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(54) **HIGH-VOLTAGE TANK**

(57) Provided is a high-voltage tank (100) for accommodating electrical components with liquid filling, comprising a first housing part (110), at least partially comprising a metal material and having a U-shape, a second housing part (120), made from a sheet material and hav-

ing a number of angulations forming a U-shape which is complement to the U-shape of the first housing part, and a sealing member (130), disposed at a joint portion between the first housing part (110) and the second housing part (120).

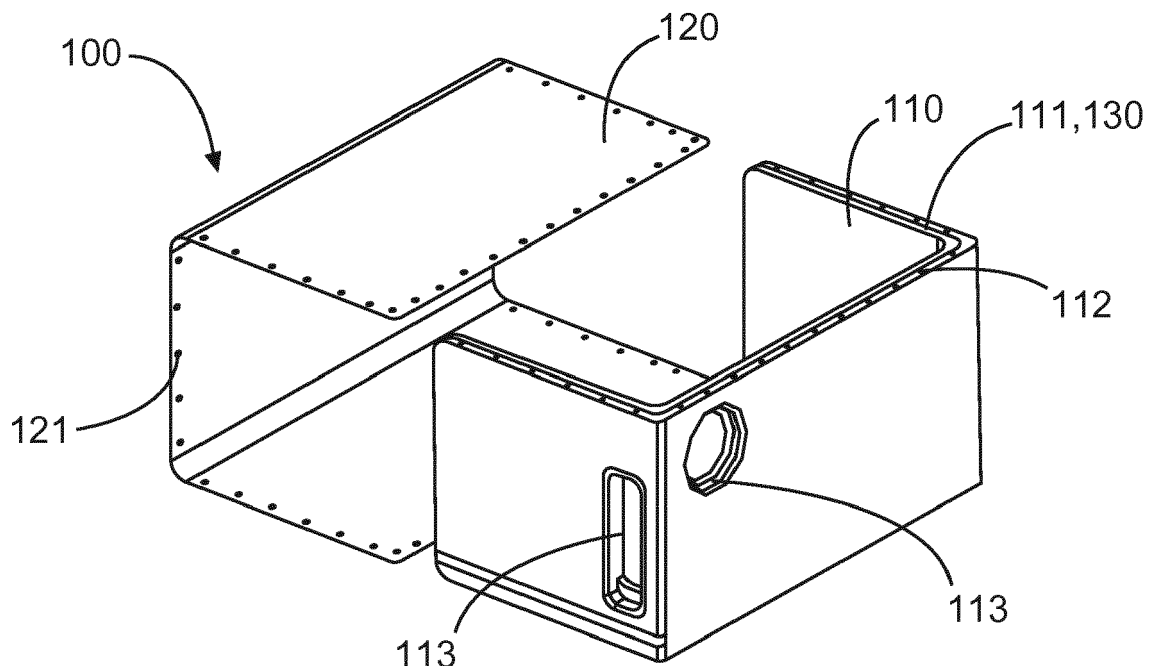


FIG. 1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a high-voltage tank. In particular, the invention relates a high-voltage tank, particularly configured for accommodating electrical components with liquid filling when in use. Further, the invention relates to using such a high-voltage tank in medical appliances, and to a method of manufacturing a high-voltage tank for accommodating electrical components.

BACKGROUND OF THE INVENTION

[0002] High-voltage systems may be used in different industrial or scientific applications, where a voltage above a related threshold is needed. By way of example, x-ray devices, computed tomography devices, or the like, are applicable in industrial imaging and testing, medical imaging and diagnosis, general radiography, or the like, where high-voltage is used for generating the radiation by means of acceleration of particles. An acceleration voltage, for example, may typically be in a high-voltage range.

[0003] Such a high-voltage system may comprise one or more high-voltage, electrical components which, for example, can be configured to transform, amplify, rectify, or filter etc. the main voltage, which may be taken from e.g. power line, to output suitable high-voltage.

[0004] At least in some applications or voltage ranges used, high-voltage components of a high-voltage system, such as generators, transformers, or the like, maybe installed in a high-voltage tank. Therein, the high-voltage components may be surrounded by a liquid filling, such as an oil, a coolant, etc., for cooling and/or electrically isolating. Such a tank may be sealed so as to prevent the liquid from leaking out. Commonly, high-voltage tanks consist of a metal material, manufactured either by deep drawing or by welding or by casting. Those high-voltage tanks may have in common that one part of the tank is a closed container with five closed sides and an opening which can be closed with a lid. Thereby, usually the lid is used for feeding through cables etc. to connect the high-voltage components installed inside the high-voltage tank with the outer surroundings. Further, those high-voltage tanks may have in common that their manufacturing is complex and costly. Also, the overall design of the tank may lack flexibility as, for example, the lid is to be positioned in such a way that feeding-through of components and/or mounting, fixing etc. of the whole high-voltage tank is possible at all, or a side surface has only a small available surface area.

SUMMARY OF THE INVENTION

[0005] There may, therefore, be a need to improve providing a high-voltage tank, and in particular in terms of

overall design. The object of the present invention is solved by the subject-matter of the appended independent claims, wherein further embodiments are incorporated in the dependent claims.

