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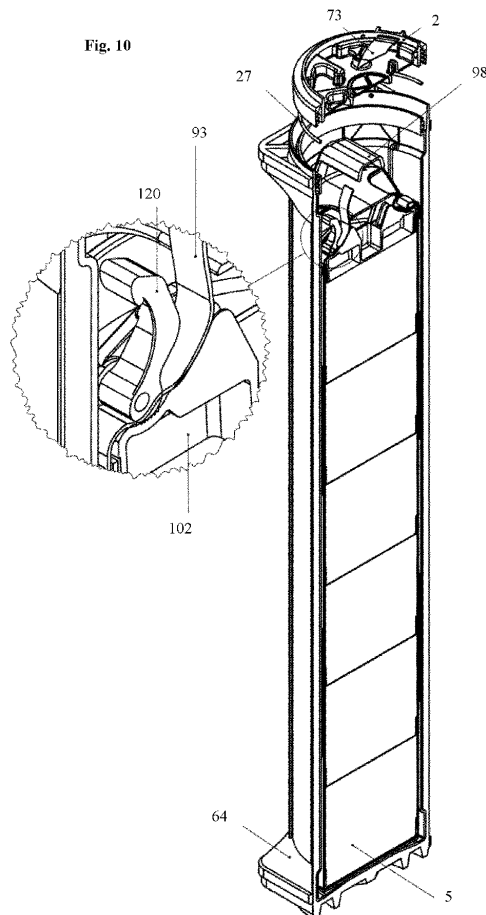
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(54) TRANSPORT AND STORAGE CONTAINER

(57) Transport and storage container, particularly for transport of explosives and objects containing explosives, said container comprising:

- a base vessel (1) having a bottom and a side wall,
 - a complementary vessel (6), an inner surface of which surrounds or adjoins an outer surface of the bottom and the side walls of the base vessel (1),
 - a removable cover (2) for watertight closing of an interior space of the base vessel (1),
- the material of the base vessel (1) and the material of the cover (2) are impermeable to water and steam.



Description

Field of Invention

[0001] The invention relates to a transport and storage container as a casing, particularly for explosives and objects comprising explosives, e.g. gunpowder filling or large calibre ammunition.

Background Art

[0002] Transport and storage of explosives need to be carried out in accordance with valid safety regulations.

[0003] Transport containers should be stackable, rigid and resistant to damage resulting from shocks or falls from a height. At the same time, the transport containers should be easy and cheap to manufacture.

[0004] A tube-shaped casing for explosives and propellants having a wall comprising an inner paper-based layer and an outer polyurethane layer is known in the art.

[0005] A drawback of such known casing is that humidity diffuses through said paper and polyurethane layers, further affecting and degrading the material transported or stored in the casing.

[0006] Furthermore, containers known from the art are not sufficiently protected against fire, e.g. when the container is located in the vicinity of a fire. In such a case, the ammunition stored in the standard containers may ignite or explode.

[0007] Several modular propellant weapon charges may be successively, one onto another, inserted into such casings. The charges may be of different types and the respective container is thus not always filled up to its cover. The charges thus may move freely along the longitudinal axis which might bring about risks during transport. Given the length of the tube, it is also inconvenient to insert the charges into the tube through the inlet opening in a way that the charge does not hit the bottom or a previously inserted charge. Taking out the charges from the transport container is likewise inconvenient.

Summary of Invention

[0008] The above-mentioned drawbacks of the devices known in the art are to a large extent eliminated by a transport and storage container, particularly for transport of explosives and objects, comprising explosives, said container comprising:

- a base vessel having a bottom and a side wall,
- a complementary vessel, in which the base vessel is inserted, or an inner surface thereof is adjacent to an outer surface of the bottom and the sidewalls of the base vessel, and
- a removable cover for water-tight enclosure of an

interior space of the base vessel,

wherein the materials of the base vessel and of the cover are impermeable to water and steam.

[0009] The material of the base vessel may comprise e.g. a blend comprising at least 20 wt. % of polypropylene and at least 20 wt. % of thermoplastic polyurethane.

[0010] In an embodiment, the material of the base vessel comprises a blend comprising at least 30 wt. %, preferably at least 40 wt. % of polypropylene and at least 30 wt. %, preferably at least 40 wt. % of thermoplastic polyurethane, and/or the total content of polypropylene and thermoplastic polyurethane in the material of the base vessel amounts to at least 80 wt. %.

[0011] The material of the cover comprises e.g. a blend comprising at least 20 wt. % of polypropylene and at least 20 wt. % of thermoplastic polyurethane, and/or the material of the cover is identical to the material of the base vessel.

[0012] The material of the complementary vessel preferably comprises an elastomer in an amount of more than 70 wt. %.

[0013] Preferably, the cover comprises a pressure relief valve for preventing a pressure increase in the base vessel above a defined level, e.g. a magnetic pressure relief valve.

[0014] The magnetic pressure relief valve may be fixed in a through-opening in the cover and may comprise a supporting annular collar which extends along a circumference of the opening of the valve and against which a sealing disc abuts, wherein a first magnet is fixed to said sealing disc on its side facing away from the interior space of the base vessel, and wherein a second magnet is arranged in an adjustable distance from the first magnet, the second magnet being adapted for pressing the sealing disc against the supporting annular collar by means of a mutually repulsive force acting between the first magnet and the second magnet.

[0015] In a preferred embodiment, one end of the side wall of the base vessel merges with the bottom and the other end is provided with a thread for screwing the cover.

[0016] The cover is preferably provided with an outer tube-shaped collar, an inner surface of which being provided with a thread for screwing the cover on the thread of the base vessel.

[0017] The cover of the transport and storage cover preferably comprises an inner tube-shaped collar which extends with a distance from and in parallel to the inner tube-shaped collar, wherein a sealing ring is arranged on a bottom of a groove formed by a recess between the outer tube-shaped collar and the inner tube-shaped collar.

[0018] In a screwed state of the cover, an upper edge of the base vessel is preferably arranged between the outer tube-shaped collar and the inner tube-shaped collar, and an outer surface of the outer tube-shaped collar abuts the inner surface of the complementary vessel.

[0019] A wall of the transport and storage container

preferably also comprises a refractory layer which preferably comprises a refractory fibrous material. Said refractory fibrous material is preferably a ceramic refractory fibrous material, preferably a ceramic paper. A thickness of the refractory layer is at least 0.5 mm, preferably 1 to 5 mm. The refractory layer is preferably arranged at least partially between the side wall of the base vessel and a side wall of the complementary vessel.

[0020] The above-mentioned drawbacks of devices known in the art are also eliminated by a transport container for transport of modular propellant weapon charges, said container comprising a manipulation carrier.

[0021] The manipulation carrier comprises at least two parts which together delimit an interior cylindrical space of the manipulation carrier, and at least one of the components comprises a partial bottom and stands which project from edges of the partial bottom and which extend in a longitudinal direction of the manipulation carrier, wherein said components are mutually connected in a swivelling manner for opening the manipulation carrier.

[0022] A preferred embodiment of the manipulation carrier comprises a tightening belt which extends through the partial bottom of at least one of the parts, one end of said tightening belt being lead through a stand of one of the parts at least in its upper region, and the other end is lead through a stand of another part at least in its upper region, and a locking element for fixing a position of the tightening belt.

[0023] The swivelling connection of the parts is preferably ensured by the tightening belt and a swivelling axis of this swivelling connection is preferably located in a plane of a bottom of the manipulation carrier.

[0024] The manipulation carrier preferably comprises a tightening insert, wherein the locking element is fixed on the tightening insert.

[0025] The tightening insert is preferably disc-shaped, wherein an outer circumference of the disc corresponds to a circumference of an inner cross-section of the manipulation carrier.

[0026] In another preferred embodiment, the partial bottoms of the parts are mutually connected in a swivelling manner for providing the mutual swivelling connection of the parts.

[0027] The parts are preferably made of plastic, wherein the mutual swivelling connection may be in the form of a crease, a longitudinal axis thereof being perpendicular to the longitudinal axis of the manipulation carrier.

[0028] In a region arranged in a distance from the bottom, the manipulation carrier preferably comprises a connecting mechanism for a mutual connection of the parts in a closed state of the manipulation carrier.

[0029] A preferred embodiment of the connecting mechanism comprises a protrusion arranged on one of the parts and a catch fixed to another of the parts and further comprising a through-opening adapted for slipping the catch over the protrusion to prevent the manipulation carrier from spreading out.

[0030] The manipulation carrier preferably comprises a manipulation grip.

[0031] The manipulation carrier is preferably arranged on a side which faces away from the bottom of the manipulation carrier.

[0032] In a particularly preferred embodiment, each of the parts comprises a partial grip, wherein both partial grips together form said manipulation grip of the manipulation carrier.

[0033] Each of the parts preferably comprises at least one partial interconnecting ring which mutually interconnects the stands.

[0034] In a preferred embodiment, the manipulation carrier comprises a set of partial interconnecting rings, wherein at least one partial interconnecting ring is arranged adjacent to the partial bottom, at least one partial interconnecting ring is arranged in a region adjacent to the partial grip, and at least one partial interconnecting ring is arranged in an intermediate region.

