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(54) **MOBILE TANK CONTAINER**

(57) The present invention relates to a mobile tank container (1) for filtering a medium, preferably a liquid or a gas, comprising: (a) a tank vessel (2) for receiving, storing, and discharging the medium, (b) a frame (3) whose external dimensions are defined in ISO standard 668:2020, and wherein the frame fully encloses the tank vessel, and (c) a skid (9) suitable for loading and unloading the tank container onto and from means of transport, wherein the dimensions of the skid are defined in DIN standard 30734:2018 and is provided with two or more hook points (11).

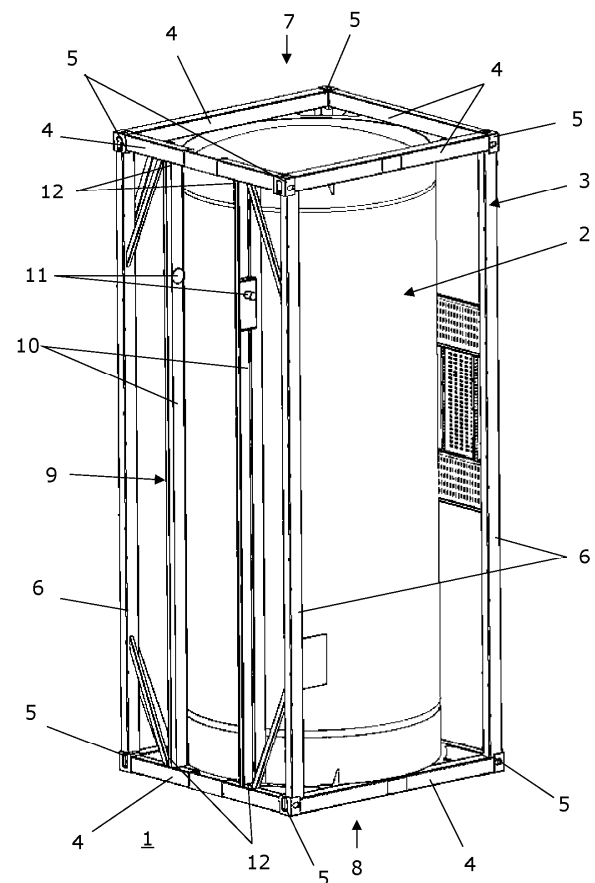


FIG. 1

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Description

TECHNICAL FIELD

[0001] The invention relates to a mobile tank container for receiving, storing, and discharging a medium.

BACKGROUND ART

[0002] In the prior art, various methods and apparatus for storing a medium are known. Storage often takes place in a tank container. These conventional tank containers, due to their static nature and size, are not easily adaptable to changing circumstances or location requirements. This makes them unsuitable for applications where flexibility and mobility are of crucial importance.

[0003] Furthermore, tank containers are nowadays deployed to filter these media, for example by means of activated carbon filters present in the tank container. These filters are generally fixed installations, permanently mounted at one location, and are often manufactured from steel with a protective internal coating to resist corrosion. Despite their prevalence and general effectiveness in removing contaminants such as organic substances, chemicals, and odors, these systems have significant limitations.

[0004] In addition, activated carbon filters require regular replacement and maintenance, which in the current filters can lead to higher operational costs and potential interruptions in the filtration process. Also, the management of spent carbon is an environmental burden and logistical challenge, given the necessity for safe disposal or regeneration.

[0005] These shortcomings in the existing technology underscore the need for innovative storage and filtration solutions that are mobile, versatile, and cost-efficient, with the capacity to store and/or treat multiple types of media, are easily adaptable to various operational requirements, and offer improved sustainability and environmental friendliness.

[0006] EP3870339 discloses an activated carbon adsorber unit, wherein an activated carbon adsorber is provided with a frame-like transport rack for transport by means of a vehicle for goods transport, wherein the transport rack and the housing of the activated carbon adsorber are made of an ISO tank container. However, handling of this unit between the various positions still proves to be difficult. In particular, the conversion from a horizontal transport position to a vertical operational position must take place via twistlock systems. The hooking on and locking of such twistlock connections requires a very precise positioning of the transport vehicle relative to the container. This makes the process time-consuming and error-prone. Furthermore, the coming loose of a coupled twistlock connection during or after handling entails considerable safety risks. There accordingly exists a need for a solution that simplifies the handling from horizontal to vertical position and avoids the aforemen-

tioned safety risks.

[0007] EP3170696 describes a silo positioning device, for a commercial vehicle and a commercial vehicle with such a container positioning device.

[0008] The present invention aims to find at least a solution for some of the above-mentioned problems or disadvantages. An object of the invention is to provide a method which overcomes these disadvantages.

SUMMARY OF THE INVENTION

[0009] In a first aspect, the present invention relates to a mobile tank container according to claim 1. Preferred embodiments of the mobile tank container are set out in the dependent claims.

[0010] Specifically, the invention provides a mobile tank container comprising:

- a. a tank vessel for receiving, storing, and discharging the medium,
- b. a frame of which the external dimensions are defined in ISO standard 668, and wherein the frame fully encloses the tank vessel, and
- c. a skid suitable for loading and unloading the tank container onto and from means of transport, wherein the dimensions of the skid are defined in DIN standard 30734 and wherein the skid is provided with two or more hook points, and wherein the skid is located within the external dimensions of the frame.

[0011] The present invention provides an improved mobile tank container, wherein the tank container can be easily switched between a horizontal and a vertical position. This is achieved by the presence of both an ISO frame and a DIN skid with hook points.