[0006] According to a first aspect, there is provided a high-voltage tank for accommodating electrical components with liquid filling. The high-voltage tank comprises:

- a first housing part, at least partially comprising a metal material and having a U-shape or V-shape,
- a second housing part, made from a sheet material and having a number of angulations forming a U-shape or V-shape which is complement to the U-shape or V-shape of the first housing part, and
- a sealing member, disposed at a joint portion between the first housing part and the second housing part.

[0007] The provided high-voltage tank may be applicable in different industrial, medical or scientific applications, where electrical components related to high-voltages as defined below are used. By way of example, it may be used with x-ray devices, computed tomography devices, or the like, which may be applicable in industrial imaging and testing, medical applications, such as medical imaging and diagnosis, general radiography, or the like.

[0008] The high-voltage tank is configured to be partly or fully filled with a liquid, which may be any liquid suitable for cooling and/or electrical insulation. For example, the liquid maybe oil-based. For this purpose, the high-voltage tank is configured to be at least substantially liquid-tight, in some embodiments even air-tight.

[0009] The first housing part may be formed from a metal material or may be formed from a plastics material and coated with a metal material, so that it may be at least partially comprise a metal material.

[0010] The second housing part may, from a functional perspective, optionally be referred to as a lid, which may be adapted to close the open sides of the first housing part.

[0011] The electrical components to be accommodated may comprise one or more high-voltage components adapted to, for example, generate, transmit and/or convert electrical voltage, AC and/or DC, wherein at least in the overall system a high-voltage as defined below may be measurable during use.

[0012] As used herein, the term high-voltage may generally relate to voltages and/or voltage ranges above a threshold, wherein the term high-voltage may also include extra-high voltages. More generally, the term high-voltage may relate to electrical energy at said voltages that is high enough to inflict harm on living organisms. Voltages below said threshold may be referred to as low-voltage, extra-low voltage, or the like, which are excluded from the term high-voltage as used herein. The threshold may at least depend on the field of application, wherein, in building wiring and in safety of electrical apparatus,

exemplary thresholds may be set at about 1000 V (Volt) for AC and about 1500 V for DC, in automotive engineering between about 30 to 1000 V for AC and between about 60 to 1500 V for DC, etc. By way of example, voltages used in electric power transmission engineering, in electronics systems, or accelerating voltages, such as used in e.g. scientific and/or medical applications, may be in the range of Kilovolts (kV), which is above each of the above voltage or threshold classifications, and therefore may be regarded as high-voltages. Of course, in some applications or specific regions there may be other or shifted thresholds defined, wherein at least the general definition of the term high-voltage, according to which high-voltage relates to electrical energy high enough to inflict harm on living organisms, still applies. Accordingly, a given voltage of a specific application may at least be determined as a high-voltage based on considering whether or not the electrical energy at that given voltage is high enough to inflict harm on living organisms and/or whether or not any one of the above exemplary voltage or thresholds classification is met.

[0013] As used herein, a U-shape may comprise a number of angulations, wherein two or more inner surfaces may face each other or may be parallel to each other. In at least some embodiments, the U-shape may also comprise a slight V-shape.

[0014] Further, as used herein, the term sheet material may be related to a thin, flat element, which may be made from a suitable metal to form a sheet metal, a plastics material, or the like. If a plastics material is used, a metal coating may be provided at least partially. If a sheet metal is used, the U-shape may be formed by bending or the like.

[0015] Thus, the provided high-voltage tank may be improved in terms of design complexity, costs, and/or design flexibility. For example, the provided high-voltage tank may reduce the number of rather cost driving parts of the housing from at least three, such as a container, a lid and a cooling device, such as a fan, to only one, i.e. said first housing part. Thereby, the first housing part may be manufactured by an extrusion process or the like, or if a plastics material is used, by injection molding, which may be less complex, and possibly less costly, than deep drawing, welding, or casting. Further, for example, said first housing part may allow for integrating, by e.g. forming it in one-piece, one or more feed-through and further mechanical structures, such as a mounting point, a fluid filling port, etc., on three walls and/or outer surfaces instead of one, i.e. the lid, which improves flexibility in the overall design. Also, it may allow a more compact mechanical setup.

[0016] According to an embodiment, the first housing part may form a first part of the tank, wherein a form of the overall tank may be selected from: a cuboid, a cube, or a truncated pyramid. Preferably, the first housing part may form a first half of a cuboid, the first housing part defining three closed side walls and/or three adjacent side walls of the tank.

[0017] Thus, at least three sides may serve for positioning mechanical elements, such as one or more feed-through, one or more mounting points, one or more fluid filling ports etc.

[0018] In an embodiment, the second housing part may form a first part of the tank, wherein a form of the tank may be selected from: a cuboid, a cube, or a truncated pyramid. Preferably, the second housing part may form a second half of a cuboid, the second housing part defining three closed side walls and/or three adjacent side walls of the tank.

[0019] Thus, at least three sides may serve for positioning mechanical elements, such as one or more feed-through, one or more mounting points, one or more fluid filling ports, etc.

[0020] According to an embodiment, a wall thickness of the first housing part may be greater than a wall thickness of the second housing part.

[0021] The different wall thicknesses may be provided, for example, by using different materials for manufacturing of the first and second housing parts, or by using different manufacturing processes, such as extrusion for the one part and bending for the other part, etc.