Description of Drawings

[0035] The invention is described in more detail based on exemplifying embodiments, which are schematically depicted in drawings, wherein Fig. 1 represents a view of an exemplifying embodiment of the container according to the invention, Fig. 2 is a longitudinal cross-section A-A of the container of Fig. 1, wherein the section is indicated in Fig. 3, Fig. 2A is a detail A of a cross section of a closing screw in a cover, Fig. 2B is a detail B of a pressure relief valve in the cover, Fig. 2C is a detail C of seating of the cover on the container, Fig. 2D is a detail of a cross-section through the wall of the container, Fig. 3 is a plan view of the container of Fig. 1, Fig. 4 shows the cover and the base vessel which forms the inner wall of the container of Fig. 1, Fig. 4A shows a detail of the cover, the valve and the closing screw in an exploded view, Fig. 5 is a complementary vessel forming the outer cover of the container of Fig. 1, Fig. 6 is a cross-section through a part of an exemplifying embodiment comprising a refractory layer, Fig. 7 is a view of an exemplifying embodiment of a manipulation carrier in a partially opened state and with indicated modular propellant weapon charges, Fig. 8 show an empty manipulation carrier in a closed state with a removed tightening insert, Fig. 9 shows a manipulation carrier in a closed state with charges, Fig. 10 shows a cross-section through a transport container with an inserted manipulation carrier and with modular propellant weapon charges.

Description of Exemplifying Embodiments

[0036] An exemplifying embodiment of a container according to the invention, shown in Fig. 1 to 5, comprises a base vessel 1 which forms an inner wall of the container, and a complementary vessel 6 which forms an outer vessel of the container, wherein an outer surface of the base vessel 1 is closely adjacent to an inner surface of the

complementary vessel 6, wherein said surfaces are essentially mutually connected or they adhere to each other.

[0037] The base vessel 1 is made from a blend of polypropylene and an elastomer in a mass ratio which ensures a high impact resistance, e.g. in a mass ratio of 50:50, wherein said base vessel 1 can be manufactured by means of blow moulding, injection moulding or rotomoulding. In the present exemplifying embodiment, the base vessel 1 is manufactured by blow moulding a blend of polypropylene and thermoplastic polyurethane in the form of an elastomer in a mass ratio 50:50, although other values of the mass ratio are also possible, in general e.g. a mass ratio of 20:80 to 80:20, preferably 30:70 to 70:30, most preferably 40:60 to 60:40; eventually, further components may be comprised in the blend.

[0038] The container furthermore comprises a cover 2 which is preferably also made of a blend of polypropylene and an elastomer, e.g. from the same blend as the base vessel 1.

[0039] Alternatively, the base vessel 1 and/or the cover 2 may be made of polyethylene or a blend comprising polyethylene, and in general they may be made of any plastic.

[0040] In general terms, a material which is impermeable to water and steam and at the same time sufficiently rigid or ductile, and may be which tends to adhere to the material of the complementary vessel 6, might be used for the production of the base vessel 1 and/or the cover 2.

[0041] The material of the base vessel 1 and/or the cover 2 and/or the complementary vessel 6 may comprise additional admixtures, e.g. colourants and/or a flame retardant etc.

[0042] The base vessel 1 has a form of a tube, said tube comprising a bottom on one side while the other side is open, and its outer surface is provided with a thread for screwing the cover 2 thereon.

[0043] The cover 2 comprises a central through-opening 20, in which a pressure relief safety device is located, wherein said pressure relief safety device may function mechanically or magnetically, and also a control opening closed by a closing screw 29 with a sealing 28. In the present embodiment, the pressure relief safety device is a pressure relief valve.

[0044] The illustrated embodiment of the pressure relief valve comprises a carrier 31 fixed in the central through-opening 20 of the cover 2. An annular seating 32 is coaxially fixed in the carrier 31 by a form fit, said annular seating 32 comprising a supporting annular collar, an inner surface of which is funnel-shaped and with which the annular seating 32 faces away from the interior space of the container. The annular seating 32, eventually at least the supporting annular collar, is made of an elastic, flexible and chemically resistant rubber material (e.g. fluoro-rubber).

[0045] The opening delimited by the annular seating 32 is closed by a sealing disc 33 which, in a closed state, abuts against the supporting annular collar of the annular

seating 32, and which has essentially a plate-like shape. On a side which faces away from the supporting annular collar, a first magnet 34 is fixed in the central part of the sealing disc 33.

[0046] A covering grid 35 is screwed into the carrier 31 by means of a thread on its side, wherein said covering grid 35 covers the sealing disc 33 spaced apart therefrom and has a central through-opening comprising an inner thread, into which an adjustment screw 36 is screwed. The adjustment screw 36 comprises a cavity on its side facing towards the sealing disc 33, thus also facing towards the first magnet 34, wherein a second magnet 37 is attached in said cavity. The adjustment screw 36 comprises a manipulation groove on a side facing away from the sealing disc 33.

[0047] Magnets 34, 37 face each other with their identical poles so to exert a repulsive force on each other. The sealing disc 33 is thus pressed onto the supporting annular collar so that the central through-opening 20 is closed. If a pressure in the container exceeds an acceptable level, it will cause the sealing disc 33 to rise, thus opening the container. This situation is shown in Fig. 2B, wherein the sealing disc 33 is arranged at a distance from the supporting annular collar, thus in a state when the pressure inside the vessel exceeded the force with which the second magnet 37 pushes away the first magnet 34 and the sealing disc 33 with it. As soon as the pressure drops again, the second magnet 37 pushes the sealing disc 33 again to the position where it abuts against the supporting annular collar of the annular seating 32.

[0048] The magnets 34, 37 are preferably arranged coaxially. In general, any types of permanent magnets which ensure an appropriate force effect may be used, e.g. neodymium magnets.

[0049] In the present case, the carrier 31 of the pressure relief valve is pressed in the cover 2. Other types of fixtures may also be used, e.g. screwing, glueing etc.

[0050] The value of pressure necessary to open the valve can be readily set by the depth with which the adjustment screw is screwed into the covering grid 35, i.e. by adjusting the distance of the second magnet 37 from the first magnet 34.

[0051] Other designs of the pressure relief valve may also be used for the container according to the invention. For example, the cover 2 may be built such that it comprises a notch or an indentation or another kind of thinning which will burst once a defined pressure threshold limit is exceeded.

[0052] Additionally, the cover 2 is provided with shaped protrusions and recesses which facilitate manipulation with the cover 2 and stacking of the containers.

[0053] On a side which faces towards the cavity of the container, the cover 2 comprises an outer tubular collar 25 and an inner tubular collar 26, arranged coaxially with said outer tubular collar 25. On its inner side, the outer tubular collar 25 is provided with a thread which can be screwed onto the thread of the base vessel 1. A sealing ring 27 is arranged at the bottom of a groove between the

inner tubular collar 26 and the outer tubular collar 25. The distance between the outer tubular collar 25 and the inner tubular collar 26 essentially corresponds to the thickness of the wall of the base vessel 1 with a clearance, or eventually it is slightly larger so that the cover 2 can be

screwed onto the base vessel 1 and the inner tubular collar 26 at least partially adjoins to the inner surface of the base vessel 1.

[0054] After screwing the cover 2 onto the base vessel 1, a terminal edge of the base vessel abuts against the sealing ring 27.

[0055] The transport and storage container further comprises a complementary vessel 6. The inner surface of the bottom and the side wall of the complementary vessel 6 closely adjoin an outer surface of the bottom and the side wall of the base vessel 1 up to the vicinity of the outer thread on the base vessel 1, or rather to the vicinity of the cover 2, at which area the inner surface of the complementary vessel 6 is provided with an inner step 60. Therefore, in the region where the cover 2 is screwed on the base vessel 1, the inner side wall of the complementary vessel 6 extends abutting or almost abutting the outer side walls of the cover 2, specifically the outer side walls of the outer tubular collar 25.

[0056] The complementary vessel 6 thus forms an outer shell of the base vessel 1.

[0057] The complementary vessel 6 can be provided with reinforcing ribs 60 on its outer surface, wherein said reinforcing ribs 60 extend in parallel to the axis of the container and are arranged with a uniform mutual angular spacing.

[0058] In the bottom region, the complementary vessel 6 is provided with a lower reinforcing frame 64 and in the region of the cover 2, the complementary vessel 6 is provided with an upper reinforcing frame 65. The reinforcing frames 64, 65 have an essentially square ground plan having a centre located in the axis of the container, and they comprise reinforcing rib elements shaped to absorb energy and thus to eliminate a damage to the walls of the container when the container falls from a height. The reinforcing rib elements thus act as bumper zones. On outer sides, the shape of the reinforcing frames 64, 65 is formed to be at least partially mutually complementary so that, when the containers are stacked on one another, at least some of the shaped protrusions of the lower reinforcing frame 64 of a first container engage with recesses of the upper reinforcing frame 65 of a second container and/or at least some of the shaped protrusions of the upper reinforcing frame of the second container engage with recesses of the lower reinforcing frame 64 of the first container.

[0059] The complementary vessel 6 is preferably made of an appropriate elastomer, eventually from a blend comprising at least 80 wt. %, preferably at least 90 wt. % of an elastomer. It may be made e.g. from a blend comprising at least 80 wt. % of thermoplastic polyurethane in the form of an elastomer. In the present embodiment, the complementary vessel 6 is made of thermo-

plastic polyurethane in the form of an elastomer, though it is possible to utilize other elastomer materials.

[0060] The thickness of the wall of the base vessel 1 is preferably 1 to 4 mm.