[0012] This combination provides two complementary advantages that are each individually not obtained with the known systems. On the one hand, the DIN-compliant skid with hook points enables simple, safe, and low-precision-requirement handling from the horizontal transport position to the vertical operational position and vice versa, without making use of error-prone twistlock connections. On the other hand, the ISO-compliant frame guarantees the possibility of intermodal transport over long distances via a globally standardized transport and handling infrastructure. The combination of both standards in one product thus unites the advantages of flexible local handling with the advantages of global transport compatibility.

[0013] The skid is provided within the frame, so that the external dimensions of the complete mobile tank container do not deviate from the ISO standard. This provides a number of important advantages. First, the tank container remains fully compatible with the global intermodal transport infrastructure: the container can be stacked, loaded onto trucks, trains, and ships, and handled via standard lifting equipment without restrictions, exactly like a conventional ISO tank container. Second, protrud-

ing parts are avoided that could cause damage during transport to the skid itself, to adjacent containers, or to loading and unloading infrastructure such as quays and loading platforms. Third, the skid is protected by its position within the frame against external mechanical influences during transport and storage, which increases the service life and reliability of the skid.

[0014] In a preferred embodiment, the hook points are present at multiple positions, whereby the container can be brought into a tipping position on two sides or can be placed vertically. Furthermore, only one manhole is thereby required, which increases the structural integrity of the container and reduces the risk of leakages and maintenance costs.

[0015] Due to the improved mobility and versatility of the container, it can be deployed more efficiently in diverse storage and filtration processes and operational environments. The design enables compatibility with existing transport and handling infrastructures, which simplifies implementation and minimizes additional investments. Furthermore, the innovative construction facilitates the maintenance and replacement of filter materials, which reduces the operational costs and the environmental burden from waste management. The invention thereby provides a sustainable, cost-efficient, and broadly deployable solution for filtration applications, wherein the disadvantages of existing systems are overcome.

[0016] An object of the device is to promote the possibility of using the tank container horizontally and vertically. Another or further object of the device is to enable intermodal transport.

DETAILED DESCRIPTION

[0017] The invention relates to a mobile tank container, preferably a mobile tank container.

[0018] Unless otherwise defined, all terms used in the description of the invention, including technical and scientific terms, have the meaning commonly understood by a person skilled in the art to which the invention pertains. For a better understanding of the description of the invention, the following terms are explicitly defined.

[0019] The term "mobile" refers to the ability of the tank container to be moved.

[0020] The term "DIN standard" refers to the standardization systems developed by the German Institut für Normung, which translates to the German Institute for Standardization. DIN standards form a set of technical specifications and guidelines that have been established to ensure consistency, efficiency, and safety in various industries and fields. To bring the tank container from the horizontal transport position to the vertical operational position, use is made of special trailers or roll-off tipper vehicles. DIN standard 30734 specifies the connection dimensions and requirements, including the magnitude of the alternating forces and the maximum permissible filling weight under static load.

[0021] The term "tank container" refers in this context to a tank vessel in a frame that provides a wholly or partially enclosed space that can be used to receive, store, and transport a medium; furthermore, a tank container is further provided with elements that are generally known for filling, receiving, storing, inspecting, and transporting a medium. These elements may further consist of structures such as a manhole, an inlet or outlet, connecting pipes, a ladder, means of transport such as hooks or wheels, etc. The tank container may have a "manhole" in the tank vessel - (i.e., an inspection or maintenance opening), which is the top opening or the opening and the side wall of a tank container and generally serves as an access point for making connections, inspection, valve adjustments, or performing maintenance. Usually, a manhole is positioned in the center of the long side of the tank container.

[0022] As used herein, the term "ISO standard" generally refers to the dimensions (e.g., sizes and volumes) established by the International Organization for Standardization (ISO). ISO is an international organization that develops standards that ensure that products, services, and systems are safe, reliable, and of good quality. The term "ISO" in general implies conformity with or use of specific standards developed by ISO that are relevant to the design, production, and testing procedures of the mobile tank container and its components. This includes, but is not limited to, standards related to quality, safety, efficiency, and compatibility with other systems or equipment. In the present context, this indicates that the mobile tank container may comply with specific ISO standards applicable to the design, manufacture, safety, and quality of containers used for the transport and storage of gases and other media. This may refer, for example, to ISO 668.

[0023] The term "ISO corner casting" refers to a structural element located at the corners of a tank container, as defined by ISO. It is a reinforced metal fitting that is designed to reinforce the corners of the container and to enable the stacking and moving of containers. These corner fittings have a standardized design, enabling containers to be easily loaded and unloaded onto trucks, trains, and ships using cranes and other lifting equipment.

[0024] The term "media" or "medium" refers to substances such as liquids (e.g., water, oil), gases (e.g., air), or powders that are filtered or processed in the described mobile tank container.

[0025] The term "means of transport" refers in this context to a device designed for transporting the tank container. Preferably, it is a motorized vehicle that is commonly used for the transport of the tank container. Examples of means of transport are trucks, boats, trains, etc. "Intermodal transport" refers in the present invention to all forms of transport in which two or more different forms of transport are combined, such as road, sea, and rail transport.

[0026] The term "skid" refers in this context to a supporting structure or chassis on which the tank container

rests and by means of which it is transported.

[0027] The terms "filtering" or "purifying" are to be understood as the process whereby unwanted constituents are removed from a medium, in particular a gas or a liquid, by passing this medium through the activated carbon filter bed that is capable of adsorbing or absorbing contaminants from the medium. This process results in the reduction or elimination of chemical, physical, or biological contaminants and renders the medium more suitable for safe use, further processing, or discharge into the environment.

[0028] As used in this document, "a", "an" and "the" refer to both the singular and the plural, unless the context clearly dictates otherwise. For example, "a segment" means one or more than one segment.

