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(54) **Container for a supply unit, oxygen supply device and passenger supply unit and system of an arrangement of a number of containers**

Behälter für eine Versorgungseinheit, Sauerstoffversorgungsvorrichtung und
Passagierversorgungseinheit und System einer Anordnung mehrerer Behälter

Réceptient pour unité d'alimentation, dispositif d'alimentation en oxygène et unité d'alimentation de
passagers et système d'agencement de plusieurs réceptients

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Description

[0001] The invention relates to a container for a supply unit, in particular an oxygen supply unit and/or a passenger supply unit (PSU), having a container well at least, wherein a container door can be pivotably joint at a container well's edge, in particular pivotable about a hinge at the container well's edge. Further the invention relates to an oxygen supply device having an oxygen supply unit stored in the container. Further the invention relates to a passenger supply unit (PSU) having a passenger appliance stored in the container. Further the invention relates to a system of an arrangement of a number of containers, each for a supply unit, in a ceiling-panel along an aircrafts cabin, in particular along an aircrafts cabin alley of seats, wherein each supply unit is stored in a container.

[0002] A passenger service unit as known in the state of the art are widely used in civil aircraft comprising for instance a reading light, a passenger or crew air or oxygen supply device, oxygen masks, warning lights and the like passenger appliances. In particular an oxygen supply unit usually is part of an oxygen supply device wherein the unit is stored in a container of the aforementioned kind. In some aircrafts one passenger service unit is provided for each seat of a passenger and crew member. In other aircrafts one single passenger service unit is provided for a number of the seats, for instance in a particular for a row of seats. A row usually is aligned crosswise to an alley of seats.

[0003] Containers of oxygen supply units of the aforementioned kind usually are arranged adjacent to each other, side by side, to allow an arrangement of a number of oxygen supply devices in a ceiling-panel along an aircrafts cabin, in particular along an aircrafts cabin alley of seats. Such oxygen supply devices are adapted to temporarily or continuously provide oxygen to a passenger or crew member of an aircraft. Various methods of generating oxygen are known; basically one is adapted for physically generating oxygen gas by means of an oxygen pressure cylinder and another one is adapted for chemically generating oxygen by means of a chemical oxygen generator or another one could be an OBOGS (on-board-oxygen-generating-system) or centralized Gaseous Oxygen Systems. Thereby a certain amount of air or continuous air flow comprising a sufficient or high concentration of oxygen can be provided to a passenger or crew member like for instance described in laid-open European patent application EP 2 168 635 A1 of the applicant.

[0004] A general desire associated with modern aircrafts is to provide an in general lightweight appliance which also holds in particular for the aforementioned container for an oxygen supply unit. Also efficient manufacturing and maintenance of the aircraft and in particular the safety relevant systems are desirable; however nevertheless a safety standard according to numeral regulations shall be met. In particular this holds for an aforementioned container for an oxygen supply unit which e.g. has to withstand safely relative high surface temperatures

when using a chemical oxygen generator for generating oxygen in the container. Further the container for an oxygen supply unit shall be resistant against an accumulation of electrical load on the container; this is to avoid in any case not allowable electrical discharges or the like which would endanger electrical safety systems in the aircraft. Thus the container must not be inflammable or meltable even upon extensive heat or flame exposure.

[0005] Nevertheless even in case of a chemical, electrical or heat impact or the like hazardous impact to the container a mechanical strength of the container shall be such that the container is able withstand stress and pressure be that it may from the surroundings of the container or from an aircrafts cabin construction. In EP 0 545 118 A1 a container made of aluminium sheet is described, wherein mechanical stability is achieved by numerous depressions from a container wall or the like. It is desirable to provide an improved adjustment of the mechanical stability of a container for an oxygen supply unit also considering the aforementioned demands and safety requirements of the container.

[0006] The document WO 97/43178 A1 relates to a personal service unit and system for generating and dispensing oxygen in an emergency case on board of an aircraft, wherein the housing is formed by compression moulding of a sheet or bulk moulding material. One preferred type of sheet moulding materials for use in compression moulding thereof is the type of sheet moulding components made ready for fabrication by combination of a thermosetting resin with a reinforcing fiber material; available in a rolled sheet form approximately 0,125 inches thick with a specific glass fiber content.

[0007] Accordingly, it is a major object of the present invention to provide a container for an oxygen supply unit which as such is improved in mechanical strength. Further it is an object of the invention to provide a mechanically strengthened container for an oxygen supply unit wherein nevertheless the container is resistant to hazardous impacts. Still further it is an object of the invention to provide a mechanically strengthened container for an oxygen supply unit resistant to hazardous impacts and which is nevertheless easy to manufacture; also easy maintenance or assembling in an aircrafts cabin is preferred. It is still further another object of the invention to provide a container which has sufficient mechanical strength when arranged adjacent to one or two further containers in a row of a number of containers for oxygen supply devices in a ceiling-panel along an aircrafts cabin.

[0008] As relates the container the object is achieved by a container of claim 1. In accordance with the invention the container has a container well wherein the container well at least consists of a sheet moulded compound material moulded from a composite of thermoset sheet material based on fiber-reinforced polymer matrices mainly.

[0009] The invention also leads to an oxygen supply device having an oxygen supply unit stored in a container according to the invention. The oxygen supply unit can

be based on oxygen pressure effect and thus has an oxygen pressure cylinder. Additionally or alternatively the oxygen supply unit can be based on chemical oxygen generation and thus has a chemical oxygen generator. In particular the combination comprises a chemical oxygen container combined with an oxygen pressure buffer and a downstream connected electronic or mechanical float regulator.

