

Title: Assembly of an insulated container and a tank

5 The invention relates to an assembly of an insulated container and a tank which is positioned inside the container, the insulated container being provided with a heating or cooling device and being provided on at least one side with doors.

10 An assembly of the type described in the preamble is known from international patent application WO 97/29030. This publication has disclosed a container in which there is a tank for storing and transporting hydrocarbon products, such as for example bitumen. Inside the container there is a heating installation in order as far as possible to keep the bitumen in the tank in the liquid state. According to this publication, the tank is provided on the top side with a filling opening for loading and unloading the tank inside the container. Moreover, according to this publication the tank is fixedly attached to the inside of the container.

15 The design of the tank according to WO 97/29030 and the fact that this tank is secured in the container means that it is necessary to design a container which is specifically suitable for accommodating the tank. Since the tank is fixedly connected to the interior of the container, the container according to the prior art can only be used for one purpose, namely that of packing and transporting hydrocarbons.

20 The object of the present invention is to provide an assembly of the type described in the preamble in which, as far as possible, it is possible to use standard components which do not have to be designed or adapted for a specific purpose.

25 In the present invention, this object is achieved by the fact that the assembly according to the invention is characterized in that the tank is arranged removably inside the container, and in that the tank comprises connections, such as an opening for filling and emptying a tank, which connections are arranged in the vicinity of an end wall of the tank, the tank being positioned inside the container with the connections in the vicinity of the doors, so that the connections can be reached as soon as the doors of the container are opened.

30 In this case, it is advantageous if the connections are arranged in the vicinity of the end wall of the tank, in such a manner that the connections can be reached as soon as a door of the container is opened.

This measure makes it possible to use a so-called "reefer box" for the assembly according to the invention. These reefer boxes are known in the prior art and are designed in such a way that they are provided at one end wall with doors allowing access to the interior of the container. The cooling device is integrated in the opposite
5 end wall. To ensure that the interior of the container can be cooled effectively with the aid of the integrated cooling device, the inner walls of the container are lined with insulating material, which in turn is covered on the inside by a further inner wall. Reefer boxes of this type are used in the prior art inter alia for transporting fruit or other goods which need to be cooled while they are being transported.

10 Reefer boxes are generally leased from an owner by users or are hired in a similar arrangement. These "lessees" will return the containers to the owner after use. The reefer boxes are generally driven in with the aid of pallet trucks or lifting devices. Since the inner walls of the reefer boxes are not particularly strong, it is easy for the walls of the reefer boxes to become damaged.

15 A reefer box whose inner walls have been damaged in use is not easy to hire out in practice. Therefore, a leasing company often has large numbers of damaged reefer boxes in stock, which on the one hand are not sent for repair and the other hand can no longer be hired out to users.

Arranging a tank in the interior of the insulated container prevents users
20 from driving into the reefer box with pallet trucks or lifting devices, for example. The container is filled by simply pushing a tank into the container. During this operation, the inside of the reefer box will not be damaged. The tank can remain inside the container and does not have to be removed from the container in order for the tank to be unloaded. This is achieved as a result of the connections being positioned in the
25 vicinity of the end wall of the tank, which tank is located in the vicinity of the doors of the container. It is possible to secure the connections in such a manner that they can be reached once only one door has been opened.

Reefer boxes are frequently provided with two doors. Normally, the right-hand door is opened first, after which the left-hand can then be opened. As a result of
30 all the connections being arranged on one side of the tank, it is possible to make all the connections accessible after only one door has been opened.

According to the invention, it is possible for the external dimensions of the tank to substantially correspond to the internal dimensions of the insulated container. In

use, it is advantageous for the tank to be attached to at least one of the walls of the container.

The tank inside the insulated container can be used to transport fluids, such as for example fruit juices, which have to be cooled during transport. The fluids are
5 pumped into the tank, after which the tank can be cooled using the cooling installation which is present and the insulation of the walls of the container which is also present. One effect of arranging the tank inside the container is that loading and unloading can be carried out much more quickly and inexpensively than with containers according to the prior art. Moreover, packaging material is saved compared to the "drum-in-box"
10 system according to the prior art. Furthermore, the use of the tank means that the entire loading weight of the container is utilized.

In use, the tank will be more or less permanently present inside the insulated container. To prevent the tank from moving with respect to the walls of the container, it is advantageous if this tank were to be attached to one of the walls of the
15 container. Since the bottom wall of an insulated container is generally formed from I-shaped/T-shaped profile sections, it is obvious for the tank to be attached to the bottom wall of a container.

In order for the tank to be securely attached to one of the walls of the container, it is advantageous for the tank to be provided with supports, the supports
20 being attached to one of the walls of the container.

In this case, it is possible for the tank, in its longitudinal direction, to comprise a front side and a rear side, the tank, in use, having its rear side pushed into the insulated container, the tank being provided, in the vicinity of its rear side, with supports, which supports comprise elements, one wall of the container being provided
25 with corresponding wedge-shaped elements, all this in such a manner that the wedge-shaped elements on the tank, when the tank is being positioned in the container, are received in the corresponding elements on the wall of the container. Moreover, it is possible for the tank to comprise, on its front side, supports which are attached, by attachment means, to one of the walls of the container.