[0029] The terms "comprise", "comprising", "consist of", "consisting of", "provided with", "contain", "containing", "encompass", "encompassing", "include" and "including" are synonyms and are inclusive or open terms indicating the presence of what follows, and do not exclude or preclude the presence of other components, features, elements, members or steps known from or described in the prior art.

[0030] The citation of numerical ranges by their endpoints includes all integers, fractions and/or real numbers between the endpoints, inclusive.

[0031] In a first aspect, the invention relates to a mobile tank container for receiving, storing, and discharging a medium.

[0032] In a specific embodiment, the invention relates to a mobile tank container for filtering a medium, preferably liquids or gases. A mobile tank container provides a flexible and efficient solution for filtering a medium, essential in diverse sectors such as industry, the chemical sector, energy production, and medical applications. Often, a fixed filtration system is impractical, especially in situations where temporary or variable filtration requirements apply, or where a permanent installation is not feasible or cost-effective. This mobile tank container can easily be moved to different locations, thereby enabling on-site filtration, exactly where and when this is needed. Some projects or processes require only temporary filtration of a medium. In such cases, a mobile solution will reduce the costs and efforts associated with installing a permanent filtration system.

[0033] According to one embodiment, the mobile tank container is suitable for filtering a gas stream comprising, for example, nitrogen, carbon dioxide, and/or methane, from which organic and inorganic contaminants are to be removed, such as preferably aliphatic hydrocarbons, aromatic hydrocarbons, sulfur- and nitrogen-bound organic components, halogenated organic components, hydrogen sulfide, ammonia, and/or mercury.

[0034] In another or further embodiment, the mobile tank container is suitable for filtering liquids, i.e., a liquid stream comprising, for example, water, organic solvents, and/or a combination of liquid media; preferably oil, alcohols, and/or esters, from which organic and inorganic

contaminants are to be removed, such as preferably aliphatic hydrocarbons, aromatic hydrocarbons, heavy metals, sulfur- and nitrogen-bound organic components, halogenated organic components, pesticides, herbicides, and/or pharmaceutical residues.

[0035] In a preferred embodiment, the mobile tank container comprises

- a. a tank vessel for receiving, storing, and discharging the medium, and
- b. a frame for repeated demountable connection of the tank container to a means of transport, wherein the frame fully encloses the tank vessel.

[0036] This enclosing structure provides robust protection for the tank vessel against external influences, such as mechanical damage during transport or exposure to environmental factors that could degrade the tank container. The complete enclosure of the tank vessel by the frame also provides improved stability and safety during loading and unloading, as well as during transport. In addition, this complete enclosure facilitates the implementation of additional safety measures, such as locks and seals, that prevent unauthorized access to the contents of the tank vessel.

[0037] The mobile tank container comprises a frame, wherein the frame is suitable for repeated demountable connection of the tank container to a means of transport. This frame is preferably beam-shaped and fully encloses the tank vessel. According to one embodiment, the frame thus comprises twelve ribs and eight corners, which form the corners of the tank container, and thereby provides a robust and stable structure. Furthermore, a plurality of cross beams are present that connect the corner posts to one another both at the top and at the bottom of the frame. This configuration contributes to the overall strength and durability of the tank container and facilitates a safe and efficient coupling to various means of transport.

[0038] The frame has a beam shape, which is formed by four cross beams that are parallel to the length of the tank vessel, wherein the length of the tank vessel extends from the top to the bottom of the tank vessel, wherein bottom and top in this context describe the bottom and top of the tank container in vertical position. Furthermore, the cross beams are connected to one another by means of corner posts via the corners, so that a beam-shaped frame is formed.

[0039] At each corner, ISO corner castings are preferably present that ensure compatibility with standard transport systems.

[0040] According to one embodiment, the frame comprises a maximum height of 2,600 mm, a maximum length of 6,100 mm, and a maximum width of 2,500 mm. According to another embodiment, the height can vary between 2,000 mm and 2,700 mm, preferably between 2,400 mm and 2,600 mm, and more preferably approximately 2,600 mm. The length can vary between 5,800 mm and 6,400 mm, preferably between 6,000 mm

and 6,200 mm, and more preferably approximately 6,100 mm. The width can vary between 2,400 mm and 2,600 mm, preferably approximately 2,500 mm.

[0041] According to a preferred embodiment, the frame is a standardized ISO frame, preferably a standardized 20ft ISO frame. Preferably, the mobile tank container complies with the standards of the International Organization for Standardization (ISO), preferably with a standardized 20ft ISO tank container. Both the frame and the tank vessel can fully comply with these international standards. This ensures that both the structural basis (the frame) and the specific storage element (the tank vessel) are consistent and compatible with the global industry standards as established by the ISO.

[0042] This choice for an ISO tank container offers numerous advantages. Conformity with international standards ensures that the tank container is compatible with various global means of transport, such as ships, trucks, and trains. This standardization not only facilitates the worldwide transport of the tank container, but also makes use of the intermodality that ISO tank containers make possible. As a result, the mobile tank container can be effortlessly transferred between different means of transport without the need to transfer the cargo. This increases the efficiency and flexibility in transport over long distances. In addition, ISO 20ft frames offer stability and robustness, as they are designed to withstand heavy loads and are suitable for stacking. Alternatively, the ISO tank container can also have a different standardized size, such as a 10ft, 30ft, 40ft, or 45ft ISO tank container.