[0010] The invention also leads to a passenger supply unit (PSU) having one or more passenger appliances stored in a container according to the invention. Thus the inventive concept recognized, that in a first variant a passenger appliance and an oxygen supply unit can each be stored in a segregated configuration in a container according to the invention.

[0011] In a particular preferred development the invention also leads to a passenger supply device having a passenger appliance and an oxygen supply unit stored in a container according to the invention. In this second variant the inventive concept recognized, that a passenger appliance and an oxygen supply unit can be stored in an integrated configuration in one single container according to the invention.

[0012] The invention also leads to a system of an arrangement of a number of containers according to the inventive concept. In a preferred development the containers are arranged for respective support of each other at at least one of each of the containers well's edge.

[0013] In particular the system has an arrangement of a number of oxygen supply devices and/or a number of passenger supply units in a ceiling-panel along an aircrafts cabin wherein each device and/or unit is stored in a container according to the invention. Particular preferred the containers are arranged for respective support at the containers well's edge. In a particular preferred development an arrangement of containers for oxygen supply units can be adjacent to or combined with a panel or another arrangement of containers for passenger supply units.

[0014] In particular in an alternative the system has an arrangement of a number of passenger supply devices, wherein each supply device has a passenger appliance and an oxygen supply unit stored in a container according to the invention. In particular an arrangement is in a ceiling-panel along an aircrafts cabin, in particular along an aircrafts cabin alley of seats. The invention recognized that a sensitive weightening of the advantages and disadvantages for a container of an oxygen supply unit with regard to mechanical strength as well as further safety demands and resistance to heat, flammability, electricity discharge and other hazardous impacts begins with a careful selection of the material of the container. The invention on the one hand recognized that for instance aluminum or other metal based materials for providing the container has advantages with regard to mechanical strength and resistance to mechanical stress. However, in each case a metal material container, in particular also an aluminum container, can be electrically uploaded and

therefore endanger an electrical discharge during hazardous situations in an aircrafts cabin. Thus an aluminum container for an oxygen supply unit has to be grounded to an aircrafts construction for instance by bonding or the like contact methods. This leads to rather high maintenance and assembly costs in addition to the manufacturing costs for an aluminum container for an oxygen supply unit. On the other hand the invention recognized that plastic materials have severe disadvantages with regard to stability and mechanical stress. Also, as compared to an aluminum container, a plastic container can be of increased weight. In particular this holds true when a plastic container is to be supplemented to achieve a desired mechanical strength and resistance to hazardous impacts for instance by means of an increased wall thickness of the plastic container. These limiting conditions in mind the invention recognized that surprisingly the container well at least, in particular the container well and/or the container door, advantageously consists of a sheet-moulded compound material according to the invention were moulded from a composite of thermoset sheet material based on fiber-reinforced polymer matrices mainly.

[0015] By providing a sheet-moulded compound material for the container well at least, in particular the container well and/or the container door, the invention provides a good compromise between an advantageous solution for resisting mechanical strength on the one hand and an advantageous solution for resisting electrical uploads and/or inflammability or other hazardous impacts on the other hand. The invention recognized that sheet-moulded compound materials --like for instance based on polymer matrices selected from the group of polymer matrices selected from one or more of Bis-Maleimids (BMI), Epoxy (Epoxide), Phenolic (PF), Polyester (UP), Polyimide, Polyurethane (PUR) or Silicone or the like-- can be manufactured sufficiently lightweight by implementation of fibers and also can be reinforced due to the fibers. In a particular preferred development it has been recognized that an unsaturated polyester resin or an epoxy or phenolic resin system is particularly advantageous to meet the compromise between a good mechanical stress resistance and a resistance to inflammability and electrical discharge or other hazardous impacts.

[0016] In particular with regard to the system of an arrangement of a number of oxygen supply devices in a ceiling-panel along an aircrafts cabin the invention recognized that the inventive use of a sheet-moulded compound material for the container well and/or the container door has sufficient flexibility and forms a good basis to provide support regions of adjacent containers at the containers well's edge. The invention recognized that--whereas aluminum containers fulfill in particular side stability when arranged between adjacent containers for providing an arrangement of a number of oxygen supply devices nevertheless the same-- arrangements, with plastic containers is far away from providing sufficient side stability. In particular the invention recognized that even when a plastic container might be considered to be

as such stable; nevertheless in an arrangement of adjacent containers for providing an arrangement of a number of containers for oxygen supply devices a plastic container is endangered to collapse or being bent or deform when exposed to mechanical stress or pressure loads, in particular during an aforementioned hazardous impact in an aircraft's cabin.

[0017] Surprisingly, by using sheet-moulded compound material, the inventive concept allows for a container well's edge of sufficient support and stability between adjacent containers for supply units, in particular for oxygen supply units and/or panels of passenger supply units. Thus, in particular within a row arrangement of containers side by side for supply units (be that it may be for oxygen supply units or passenger supply units in a panel or another arrangement) along an aircrafts cabin alley of seats, when one container supports an adjacent container by contact the sheet-moulded compound material shows up to have particular advantageous features superior of those of aluminum and plastic materials, as such.

[0018] For each of the aforementioned features it is claimed independent protection independent from all features of this disclosure.

[0019] These and further developed configurations of the invention are further outlined in the dependent claims. Thereby the mentioned advantages of the proposed concept are even more improved. For each of the features of the dependent claims it is claimed independent protection independent from all features of this disclosure.