[0022] Thus, complexity of manufacturing and/or design may be adjusted for each one of the first and second housing part.

[0023] In an embodiment, the metal of the first housing part may be aluminium or an aluminium alloy.

[0024] Thus, the first housing part may be manufactured particularly easily, by e.g. an extrusion process, and/or may particularly be easily subsequently machined.

[0025] According to an embodiment, the first housing part may comprise a heat sink formed on an outer side thereof.

[0026] The heat sink may generally be configured to increase the surface area of one or more side walls of the first housing part. It may particularly be configured to increase the rate of heat transfer to the environment of the high-voltage tank by increasing convection, wherein conduction and/or radiation may be also be increased.

[0027] Thus, heat transfer from the high-voltage tank to its environment may be improved. In at least applications, a fan or other engine-driven heat transfer device may therefore be omitted.

[0028] In an embodiment, the heat sink may comprise one or more, preferably a plurality, of cooling fins extending from an outer side wall of the first housing part.

[0029] The heat fins may, for example, be manufactured by preferably an extrusion process, wherein other processes, such as machining, may also be conceivable.

[0030] Thus, heat transfer from the high-voltage tank to its environment may be improved, while manufacturing in terms of complexity and/or costs may also be improved.

[0031] According to an embodiment, the first housing part may comprise at least one groove adapted to at least partially seat the sealing member.

[0032] The groove may be formed by e.g. machining or another suitable manufacturing method.

[0033] Thus, the high-voltage tank may be formed particularly compact, while providing improved fluid-tightness.

[0034] In an embodiment, the groove may be disposed at a face, which may also be referred to as an outer face running around the U-shaped first housing part and/or may be referred to as a front surface or end surface, of a wall of the first housing part.

[0035] In other words, the groove may be disposed on a narrow side of the first housing part.

[0036] Thus, the high-voltage tank may be formed particularly compact, while providing improved fluid-tightness.

[0037] According to an embodiment, one or more walls of the first housing part may comprise at least one feed-through connecting an inner side of the tank to its external surroundings.

[0038] The feed-through may be configured to be at least fluidically sealed, by e.g. providing a suitable sealing member. The term feed-through may also include a fluid filling port and/or a deaeration port.

[0039] Thus, depending on e.g. the specific application, the feed-through may be disposed freely on any one of the walls, allowing a wide variety of different applications and overall design of the high-voltage tank.

[0040] In an embodiment, the joint portion may comprise, on a first housing side, a plurality of screw holes disposed at a face of a wall of the first housing part, the screw holes arranged on an outer side of the sealing member, and, on a second housing side, a plurality of through holes.

[0041] Thus, liquid density on the one hand and a possibility to reopen the high-voltage tank on the other hand may be provided. If reopening is rather negligible, in some embodiments, the joint portion may also be configured for an adhesive, welding, or the like.

[0042] A second aspect relates to the use of a high-voltage tank, particularly of any one of the embodiments according of the first aspect, to accommodate one or more high-voltage components configured for medical appliances, wherein, in use, the tank is at least partially filled with a liquid at least partially surrounding said high-voltage components.

[0043] By way of example, the medical appliance may be an x-ray device, a computed tomography device, or the like. The high-voltage components may be configured to, for example, generate, transmit and/or convert electrical voltage, AC and/or DC.

[0044] Thus, the medical appliance using the provided high-voltage tank may be particularly flexible in terms of its overall design. Further, it may be formed particularly compact. As the high-voltage tank may be manufactured at low cost, the overall costs for providing the medical appliance may be low.

[0045] A third aspect provides a method of manufacturing a high-voltage tank for accommodating electrical

components. The method comprises the steps of:

- extruding, a first housing part, the first housing part having a U-shape,
- 5 - providing a second housing part, the second housing part is made from a sheet material and formed to have a number of angulations forming a U-shape which is complement to the U-shape of the first housing part, and
- 10 - disposing a sealing member at a joint portion between the first housing part and the first housing part.

[0046] The step of extruding may be performed by using a suitable extrusion die. The step of providing may also comprise optional manufacturing steps, depending on e.g. the material used for forming the second housing part. If a plastics material with a metal coating is used, at least an injection moulding tool and/or a tool for applying the metal coating may be used.

20 **[0047]** The first housing part may be formed from a metal material by using a suitable extrusion process. Thereby, the U-shape may be directly formed during extrusion, so that, at least in terms of the U-shape, substantially no further processing steps are necessary. Subsequent to extruding the basic part, the joint portion may be formed and/or prepared by e.g. machining or the like. Optionally, one or more feed-through may be provided subsequently to the extrusion process.

25 **[0048]** Thus, the provided method allows for reducing complexity of manufacturing the high-voltage tank. Further, one or more feed-through may be freely positioned on different side walls of the first housing part, so that the overall design of the high-voltage tank is particularly flexible.

30 **[0049]** According to an embodiment, providing the second housing part may further comprise bending of the sheet material into the U-shape.

[0050] The second housing part may be a sheet metal, which may be made from steel or an alloy therefrom, aluminium or an alloy therefrom, or another suitable metal material. Thus, complexity of manufacturing may further be reduced as bending is a rather easily controllable process.

35 **[0051]** In an embodiment, extruding the first housing part may further comprise extruding a plurality of cooling fins extending at least one outer side wall of the first housing part.

