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(71) Applicants:
• **Van Hool NV**
2500 Lier (Koningshooikt) (BE)
• **BASF SE**
67056 Ludwigshafen (DE)

(72) Inventors:
• **Taeymans, Erik**
2500 Lier (Koningshooikt) (BE)
• **Bieker, Thorsten**
Carl-Bosch Str. Ludwigshafen Am Rhein (DE)

(74) Representative: **Brantsandpatents bvba**
Pauline Van Pottelsberghelaan 24
9051 Ghent (BE)

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(54) **TANK CONTAINER WITH INCREASED VOLUME AND LOAD CAPACITY**

(57) The present invention relates, in a first aspect, to a tank container, the use of a tank container, and a system for storing and/or transporting a gas and/or liquid, which tank container comprises an elongated, mainly cylindrical tank vessel, a frame and at least one outlet valve, wherein the frame comprises a front and back frame each with 2 or 4 corner castings with facilities for receiving or engaging with connection means, which are attached to said tank vessel of the tank container, characterized in that the gross weight of the tank container is more than

40000 kg (up to 75000 kg inclusive). By means of a better material quality for the corner castings of the tank container, it can be prevented that the container deforms permanently in case of high tonnages, e.g. when lifting.

In a second aspect, the invention relates to a box container with 4 bottom corner castings, the use of a box container, and a system for storing and/or transporting solids, whereby the gross weight of the box container is more than 40000 kg (up to 75000 kg inclusive).

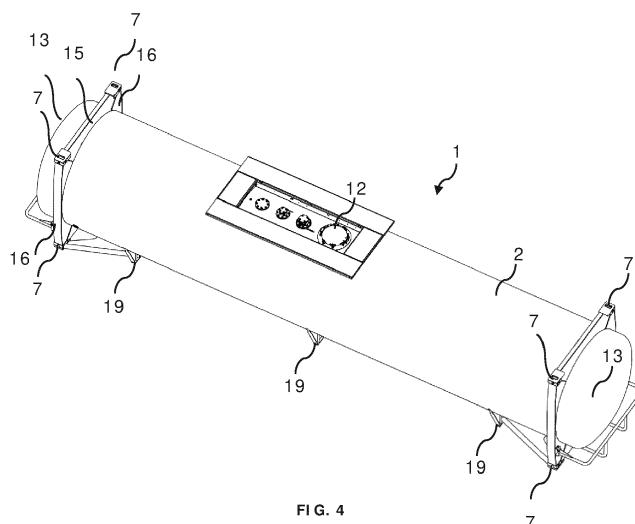


FIG. 4

Description

TECHNICAL FIELD

[0001] The present invention relates to a container, in particular a tank container for storing and/or transporting gas, liquid and/or solids.

BACKGROUND

[0002] A tank container is an intermodal container for the transport of liquids and/or gases. A standard tank container comprises a manhole and at least one connection. Loading and unloading is carried out by connecting tubes of the load and unload installation to connections of the tank container. Subsequently, one can load or unload. A connection is part of a valve, also called outlet valve, which can interrupt the supply or discharge of liquids and/or gases, if necessary. The connections are made of a composed valve in accordance to legislation.

[0003] Tank containers often also contain corner castings (or corner pieces) at the ends of the front and back frame, which corner castings are provided with lifting openings (lifting eyes) for lifting the container by means of a crane. These corner castings are normalized and hence, tank containers are often limited to gross weights of maximum 34 ton, with exceptions to 38 to 40 ton.

[0004] Documents US732227B2 and CA2765684A1 describe examples of a tank container according to the state of the art in the patent literature.

[0005] Document NL8902602A more in particular describes a tank container comprising at least one tank or vessel attached in a parallelepiped frame wherein the width of the frame is such a fraction part of the width of the container standardized according to the ISO norms (about 8 feet) that by connecting a number of adjacent containers, a cluster is formed with said ISO norm width (8 feet) and that the length of the frame is equal to the length of a container standardized according to the ISO norms (for example about 10 feet, about 20 feet) or such a fraction part that by connecting a number of adjacent containers, a cluster is formed with the length of an ISO norm container.

[0006] Document EP13192751.9, published as EP 2 730 832, discloses tank containers with increased volumes of 24000 to 52500 l. This tank container is designed for storing and/or transporting a gas and/or liquid, which tank container comprises a tank vessel, a frame and at least one outlet valve, wherein the end of said outlet valve is attached to a tank flange, which is preferably countersunk between 1 and 30 cm in a recess at an end base of the said tank vessel, more preferably between 5 and 20 cm, most preferably between 10 and 15 cm. By countersinking at least one outlet valve, the length of the tank vessel can be increased within the frame.

[0007] A problem with the known intermodal tank containers is that the volume is limited by the dimensions of the frame around the container and by the space the

outlet valve takes at the container and which must be comprised within (the casing of) the ISO frame.

[0008] When transporting tank containers on railway wagons, two or three standard containers of 20 feet long or two standard containers of about 26 or 30 feet long can indeed be placed successively on e.g. a four-axis wagon (e.g. 45 or 60 feet, with a tare weight of about 16 to 22 ton), that can be loaded till a gross weight of maximum 90 ton. To this end, the two containers may or may not be connected to each other by means of a double frame. However, it remains unseen to make full use of a wagon by placing one big, separate tank container with increased volume and load capacity, offering a faster and easier placement.

[0009] If containers are attached to each other to form one unit, the corner castings at the bottom (2 x 4 corner castings) will in practice not be loaded simultaneously or equally during force transmission on the chassis or the wagon, as a result of which the container can be deformed permanently.