[0061] The thickness of the wall of the complementary vessel 6 is preferably 2 to 6 mm.

[0062] The embodiment which comprises two layers, wherein the complementary vessel 6 forms the outer vessel made of a flexible polyurethane or other elastic material, ensures a high resistance during drop testing. The base vessel 1 which forms the inner vessel ensures watertightness, eventually steam-tightness, thus also ensuring a high protection of the transported and stored material against humidity.

[0063] The cover 2 with an embedded pressure relief safety device prevents an uncontrollable pressure increase. As a result of the base vessel 1 being manufactured by blow moulding, injection moulding or rotomoulding, and the complementary vessel 6 which is applied onto the base vessel 1 being made of polyurethane or generally an elastomer, the production of the container is inexpensive. At the same time, the material of the base vessel 1 and the material of the complementary vessel 6 adhere to each other, thus also ensuring watertightness and a high resistance of the container against mechanical damage.

[0064] In a preferred embodiment, a part of which is shown in Fig. 6, a refractory layer 100 is arranged between the base vessel 1 and the complementary vessel 6 so that the inner surface of the bottom and the side wall of the complementary vessel 6 tightly adhere to said refractory layer 100. In the upper fifth of its length, the complementary vessel 6 comprises an abutting surface 61, against which the base vessel 1 abuts with its flange arranged on its outer surface. The refractory layer 100 abuts the bottom and the walls of the base vessel 1 up to the level of the abutting surface 61. Above the level of the abutting surface 61, the side walls of the complementary vessel 6 adjoin to the side walls of the base vessel 1 up to the vicinity of the outer thread on the base vessel 1, or rather to the vicinity of the cover 2 where the inner surface of the complementary vessel 6 is provided with the inner step 60.

[0065] The refractory layer 100 is made of refractory fibrous material, preferably from ceramic refractory fibrous material, e.g. from the Fiberfrax® ceramic paper (produced by Unifrax). In general, it is preferable that the refractory layer 100 be made of a ceramic fibrous material, the fibres of which comprise 40 to 60 wt. % of SiO₂, 40 to 60 wt. % of Al₂O₃, and possibly other admixtures.

[0066] In a particularly preferable embodiment, the container is equipped with a manipulation carrier as shown in Figs. 7 to 11. An embodiment of the manipulation carrier comprises two parts 21 which are mutually connected at a bottom region in a swivelling manner and which together delimit an interior cylindrical space.

[0067] Each part 91 comprises a partial bottom 92, stands 96 which extend spaced from each other in a

direction perpendicular to the partial bottom 92, partial interconnecting rings 97 which mutually interconnect the stands 96, and a partial grip 98.

[0068] Each part 91 thus surrounds a half of the interior cylindrical space.

[0069] Spaced from the bottom, each part 91 is also provided with a protrusion 94 on one lateral side and with a catch 95 on the other lateral side, the catch 95 being provided with a through-opening for the protrusion 94 of the other part 91. These protrusions 94 and catches 95 are arranged so that after closing the carrier, it is possible to always slip the through-opening of the protrusion 95 of one part 91 on the protrusion 94 of the other part 91, thereby securing both parts 91 in a closed state, i.e. are tilted towards each other.

[0070] A tightening insert 102 is also a part of the carrier, wherein, in the present embodiment, the tightening insert 102 has a shape of a disc with an annular hem 123 and comprises a pair of locking elements in the form of a fastener 120, wherein both fasteners 120 are fixed to said disc in a space delimited by the annular hem 123 by means of a carrier 122. In the present case, the fasteners 120 are swivelling lever fasteners, although other types of fasteners may be used.

[0071] Additionally, the carrier comprises a manipulation tightening belt 93 which extends from the upper partial interconnecting ring 97 of the first part 91 to its partial bottom, wherein said tightening belt 93 is guided through passages in the stand 96 so that it passes along the stand 96 in an alternating manner along its inner side and its upper side. The tightening belt 93 is further guided along the inner and then outer side of the partial bottom 92 of that part 91 and further along the outer and then inner side of the partial bottom 92 of the other part 91 and further to its partial interconnecting ring 97, again along the stand 96 in an alternating manner along its inner side and upper side.

[0072] The ends of the tightening belt 93 are adapted for passing through the fastener 120, by means of which they can be secured.

[0073] The tightening belt 93 is preferably in the form of a fabric tape, the parts 91 and the tightening insert 102 are preferably made of plastic. The parts 91 can be mutually connected in a swivelling manner by means of an articulated mechanism, or by an appropriate crease allowing for mutual swivelling, e.g. by thinning or by crease having a linear longitudinal axis extending essentially perpendicularly to the longitudinal axis of the manipulation carrier.

[0074] The upper side of the cover 2 of the container may be equipped with a manipulation strap 73.

[0075] The manipulation carrier may be used for example in the following way:

The manipulation carrier is turned to the side (Fig. 1) and opened, i.e. the upper part 91 is swivelled away from the other part 91. Subsequently, the modular propellant weapon charges 5 are arranged one after another so that they form a lying column, and the tightening insert

102 is placed adjacent to the last of the modular propellant weapon charges 5. The entire lying column of modular propellant weapon charges 5 together with the tightening insert 102 is gripped so that a force of pressure is exerted from both sides of the column in the axial direction, and the column is moved into the lying part 91 in such a way that the tightening insert 102 faces towards the partial grip 98 and the other side of the column abuts on the partial bottoms 92. The other part 91 is swivelled to that and secured by means of the catches 95 and protrusions 94. The tightening belt 93 is guided through the fasteners 120 and tightened and as a result, the modular propellant weapon charges 5 are enclosed between the bottom of the manipulation carrier and the tightening insert 102, or rather the weapon charges 5 are pulled to the bottom of the manipulation carrier and the tightening belt 93 is secured by means of the fasteners 102.

[0076] The manipulation carrier then may be taken by the grip 98 and inserted into the transport container which is then closed by the cover 2.

[0077] The outer circumference of the cross-section of the manipulation carrier is designed to correspond, with a clearance, to the inner circumference of the cross-section of the transport container, and the height of the manipulation carrier along with the partial grips 98 corresponds, with a clearance, to the height of the interior space in the closed transport container, i.e. to the distance between the bottom of the container and the cover 2. As a result, the modular propellant weapon charges 5 are prevented from moving inside the transport container, and that for different heights of the stack of modular propellant weapon charges 5. The modular propellant weapon charges 5 are thus housed in the container without a risk of hitting each other during transport.

[0078] In the present embodiment, each part 91 comprises a pair of stands 96 on their edges and one intermediate stand 96. In an alternative embodiment of the manipulation carrier, more or less stands 96 may be present. If the stands 96 on the edges are sufficiently wide, the intermediate stand 96 does not need to be present and the tightening belt 93 may extend from the partial interconnecting ring 97, arranged in the region adjacent to the partial grip 98, up to the partial interconnecting ring 97, arranged in the bottom region, eventually to the bottom itself, essentially without contacting the stand 96, i.e. directly along the modular propellant weapons charges 5.

[0079] In another embodiment, the catches 15 may be arranged on one of the parts 91, wherein the protrusions 14 are, in such an embodiment, arranged on the other part 91. The mutual interconnection of the parts 91 by means of a protrusion 94 and a catch 95 may be replaced with another locking mechanism, eventually with an additional tightening belt or a latch in the region of the partial grips 98. The grip itself does not need to be present and can be replaced with e.g. a strap belt. At the same time, it is good to maintain the total height of the manipulation carrier so that it corresponds to the height of the interior

space of the closed transport container, in order that the carrier is housed in the transport container with a minimum clearance.

[0080] In one of the less preferred embodiments, neither the tightening insert 102 nor the tightening belt 93 has to be present, so that the manipulation carrier serves primarily as a tool for a safe insertion of modular propellant weapon charges 5 into the transport container and for removing them from the container. If at least the tightening belt 93 is present, along with the corresponding locking element for securing the tightening belt 93 in a position in which it pulls the inserted modular propellant weapon charges 5 to the bottom, the manipulation carrier is also adapted for eliminating the movement of modular propellant weapon charges 5 inside the transport container during transport. In the case where a tightening insert 102 is additionally present, the assembly as a whole is more solid, more stable and easier to handle, particularly during the tightening of the tightening belt 93.

[0081] In another alternative embodiment, only one fastener 120 may be present on the tightening insert 102, so that one end of the tightening belt 93 is fixed to the tightening insert 102 without the possibility of moving, whereas the other end of the tightening belt 93 is guided through the fastener 120 and the tightening thus takes place only by pulling this end of the tightening belt 93.

[0082] In a particularly preferred embodiment, the parts 91 can be in the form of separate components, wherein the mutual swivelling connection of the parts 91 is ensured by the tightening belt 93.

[0083] In another alternative embodiment, three or more parts 91 can be used which together delimit a cylindrical interior space for modular propellant weapon charges 5, wherein at least one of the parts 91 is fixed to further part 91 in a swivelling manner.

[0084] Referring to the drawings, solutions have been described in which the manipulation carrier has an essentially solid bottom. In an alternative embodiment the bottom may be partially absent, e.g. so that the partial bottoms 92 of the parts 91 comprise a cutout and these cutouts form, in the closed state of the manipulation carrier, a central opening in the bottom, or one of the parts 91 does not comprise a bottom while the other one does etc.

[0085] Although particularly preferred embodiments were described, it is clear that a person skilled in the art will readily find further possible alternatives to these embodiments. The scope of the invention thus is not limited to these exemplifying embodiments but is rather defined by the appended patent claims.