[0052] In other words, the cooling fins and the at least one outer side wall may be formed one-piece, wherein at least a similar or even the same manufacturing process may be used. The cooling fins may be formed on only a portion of the outer wall to leave a suitable surface area to arrange the feed-through.

40 **[0053]** Thus, complexity of manufacturing may further be reduced.

[0054] It should be noted that the above embodiments may be combined with each other irrespective of the aspect involved. Accordingly, the method may be combined

with structural features and, likewise, the high-voltage tank maybe combined with features described above with regard to the method.

[0055] These and other aspects of the present invention will become apparent from and elucidated with reference to the embodiments described hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0056] Exemplary embodiments of the invention will be described in the following drawings.

Fig 1 shows in a schematic perspective view a high-voltage tank according to an embodiment, wherein for better illustration a first housing part and a second housing part a separated from each other.

Fig. 2 shows in a schematic perspective view the high-voltage tank of Fig. 1 in an assembled condition.

Fig. 3 shows in a schematic perspective view a high-voltage tank according to an embodiment, wherein for better illustration a first housing part and a second housing part a separated from each other.

Fig. 4 shows in a schematic perspective view the high-voltage tank of Fig. 3 in an assembled condition.

Fig. 5 shows in a flow chart a method of a high-voltage tank for accommodating electrical components according to an embodiment.

DETAILED DESCRIPTION OF EMBODIMENTS

[0057] Fig. 1 shows in a perspective view a high-voltage tank 100 according to an embodiment. High-voltage tank 100 may be used to accommodate electrical, high-voltage components (not shown) adapted, for example, to generate, transmit and/or convert electrical voltage. An exemplary use of high-voltage tank 100 is in a medical appliance (not shown), such as a radiation device, wherein, in use, high-voltage tank 100 is at least partially filled with a liquid at least partially surrounding said high-voltage components. Accordingly, high-voltage tank 100 may at least substantially be fluid-tight when in use.

[0058] For better illustration, Fig. 1 shows high-voltage tank 100 in a semi-assembled condition. High-voltage tank 100 basically comprises a first housing part 110, a second housing part 120 and a sealing member 130.

[0059] First housing part 110 has a U-shape with three sides, each of which form a side wall of high-voltage tank 100. As can be seen in Fig. 1 two sides, having a smaller surface area, face each other while the third side, having a larger surface area, extends transversely thereto. First housing part 110 is formed from a metal material, which, for example, may be aluminum or an aluminum alloy, and has a first wall thickness. For example, housing part 110 may be formed by extrusion. On each narrow side, wherein the term narrow side is used here to distinguish it from a surface side and a narrow side may also be referred to as a front surface, a groove 111 is formed, adapted to seat sealing member 130. To provide suffi-

cient sealing, groove 111 may be formed continuously. For example, groove 111 may be formed by machining. Further, each narrow side or front surface, respectively, comprises a number of screw holes 112, which, in relation to an inner side of high-voltage tank 100, are arranged on the outside next to groove 111. Screw holes 112 may be drilled and threaded. Like groove 111, screw holes 112 may be arranged continuously along the narrow sides or front surfaces. As exemplary shown in Fig. 1, first housing part 110 may have a number of feed-through 113, which may be freely arranged at one or more of the three sides, e.g. depending on the specific application of high-voltage tank 100. Feed-through 113 may, for example, be formed by machining, and may vary in size and shape, e.g. depending on form and size of a component (not shown) to be fed through it.

[0060] Further, second housing part 120 has a U-shape with three sides, each of which form a side wall of high-voltage tank 100. It is made from a sheet material, which, for example, may be a steel or steel alloy, and has a number of angulations to form the U-shape. For example, second housing part 120 maybe formed from a semi-finished sheet metal that is bent. As can be seen in Fig. 1, the shape of second housing part 120 is complement to the shape of housing part 110, wherein the size of both housing parts 110, 120 is matched to each other. Second housing part 120 has a second wall thickness that is less than the first wall thickness of first housing part 110. Further, second housing part 120 has a number of through holes 121, which are arranged to be at least substantially congruent with screw holes 112 of first housing part 110 when these housing parts 110, 120 are in contact (see e.g. Fig. 2). As can be derived from Fig. 1, when mounted together (see Fig. 2), second housing part 120 is in contact with the corresponding complementary front face of first housing part 110, each with an edge area of a flat side of second housing part 120. Second housing part 120 may then be attached to first housing part 110 with a number of screws 200 (see e.g. Fig. 2).

[0061] Still referring to Fig. 1, sealing member 130 is disposed and adapted to seal a joint between the first housing part 110 and the second housing part 120. In at least some embodiment, sealing member 130 maybe a mechanical gasket in a suitable shape and formed from a suitable material that is impermeable to fluid and/or gas. For example, sealing member 130 may have a round cross-section and may be configured to be seated in groove 111.