[0010] A further length and volume increase in one tank container, thus without forming clusters, and allowing to transport even more gas and/or liquid with an increased load capacity, without permanently deforming the tank container while lying on a railway wagon or lifting, is as yet not known.

[0011] The object of the present invention is an improved device of a tank container offering a solution for at least one of said disadvantages when transporting gases and/or liquids, as described in claim 1.

SUMMARY

[0012] The present invention relates in a first aspect to a tank container for storing and/or transporting a gas and/or liquid, which tank container comprises in a first aspect an elongated, mainly cylindrical tank vessel, a frame and at least one outlet valve, wherein the frame comprises a front and back frame each with 2 or 4 corner castings with facilities for receiving or engaging with connection means, which are attached to head ends of the tank container, characterized in that the gross weight of the tank container is more than 40000 kg. By using a better material quality for the corner castings of the container, it can be prevented that the container deforms permanently in case of such high tonnages, e.g. when lifting.

[0013] In a second aspect, the invention relates to a box container with 4 bottom corner castings for storing and/or transporting solids, wherein the gross weight of the box container is more than 40000 kg.

[0014] In a third aspect, the invention relates to the use of a tank container or box container as described in this document for subsequent transport and/or storage whereby said tank container or box container is placed on a wagon and any of the following: a chassis, a container terminal. Hence, the present invention allows intermodal transport that includes rail transport, and also

allows interim storage on a wagon.

[0015] In a fourth aspect, the invention relates to a system for storing and/or transporting a gas, liquid and/or solid with a tank container or box container, wherein the tank container or box container is placed on a chassis, wagon or container terminal.

[0016] Further preferred embodiments are described in the dependent claims.

[0017] The explicit characteristics, advantages and objectives of the present invention will become clear for the skilled worker in the technical domain of the invention from the following detailed description of the embodiment of the invention and the attached figures. The figures are only illustrative of the invention, and are in no case limitative of the invention.

DESCRIPTION OF THE FIGURES

[0018] The following figures show preferred embodiments of the invention.

Figure 1 is a side view of a tank container along to the longitudinal axis, according to a preferred embodiment of the invention.

Figure 2 is a plan view of a tank container along to the longitudinal axis of a tank container, according to a preferred embodiment of the invention.

Figure 3 is a back view of a tank container, according to a preferred embodiment of the invention.

Figure 4 is a perspective view of a tank container, according to a preferred embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0019] In the following, the invention will be described by means of non-limiting examples illustrating the invention, and not meant to be interpreted as limiting the scope of the invention.

[0020] In this document, the term "chassis" refers to the base frame of a wheeled vehicle, particularly that of a truck or a wagon. The term "truck" refers to a large, heavy road vehicle comprising a chassis and adapted to carry a tank container. The term "head end" refers to either one of a "front head" and a "back head".

[0021] In this document, the terms "wagon module" and "wagon" are used interchangeably.

[0022] "About" as used herein referring to a measurable value such as a parameter, an amount, a temporal duration, and the like, is meant to encompass variations of $\pm 20\%$ or less, preferably $\pm 10\%$ or less, more preferably $\pm 5\%$ or less, even more preferably $\pm 1\%$ or less, and still more preferably $\pm 0.1\%$ or less of and from the specified value, in so far such variations are appropriate to perform in the disclosed invention. However, it is to be

understood that the value to which the modifier "about" refers is itself also specifically disclosed.

[0023] In a first aspect, the present invention relates to a tank container (1) (also called "container" in this document) for storing and/or transporting a gas and/or liquid, which tank container (1) comprises, in a first aspect, an elongated, mainly cylindrical tank vessel (2), a frame and at least one outlet valve (21), wherein the frame comprises a front and back frame (4) each with 2 or 4 corner castings (7), also known as corner points or corner castings, with facilities for receiving or engaging with connection means, which are attached to said tank vessel (2) of the tank container (1), characterized in that the gross weight of the tank container is more than 40000 kg.

[0024] The tank vessel (2) comprises a front head and a back head connected by a shell. The tank vessel (2) has a longitudinal direction defining a vessel length. In a preferred embodiment of the invention, the front frame is attached to said tank vessel near the front head of the tank vessel, whereby the distance between the front head and the front frame is not larger than 50% of said vessel length. In a more preferred embodiment, said distance between the front head and the front frame is not larger than 40% of said vessel length. Likewise, in a preferred embodiment of the invention, the back frame is attached to said tank vessel near the back head of the tank vessel, whereby the distance between the back head and the back frame is not larger than 50% of said vessel length. In a more preferred embodiment, said distance between the back head and the back frame is not larger than 40% of said vessel length.

[0025] In a preferred embodiment of the invention, the maximum gross weight of the tank container is more than 40000 kg. In a more preferred embodiment of the invention, the gross weight of the tank container is more than 50000 kg. In a still more preferred embodiment of the invention, the gross weight of the tank container is more than 60000 kg. In a still more preferred embodiment of the invention, the gross weight of the tank container is more than 70000 kg. In a most preferred embodiment of the invention, the gross weight of the tank container is 75000 kg.

[0026] This characteristic is in particular appropriate for storing and/or transporting heavy liquids, i.e. with a density of about 1.0 - 1.7 kg/l, which can substantially add to the weight of the cargo.

[0027] In a preferred embodiment of the invention, the corner castings (7) of the tank container are made of a material with an elasticity limit of minimum 600 N/mm².

[0028] In a preferred embodiment of the invention, the corner castings (7) of the tank container are made of steel.