[0020] It turned out in an inventive development that the container well and/or the container wall can be moulded from the composite of thermoset sheet material based on fiber-reinforced polymer matrices mainly; for instance by deep-drawing moulding preferably. Nevertheless also compression moulding and/or injection moulding is possibly used for providing the container well and/or the container door from the composite material. In particular the moulding is assisted by a suitable thermoforming process of raised temperature according to the needs of the polymer matrix used.

[0021] Generally a sheet-moulded compound material can be provided by dispersing rather long length fibers (greater than one inch); e.g. of chopped glass fibers on a bath of polymer matrices of thermoset material like polyester resin or the like. Generally SMC is described in the standard as EN14598. The longer the fiber is in the sheet-moulded compound the better the result for the instant inventive concept turns out.

[0022] In a particular inventive embodiment the sheet-moulded compound comprises directed long fiber systems also known as C-SMC material for providing endless directed fibers. This kind of directional system having endless fibers can be provided as a mesh system like a woven or knitted system or the like In the abovementioned polymer matrix.

[0023] It turns out that in a particular inventive development the container well's edge is preferably integrally

moulded with the container well. Also, alternatively or additionally, a container door's edge is integrally moulded with the container door. In each case the edge moulded integrally with the body (of the container well and/or the container door) turns out to be particularly advantageous. The development has the advantage that a sufficient stress resistance is provided to the door and/or the container well by means of the integrally moulded edge. Additionally, particular advantageous, the opening function of the container, i. e. release of the container's door from the container's well, in an emergency situation turns out to function easy and safe even upon stress or pressure load on a container's side walls in an arrangement of a number of oxygen supply devices In the ceiling-panel along the aircrafts cabin.

[0024] In a particular preferred embodiment the container has a front, rear and side container wall and the container well's edge has a rear edge on a rear container wall and a front edge at the front container wall and a side edge at the side container wall. In particular the first side wall to a forward side adjacent container and/or a second side wall to a backward side adjacent container in an arrangement of adjacent containers have a side edge. At least the side edge is bead to form an edge bead. Thereby, in particular forward side and backward stress and pressure is safely released and a safe opening operation of the container door from the container well is guaranteed in an emergency situation. Unwanted jamming of door and well is avoided, even upon stress or pressure exposure.

[0025] In an inventive development the container has front, rear and side container walls with wall regions and transition regions there between wherein at least one wall and/or transition region has a reinforcing depressions, in particular on the front and rear container wall, in particular depressions extending into the container well's edge. It is advantageous to provide at least one wall and/or transition region with reinforcing depressions. When providing reinforcing depressions it turns out that depressions extending into the containers well's edge, in particular into the containers well's side edge are particular preferred.

[0026] Nevertheless particular advantageously it turns out that by using a sheet-moulded compound material of the concept of the invention at least one wall of the container well and/or container door can be formed to have a wall thickness of below 2 mm, preferably below 1 mm. This is particular preferred to further decrease the weight of the container. Thus in an inventive development all walls, that is the front rear and both side container walls have a wall thickness of below 2mm, preferably below 1 mm.

[0027] In an inventive development it turns out that the container well's edge has an edge material thickness and a container walls transition region has a transition region material thickness. The development provides that the edge material thickness and/or the transition region material thickness is at least partly larger than the wall thick-

ness; in particular at least partly than a thickness of 2mm preferably larger than a thickness of 1 mm. The development recognized that --by providing thicker container well's edge and/or container walls transition regions-- the stress and pressure resist of the container can be advantageously improved. Following the concept of this development, also the reinforcing depressions advantageously have a depression material thickness wherein the edge material thickness is a larger than the wall thickness.

[0028] In a particular preferred development for providing the aforementioned development the composite of thermoset sheet material based on fiber reinforced polymer matrices has large thickness regions and low thickness regions. The respective regions in the development are arranged such that for moulding a container wall's edge material thickness and/or a container wall's transition region material thickness and/or a reinforcing depression material thickness is thicker than the container wall's thickness, in particular thicker than 2 mm, preferably thicker than 1 mm.

[0029] The aforementioned concept of the development provides a particular preferred synergy of manufacturing process by using a preferred half product of SMC material variation in thickness of the regions.

[0030] For a more complete understanding of the invention, the invention will now be described in detail with reference to the accompanying drawing. The detailed description will illustrate and describe what is considered as a preferred embodiment of the invention. It should of course be understood that various modifications and changes in form or detail could readily be made without departing from the scope of the claims.

[0031] It is therefore intended that the invention may not be limited to the exact form and detail shown and described herein, nor to anything less than the whole of the invention disclosed herein and as claimed hereinafter. Further the features described in the description, the drawing and the claims disclosing the invention may be essential for the invention considered alone or in combination. In particular, any reference signs in the claims shall not be construed as limiting the scope of the invention. The wording "comprising" does not exclude other elements or steps. The wording "a" or "an" does exclude a plurality. The wording "a number of" items, comprises also the number one, i.e. a single item, and further numbers like two, three, four and so forth.

[0032] The drawing shows in:

Fig. 1 a particular preferred embodiment of a container for an oxygen supply unit having different thickness regions resulting from different thickness regions of the half product of sheet-moulded compound material.

Fig. 2 an example of an oxygen supply device having an oxygen supply unit and a container of Fig. 1.;

Fig. 3 a particular preferred embodiment of a system

of an arrangement of containers --here a number of oxygen supply devices-- in a ceiling-panel along an aircrafts cabin --here along an aircrafts cabin alley of seats-- wherein each oxygen supply unit is stored in a container of Fig. 1.