Claims

1. Transport and storage container, particularly for transport of explosives and objects containing explosives, said container comprising:

- a base vessel (1) having a bottom and a side wall,
- a complementary vessel (6), in which the base vessel (1) is arranged, or an inner surface of which adjoins an outer surface of the bottom and the side walls of the base vessel (1),
- a removable cover (2) for watertight closing of an interior space of the base vessel (1),

characterized in that the material of the base vessel (1) and the material of the cover (2) are impermeable to water and steam.

2. Transport and storage container according to claim 1, **characterized in that** the material of the base vessel (1) comprises:

- a blend comprising at least 20 wt. % of polypropylene and at least 20 wt. % of thermoplastic polyurethane, preferably a blend comprising at least 30 wt. %, preferably at least 40 wt. % of polypropylene, and at least 30 wt. %, preferably at least 40 wt. % of thermoplastic polyurethane,

and/or the total content of polypropylene and thermoplastic polyurethane in the material of the base vessel (1) amounts to at least 80 wt. %,

wherein the material of the cover (2) comprises a blend comprising at least 20 wt. % of polypropylene and at least 20 wt. % of thermoplastic polyurethane, and/or the material of the cover (2) is identical to the material of the base vessel (1).

3. Transport and storage container according to claim 1 or 2, **characterized in that** the material of the complementary vessel (6) comprises an elastomer in an amount of more than 70 wt. %, preferably at least 80 wt. % of thermoplastic polyurethane in the form of an elastomer.

4. Transport and storage container according to any one of claims 1 to 3, **characterized in that** the cover (2) comprises a pressure relief valve, preferably a magnetic pressure relief valve, for preventing a pressure increase in the base vessel (1) above a defined threshold value.

5. Transport and storage container according to any one of claims 1 to 4, **characterized in that** one end of the side wall of the base vessel (1) merges with the bottom and the other end is provided with a thread for screwing on the cover (2).

6. Transport and storage container according to claim 5, **characterized in that** the cover (2) is provided with an outer tubular collar (25), an inner surface of

which is provided with a thread for screwing the cover (2) onto the thread of the base vessel (1).

7. Transport and storage container according to claim 6, **characterized in that** the cover (2) comprises an inner tubular collar (26) which extends spaced from the outer tubular collar (25) and coaxially with it, wherein a sealing ring (27) is arranged at a bottom of a groove formed by a recess between the outer tubular collar (25) and the inner tubular collar (26), said sealing being arranged so that in a screwed state of the cover (2), an upper edge of the base vessel (1) is arranged between the outer tubular collar (25) and the inner tubular collar (26), and an outer surface of the outer tubular collar (25) adjoins to the inner surface of the complementary vessel (6). 5 10
8. Transport and storage container according to any of claims 1 to 7, **characterized in that** a wall of the transport and storage container also comprises a refractory layer (100) which is at least partially arranged between the base vessel (1) and the complementary vessel (6) and comprises a refractory fibrous material, preferably a ceramic refractory fibrous material, preferably a ceramic paper, and/or the thickness of the refractory layer (100) is at least 0.5 mm, preferably 1 to 5 mm. 20 25
9. Transport and storage container according to claim 8, **characterized in that** the base vessel (1) is, on its outer side, provided with a flange with which it abuts an inner step (60) of the complementary vessel (6), wherein the refractory layer (100) is arranged between the base vessel (1) and the complementary vessel (6) in a region of the bottom and in a region of their side walls from the bottom to the flange of the base vessel (1). 30 35
10. Transport and storage container according to any one of the preceding claims, **characterized in that** it comprises a removable manipulation carrier for modular propellant weapon charges (5), wherein the manipulation carrier comprises at least two parts (91) which together delimit an interior cylindrical space of the manipulation carrier, wherein the parts (91) are mutually connected in a swivelling manner for spreading out the manipulation carrier. 40 45
11. Transport and storage container according to claim 11, **characterized in that** at least one of the parts (91) comprises a partial bottom (92) and at least one stand (96) which projects from an edge of the partial bottom (92) and extends in a longitudinal direction of the manipulation carrier. 50 55
12. Transport and storage container according to claim 10 or 11, **characterized in that** the manipulation carrier comprises:

- a tightening belt (93) which passes through the partial bottom (92) of at least one of the parts (91), one end of which belt (93) passes through the stand (96) of at least one of the parts (91) at least in its upper region and the other end is guided through an opposite stand (96) of a second part (91) at least in its upper region, and
- a locking element for securing the position of the tightening belt (93).

13. Transport and storage container according to claim 12, **characterized in that** it comprises a tightening insert (102), wherein the locking element is fixed on the tightening insert (102).
14. Transport and storage container according to claim 10 to 13, **characterized in that** the swivelling connection of the parts (91) of the manipulation carrier is ensured by the tightening belt (93), which passes through the partial bottoms (92) of the parts (91).
15. Transport and storage container according to any one of claims 10 to 14, **characterized in that** the manipulation carrier comprises a manipulation grip, preferably arranged on the side facing away from the bottom of the manipulation carrier, and/or the height of the interior space of the transport container closed with the cover (2) corresponds to the total height of the manipulation carrier.