[0029] The corner castings (7) at the end of the frames of the tank container are normally dimensioned according to ISO norms for use on containers with a weight of 38 to 40 ton, but are dimensioned, in the present invention, for higher tonnages (more than 40 ton to maximum 75 ton). When using a better material quality, for example

of steel, the elasticity limit of minimum 600 N/mm² is appropriate for preventing that such heavy tank container is deformed permanently when for example lifting it by means of a crane.

[0030] In a preferred embodiment of the invention, three support saddles (19, also known as supporting points) are provided at the bottom of the tank container:

- one at a distance of 1.6 m to 2.2 m of the front frame;
- one at a distance of 1.6 m to 2.2 m of the back frame;
- one centrally under the tank container;

wherein said support saddles (19) preferably have a free height of 12 mm above the bottom surface of the frame.

[0031] When the container is placed on a railway wagon, these support saddles normally do not touch the upper side of the wagon, considering the free height of 12 mm. When mounting the container on a carrying means, e.g. a trailer of a truck, the support saddles will touch the carrying means. This offers an optimal support of the container during storage and transport, in particular thanks to the central support saddle.

[0032] An inventive aspect of this modularity of the present invention is hence that the chassis or the wagon can further be used for other activities while the container is loaded, unloaded, moved on the site, repaired or cleaned (e.g. after having unloaded chemicals). As a result, the chassis or the wagon is in such periods not further occupied by such container(s). The modularity further offers the possibility to transport empty containers by truck to maintenance and cleaning facilities. This solution is flexible and cheap and will, in a certain degree, allow the apparatus to be used for several purposes (different kinds of goods).

[0033] The development and the use of the present invention will be the key to the reorganisation and flexibilization of on-site logistics, including first-mile and last-mile transport and interim storage. The handling of such containers will substantially increase the use of the apparatus and will substantially shorten round-trip times.

[0034] In a preferred embodiment of the invention, the corner castings (7) of the tank container are provided with lifting openings for the passage of a twistlock for attaching the tank container to a chassis or wagon (at the bottom) or container terminal (at the upper part), which lifting openings are suitable for allowing the expansion of the material of the tank vessel (2) under the influence of heat.

[0035] For example: when in case of a 40 feet or 45 feet container, the difference in temperature between the environment and the inside of the tank container is 100°C, it can be expected that a stainless steel container wall will expand by about 20-25 mm.

[0036] In a preferred embodiment of the invention, the tank container is minimum 6058 mm (20 feet) long, preferably 7820 mm (26 feet), 9144 mm (30 feet), 12192 mm

(40 feet), 13716 mm (45 feet), 15240 mm (50 feet) or more than 50 feet long, minimum 2438 mm (8 feet) wide, preferably 2550 mm or more than 2550 mm wide, and minimum 2438 mm (8 feet) high, preferably 2591 mm (8.6 feet), 2895 mm (9.5 feet) or more than 2895 mm high.

[0037] In a preferred embodiment of the invention, the volume of the tank container is minimum 24000 l, more preferably minimum 30000 l, still more preferably minimum 37500 l, still more preferably minimum 50000 l, still more preferably minimum 60000 l, still more preferably minimum 81500 l and most preferably minimum 95500 l.

[0038] In a preferred embodiment of the invention, the weight of the filled tank container is minimum 40 ton, more preferably minimum 50 ton, still more preferably minimum 60 ton, still more preferably minimum 70 ton and most preferably minimum 75 ton. In an embodiment with 75 ton, the tank container has a loading capacity that is the double of a usual tank container and comparable to that of a rail tank car according to a known concept, i.e. a wagon comprising a tank vessel as an integrated whole.

[0039] Another inventive aspect of the present invention is hence that the container is designed for an optimal handling and storing of goods. This principle is known of conventional intermodal transport, but the present container offers an even better efficiency as to storage and transport. Higher tonnages enable e.g. a faster delivery of cargo, particularly in cases where the present invention allows delivery with a single container, whereas more than one container is required for delivery of the same cargo weight with smaller containers (with lower tonnage). In this manner, make conventional rail transport as flexible and fast as combined transport without compromising on the advantages offered by the existing, high-load capacity of conventional rail transport.

[0040] In a preferred embodiment of the invention, at least one manhole is located in a shell or in a head end of said tank vessel of the tank container.

[0041] In a preferred embodiment, two or more manholes are provided, so that the tank container can be cleaned optimally.

[0042] In a preferred embodiment of the invention, one or more outlet valves are provided at an end or a left and/or right side of the tank container.

[0043] In a preferred embodiment of the invention, a slight inclination is provided on the tank container along the longitudinal direction, preferably an inclination of 0.1°, corresponding to an inclination of 20-25 mm over the full length of a 45-feet tank container, or more preferably an inclination of 0.3°, corresponding to an inclination of 50-60 mm over the full length of a 45-feet tank container. This inclination in particular allows an improved emptying through the outlet valve (21) at the lowest end of the tank container, e.g. when the tank container is mounted immovably onto a wagon.

[0044] In a preferred embodiment of the invention, the tank container can be isolated.

[0045] In a preferred embodiment of the invention, the

tank container can be heated.

[0046] In a second aspect, the invention relates to a box container with 4 bottom corner castings for storing and/or transporting solids, wherein the gross weight of the box container is more than 40000 kg. Hereby, 2 of the 4 bottom corner castings belong to the front frame, and the other 2 belong to the back frame, all four situated at bottom corners of their respective frame. In an embodiment of the invention, the maximum gross weight of the box container is more than 40000 kg. In a more preferred embodiment of the invention, the gross weight of the box container is more than 50000 kg. In a still more preferred embodiment of the invention, the gross weight of the box container is more than 60000 kg. In a still more preferred embodiment of the invention, the gross weight of the box container is more than 70000 kg. In a most preferred embodiment of the invention, the gross weight of the box container is 75000 kg. This characteristic is in particular appropriate for storing and/or transporting much or heavy cargo, for example steel coils. Hereby, given the fact that no more than four bottom castings are present, the bottom corner castings are adapted to carry very large weights.