[0043] According to a further embodiment, the frame is provided with ISO corner castings. ISO corner castings are designed to be compatible with the international standards for container transport and storage. The standard format and positioning of the ISO corner castings ensure compatibility and uniformity in the handling of containers throughout the world. They serve, for example, as connection points by means of which containers can be coupled to one another, stacked, and held securely in place during transport. These standardized corner fittings have contributed to the efficiency and global interoperability of container transport. ISO corner castings thus make it possible to securely and firmly attach the tank container to various means of transport. Moreover, the ISO corner castings ensure a high degree of stability and safety during transport and storage of the tank container. They ensure that the tank container remains firmly in place, even under heavy loads and in challenging conditions. This reduces the risk of damage to the tank container and to the surrounding equipment and infrastructure.

[0044] The external dimensions of the frame are preferably defined in ISO standard 668, specifically ISO standard 668:2020.

[0045] In a preferred embodiment, the mobile tank container comprises

- a. a tank vessel for receiving, storing, and discharging the medium, and

ging the medium, and

- b. a frame for repeated demountable connection of the tank container to a means of transport, wherein the frame fully encloses the tank vessel.

- c. a skid suitable for manipulating the tank container from a vertical to a horizontal position and vice versa.

[0046] The mobile tank container comprises a skid, provided on a side face of the tank container. This skid is designed to enable loading and unloading of the tank container onto and from the means of transport, as well as to enable easy manipulation of the tank container from a horizontal to a vertical position and vice versa. The placement of the skid on the underside increases the efficiency of the transport operations and contributes to the ease of use of the tank container.

[0047] Preferably, the skid is provided on the side face that, in a horizontal position, would form the bottom of the tank container. The skid is provided within the frame, so that the external dimensions of the complete mobile tank container do not deviate from the ISO standard.

[0048] The skid can be provided on the frame whereby it is attached at the top and bottom of the frame to two parallel corner posts, or directly attached to the outside of the tank vessel. In a preferred embodiment, the skid is attached at the top and bottom of the frame to two parallel corner posts and also to the outside of the tank vessel.

[0049] The skid is mounted by means of bolts, screws, rivets, adhesives, clamps, or the like.

[0050] According to one embodiment, the skid is equipped with at least two ribs that are positioned parallel to each other in the longitudinal direction of the tank vessel, wherein the length of the tank vessel extends from the top to the bottom of the tank vessel, wherein bottom and top in this context describe the bottom and top of the tank container in the vertical state.

[0051] These ribs can thus be provided on the frame whereby it is attached at the top and bottom of the frame to two parallel corner posts, or directly attached to the outside of the tank vessel. In a preferred embodiment, the skid is attached at the top and bottom of the frame to two parallel corner posts and also to the outside of the tank vessel.

[0052] This design provides structural stability and reinforcement for the skid, which is important for the safe loading and unloading of the tank container onto and from the means of transport. By positioning the ribs parallel and in the longitudinal direction, the load is distributed evenly across the skid, which reduces the risk of deformation or damage during transport. Moreover, this configuration provides better integration of the skid with the frame, thereby increasing the overall durability and robustness of the container. This contributes to a longer service life of the tank container and reduces maintenance costs, while providing a safe and reliable way of handling the container during transport processes.

[0053] The distance between the ribs may vary, but is preferably between 0.5 and 2 meters, more preferably

between 0.75 and 1.5 meters, even more preferably between 0.9 and 1.2 meters, and most preferably approximately 1 meter. This ensures an optimal balance between strength and flexibility, enabling the tank container to effectively bear the load without excessive stress or deformation.

[0054] According to a preferred embodiment, the skid is provided with two or more hook points for attaching the tank container to the means of transport and for manipulating the position of the mobile tank container. The hook points facilitate the lifting, dragging, or moving of the skid, and thus also the entire tank container. The precise location and shape of hook points on a skid may vary. The hook points may be located on the sides of the skid, and may be in the form of metal loops, pins, hooks, eyes, or holes.

[0055] The hook points are preferably provided on the skid in pairs, which are positioned at the same height along both sides of the skid.

[0056] In a preferred embodiment, the mobile tank container comprises:

- a. a tank vessel for receiving, storing, and discharging the medium,
- b. a frame of which the external dimension is defined in ISO standard 668, and wherein the frame fully encloses the tank vessel, and
- c. a skid suitable for loading and unloading the tank container onto and from means of transport, wherein the skid is provided with two or more hook points, and wherein the skid is located within the external dimensions of the frame.

[0057] According to a preferred embodiment, the skid of the mobile tank container is configured to comply with DIN standard 30734, preferably DIN 30734:2018, such that the dimensions of the skid are defined in DIN standard 30734, preferably DIN 30734:2018.

[0058] According to a preferred embodiment, the tank container comprises an ISO-compliant tank container and a DIN-compliant skid. More preferably, the tank container comprises an ISO 20ft tank container and a skid which complies with DIN standard 30734.

[0059] In a particularly preferred embodiment, the mobile tank container comprises:

- a. a tank vessel for receiving, storing, and discharging the medium,
- b. a frame of which the external dimensions are defined in ISO standard 668, and wherein the frame fully encloses the tank vessel, and
- c. a skid suitable for loading and unloading the tank container onto and from means of transport, wherein the dimensions of the skid are defined in DIN standard 30734 and wherein the skid is provided with two or more hook points, and wherein the skid is located within the external dimensions of the frame.

[0060] In one embodiment, the mobile tank container comprises two skids as described herein, such that the mobile tank container can be manipulated along two side faces from a vertical to a horizontal position and vice versa.

[0061] The mobile tank container can easily be brought from a horizontal transport position into a vertical operational position. A notable feature in this regard is the ability to stack the tank containers, which results in a considerable saving of space. In contrast to other methods, such as the use of silos that can only be placed vertically, these empty tank containers can be stacked up to as many as six high. As a result, in the same space where normally only two vertical cement silos would fit, at least six tank containers can be placed. Alternatively, the mobile tank container can be stacked to a minimum of 2, 4, 6, 8 or even more containers high.