[0033] Fig. 1 shows a container 10 for an oxygen supply unit as shown in the system 20 of Fig. 2. In the system 20 an oxygen supply device having an oxygen supply unit 30 and the container 10 of Fig. 1 is provided. The oxygen supply unit 30 can be an oxygen pressure cylinder or a chemical oxygen generator. Also the oxygen supply unit 30 can be a chemical oxygen container combined with an oxygen pressure buffer and a downstream connected electronic or mechanical flow regulator. The container 10 of Fig. 1 has a container well 1 and a container door 2 and a hinge profile 3 which on the one hand is adapted to keep the door on top of the well during usual flight conditions and on the other hand for safe opening during hazardous situations when needed.

[0034] Also, according to Fig. 3 the hinge profile 3 is adapted for assembling the container 10 into an arrangement 100 of a number of containers 10.i --this means containers 10.1, 10.2 and so forth until 10.n according to a predetermined number n-- for a ceiling-panel along an aircrafts cabin. Thus the arrangement 100 of containers 10.1 to 10.n is for providing an arrangement of a number of oxygen supply devices like the one shown as system 20 in Fig. 2 along an aircrafts cabin alley of seats. As shown by the hinge bar 11 --for cooperation with hinge openings 12 and hinge openings 13 in the hinge profile 3-- the container door 2 is pivotably joint at a container well's edge 4. As recognized by the inventive concept the containers well's edge 4 establishes not only sufficient stability to the container well 1 of Fig. 1 as such and thus to the container 10 but also to an arrangement 100 of containers 10.1 until 10.n of Fig. 3 even when subjected to considerable stress and pressure load along an aircraft cabins elongate axis above an alley of seats. Thus the edge 4 functions as a stabilising frame for the container 10 as such. Also the edge is a load deducting element upon arrangement of the container 10 in the arrangement 100 shown in Fig. 3.

[0035] In the present embodiment the container well 1 with the container well's edge 4 the container door 2 with the container door's edge 5 and the hinge profile 3 consists of a sheet-folded compound material SMC. SMC is moulded from a composite of thermoset sheet material based on fiber-reinforced polymer matrices mainly.

[0036] In the instant embodiment the polymer matrices is an unsaturated polyester resin but in a variant also can be based on epoxy or also silicone, melamine, phenolic, polyimide and other resin systems. Generally these kinds of resins provide for a wide range of electrical, mechanical and thermoinsulating applications. In particular also flame retardant and heat resistant applications can be provided. In particular it turns out that upon providing a fiber-reinforcement to the polymer matrices this results

in a high mechanical strength composite material being of high temperature and chemical resistance. The SMC is best-suited for static dissipation of stress and pressure as demanded for the instant container for an oxygen supply unit as such and for arrangement in a number of oxygen supply devices of Fig. 3.

[0037] In a varied embodiment the container 10 of Fig. 1 and the containers can 10.1 of Fig. 3 can be adapted such that a passenger appliance is stored in the container. Thus the number of containers 10.i can form an arrangement of a number of oxygen supply devices as shown in Fig. 3. Also additionally or alternatively the number of containers 10.1 can form a number of passenger supply units or a number of passenger supply devices as claimed in one of claims 15 or 16. Then the oxygen supply unit 30 of Fig. 3 could be replaced by a passenger appliance --like an oxygen supply unit, oxygen masks, warning lights, reading lights, airjet nozzle alone or in combination-- and/or an oxygen supply unit, i.e. in an integrated or segregated configuration. In particular an arrangement of containers for oxygen supply units can be adjacent to or combined with a panel or another arrangement of containers for passenger supply units.

[0038] Generally a sheet-moulded compound is manufactured by dispersing long length fibers with a length greater than 1 inch; here the fibers are chopped glass fibers on a bath of polyester resin. The longer the glass fibers in a sheet-moulded compound the better are strength properties of the SMC as compared to standard bulk-moulded compound products BMC. During the manufacturing process a reservoir, dispenses a measured amount of specified resin paste onto a plastic carrier film for example. This carrier film passes underneath a chopper which cuts the glass rowing onto the surface. Once these have drifted through the depth of the resin paste another sheet is added on top which sandwiches the cast. The sheets are compacted and then entered onto a take-up roll which is used to store the product while it matures. A carrier film is then later removed and the material is cut into charges. Depending on what shape is required determines the shape of the charge. Generally sheet-moulded compound benefits from a very high volume production ability, excellent part reproducibility and cost efficiency.

[0039] In the present embodiment a directional long fiber version of sheet-moulded compound material is used wherein rather long directional fibers are used to form a mesh like system. The mesh like system can in particular also use a woven or knitted system of fibers in a variant. For increasing mechanical strength of the container well 1 and container door 2 both edges, namely container well's edge 4 and container door's edge 5 are integrally moulded with the body of the container well and the container door respectively.

[0040] The container well in particular has a front, rear and side container wall 1.1, 1.2, 1.3, 1.4 and a floor 1.5 respectively. In the present embodiment a front edge 4.1, rear edge 4.2 and side edges 4.3, 4.4 are formed by

integrally moulding the edges 4.1, 4.2, 4.3, 4.4 with the container well walls. Thus this results in a very high stable version of the container well 1. In particular, on all the aforementioned sides the container edge 4 has an outer edge portion 4A extending crosswise from the walls and an inner edge portion 4B which smoothly extends from the outer edge portion 4A into the wall 1.1, 1.2, 1.3, 1.4 respectively. Thus also this construction increases static stability of the container. Moreover this construction is adapted to be easily produced within a thermoforming assisted deep-drawing moulding process for the sheet-moulded compound material SMC.