[0047] In a preferred embodiment of the invention, the corner castings (7) of the box container are made of steel. By using a better material quality, for example of steel, the elasticity limit of minimum 600 N/mm² is appropriate for preventing that such heavy box container is deformed permanently when for example lifting it by means of a crane.

[0048] In a preferred embodiment of the invention, the corner castings (7) of the box container are provided with lifting openings for the passage of a twistlock for attaching the tank container to a chassis or wagon (at the bottom) or container terminal (at the upper part).

[0049] A further aspect of the present invention concerns a wagon adapted for receiving a tank container as described in this document. Hereby, said wagon able to carry said tank container, and said wagon is optimized for compactness, fast braking and low noise, with TSI noise level preferably below 78 dB(A). According to an embodiment of the present invention with tank container weight of 75 ton, being able to carry said tank container requires the ability to carry up to 75 ton on the four bottom corner castings of the container. Also here, given the fact that no more than four bottom castings are present, the bottom corner castings are adapted to carry very large weights.

[0050] In a preferred embodiment, said wagon is optimized for compactness. Hereby, optimizing the compactness encompasses aspects of physical dimensions as well as a reduced weight of the wagon, taking into account the load that is to be carried. In one embodiment, the wagon is adapted for carrying a first load, a single 45 feet tank container, or a second load, which is a combination of a 20 feet and a 26 feet container. In case of said first or second load, the length of said wagon is preferably between 14.8 meter and 15.8 meter, more pref-

erably between 15 meter and 15.6 meter, most preferably about 15.3 meter, where the latter corresponds to a loading length of 46 feet. Still for said first and second load, the loading height is preferably between 90 cm and 130 cm, more preferably between 100 cm and 120 cm, most preferably about 110 cm. In terms of weight, still for said first and second load, the wagon weight or tare weight is preferably between 13 ton and 19 ton, more preferably between 15 and 17 ton, most preferably about 16 ton. A compact design of the wagon provides important advantages in terms of logistics.

[0051] In a preferred embodiment, said wagon is optimized for improved braking, preferably with a disc brake. Hereby, the improvement to the brake comprises aspects of strength but also of noise. Specifically, due to the high load requirements it is important to ensure that timely and powerful braking is possible. In a preferred embodiment, the improved brakes comprise automatic brake-check equipment. Additionally, noise levels can be reduced by means of improved braking, as explained below.

[0052] In a preferred embodiment, said wagon is optimized for low noise, with TSI noise level preferably below 78 dB(A). This relates to the European Union noise regulations for new or upgraded interoperable rail vehicles, with standards that are known as Technical Specifications for Interoperability (TSI).

[0053] Of all sources of noise, braking and curve squeal are specific sources of noise disturbance and annoyance. In a preferred embodiment, disc brakes are used since these allow for larger noise reduction potential than common current technologies such as composite brake blocks. Disc brakes are superior to said composite brake blocks because they allow reduced wheel wear and are compatible with further options to improve the acoustic properties of the wheels. In a further preferred embodiment, the acoustic properties of the wheels and the wagon are further improved by the use of acoustic absorbers and/or highly efficient noise-attenuating appliances and/or axle coatings to reduce vibration noise and/or the fitting of substructure isolation.

[0054] In this way, said wagons are adapted for reduced TSI noise level, preferably below 78 dB(A). Noise reduction is important to protect the health and quality of life of people living near railways. Rail traffic noise, and public resistance to increasing traffic and new infrastructures due to noise, is a major obstacle towards achieving the ecological objective of shifting traffic to less carbon-intensive transport modes such as rail.

[0055] An important aspect of the present invention is the combined use of said tank container or box container with a wagon adapted for this purpose. For the large loads concerned in the present invention, existing concepts for transport by train have always relied on a wagon comprising a tank vessel as an integrated whole. Opposed to this, the present invention allows to separate the vessel containing the goods (tank container module) from the chassis (wagon module). The wagon module or wagon

concerned in the present invention comprises a chassis but does not comprise a vessel. Rather, the wagon is adapted for receiving a tank container. This modularity brings about cost advantage. The tank container module can be designed for optimum handling and storage. This principle is known from conventional intermodal transport. On the other hand, the wagon module can be further used for operations whilst the tank container is loaded, unloaded, moved on-site, repaired or cleaned. The wagon is not occupied by the tank container any longer than strictly needed. Due to this modularity, the present invention allows to significantly increase the utilisation of equipment as round-trip times can be shortened significantly. The higher utilisation of the equipment will lead to shorter innovation cycles and hence lead to a quicker integration of up-to-date standards including safety. Overall, less wagons are needed. The use of a crane improves supply and cleaning and repairs can be carried out faster.

[0056] The modularisation further provides the opportunity that empty modules can be transported via truck to maintenance and cleaning facilities. Hereby, transport via truck has the advantage of being flexible. Furthermore, the modularisation allows to some extent to use the equipment for multiple purposes (types of goods). Nowadays, wagons comprising a tank vessel as an integrated whole are to a large extent used dedicatedly due to lacking cleaning possibilities requiring an empty transport back to the point of loading.

[0057] In a third aspect, the invention relates to the use of a tank container or box container as described in this document for subsequent transport and/or storage whereby said tank container or box container is placed on a wagon and any of the following: a truck chassis, a container terminal. As such, the tank containers can be used for rail transport, inland waterways and (when empty) also for road transport.