[0062] In a specific embodiment, the tank vessel is configured as a filter, wherein an activated carbon filter bed suitable for adsorbing contaminants from a medium is provided in the tank vessel. The filter bed provided with activated carbon will remove contaminants from the medium, preferably a gas, by adsorbing them, which means that the contaminants are retained on the surface of the activated carbon. Activated carbon is particularly effective in adsorbing a wide range of contaminants, including organic compounds, odors, tastes, chemicals, and other undesirable substances. This filter bed can take various forms, ranging from granules to other structures such as mats or membranes. The activated carbon can be packaged in bags, cartridges, or loosely filled into a compartment within the tank vessel.

[0063] Activated carbon or activated charcoal has an excellent capacity to adsorb contaminants thanks to its high microporosity and high surface area. Activated carbon is particularly effective in removing organic compounds, solvents, pesticides, heavy metals, odors, and other gases, thereby providing a versatile and powerful solution for a wide range of purification challenges. Activated carbon can be regenerated or cleaned of the adsorbed contaminants by heating it or by means of a chemical treatment, thereby making it reusable for multiple filtration cycles. The mobility of the tank container thereby increases operational flexibility. This makes the mobile tank container an optimal choice for locations that require temporary or specific purification actions.

[0064] According to a further or alternative embodiment, the tank vessel has a total volume of at least 14,000 liter and at most 27,000 liter, more preferably between 18,000 liter and 25,000 liter and most preferably between 20,000 liter and 24,000 liter. This considerable capacity makes the tank vessel extremely suitable for large-scale industrial applications where large quantities of medium must be processed. It also contributes to the optimization of the logistical processes by reducing the number of transport movements required for the same quantity of medium, which has a cost-saving effect and increases operational efficiency. It further ensures an

optimal utilization of the space within the mobile tank container, while still maintaining a practical and manageable size for transport and storage.

[0065] According to a further or alternative embodiment, the volume of activated carbon when the mobile tank container is in use is at most 25 m³, preferably at most 24 m³, more preferably at most 23 m³, more preferably at most 22 m³, more preferably at most 21 m³. Further, the volume of activated carbon when the mobile tank container is in use is at least 5 m³, preferably at least 10 m³, more preferably at least 15 m³, more preferably at least 17 m³, more preferably at least 19 m³. In this context, the tank container is operational and is used to store a medium and/or to filter it through the activated carbon, which absorbs and removes contaminants. "In use" thus implies that the filtration process is active and that the specified quantities of activated carbon are actually being utilized to achieve the intended purification performance. In some embodiments, the volume of activated carbon may, for example, be between 15 and 25 m³, preferably between 18 and 22 m³, more preferably between 19 and 21 m³, and in the most preferred embodiment approximately 20 m³.

[0066] According to a further or alternative embodiment, the tank vessel is manufactured from stainless steel, preferably from 316 stainless steel. One of the most important advantages of using stainless steel is its superior corrosion resistance. This means that the mobile tank container requires less maintenance and has a longer service life. When using stainless steel, therefore, no internal coating is required for corrosion protection. It reduces the risk that the tank vessel will leak during use as a result of corrosion. In particular, 316 stainless steel is a particularly favorable choice of material due to its increased corrosion resistance compared to other types of stainless steel. The use of 316 stainless steel significantly increases the service life of the tank vessel, because it is more resistant to both oxidation and chemical damage compared to other types of steel. This material is particularly suitable for applications where hygiene and cleanliness are important, such as in the storage or the filtering and storage of gases and liquids in industrial and environmental applications. 316 stainless steel contains molybdenum, which increases the resistance to many chemical environments and corrosive substances. The choice of 316 stainless steel not only guarantees a longer operational service life, but also contributes to the safety and effectiveness of the filtration process, by ensuring that the tank vessel remains free of contamination that could affect the medium.

[0067] According to a further or alternative embodiment, the tank vessel is entirely manufactured from 316 stainless steel. According to another embodiment, the tank vessel may be partially manufactured from 316 stainless steel. Although 316 stainless steel is preferred, the use of other types of stainless steel, such as 304, 310, or 321 stainless steel, may also be advantageous, depending on the specific application and operating condi-

tions. Each of these types of stainless steel has its own unique set of properties that may make them suitable for certain applications. For example, 304 stainless steel has excellent formability, while 310 stainless steel has excellent oxidation resistance at high temperatures.

[0068] According to one embodiment, the tank vessel is cylindrical or capsule-shaped. This specific shape of the tank vessel contributes to flow optimization within the tank, which will result in improved filter performance. With "shape" is meant in this context the principal shape of the tank vessel, with the exception of local protrusions or curvatures caused by, among other things, closing mechanisms. In general, a cylindrical tank vessel will provide the optimal durability and structural properties due to its shape. Also, due to the round shape, there may be no specific weak points present.

[0069] According to one embodiment, the tank vessel is an ADR-approved tank. This means that the tank container complies with strict safety standards established by the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR). This provides additional safety by minimizing the risk of incidents during the transport and storage of hazardous substances. Moreover, the ADR-approved tank container can also be used for the transport and storage of non-hazardous substances, thereby increasing the versatility of the tank container.

[0070] The tank vessel may further comprise one or more medium outlets and medium inlets. Preferably, the one or more medium outlets and medium inlets are located within the frame. By integrating the medium inlet and outlet within the frame and the tank vessel, these components are protected against physical damage during transport or during normal use, especially in a mobile context where the tank may be exposed to variable external influences. The integration of these inlets and outlets along the wall enables more efficient use of the available space, which is especially important in confined environments or when the tank container must be mounted on a means of transport. By positioning inlets and outlets close to or in the frame, the connection points can be made more robust and secure, which increases the structural integrity and reduces the risk of leakage, a crucial consideration for the safe handling of liquids and gases. By strategically positioning the inlet and outlet along the wall of the vessel, the flow dynamics within the tank vessel can also be optimized, thereby minimizing dead zones and promoting more efficient flow, and optionally also filtering.