[0041] Also in the present embodiment In the transition regions 5.1, 5.2, 5.3, 5.4 between the walls 1.1, 1.2, 1.3, 1.4 depression regions are provided to further increase the static stability.

[0042] In a particular preferred variant of this embodiment the walls can be produced with a wall thickness well below 2 mm, preferably well below 1 mm, whereas the regions of edge transition have material thicknesses which are above a wall material thickness, in particular above a thickness of 2mm, preferably above a thickness of 1 mm. Thus without increasing the weight of the container considerably these statically sensitive regions are further stabilized by an increased wall thickness of the light weight sheet-moulded compound material. Thus the static stability of the container 10 is drastically increased without considerable Increasing the weight.

[0043] As it is to be understood the instant embodiments can be well produced from a composite of thermoset sheet-material based on fiber-reinforced polymer matrices which have large thickness regions and low thickness regions. The regions are arranged such that -- after moulding-- a container well's edge material thickness and a container well's transition region material thickness and reinforcing depression material thickness as outlined above is thicker than a container wall's thickness. In particular In the present embodiment this means that the large thickness regions are assigned to the edge 4, the depressions and the transition regions 5.1, 5.2, 5.3, 5.4 as outlined before. The low thickness regions are addressed to the regions of the walls 1.1, 1.2, 1.3, 1.4 as outlined above.

[0044] Thereby as such stable and also in an arrangement 100 a container 10 with high stress resistance is provided by the concept of the instant invention and as described in the aforementioned embodiment. In particular opening of the container door 2 is guaranteed even upon mechanical load or a hazardous impact on the container 10.

Claims

1. Container (10) for a supply unit, namely an oxygen supply unit and/or a passenger supply unit (PSU) or a passenger supply device,

- the container (10) having a container well (11) at least, wherein a container door (2) can be pivotably joint at a container well's edge (4), pivotable about a hinge at the container well's edge (4); and
- the container (10) being adapted for respective support to another container in a panel along an aircraft's cabin, wherein the container and the another container are arranged for respective support of each other at at least one of each of the container well's edge (4);

wherein

- the container well (1) at least consists of a sheet moulded compound material moulded from a composite of thermoset sheet material based on fiber-reinforced, polymer matrices mainly, wherein
 - the container has front, rear and side container walls (1.1, 1.2, 1.3, 1.4) and at least one wall region and at least one transition region (5.1, 5.2, 5.3, 5.4) there between, **characterized in that**
 - the sheet moulded compound material comprises a directed long fiber system (C-SMC) of sheet moulded material, wherein the fibers of the reinforcement are endless fibers of a directional system of fibers, or wherein dispersed long length fibers have a length greater than 2.54 cm (1 inch),
 - the wall region has a wall thickness of below 2 mm, and
 - the container well's edge has an edge material thickness and container wall's transition regions (5.1, 5.2, 5.3, 5.4) have a transition region material thickness, wherein the edge material thickness and the transition region material thickness is at least partly larger than a wall thickness, wherein at least one wall and/or transition region has reinforcing depressions and
 - the container well's edge is integrally moulded with the container well (1), wherein on the front and rear container wall (1.1, 1.2) the reinforcing depressions extend into the container well's edge (4), and
 - the reinforcing depressions have a depression material thickness wherein the depression material thickness is larger than a wall thickness.
2. Container (10) as claimed in claim 1 wherein the container well (1) and/or the container wall is moulded from the composite by a deep-drawing moulding, compression moulding and/or injection moulding, assisted by thermoforming.
 3. Container (10) as claimed in claim 1 or 2 wherein the polymer matrice is a matrice of Bis-Maleimids

(BMI), Epoxy (Epoxide), Phenolic (PF), Polyester (UP), Polyimide, Polyurethane (PUR), Silicone, wherein the Polyester (UP) is an unsaturated polyester resin, the Epoxy (Epoxide) is an epoxy resin system, the Phenolic (PF) is a phenolic resin system.

4. Container (10) as claimed in one of claims 1 to 3 wherein the fiber-reinforcement is a carbon and/or graphite and/or glass fiber reinforcement.
5. Container (10) as claimed in one of claims 1 to 4 wherein the sheet moulded compound material is a mesh system of fibers, like a woven or knitted system or the like.
6. Container (10) as claimed in one of claims 1 to 5 wherein a container door's edge is integrally moulded with the container door (2).
7. Container (10) as claimed in claim 6 wherein the container well's edge has a rear edge (4.2) on a rear container wall (1.2) and a front edge (4.1) at a front container wall (1.1) and a side edge (4.3, 4.4) at a side container wall (1.3, 1.4) of the container well (1) and at least the side edge is bead to form an edge bead.
8. Container (10) as claimed in one of claims 1 to 7, wherein all wall regions and/or all walls have a wall thickness of below 1 mm.
9. Container (10) as claimed in one of claims 1 to 8 wherein the composite of thermoset sheet material based on fiber-reinforced polymer matrices has a large thickness region and a low thickness region arranged such that after moulding a container well's edge material thickness and a container wall's transition region material thickness and a reinforcing depression material thickness is thicker than a container wall's thickness.
10. Oxygen supply device having an oxygen supply unit stored in a container (10) according to one of the claims 1 to 9, wherein the oxygen supply unit has a oxygen pressure cylinder and/or a chemical oxygen generator.
11. Passenger supply unit (PSU) having one or more passenger appliances stored in a container (10) according to one of the claims 1 to 9.
12. Passenger supply device having a passenger appliance and an oxygen supply unit stored in a container (10) according to one of the claims 1 to 9.
13. System (20) of an arrangement with a number of containers (10) according to one of claims 1 to 9, namely an arrangement of a number of oxygen sup-

ply devices and/or a number of passenger supply units or a number of passenger supply devices in a panel along an aircraft's cabin, wherein the containers (10) are arranged for respective support of each other at at least one of each of the containers well's edge (4).