[0058] According to a first embodiment of said use, a tank container is handled and filled at a first container terminal in a first step. In a second step, the tank container is transported by train on a wagon to a second container terminal. In a third step, the tank container is handled and emptied at said second container terminal. In a fourth step, said tank container is transported by truck in empty state to a cleaning facility.

[0059] In a second embodiment of said use, the first, second and third step are identical to the corresponding steps in the first embodiment of said use. However, the fourth step does not involve transport by truck because the tank container is kept in the vicinity of the second container terminal and is cleaned in place.

[0060] According to a third embodiment of said use, a tank container is handled and filled at a first container terminal in a first step. In a second step, the tank container is transported by train to a first ship terminal comprising facilities for handling containers. In a third step, the tank container is shipped on a barge to a second ship terminal comprising facilities for handling containers. In a fourth

step, the tank container is transported by train to a second container terminal. In a fifth step, the tank container is cleaned at or near the second container terminal.

[0061] In further embodiments of said use, short distances, e.g. between a container terminal and a cleaning facility, can be bridged with transport by train (filled or empty tank container) or by truck (empty tank container). Additionally, interim storage on a wagon can be included in-between handling. Alternatively, tank containers may stand alone (without wagon) during interim storage.

[0062] In a preferred embodiment of the invention, a first tank container comprises two frames (a front frame and a back frame) at its outer portions. Each of said frames is adapted to carry large weights and is adapted for stacking of a second tank container on top of said container. Hereby, said frames may be adapted to be in contact with the frames of the second tank container when said second tank container is stacked on the first tank container. Preferably, said second tank container likewise comprises two frames adapted for stacking of a tank container on top of it. This allows the stacking of a third tank container on the second, and so on. Said stacking is advantageous especially when the tank containers are placed into container depots for storage. By stacking containers, the surface needed for storage is reduced, freeing up rail capacity that would otherwise have been taken up by loaded tank containers.

[0063] In a fourth aspect, the invention relates to a system for storing and/or transporting a gas, liquid and/or solid with a tank container or box container, according to any one of the claims 1 to 13, characterized in that the tank container or box container is placed on a chassis, wagon or container terminal.

EXAMPLES

[0064] The invention will now be further described by means of following examples, without being limited thereto.

[0065] Figure 1 is a side view of a tank container along to the longitudinal axis, according to a preferred embodiment of the invention.

[0066] Figure 2 is a plan view of a tank container along to the longitudinal axis of a tank container, according to a preferred embodiment of the invention.

[0067] Figure 3 is a back view of a tank container, according to a preferred embodiment of the invention.

[0068] Figure 4 is a perspective view of a tank container, according to a preferred embodiment of the invention.

[0069] The tank container (1) is provided with an elongated, mainly cylindrical tank vessel (2) and a frame, comprising two lateral frames (4) attached on the tank vessel (2) of the tank container (1), whereby a front frame is attached near to a front head, and a back frame is attached near to a back head. These lateral frames (4) carry the tank vessel (2). The tank vessel (2) is composed of different welded parts. The tank container (1) is provided with a supply and discharge connection (valve)

(21), which is latest visible at the back side in Figure 3.

[0070] The front and back frame (4) carry the tank vessel (2). Additional support can be obtained by means of three support saddles (19) that are connected to the shell of the tank vessel (2). Each frame (4) is provided with two upper and two lower corner castings (7). Both lateral frames (4) comprise top cross members (15) and bottom cross members (14) and corner supports (16) that are placed between the corner castings (7).

[0071] In this embodiment of the tank container (1), a manhole (10) is provided in the shell of the tank vessel (2). The manhole (10) is sealed using manhole bolts (11) by means of a manhole lid (12).

[0072] It is supposed that the present invention is not limited to the embodiments described above and that some changes or modifications can be added to the described examples without reappraisal of the appended claims.

[0073] The invention pertains in point 1 to a tank container (1) for storing and/or transporting gas and/or liquid, which tank container (1) comprises an elongated, mainly cylindrical tank vessel (2), a frame, a manhole (10) and at least one outlet valve (21), wherein the frame comprises a front frame and a back frame (4), wherein said front frame and said back frame each comprise 2 or 4 corner castings (7) with facilities for receiving or engaging with connection means, wherein said front frame and said back frame are attached to said tank vessel (2) of the tank container (1), **characterized in that** the gross weight of the tank container is more than 40000 kg, preferably more than 50000 kg, more preferably 60000 kg, more than 70000 kg or 75000 kg.

[0074] The invention pertains in point 2 to a tank container (1) according to point 1, **characterized in that** the corner castings (7) are made of a material with an elasticity limit of minimum 600 N/mm².

[0075] The invention pertains in point 3 to a tank container (1) according to any of points 1 to 2, **characterized in that** three support saddles (19) are provided at the bottom side of the tank container:

- one at a distance of 1.6 m to 2.2 m of the front frame;
- one at a distance of 1.6 m to 2.2 m of the back frame;
- one centrally under the tank container;

wherein said support saddles (19) have a free height of 12 mm above the bottom surface of the frame.

[0076] The invention pertains in point 4 to a tank container (1) according to any of the previous points 1 to 3, **characterized in that** the corner castings (7) are provided with lifting openings for the passage of a twistlock for attaching the tank container to a chassis or wagon (at the bottom) or container terminal (at the upper part), which lifting openings are appropriate for allowing an expansion of the material of the tank vessel (2) under the influence of heat.