[0062] Fig. 2 shows high-voltage tank 100 of Fig. 1 in an assembled condition, in which first housing part 110 and second housing part 120 are mounted together and attached to each other by screws 200. In this regard, it is noted that mounting here means that the two housing parts 110, 120 are pushed together by a sliding movement. As can be seen in Fig. 1, each of the first housing part 110 and the second housing part 120 may form, for example, one part or half of a cuboid, a cube, a truncated pyramid etc., so that both together may form a cuboid, a

cube, a truncated pyramid, or the like, which is closed on all sides, e.g. six sides, except for the individual number of feed-through 113 arranged at first housing part 110. If feed-through 113 is ready for use (not shown), high-voltage tank 100 is at least substantially fluid-tight and may be filled with the suitable liquid.

[0063] Fig. 3 and Fig. 4 show a further embodiment of high-voltage tank 100, which essentially corresponds to the above, so that to avoid repetition, only the differences are described below.

[0064] Accordingly, first housing part 110 of high-voltage tank 100 according to Fig. 3 comprises a heat sink 114 arranged on an outer side of at least one of the three sides of first housing part 110. As exemplary shown in Fig. 3, in at least some embodiments, heat sink 114 may be arranged on each of the three sides of first housing part 110, depending on e.g. the specific application and the resulting heat to be transferred to the environment. For example, heat sink 114 may be formed in one-piece with the material of first housing part 110, e.g. by extrusion. Further, as exemplary shown in Fig. 3, heat sink 114 may be recessed in sections, e.g. in sections where a feed-through 113 is arranged or intended. In at least some embodiments, heat sink 114 may comprise a number of cooling fins 115. For example, these may extend from the respective outer surface to the outside. The cooling capacity of heat sink 114 can generally be adjusted by adjusting the area size, and in particular by adjusting the size of cooling fins 115.

[0065] In Fig. 4, high-voltage tank 100 of Fig. 3 is shown in an assembled condition, in which first housing part 110 and second housing part 120 are mounted together and attached to each other by screws 200.

[0066] With reference to Fig. 5, which shows a flow chart, a method of manufacturing high-voltage tank 100 will be described below.

[0067] In a step S1, the first housing part 110 is formed by extrusion, wherein first housing part 110 has the U-shape as described above. For this purpose, a suitable extrusion tool (not shown) may be used. Optionally, heat sink 114 and/or cooling fins 115 as described above may be formed in one-piece with housing part 110, wherein the same manufacturing process with an adjusted extrusion tool may be used. Optionally, one or more feed-through 113 may be formed into one or more of the side walls of first housing part 110. For example, these may be formed by machining. Optionally, in order to seal feed-through 113, a suitable sealing member (not shown) may be arranged thereto. For example, this sealing member may be a grommet, or the like. Further, optionally, a groove may be formed in feed-through 113. Further optionally, groove 111 may be formed at one or more front surfaces of first housing part 110.

[0068] In a step S2, second housing part 120 is provided, wherein second housing part 120 is made from a sheet material and has a number of angulations that form the U-shape which is complement to the U-shape of first housing part 110. Optionally, providing may further com-

prise bending of the sheet material into the U-shape. For this purpose, a suitable bending tool (not shown) may be used.

[0069] In a step S3, sealing member 130 is disposed at the joint portion between first housing part 110 and first housing part 120. Optionally, sealing member 130 may be seated into groove 111.

[0070] Optionally, one or more electrical and/or high-voltage components may be installed into a space formed inside the U-shaped housing parts 110, 120, wherein, further optionally, feed through 130 may be used to feed through e.g. one or more cables, conduits, or the like, which may be connect the components to further, e.g. electric and/or electronic, components of e.g. a medical appliance.

[0071] Optionally, first housing part 110 and second housing part 120 may be pushed together by a sliding movement, so that the respective U-shapes complement each other. Further optionally, screws 200 may be fastened.

[0072] For using high-voltage tank 100 in e.g. a medical appliance, such as a radiation device, e.g. an x-ray device, a suitable fluid may be filled into high-voltage tank 100.

[0073] It has to be noted that embodiments of the invention are described with reference to different subject matter. In particular, some embodiments are described with reference to method type claims whereas other embodiments are described with reference to the device type claims. However, a person skilled in the art will gather from the above and the following description that, unless otherwise notified, in addition to any combination of features belonging to one type of subject matter also any combination between features relating to different subject matters is considered to be disclosed with this application. However, all features can be combined providing synergetic effects that are more than the simple summation of the features.

[0074] While the invention has been illustrated and described in detail in the drawings and foregoing description, such illustration and description are to be considered illustrative or exemplary and not restrictive. The invention is not limited to the disclosed embodiments. Other variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing a claimed invention, from a study of the drawings, the disclosure, and the dependent claims.

[0075] In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality. A single processor or other unit may fulfill the functions of several items recited in the claims. The mere fact that certain measures are re-cited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage. Any reference signs in the claims should not be construed as limiting the scope.

LIST OF REFERENCE SIGNS:

[0076]

100	high-voltage tank	5
110	first housing part	
111	groove	
112	screw hole	
113	feed-through	
114	heat sink	10
115	cooling fin	
120	second housing part	
121	through hole	
130	sealing member	
200	screw	15

Claims

1. A high-voltage tank (100) for accommodating electrical components with liquid filling, comprising: 20

- a first housing part (110), at least partially comprising a metal material and having a U-shape or V-shape, 25
- a second housing part (120), made from a sheet material and having a number of angulations forming a U-shape or V-shape which is complement to the U-shape or V-shape of the first housing part, and 30
- a sealing member (130), disposed at a joint portion between the first housing part (110) and the second housing part (120).