Fig. 1

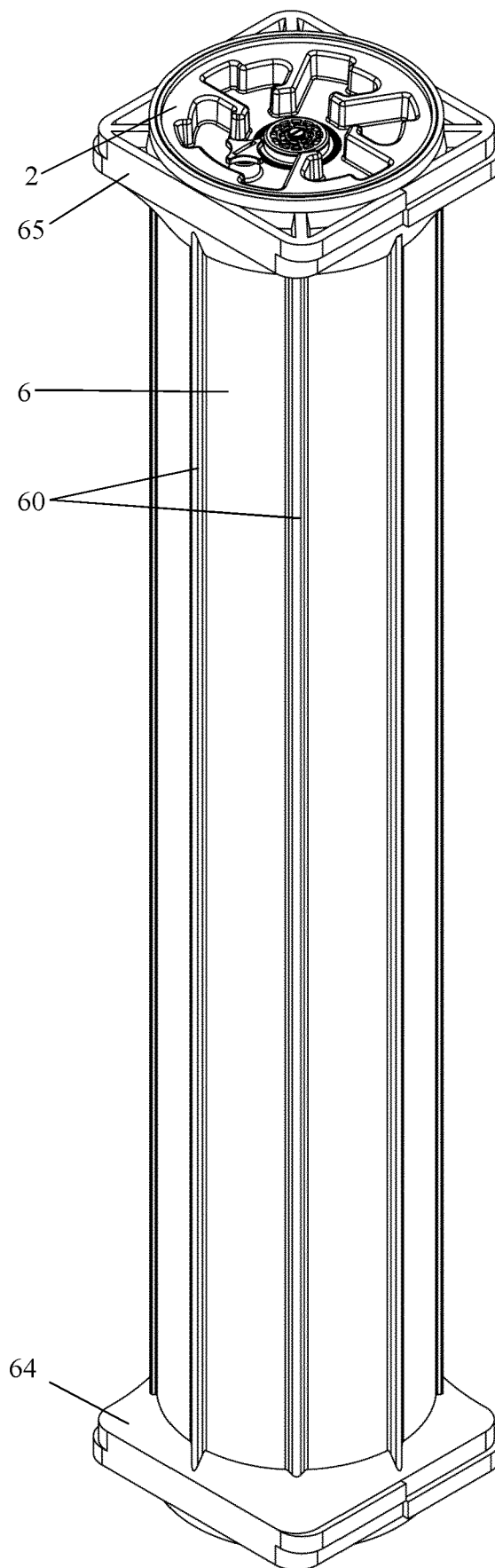


Fig. 2

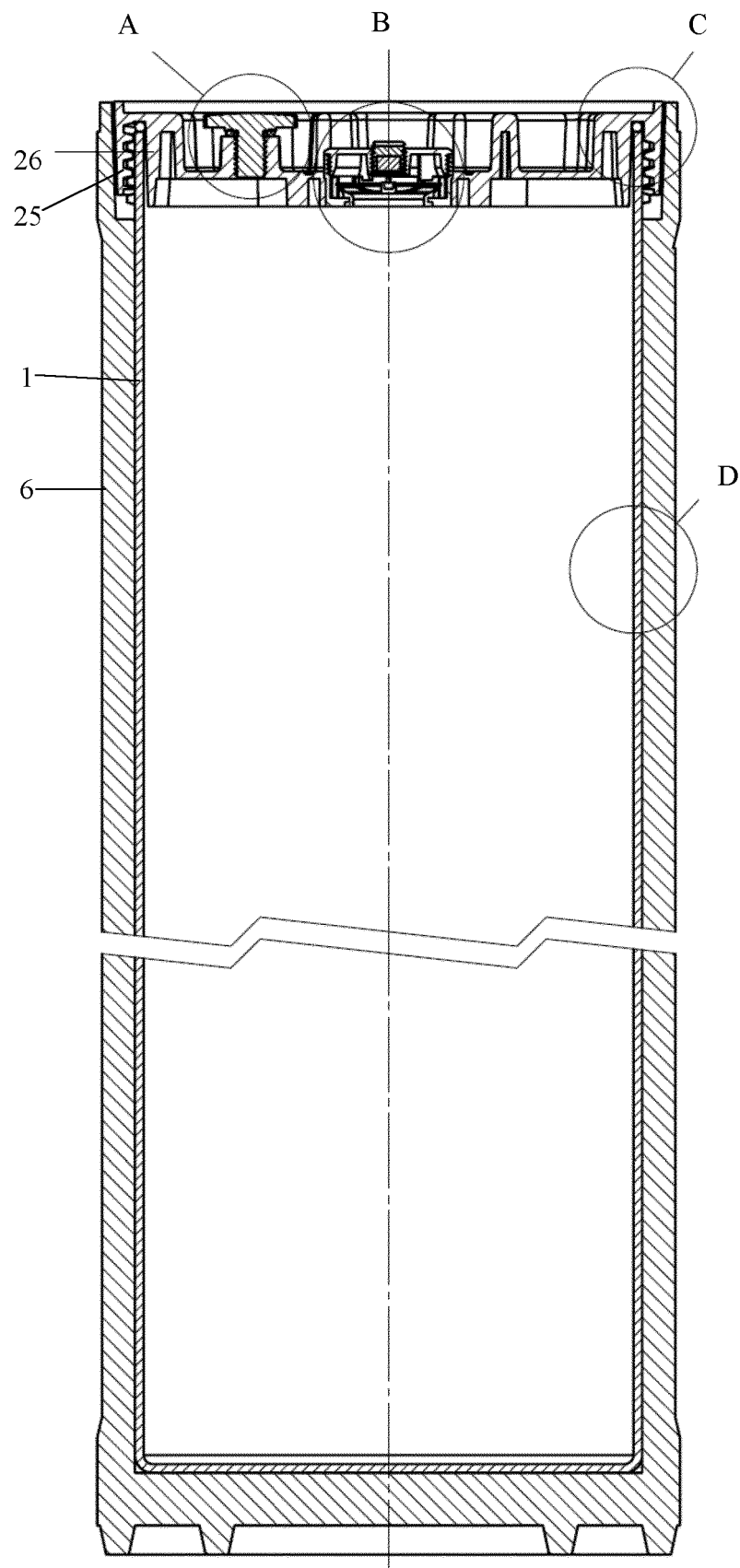


Fig. 2A

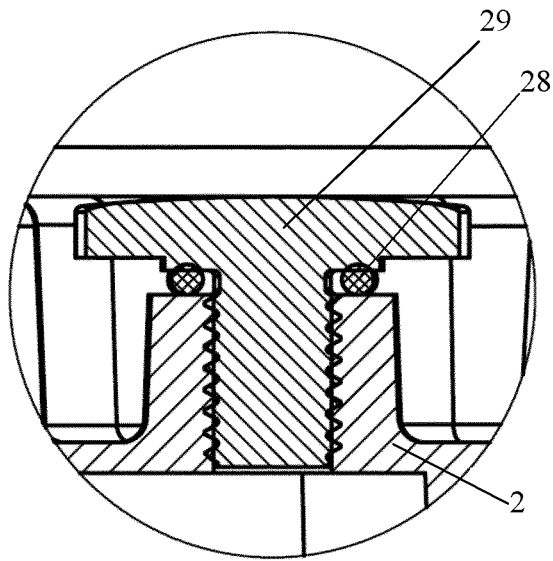


Fig. 2D

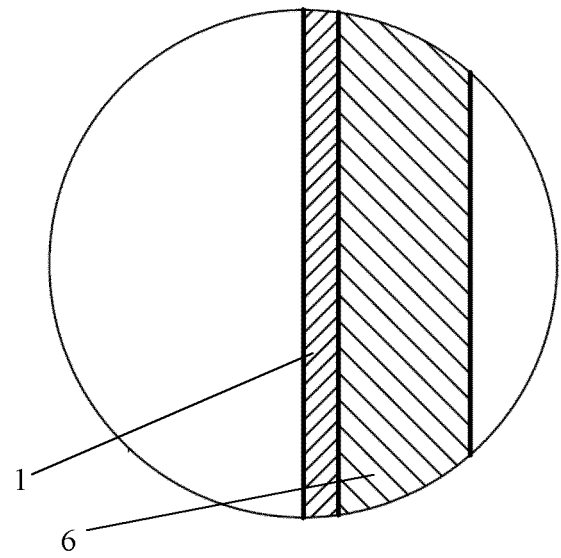


Fig. 2B

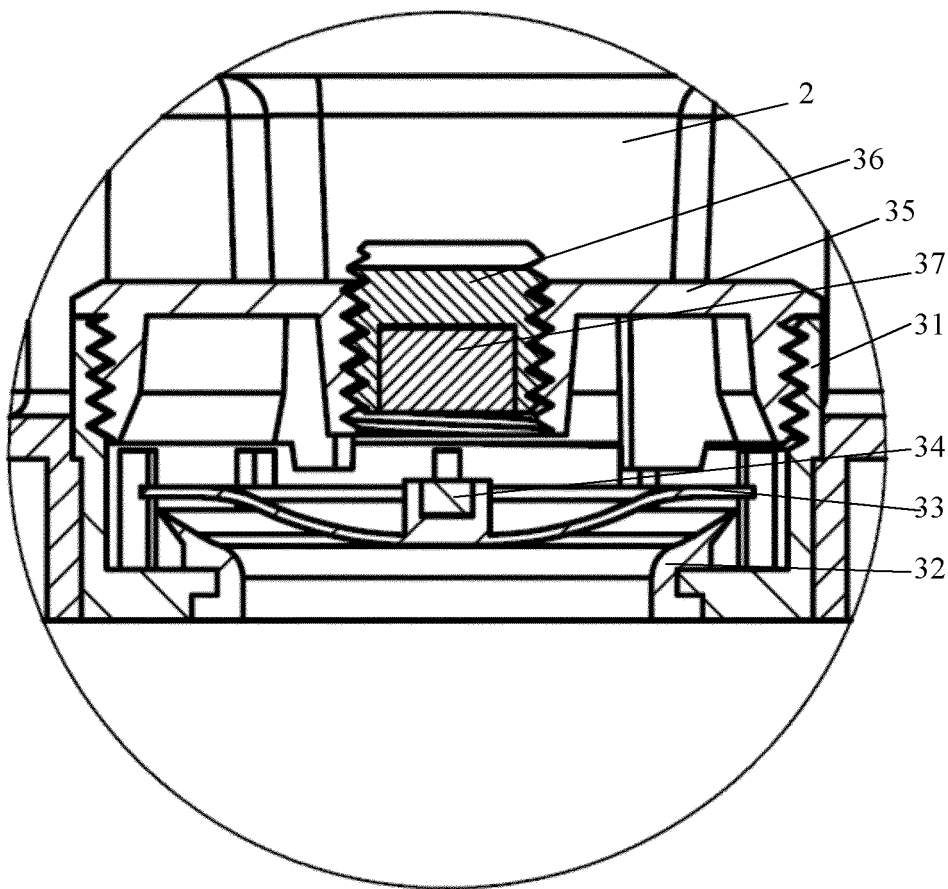


Fig. 2C

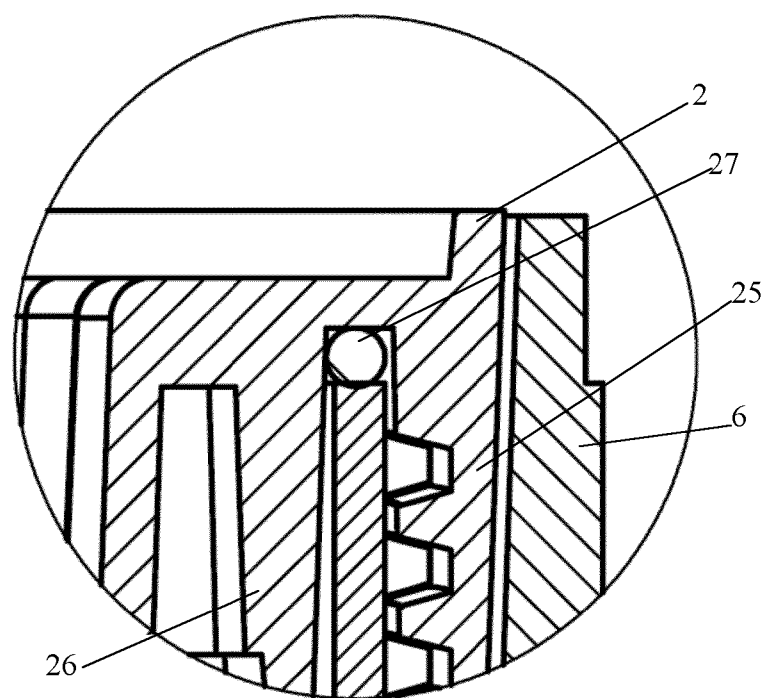


Fig. 3

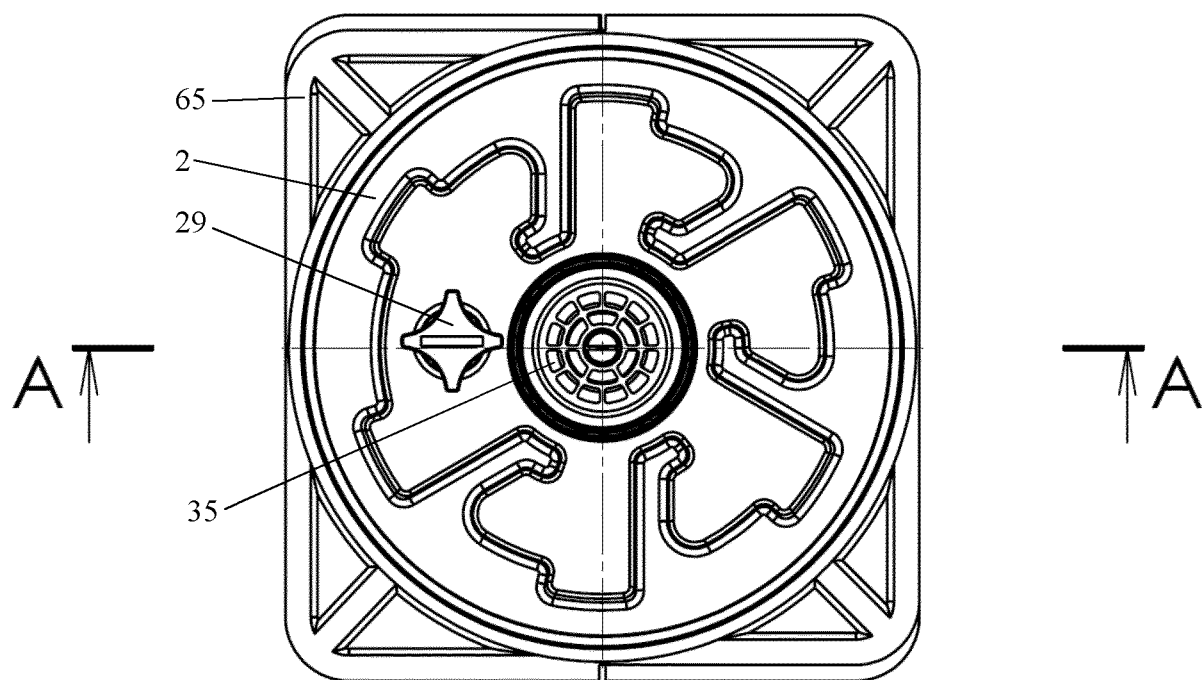


Fig. 4

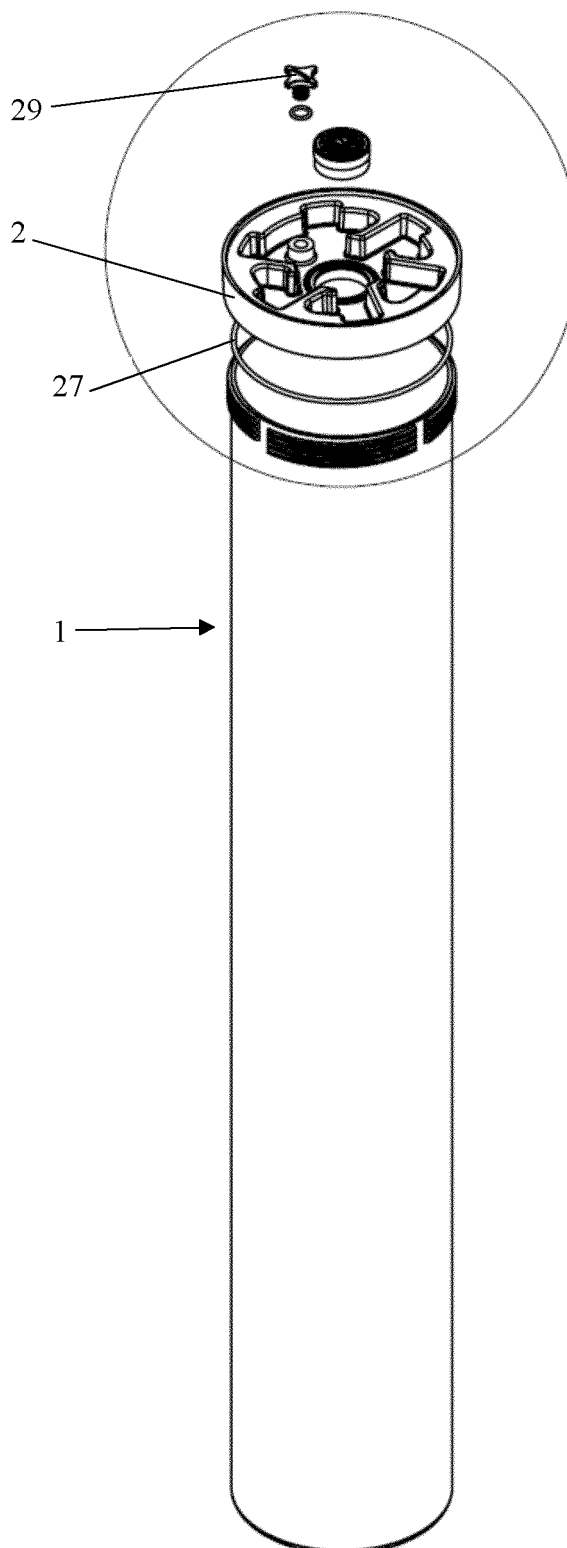


Fig. 4A