[0077] The invention pertains in point 5 to a tank container (1) according to any of the previous points 1 to 4, **characterized in that** the tank container is minimum 6058 mm (20 feet) long, preferably 7820 mm (26 feet), 9144 mm (30 feet), 12192 mm (40 feet), 13716 mm (45 feet), 15240 mm (50 feet) or more than 50 feet long, minimum 2438 mm (8 feet) wide, preferably 2550 mm or more than 2550 mm wide, and minimum 2438 mm (8 feet) high, preferably 2591 mm (8.6 feet), 2895 mm (9.5 feet) or more than 2895 mm high.

[0078] The invention pertains in point 6 to a tank container (1) according to any of the previous points 1 to 5, **characterized in that** the volume of the tank container is minimum 24000 l, preferably minimum 30000 l, minimum 37500 l, minimum 50000 l, minimum 60000 l, minimum 81500 l or minimum 95500 l.

[0079] The invention pertains in point 7 to a tank container (1) according to any one of the previous points 1 to 4, **characterized in that** the weight of the filled tank container is minimum 50 ton, preferably minimum 60 ton, minimum 70 ton or minimum 75 ton.

[0080] The invention pertains in point 8 to a tank container (1) according to any one of the previous points 1 to 7, **characterized in that** two or more manholes (10) are provided in a shell or a head end of the tank vessel (2).

[0081] The invention pertains in point 9 to a tank container (1) according to any one of the previous points 1 to 8, **characterized in that** one or more outlet valves are provided at a head end (13) or at the left and/or right side of the tank container.

[0082] The invention pertains in point 10 to a tank container (1) according to any one of the previous points 1 to 9, **characterized in that** a slight inclination is provided at the tank container in the longitudinal direction.

[0083] The invention pertains in point 11 to a tank container (1) according to any one of the previous points 1 to 10, **characterized in that** the tank container is isolated and/or is adapted to be heated.

[0084] The invention pertains in point 12 to a wagon adapted for receiving a tank container (1) according to any of the previous points 1 to 11, whereby said wagon is optimized for compactness, improved braking and low noise, with TSI noise level preferably below 78 dB(A).

[0085] The invention pertains in point 13 to a box container with 4 bottom corner castings (7) for storing and/or transporting solids, **characterized in that** the gross weight of the box container is more than 40000 kg, preferably more than 50000 kg, more than 60000 kg, more than 70000 kg or 75000 kg.

[0086] The invention pertains in point 14 to a use of a tank container or box container according to any one of the previous points 1 to 13 for subsequent transport and/or storage whereby said tank container or box container is placed on a wagon and any of the following: a truck chassis, a container terminal.

[0087] The invention pertains in point 15 to a system for storing and/or transporting a gas, liquid and/or solid with a tank container or box container, according to any

one of the previous points 1 to 14, **characterized in that** the tank container or box container is placed on a chassis, wagon or container terminal.

Claims

1. Tank container (1) for storing and/or transporting gas and/or liquid, which tank container (1) comprises an elongated, mainly cylindrical tank vessel (2), a frame, a manhole (10) and at least one outlet valve (21), wherein the frame comprises a front frame and a back frame (4), wherein said front frame and said back frame each comprise 2 or 4 corner castings (7) with facilities for receiving or engaging with connection means, wherein said front frame and said back frame are attached to said tank vessel (2) of the tank container (1), **characterized in that** the gross weight of the tank container is more than 40000 kg, preferably more than 50000 kg, more preferably 60000 kg, more than 70000 kg or 75000 kg.

2. Tank container (1) according to claim 1, **characterized in that** the corner castings (7) are made of a material with an elasticity limit of minimum 600 N/mm².

3. Tank container (1) according to any one of the claims 1 to 2, **characterized in that** three support saddles (19) are provided at the bottom side of the tank container:

- one at a distance of 1.6 m to 2.2 m of the front frame;
- one at a distance of 1.6 m to 2.2 m of the back frame;
- one centrally under the tank container;

wherein said support saddles (19) have a free height of 12 mm above the bottom surface of the frame.

4. Tank container (1) according to any of the previous claims 1 to 3, **characterized in that** the corner castings (7) are provided with lifting openings for the passage of a twistlock for attaching the tank container to a chassis or wagon (at the bottom) or container terminal (at the upper part), which lifting openings are appropriate for allowing an expansion of the material of the tank vessel (2) under the influence of heat.

5. Tank container (1) according to any of the previous claims 1 to 4, **characterized in that** the tank container is minimum 6058 mm (20 feet) long, preferably 7820 mm (26 feet), 9144 mm (30 feet), 12192 mm (40 feet), 13716 mm (45 feet), 15240 mm (50 feet) or more than 50 feet long, minimum 2438 mm (8 feet) wide, preferably 2550 mm or more than 2550 mm

wide, and minimum 2438 mm (8 feet) high, preferably 2591 mm (8.6 feet), 2895 mm (9.5 feet) or more than 2895 mm high.

6. Tank container (1) according to any of the previous claims 1 to 5, **characterized in that** the volume of the tank container is minimum 24000 l, preferably minimum 30000 l, minimum 37500 l, minimum 50000 l, minimum 60000 l, minimum 81500 l or minimum 95500 l.

7. Tank container (1) according to any one of the previous claims 1 to 4, **characterized in that** the weight of the filled tank container is minimum 50 ton, preferably minimum 60 ton, minimum 70 ton or minimum 75 ton.

8. Tank container (1) according to any one of the previous claims 1 to 7, **characterized in that** two or more manholes (10) are provided in a shell or a head end of the tank vessel (2).

9. Tank container (1) according to any one of the previous claims 1 to 8, **characterized in that** one or more outlet valves are provided at a head end (13) or at the left and/or right side of the tank container.

10. Tank container (1) according to any one of the previous claims 1 to 9, **characterized in that** a slight inclination is provided at the tank container in the longitudinal direction.