20. The high-voltage tank of claim 1, wherein the first housing part (110) forms a first part of the tank (100), a form of the tank being selected from: a cuboid, a cube, or a truncated pyramid. 35

3. The high-voltage tank of claim 1 or 2, wherein the second housing part (120) forms a second part of the tank (100), a form of the tank being selected from: a cuboid, a cube, or a truncated pyramid. 40

4. The high-voltage tank of any one of the preceding claims, wherein a wall thickness of the first housing part (110) is greater than a wall thickness of the second housing part (120). 45

5. The high-voltage tank of any one of the preceding claims, wherein the metal of the first housing part (110) is aluminum or an aluminum alloy. 50

6. The high-voltage tank of any one of the preceding claims, wherein the first housing part (110) comprises a heat sink (114) formed on an outer side thereof. 55

7. The high-voltage tank of claim 6, wherein the heat

sink (114) comprises a plurality of cooling fins (115) extending from an outer side wall.

8. The high-voltage tank of any one of the preceding claims, wherein the first housing part (110) comprises a groove (111) adapted to at least partially seat the sealing member (130).

9. The high-voltage tank of claim 8, wherein the groove (111) is disposed at a face of a wall of the first housing part (110).

10. The high-voltage tank of any one of the preceding claims, wherein one or more walls of the first housing part (110) comprise at least one feed-through (113) connecting an inner side of the tank (110) to its external surroundings.

11. The high-voltage tank of any one of the preceding claims, wherein the joint portion comprises, on a first housing side, a plurality of screw holes (112) disposed at a face of a wall of the first housing part (110), the screw holes (112) arranged on an outer side relative to the sealing member (130), and, on a second housing side, a plurality of through holes (121).

12. The use of a high-voltage tank (100) of any one of the preceding claims to accommodate one or more high-voltage components configured for medical appliances, wherein, in use, the tank is at least partially filled with a liquid at least partially surrounding said high-voltage components.

13. A method of manufacturing a high-voltage tank (100) for accommodating electrical components, comprising:

- extruding a first housing part (110), the first housing part having a U-shape or V-shape,
- providing a second housing part (120), the second housing part is made from a sheet material and formed to have a number of angulations forming a U-shape or V-shape which is complement to the U-shape or V-shape of the first housing part, and
- disposing a sealing member (130) at a joint portion between the first housing part and the first housing part.

14. The method of claim 13, wherein providing the second housing part (120) further comprises bending of the sheet material into the U-shape.

15. The method of claim 13 or 14, wherein extruding the first housing part (110) further comprises extruding a plurality of cooling fins extending at an outer side wall of the first housing part.

