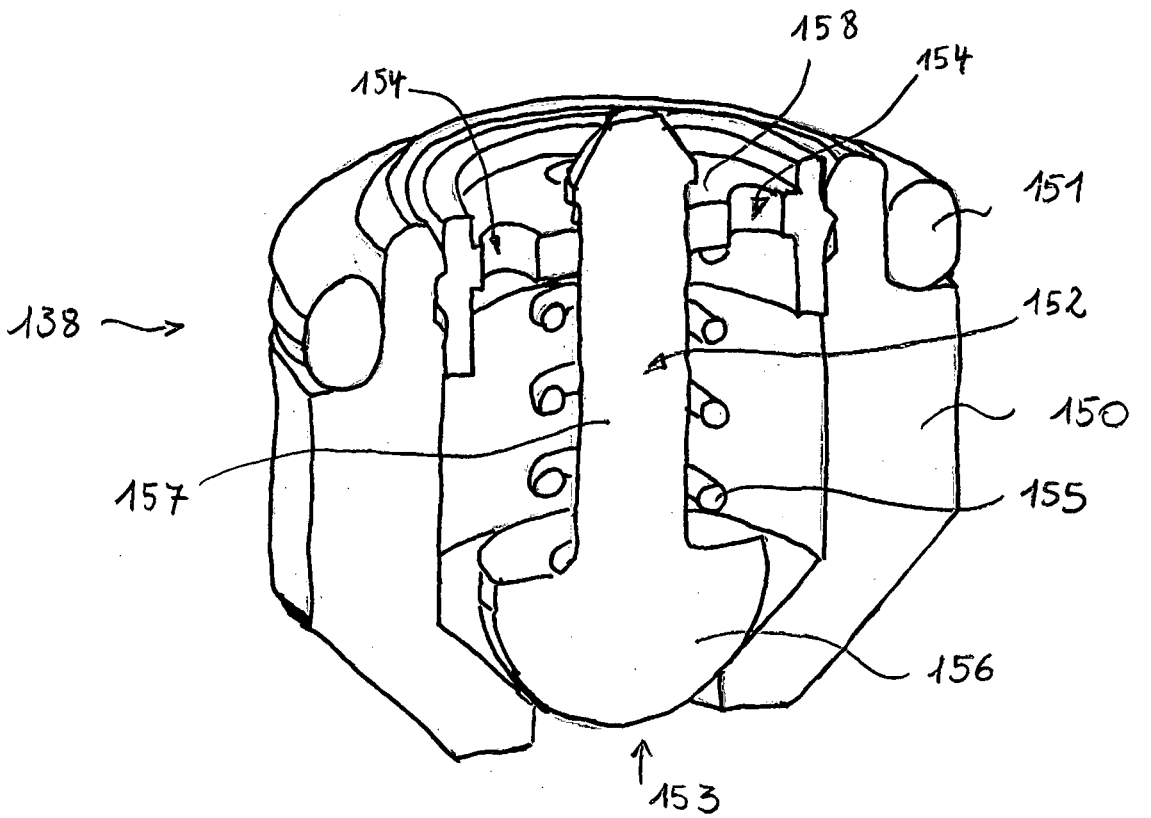

FIG. 22B

INTERNATIONAL SEARCH REPORT

International application No
PCT/BE2012/000020

A. CLASSIFICATION OF SUBJECT MATTER
INV. B67D1/08 F16K17/16
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)
B67D F16K B65D F17C

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)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 717 048 A (STENGER DONALD R [US]) 5 January 1988 (1988-01-05)	1,2,5-9, 12,13, 15-22
Y	column 1, line 11 - line 23 column 2, line 40 - column 5, line 68 -----	3,4,10, 11,14
Y	GB 2 246 768 A (LIM YIN SENG [MY]; LIM YIN FOO [MY]) 12 February 1992 (1992-02-12) page 7, line 6 - line 27 figure 1 page 5, line 1 - line 12 -----	3,4,10, 11
Y	US 3 361 152 A (AKERS EDWARD G) 2 January 1968 (1968-01-02) column 3, line 16 - line 20 -----	14
	-/--	

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 September 2012	08/10/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Schultz, Tom

INTERNATIONAL SEARCH REPORT

International application No
PCT/BE2012/000020

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2008/098936 A2 (INBEV SA [BE]; WAUTERS ALBERT [BE]; MCDERMENT IAIN [GB]) 21 August 2008 (2008-08-21) figures 1, 3, 6	1
A	WO 01/12537 A1 (DISPENSE SYSTEMS INTERNAT B V [NL]; GENDEREN DIRK HENDRIK VAN [NL]) 22 February 2001 (2001-02-22) figures 1, 2, 3, 5, 6	5-9
X	AT 250 748 B (HOECHST AG [DE]) 25 November 1966 (1966-11-25)	30,40
Y	page 1, line 1 page 1, line 35 - page 2, line 30 figure 1	31-39, 41-44
Y	US 3 005 573 A (DAWSON VICTOR C D ET AL) 24 October 1961 (1961-10-24) column 2, line 44 - line 41 figure 4	31-34, 41-43
Y	US 6 471 082 B1 (FRITZINGER DANIEL DUANE [US]) 29 October 2002 (2002-10-29) column 2, line 25 - column 3, line 15 figures 1-3	35,36,39
Y	US 5 544 779 A (YAMAMOTO KATSUYA [JP] ET AL) 13 August 1996 (1996-08-13) column 4, line 62 - column 5, line 10 figures 4a, 4b	37,38
Y	US 3 116 747 A (COWLES JOHN H ET AL) 7 January 1964 (1964-01-07) column 2, line 16 - line 21 figures 2, 3	44
A	US 4 102 167 A (WOOD LOREN E ET AL) 25 July 1978 (1978-07-25) column 1, line 42 - line 45 column 2, line 50 - line 66 column 3, line 43 - column 5, line 27 figures 1-3	30
A	US 6 286 702 B1 (BUERMANN HENRY [US]) 11 September 2001 (2001-09-11) column 7, line 33 - line 37 figures 1, 2	30,44
A	US 5 673 934 A (SACCONE PAUL T [US] ET AL) 7 October 1997 (1997-10-07) figure 1	30

INTERNATIONAL SEARCH REPORT

International application No.
PCT/BE2012/000020

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☒ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

1-22, 30-44

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☒ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/BE2012/000020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 5673934 A	07-10-1997	NONE	

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-22

   Assembly for fixing a fitting

   ---

2. claims: 23-29

   Disc spring

   ---

3. claims: 30-44

   Pressure relief valve

   ---

4. claims: 45-59

   Container for a fluid under pressure