11. Tank container (1) according to any one of the previous claims 1 to 10, **characterized in that** the tank container is isolated and/or is adapted to be heated.

12. Wagon adapted for receiving a tank container (1) according to any of the previous claims 1 to 11, whereby said wagon is optimized for compactness, improved braking and low noise, with TSI noise level preferably below 78 dB(A).

13. Box container with 4 bottom corner castings (7) for storing and/or transporting solids, **characterized in that** the gross weight of the box container is more than 40000 kg, preferably more than 50000 kg, more than 60000 kg, more than 70000 kg or 75000 kg.

14. Use of a tank container or box container according to any one of the previous claims 1 to 13 for subsequent transport and/or storage whereby said tank container or box container is placed on a wagon and any of the following: a truck chassis, a container terminal.

15. System for storing and/or transporting a gas, liquid and/or solid with a tank container or box container, according to any one of the previous claims 1 to 14,

characterized in that the tank container or box container is placed on a chassis, wagon or container terminal.

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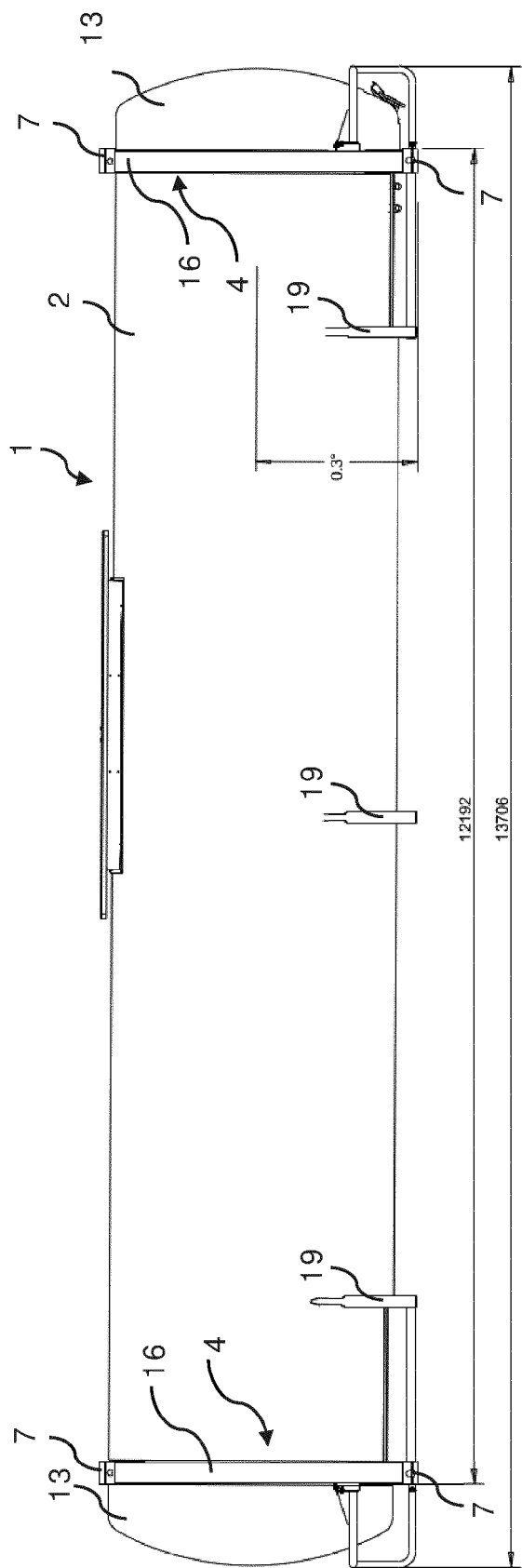