[0071] In a particularly preferred embodiment, a mobile tank container is described herein for filtering a medium, preferably a liquid or a gas, comprising:

- a. a tank vessel for receiving, storing, and discharging the medium, the tank vessel comprising an activated carbon filter bed provided within the tank vessel for adsorbing contaminants from the medium,
- b. a frame of which the external dimensions are

defined in ISO standard 668, and wherein the frame fully encloses the tank vessel, and

c. a skid suitable for loading and unloading the tank container onto and from means of transport, wherein the dimensions of the skid are defined in DIN standard 30734, wherein the skid is provided with two or more hook points, wherein the skid consists of two or more ribs, wherein each rib is provided with at least one hook point, wherein the ribs are attached to the tank vessel and are configured as upright ribs along the length of the tank vessel, and wherein the ribs are attached at their ends to the frame.

[0072] In a second aspect, the invention relates to a use of the mobile tank container as described herein for filtering a medium, preferably for filtering a liquid or a gas.

[0073] In a second aspect, the invention relates to a use of the mobile tank container as described herein wherein the mobile filter device is transported horizontally and is placed vertically during use as a filter or as storage.

[0074] In what follows, the invention is described by way of non-limiting examples or figures illustrating the invention, which are not intended and should not be interpreted as limiting the scope of the invention.

FIGURE DESCRIPTION

[0075]

Figure 1 shows a perspective view of a mobile tank container in a vertical position according to an embodiment of the present invention.

Figure 2 shows a side view of a mobile tank container in a vertical position according to an embodiment of the present invention.

Figure 3 shows a perspective view of a skid according to an embodiment of the present invention.

[0076] The mobile tank container (1) in figures 1 and 2 is configured to enable receiving, storing and discharging of a medium. Figures 1 and 2 show the mobile tank container (1) in a vertical position. In figure 2, the frame is not shown in full.

[0077] These figures show a mobile tank container (1) that is designed for storing and/or filtering media, such as liquids or gases. Centrally within the structure, the tank vessel (2) is positioned, the compartment where the medium is stored and/or where the filtration process takes place. The tank vessel (2) is embedded in a robust frame (3), which has a beam shape. The beam shape is formed by four cross beams (6) that lie parallel to the length of the tank vessel (2), wherein the length of the tank vessel (2) extends from the top (7) to the bottom (8) of the tank vessel (3), wherein bottom and top in this context describe the bottom and top of the tank container in the vertical position. Furthermore, the cross beams (6) are connected to each other by means of corner posts (4)

via the corners (5), so that a beam-shaped frame (3) is formed, of which the external dimensions are preferably defined in ISO standard 668. At each corner, ISO corner castings are located that ensure compatibility with standard transport systems.

[0078] In figures 1, 2, and 3, a skid (9) can be seen. This ensures that the tank container (1) is easily manipulated from a vertical to a horizontal position and vice versa. The skid (9) is provided along one or more side faces of the tank container (1), in this embodiment along one side face. The skid (9) consists of two ribs (10), wherein each rib (10) is provided with at least one hook point (11), in this case embodied as a pin.

[0079] In figure 1, each rib (10) comprises one pin (11) in the upper half of the skid (9), while in figures 2 and 3, a skid is shown wherein each rib (10) has two pins (11) both in the lower half and the upper half of the skid (9). Herein, the "upper half" is to be understood as the half against the top side (7) of the tank container (1). A pair of hook points is always provided at the same height on the skid.

[0080] The ribs (10) are attached to the tank vessel (2) and are embodied as upright ribs along the length of the tank vessel (2). The ribs (10) are attached at their ends (12) to the corner posts (4) of the frame (3).

[0081] The tank container comprises an ISO 20ft compliant frame and a DIN 30734 standard compliant skid. The tank vessel is placed in the center of a steel frame. The frame is made according to ISO standards and is preferably 20 feet (6.06 m) long, 8 feet (2.44 m) wide and 8 or 8.6 feet (2.44-2.60 m) high. By combining the frame and connection specifications in accordance with DIN standard 30734 with and within the ISO standard of a tank container, a combination of advantages arises as described herein.

[0082] The tank vessel (2) may further comprise inlets and outlets for discharging the activated carbon and the medium (not visible in the figures).

Claims

1. A mobile tank container (1) for receiving, storing, and discharging a medium, comprising:
 - a. a tank vessel (2) for receiving, storing, and discharging the medium,
 - b. a frame (3) whose external dimensions are defined in ISO standard 668:2020, wherein the frame fully encloses the tank vessel, and
 - c. a skid (9) suitable for loading and unloading the tank container onto and from means of transport, wherein the dimensions of the skid (9) are defined in DIN standard 30734:2018 and wherein the skid (9) is provided with two or more hook points (11), and wherein the skid (9) is located within the external dimensions of the frame (3).