Patentansprüche

1. Behälter (10) für eine Versorgungseinheit, nämlich eine Sauerstoffversorgungseinheit und/oder eine Passagierversorgungseinheit (PSU) oder eine Passagierversorgungsvorrichtung, wobei

- der Behälter (10) zumindest eine Behälterwanne (11) hat, wobei eine Behältertür (2) schwenkbar an einer Behälterwannenkante (4) verbunden sein kann, schwenkbar bezüglich eines Gelenks an der Behälterwannenkante (4); und
- der Behälter (10) für eine entsprechende Stützung eines anderen Behälters an einem Paneel entlang einer Kabine eines Luftfahrzeugs ausgebildet ist, wobei der Behälter und der andere Behälter zur jeweiligen gegenseitigen Stützung an mindestens einer von jeder der Behälterwannenkanten (4) angeordnet sind;

- die Behälterwanne (1) mindestens aus einem schichtgeformten Verbundwerkstoff besteht, der aus einem Verbundstoff aus wärmehärtendem Schichtmaterial geformt ist, das hauptsächlich auf faserverstärkten Polymermatrizen basiert, wobei

- der Behälter Vorder-, Rück- und Seitenbehälterwände (1.1, 1.2, 1.3, 1.4) hat und mindestens einen Wandbereich und mindestens einen Übergangsbereich (5.1, 5.2, 5.3, 5.4) dazwischen, **dadurch gekennzeichnet, dass**

- der schichtgeformte Verbundwerkstoff ein gerichtetes Langfasersystem (C-SMC) aus schichtgeformtem Material aufweist, wobei die Fasern der Verstärkung Endlos-Fasern eines gerichteten Fasersystems sind, oder wobei dispergierte Langlängen-Fasern eine Länge größer als 2,54 cm (1 inch) haben,

- der Wandbereich eine Wanddicke unter 2 mm hat, und

- die Behälterwannenkante eine Kantenmaterialdicke hat und Behälterwannenübergangsbereiche (5.1, 5.2, 5.3, 5.4) eine Übergangsbereichmaterialdicke haben, wobei die Kantenmaterialdicke und die Übergangsbereichmaterialdicke mindestens teilweise größer als eine Wanddicke sind, wobei mindestens eine Wand und/oder ein Übergangsbereich verstärkende Vertiefungen hat und

- die Behälterwannenkante integral mit der Behälterwanne (1) geformt ist, wobei die verstär-

kenden Vertiefungen sich an der Vorder- und Rückbehälterwand (1.1, 1.2) in die Behälterwannenkante (4) erstrecken, und

- die verstärkenden Vertiefungen eine Vertiefungsmaterialdicke haben, wobei die Vertiefungsmaterialdicke größer als eine Wanddicke ist.

2. Behälter (10) wie in Anspruch 1 beansprucht, wobei die Behälterwanne (1) und/oder die Behälterwand aus dem Verbundstoff durch eine Tiefzugformung, eine Kompressionsformung und/oder ein durch Thermoformung unterstütztes Spritzgießen geformt ist.

3. Behälter (10) wie in Anspruch 1 oder 2 beansprucht, wobei die Polymermatrix eine Matrix aus Bismaleimid (BMI), Epoxy (Epoxide), Phenol (PF), Polyester (UP), Polyamid, Polyurethan (PUR), Silikon ist, wobei das Polyester ein ungesättigtes Polyester-Harz ist, das Epoxy (Epoxide) ein Epoxid-Harz-System, und das Phenol (PF) ein Phenol-Harz-System ist.

4. Behälter (10) wie in einem der Ansprüche 1 bis 3 beansprucht, wobei die Faserverstärkung eine Karbon- und/oder Graphit- und/oder Glas-Faserverstärkung ist.

5. Behälter (10) wie in einem der Ansprüche 1 bis 4 beansprucht, wobei der schichtgeformte Verbundwerkstoff ein Maschensystem aus Fasern, wie ein gewebtes oder gestricktes System oder dergleichen ist.

6. Behälter (10) wie in einem der Ansprüche 1 bis 5 beansprucht, wobei eine Behältertürenkante integral mit der Behältertür (2) geformt ist.

7. Behälter (10) wie in Anspruch 6 beansprucht, wobei die Behälterwannenkante eine Rückkante (4.2) auf einer Behälterrückwand (1.2) und einer Vorderkante (4.1) auf einer Behältervorderwand (1.1) und eine Seitenkante (4.3, 4.4) auf einer Behälterseitenwand (1.3, 1.4) der Behälterwanne (1) hat und mindestens die Seitenkante mit einem Rand versehen ist, um eine Kantenwulst zu bilden.

8. Behälter (10) wie in einem der Ansprüche 1 bis 7 beansprucht, wobei alle Wandbereiche und/oder alle Wände eine Wanddicke unter 1 mm haben.