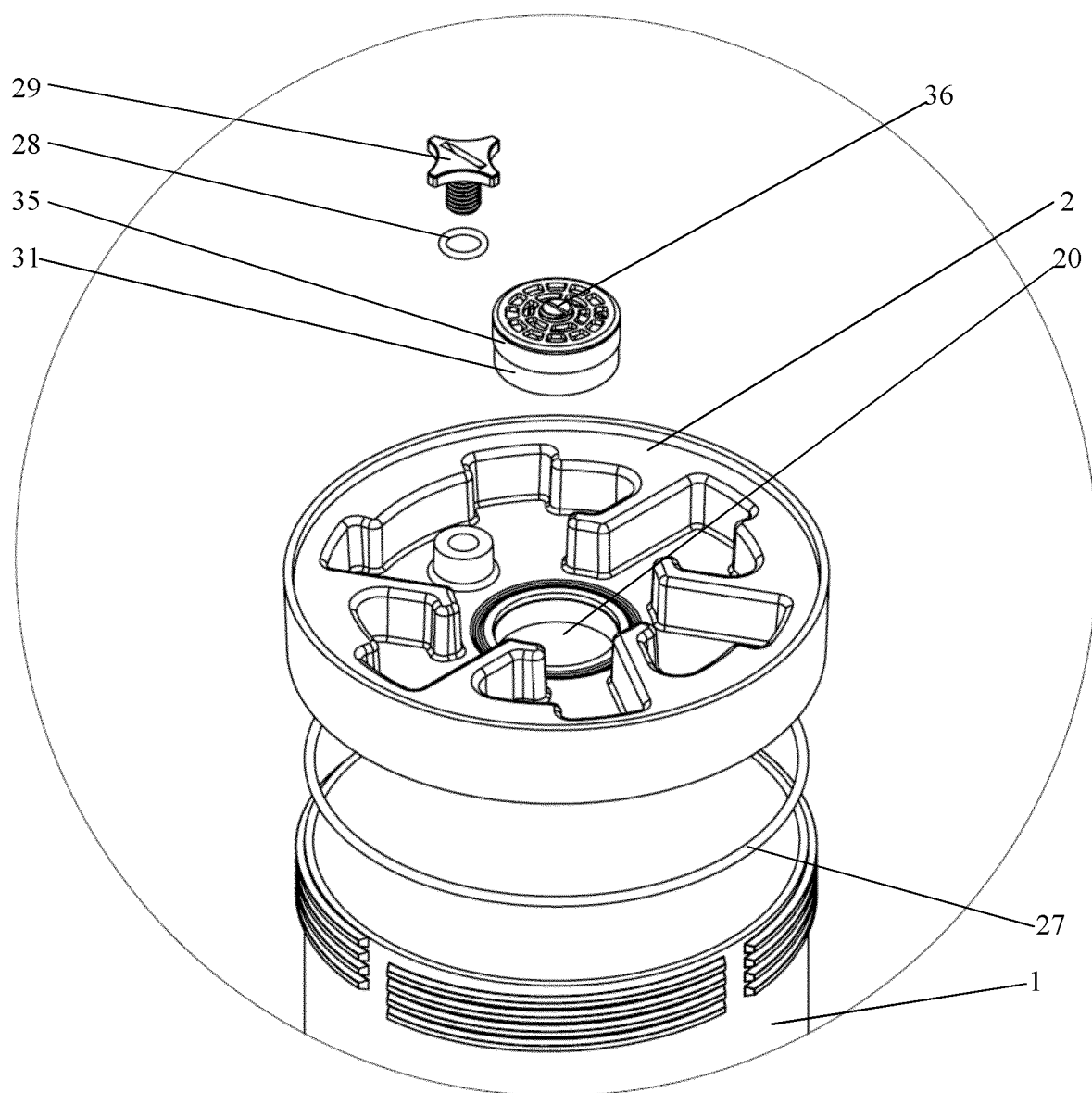


Fig. 5

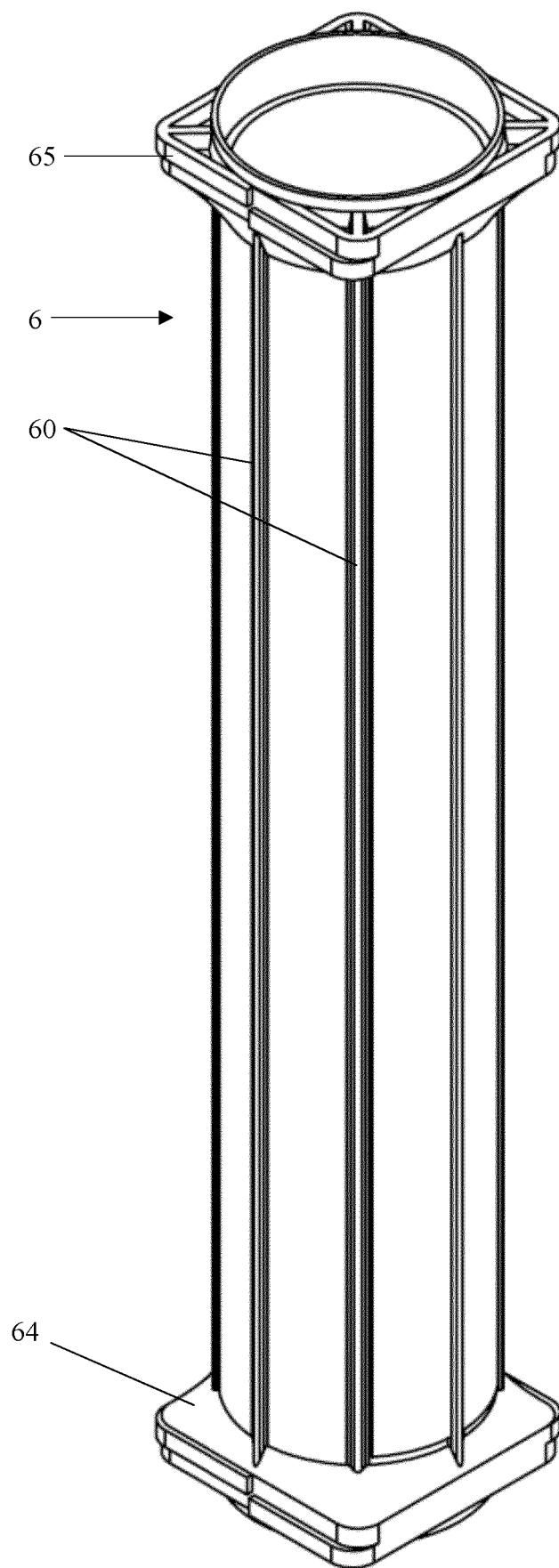


Fig. 6

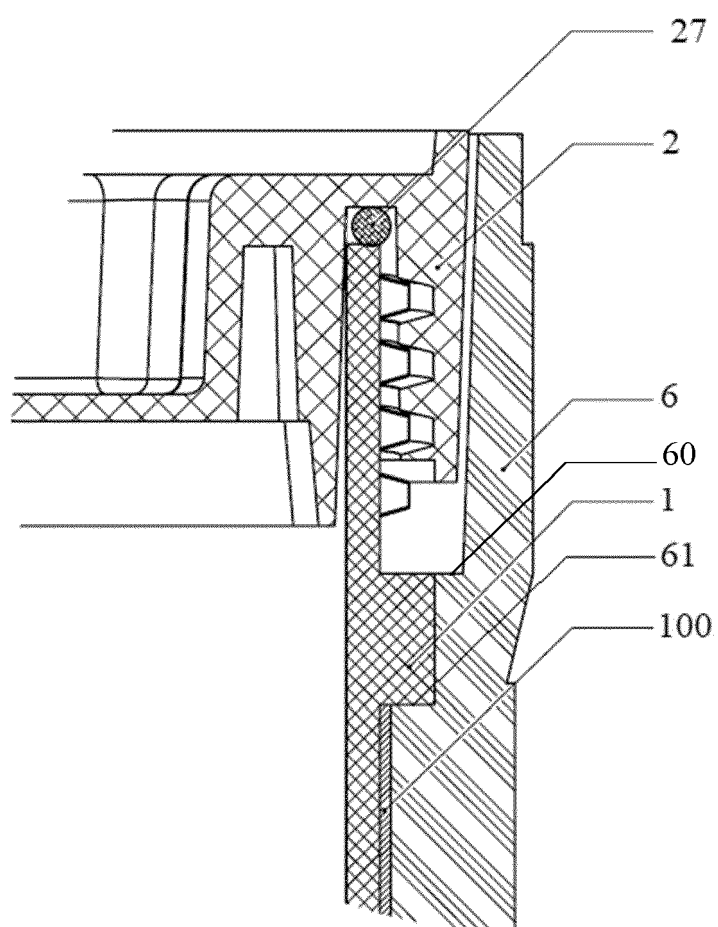


Fig. 7

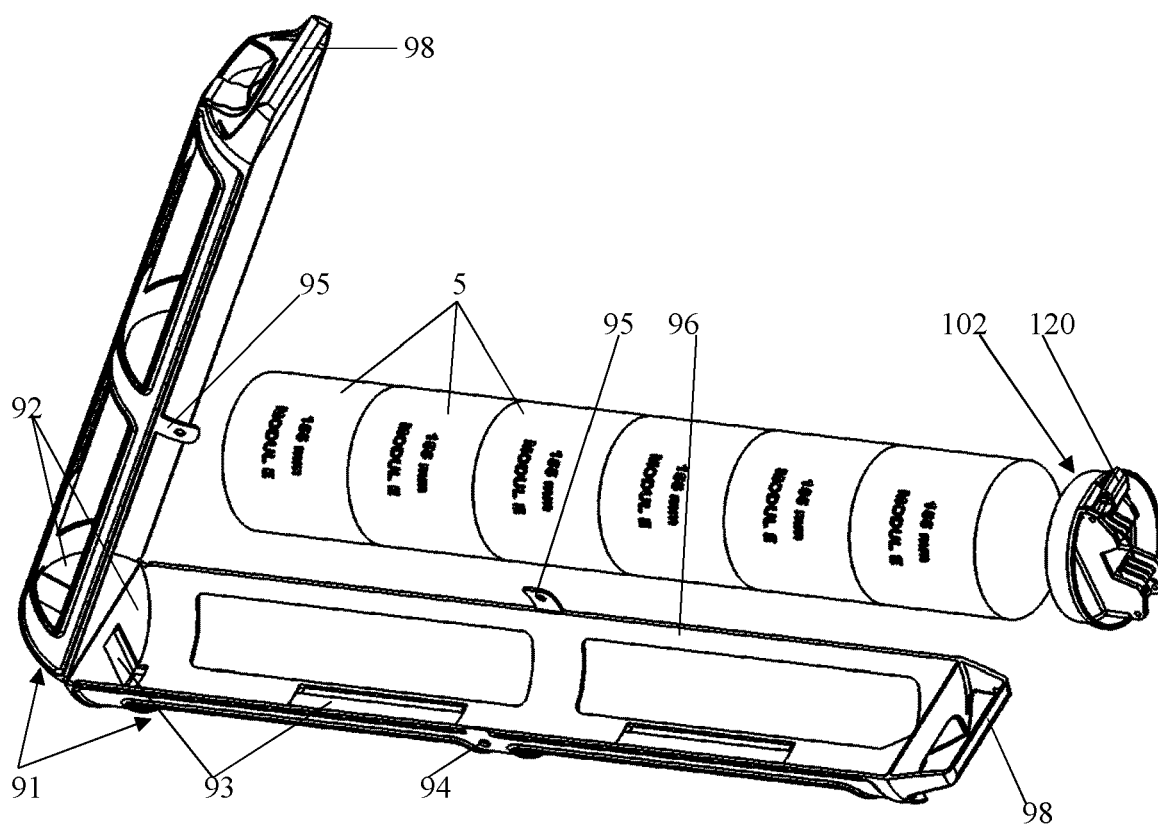


Fig. 8

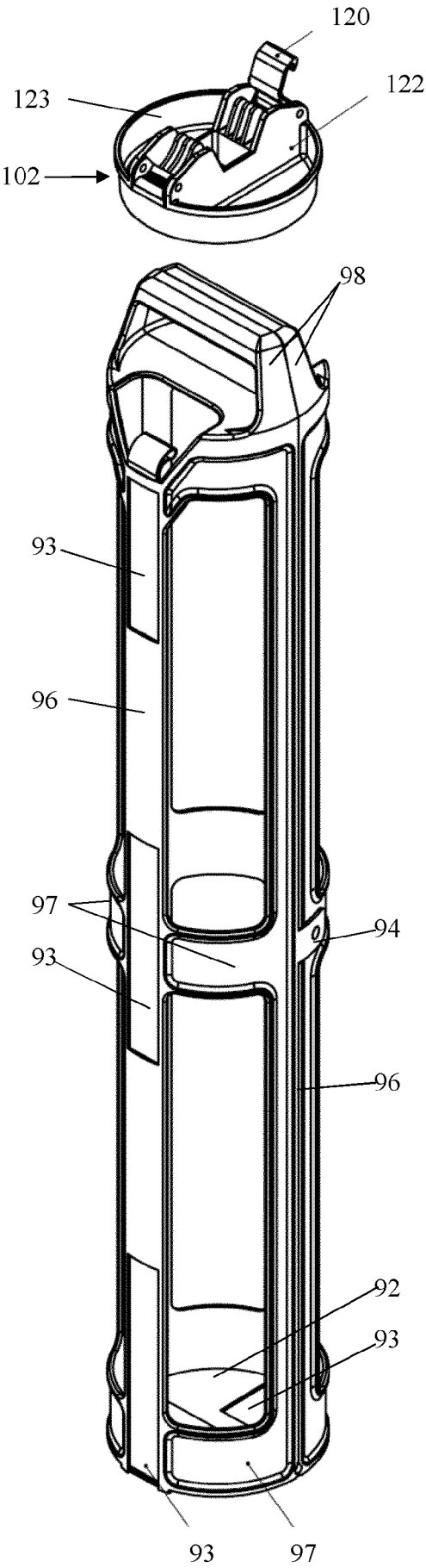


Fig. 9

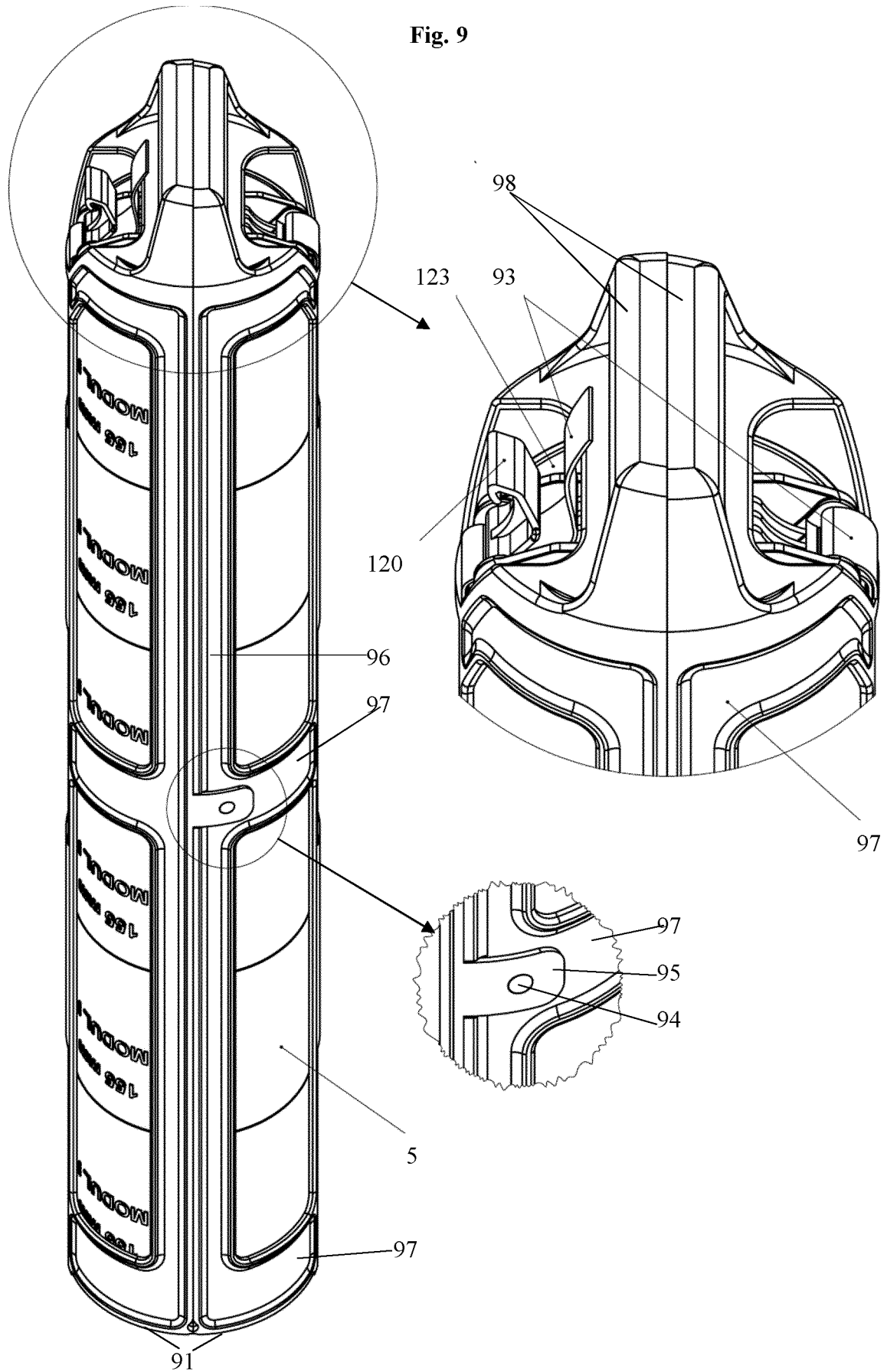
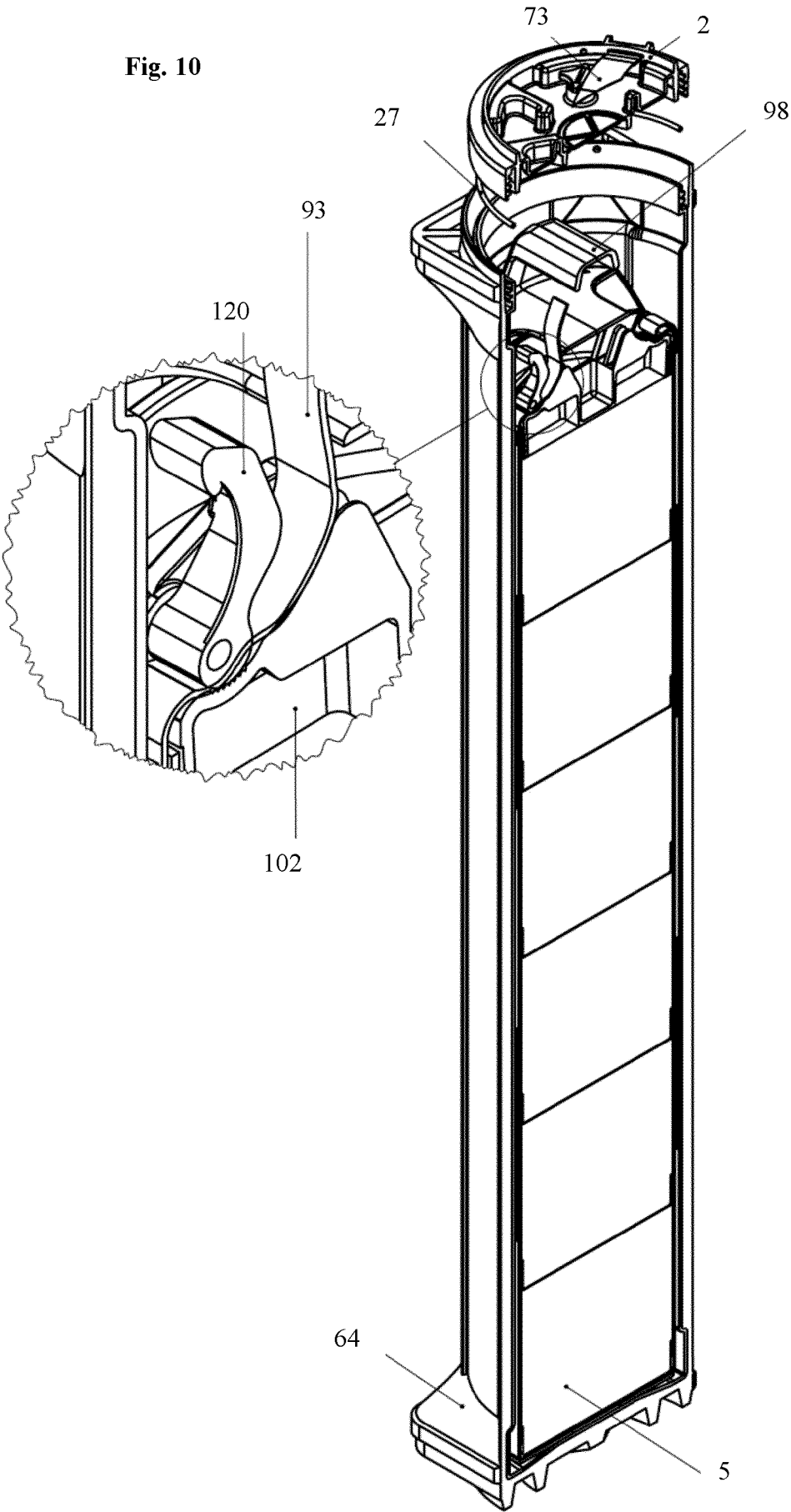


Fig. 10





EUROPEAN SEARCH REPORT

Application Number

EP 24 18 7666

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Y	* figures 1-3 *	4, 10, 11, 15	F42B39/20 F42B39/22
A	* paragraphs [0024] - [0028] * * paragraphs [0035] - [0043] * * paragraphs [0048] - [0049] *	2, 3, 8, 9, 12 - 14	F42B39/24 F42B39/26
Y	IT 2018 0001 0871 A1 (SMARTEK S R L [IT]) 6 June 2020 (2020-06-06) * claim 1; figure 1 *	4	
Y	GB 2 573 624 A (TIAG IND [FR]) 13 November 2019 (2019-11-13) * figures 2-5 * * page 5, paragraph 9 - page 6, paragraph 5 * * page 8, last line - page 9, line 1 * * page 9, paragraph 4 *	10, 11, 15	
A	KR 101 355 169 B1 (MICO C & C [KR]) 28 January 2014 (2014-01-28) * abstract; claims 1,2; figure 1 *	2, 3	TECHNICAL FIELDS SEARCHED (IPC) F42B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 31 October 2024	Examiner Schwingel, Dirk
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31-10-2024

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