2. Mobile tank container (1) according to claim 1, wherein the skid (9) consists of two or more ribs (10), wherein each rib (10) is provided with at least one hook point (11). 5
3. Mobile tank container (1) according to claim 2, wherein the skid (9) is provided on a side face of the frame (3), wherein the skid (9) is provided with at least two parallel ribs (10) located in a longitudinal direction, wherein each rib (10) comprises at least one hook point (11). 10
4. Mobile tank container (1) according to claim 3, wherein the ribs (10) are attached to the tank vessel (2) and are embodied as upright ribs along the length of the tank vessel (2). 15
5. Mobile tank container (1) according to claim 4, wherein the ribs (10) are attached at their ends (12) to the frame (3). 20
6. Mobile tank container (1) according to any one of the preceding claims, wherein the tank vessel (2) is further suitable for filtering the medium. 25
7. Mobile tank container (1) according to claim 6, the tank vessel (2) comprising an activated carbon filter bed provided within the tank vessel (2) for adsorbing contaminants from the medium. 30
8. Mobile tank container (1) according to any one of the preceding claims, wherein the frame (3) has a beam shape formed by four cross beams (6), eight corner posts (4), and eight corners (5). 35
9. Mobile tank container (1) according to any one of the preceding claims, wherein the frame (3) has a maximum height of 2,600 mm, a maximum length of 6,100 mm, and a maximum width of 2,500 mm. 40
10. Mobile tank container (1) according to any one of the preceding claims, wherein the tank vessel is manufactured from stainless steel, preferably from 316 stainless steel. 45
11. Mobile tank container (1) according to any one of the preceding claims, wherein the tank vessel is a cylindrical- or capsule-shaped tank vessel.
12. Mobile tank container (1) according to any one of the preceding claims, wherein the tank vessel (2) is provided with one or more medium inlets and outlets. 50
13. Use of a mobile tank container according to any one of the preceding claims for filtering a medium, preferably for filtering a liquid or a gas. 55
14. Use of a mobile tank container according to any one

of claims 1-12, wherein the mobile tank container is transported horizontally, and wherein the mobile tank container is placed vertically during use as a filter or as storage.