FIG. 1

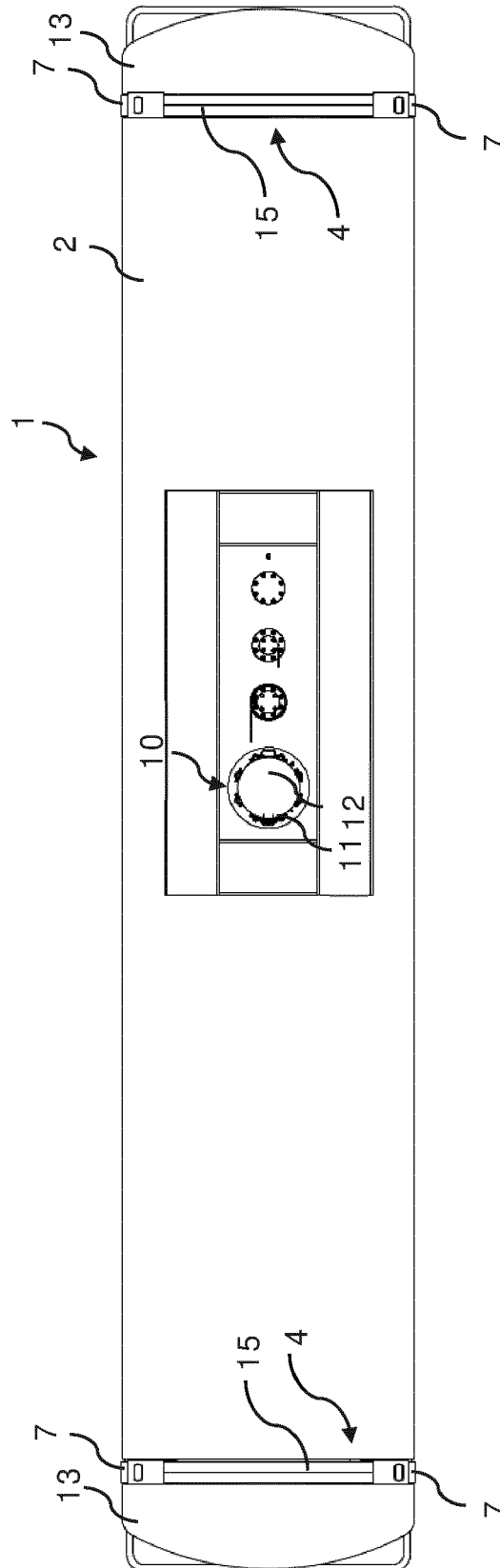


FIG. 2

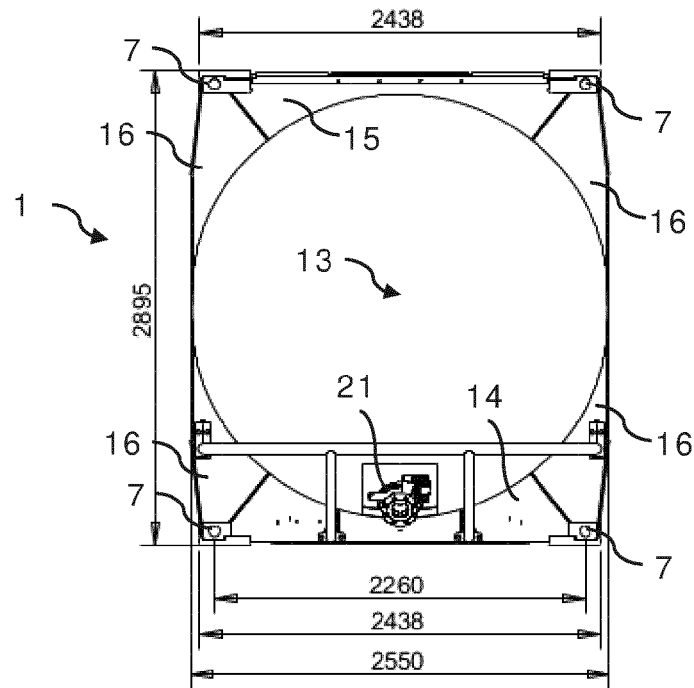


FIG. 3

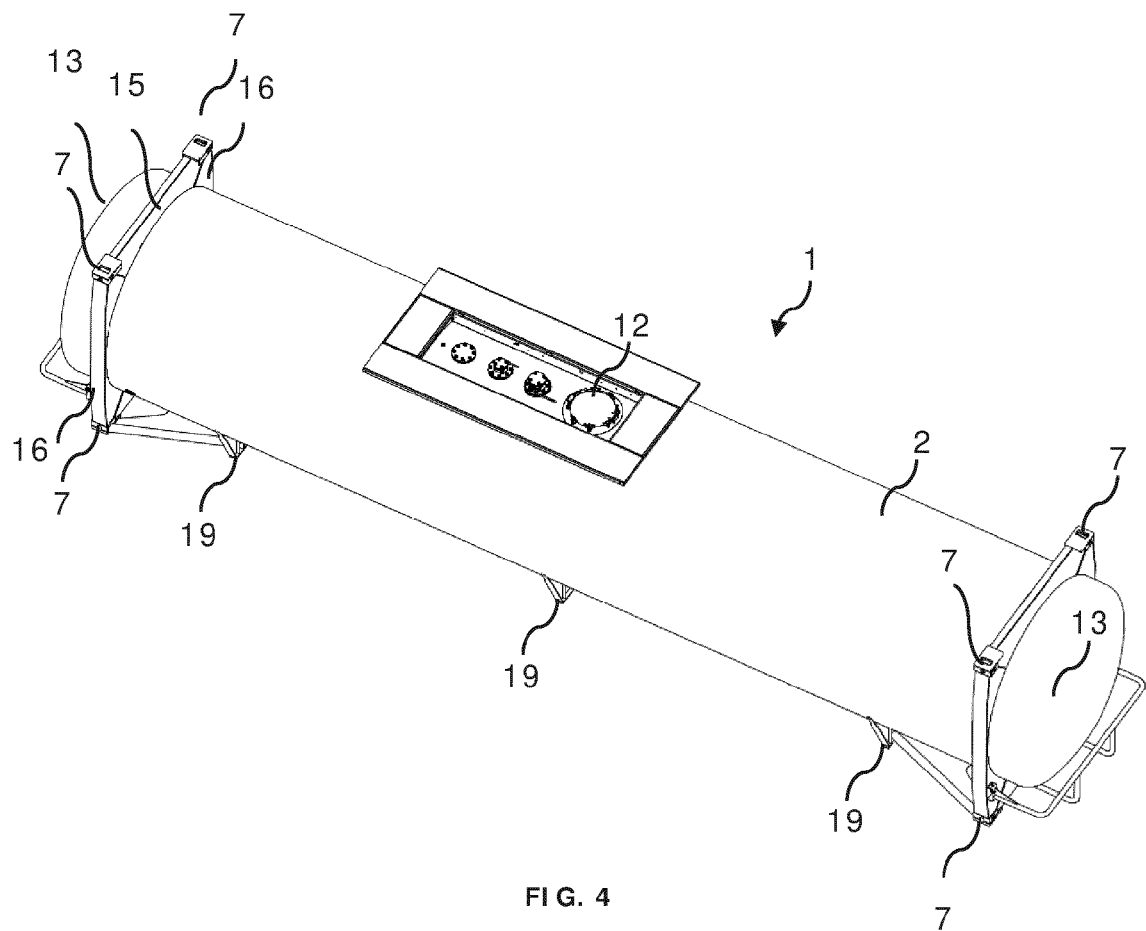


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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