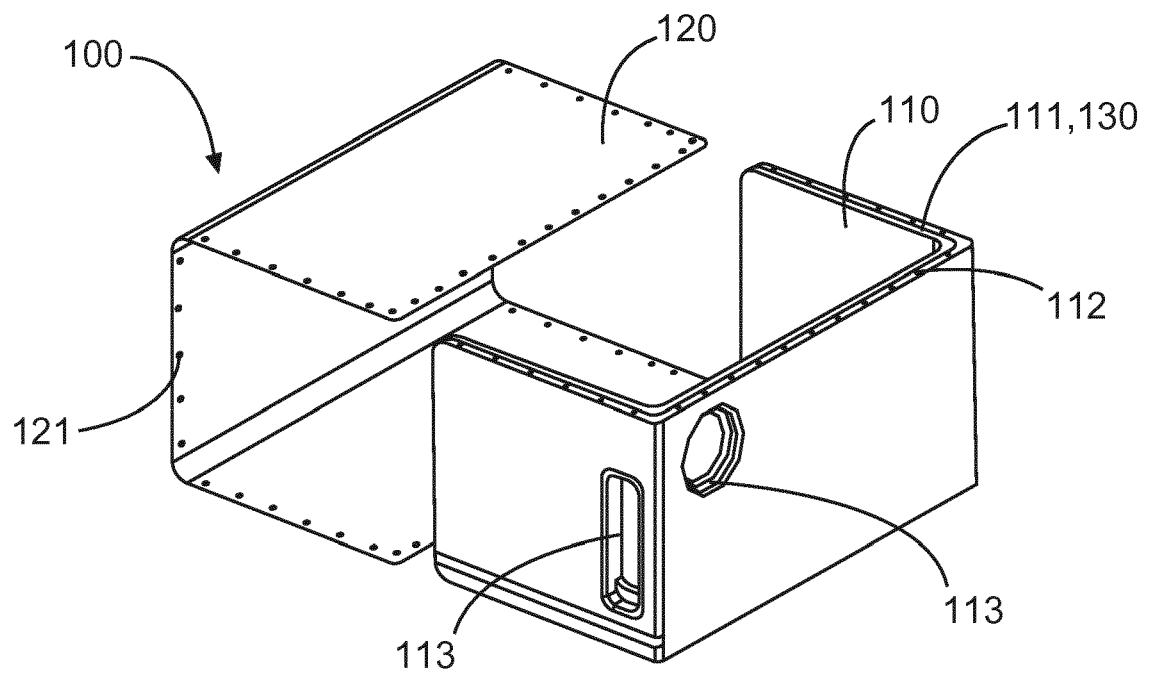


FIG. 1

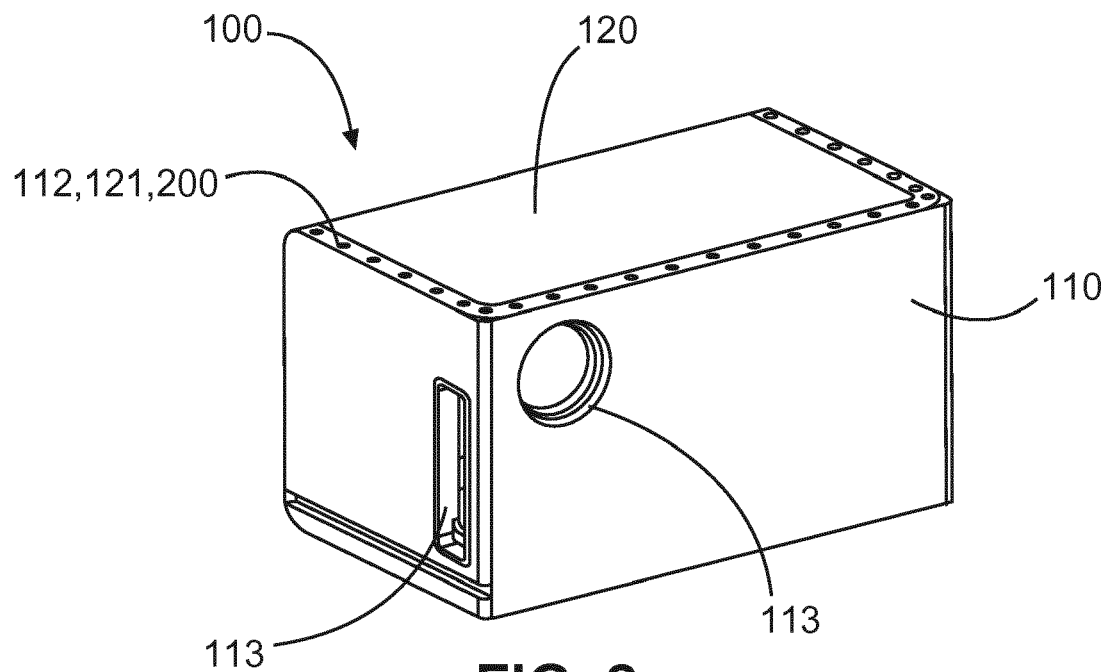


FIG. 2

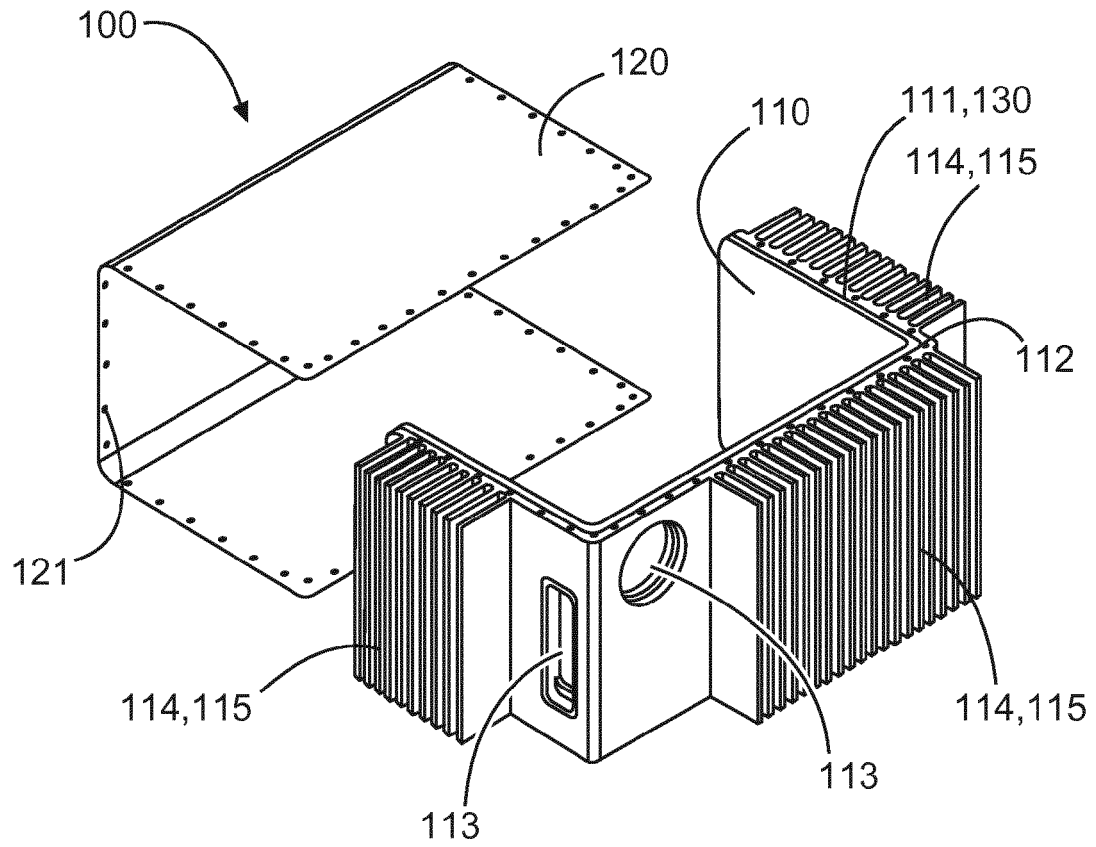


FIG. 3

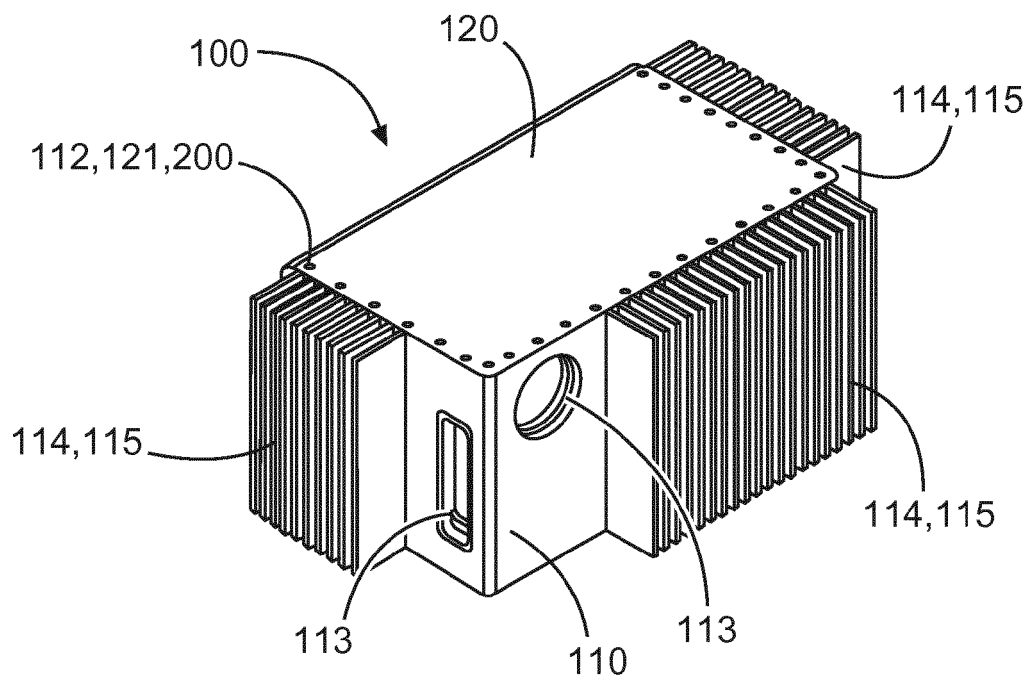


FIG. 4

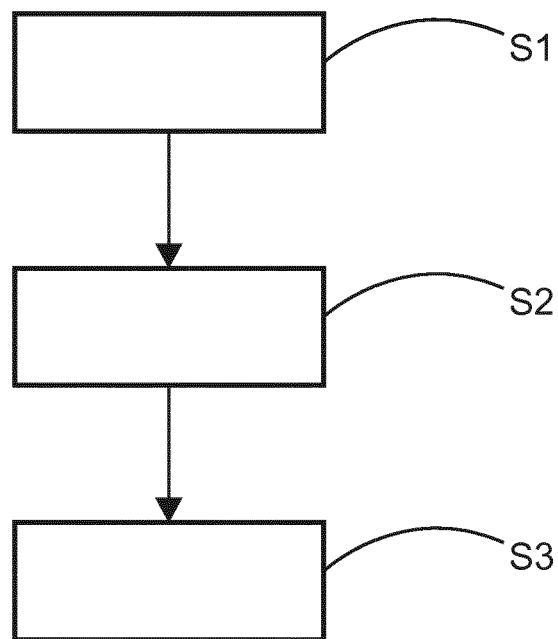


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP S60 90896 U (JAP APPLICANT) 21 June 1985 (1985-06-21) * the whole document * -----	1-7,10, 11,13-15	INV. H05G1/04 H05K7/20
			TECHNICAL FIELDS SEARCHED (IPC)
			H05K H01J H05G
1 The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 2 March 2020	Examiner Angloher, Godehard
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-7, 10, 11, 13-15

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



LACK OF UNITY OF INVENTION
SHEET B

Application Number

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-7, 10, 11, 13-15

A high voltage tank according to the subject-matter of claim 1;
additional subject-matter of claim 2:
the first housing part (110) forms a first part of the tank (100), a form of the tank being selected from: a cuboid, a cube, or a truncated pyramid;

1.1. claims: 3-7, 10, 11, 13-15

see the additional features of the corresponding claims ;

2. claims: 8, 9, 12

claims 8, 9:
A high voltage tank according to the subject-matter of e.g. claim 1;
special technical features common to claims 8 and 9:
the first housing part (110) comprises a groove (111) adapted to at least partially seat the sealing member (130);
claim 12:
The use of a high-voltage tank (100) of e.g. claim 1 to accommodate one or more high-voltage components configured for medical appliances, wherein, in use, the tank is at least partially filled with a liquid at least partially surrounding said high-voltage components.

Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

02-03-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP S6090896	U	21-06-1985	NONE

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82