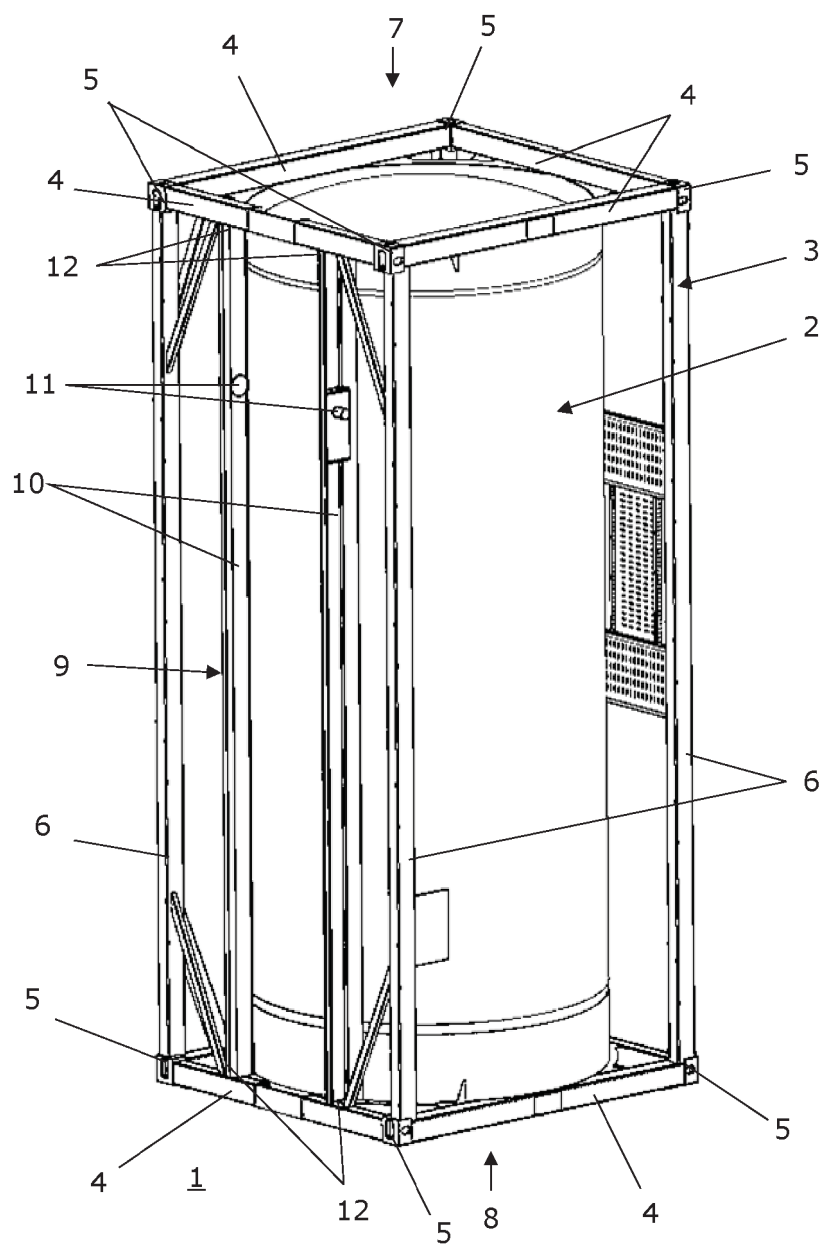


FIG. 1

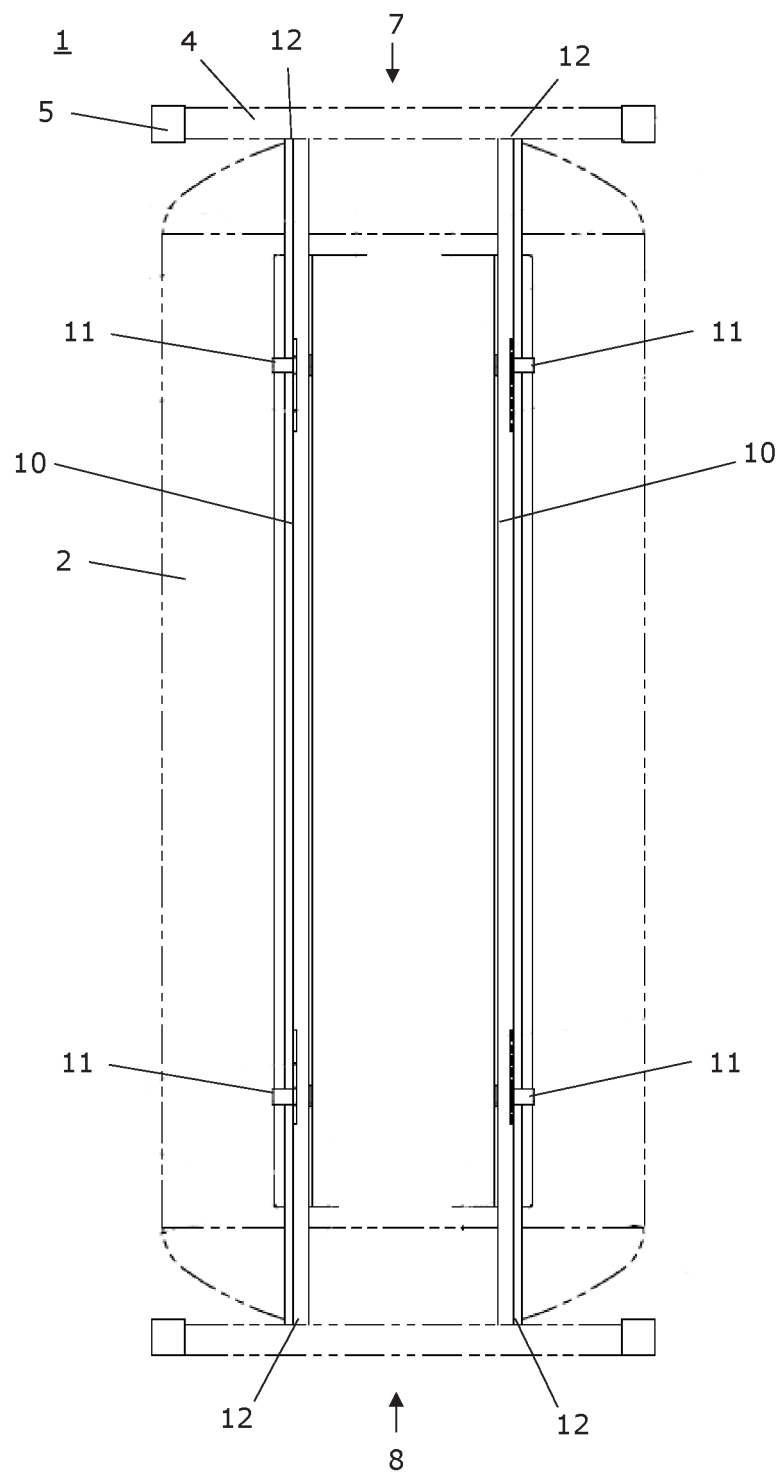


FIG. 2

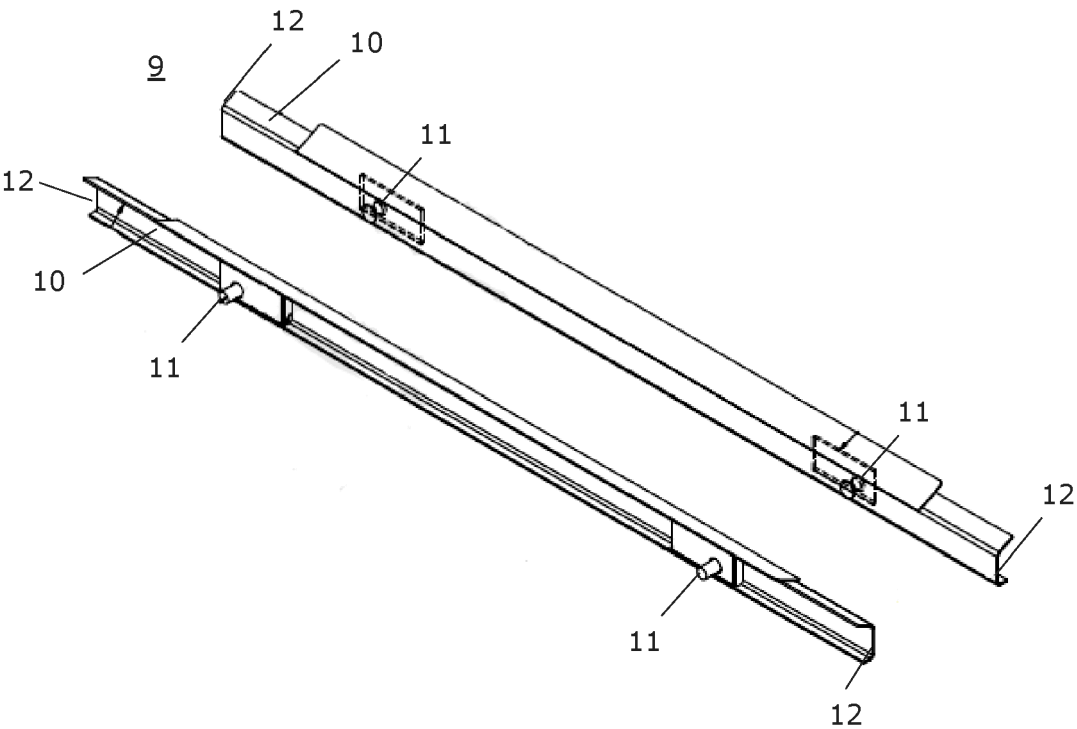


FIG. 3



EUROPEAN SEARCH REPORT

Application Number

EP 26 16 9876

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