9. Behälter (10) wie in einem der Ansprüche 1 bis 8 beansprucht, wobei der auf faserverstärkten Polymermatrizen basierende Verbundstoff aus wärmehärtendem Schichtmaterial einen Bereich großer Dicken und einen Bereich kleiner Dicke hat, die derart angeordnet sind, dass nach einem Formen einer Behälterwannenkantenmaterialdicke und einer

Behälterwandübergangsbereichmaterialdicke und eine verstärkende Vertiefungsmaterialdicke dicker ist als eine Behälterwanddicke.

10. Sauerstoffversorgungsvorrichtung, die eine in einem Behälter (10) gemäß einem der Ansprüche 1 bis 9 gelagerte Sauerstoffversorgungseinheit hat, wobei die Sauerstoffversorgungseinheit eine Sauerstoffdruckflasche und/oder einen chemischen Sauerstoffgenerator hat. 5
10
11. Passagierversorgungseinheit (PSU), die ein oder mehrere Passagiergeräte hat, die in einem Behälter (10) gemäß einem der Ansprüche 1 bis 9 gelagert sind. 15
12. Passagierversorgungsvorrichtung, die ein Passagiergerät und eine in einem Behälter (10) gemäß einem der Ansprüche 1 bis 9 gelagerte Sauerstoffversorgungseinheit hat. 20
13. System (20) einer Anordnung mit einer Anzahl von Behältern (10) gemäß einem der Ansprüche 1 bis 9, nämlich einer Anordnung von einer Anzahl von Sauerstoffversorgungsvorrichtungen und/oder einer Anzahl von Passagierversorgungseinheiten oder einer Anzahl von Passagierversorgungsvorrichtungen an einem Paneel entlang einer Kabine eines Luftfahrzeugs, wobei die Behälter (10) zur jeweiligen gegenseitigen Stützung an mindestens einer von jeder der Behälterwannenkanten (4) angeordnet sind. 25
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Revendications

1. Conteneur (10) pour une unité d'alimentation, à savoir une unité d'alimentation en oxygène et/ou une unité d'alimentation pour passager (PSU) ou un dispositif d'alimentation pour passager, 35
40
 - le conteneur (10) ayant un puits de conteneur (11) au moins, dans lequel une porte de conteneur (2) peut être jointe de manière pivotante à un bord du puits de conteneur (4), pouvant pivoter autour d'une charnière au bord du puits de conteneur (4) ; et 45
 - le conteneur (10) étant adapté pour le support respectif à un autre conteneur dans un panneau le long d'une cabine d'avion, dans lequel le conteneur et l'autre conteneur sont agencés pour le support respectif l'un de l'autre à au moins un de chacun du bord du puits de conteneur (4) ; dans lequel 50
 - le puits de conteneur (1) est au moins constitué d'un matériau de composé moulé en feuille moulé à partir d'un composite de matériau en feuille thermodurcissable basé sur des matrices de polymère renforcé de fibres principalement, dans 55

lequel

- le conteneur a des parois de conteneur avant, arrière et latérales (1.1, 1.2, 1.3, 1.4) et au moins une région de paroi et au moins une région de transition (5.1, 5.2, 5.3, 5.4) entre celles-ci, **caractérisé en ce que**
- le matériau de composé moulé en feuille comprend un système de fibres longues dirigées (C-SMC) de matériau moulé en feuille, dans lequel les fibres du renforcement sont des fibres sans fin d'un système directionnel de fibres, ou dans lequel des fibres de grande longueur dispersées ont une longueur supérieure à 2,54 cm (1 pouce),
- la région de paroi a une épaisseur de paroi inférieure à 2 mm, et
- le bord du puits de conteneur a une épaisseur de matériau de bord et les régions de transition de paroi de conteneur (5.1, 5.2, 5.3, 5.4) ont une épaisseur de matériau de région de transition, dans lequel l'épaisseur de matériau de bord et l'épaisseur de matériau de région de transition sont au moins en partie supérieures à une épaisseur de paroi, dans lequel au moins une paroi et/ou région de transition a des dépressions de renfort et
- le bord du puits de conteneur est moulé de matière avec le puits de conteneur (1), dans lequel sur la paroi de conteneur avant et arrière (1.1, 1.2), les dépressions de renfort s'étendent dans le bord du puits de conteneur (4), et
- les dépressions de renfort ont une épaisseur de matériau de dépression dans lequel l'épaisseur de matériau de dépression est supérieure à une épaisseur de paroi.

2. Conteneur (10) selon la revendication 1, dans lequel le puits de conteneur (1) et/ou la paroi de conteneur est moulé à partir du composite par moulage par emboutissage profond, moulage par compression et/ou moulage par injection, assisté par thermoformage.
3. Conteneur (10) selon la revendication 1 ou 2, dans lequel la matrice de polymère est une matrice de bismaléimides (BMI), époxy (Epoxide), phénolique (PF), polyester (UP), polyimide, polyuréthane (PUR), silicone, dans lequel le polyester (UP) est une résine de polyester non saturé, l'époxy (Epoxide) est un système de résine époxy, le phénolique (PF) est un système de résine phénolique.
4. Conteneur (10) selon l'une quelconque des revendications 1 à 3, dans lequel le renforcement de fibres est un renforcement de fibres de carbone et/ou graphite et/ou verre.
5. Conteneur (10) selon l'une quelconque des reven-

dications 1 à 4, dans lequel le matériau de composé moulé en feuille est un système de fibres, comme un système tissé ou similaire.

6. Conteneur (10) selon l'une quelconque des revendications 1 à 5, dans lequel un bord de la porte de conteneur est moulé de matière avec la porte de conteneur (2). 5
7. Conteneur (10) selon la revendication 6, dans lequel le bord du puits de conteneur a un bord arrière (4.2) sur une paroi de conteneur arrière (1.2) et un bord avant (4.1) au niveau d'une paroi de conteneur avant (1.1) et un bord latéral (4.3, 4.4) au niveau d'une paroi de conteneur latérale (1.3, 1.4) du puits de conteneur (1) et au moins le bord latéral est bourrelé pour former un bourrelet de bord. 10 15
8. Conteneur (10) selon l'une quelconque des revendications 1 à 7, dans lequel toutes les régions de paroi et/ou toutes les parois ont une épaisseur de paroi inférieure à 1 mm. 20
9. Conteneur (10) selon l'une quelconque des revendications 1 à 8, dans lequel le composite de matériau en feuille thermodurcissable basé sur des matrices de polymère renforcé de fibres a une région de grande épaisseur et une région de faible épaisseur agencées de sorte qu'après moulage une épaisseur de matériau de bord du puits de conteneur et une épaisseur de matériau de région de transition de la paroi du conteneur et une épaisseur de matériau de dépression de renfort sont supérieures à une épaisseur de la paroi de conteneur. 25 30 35
10. Dispositif d'alimentation en oxygène ayant une unité d'alimentation en oxygène stockée dans un conteneur (10) selon l'une quelconque des revendications 1 à 9, dans lequel l'unité d'alimentation en oxygène a un cylindre de pression d'oxygène et/ou un générateur d'oxygène chimique. 40
11. Unité d'alimentation pour passager (PSU) ayant un ou plusieurs équipements pour passager stockés dans un conteneur (10) selon l'une quelconque des revendications 1 à 9. 45
12. Dispositif d'alimentation pour passager ayant un équipement pour passager et une unité d'alimentation en oxygène stockés dans un conteneur (10) selon l'une quelconque des revendications 1 à 9. 50
13. Système (20) d'un agencement avec un certain nombre de conteneurs (10) selon l'une quelconque des revendications 1 à 9, à savoir un agencement d'un certain nombre de dispositifs d'alimentation en oxygène et/ou d'un certain nombre d'unités d'alimentation pour passager ou d'un certain nombre de dis- 55

positifs d'alimentation pour passager dans un panneau le long d'une cabine d'avion, dans lequel les conteneurs (10) sont agencés pour le support respectif l'un de l'autre à au moins un de chacun du bord du puits de conteneurs (4).

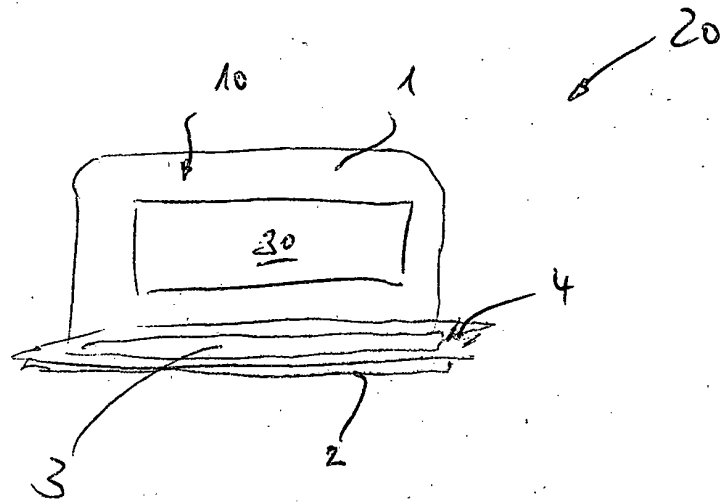


Fig. 2.

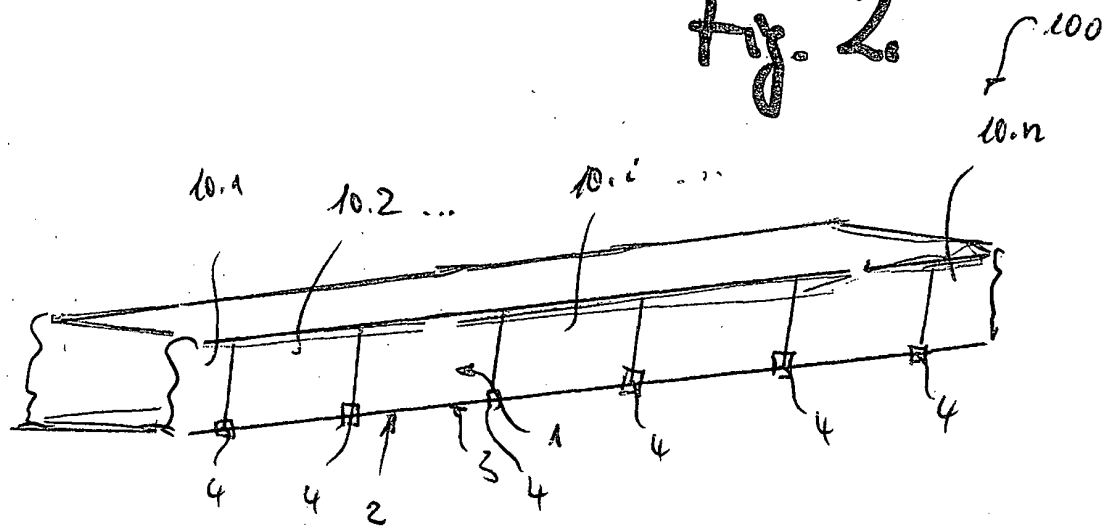


Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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