30 In use, the tank can be pushed into the insulated container from the door side. According to the invention, and as stated above, the tank may be provided with supports which are situated at the front side and at the rear side of the tank. In the vicinity of the door side of the insulated container, these supports may be attached to

the bottom wall of the container with the aid of attachment means, for example between the T-profiles. To do this, it is possible to use nuts and bolts or, for example, a tensioning system in which an eccentric is arranged. At the rear side of the tank, i.e. at that side of the container which is remote from the door side, there is no space for a user to attach the supports of the tank to one of the walls of the container. Therefore, it is advantageous if a wedge-shaped element is attached to the supports, which element, when the tank is being positioned in the container, can be received in an associated attachment element in which there is a recess in which the wedge-shaped element of the tank can be received.

Furthermore, according to the invention it is possible for the tank to be designed as an unpressurized vessel. In this case, it is possible for the wall of the tank to be designed in such a manner that it can be deformed under the influence of the fluid which is introduced into the tank. This measure makes it possible for the tank to swell slightly in use when the tank is being filled, so that it fixes itself against the inner walls of the container. This further prevents movement of the tank with respect to the walls of the container.

Furthermore, according to the invention it is possible for the insulated container to include filler cushions or bags which are to be arranged between the inner walls of the container and the outer walls of the tank. It is possible for the position of the tank inside the container to be additionally ensured through the use of these cushions or bags. These cushions or bags may, for example, be composed of a plastics material, such as for example a soft plastics material. It is also conceivable for the elements to be designed as an element which can be inflated, so that the elements clamp themselves securely, under internal pressure, between the outer wall of the tank and the inner wall of the container.

For daily use, it is advantageous for the tank to comprise a filling opening, a safety valve and a manhole and for the tank to be provided with a cleaning device for cleaning the tank. In this case, it is advantageous for the filling opening and/or the safety valve and/or the manhole and/or the spraying installation to be arranged in the vicinity of the front side of the tank, to one side of a vertical centre line of the tank.

In the insulated containers according to the prior art, it is customary for the right-hand door to be opened first, followed by the left-hand door. If the filler pipe connection, the manhole, the cleaning pipe connector and the air inlet/safety valve are

now all arranged on one side of the tank, specifically the right-hand side of the tank, only the right-hand door of the insulated container has to be opened in order to allow the necessary work to be carried out on the tank.

The invention will be explained below with reference to the appended
5 figures, in which:

Figure 1 shows a view of an insulated container, from its door side, with a tank inside it.

Figure 2 shows a side view of the container shown in Figure 1, with a tank inside it.

10 Figure 3 shows the way in which a support is attached to the outer wall of a tank for the purpose of securing the tank inside the container.

Figures 4a and 4b show views of the way in which the supports are attached to a wall of the container, at the rear side of the tank.

15 Figures 5a and 5b show views of the way in which the supports are attached, on its front side.

Figure 1 shows a view of an insulated container 1, from its door side, inside which there is a tank 2. The external dimensions of the insulated container 1 correspond to the external dimensions of standard seaborne containers or ISO containers. The containers are generally composed of a top wall 3, a bottom wall 4 which runs parallel thereto and side walls 5 and 6 which run transversely thereto. On one side, these walls
20 are closed off by means of an end wall 7. On the opposite side, the walls 3, 4, 5 and 6 are closed off by means of one or more doors (not shown).

The walls 3, 4, 5 and 6 of the container 1 shown in Figure 1 are provided with an insulating layer. A cooling device is integrated in the end wall 7 of the
25 container 1 (cf. Figure 2), with the aid of which cooling device the interior of the container 1 can be cooled. The inside of the walls 3, 4, 5 and 6 are generally fragile. It is therefore necessary to prevent the possibility of these walls being damaged in use, for example while the interior of the container 1 is being filled and emptied. To minimize damage to the walls 3, 4, 5 and 6, a tank 2 is positioned between the respective walls.
30 This tank is designed in such a manner that its outer walls substantially adjoin the inner walls of the container 1.

The tank 2 may be designed as a so-called unpressurized vessel. To enable the tank 2 to be filled, this tank is firstly provided with a filler pipe connection 10. To

counteract any excessive build-up of pressure in the tank, the tank 2 is also provided with a safety valve 11. The inside of the tank 2 can be cleaned as a result of the presence of a cleaning pipe 12 which is provided, in the vicinity of the wall of the tank 2, with a cleaning pipe connector. In use, it is possible that it may be necessary for a person to be able to enter the inside of a tank 2. For this reason, the wall of the tank 2 is additionally provided with a manhole 14.

In use, it is important that the tank 2 should not be able to move with respect to the container 1. If the tank 2 were to be positioned freely inside the container 1, numerous problems may arise if the container is used, for example, as a seaborne container and the content of the tank 2 is exposed to fluctuating loads. To attach the tank 2 to the inner walls of the container 1, the tank is provided with so-called supports 15. These supports 15 can be attached to, for example, the bottom wall 4 of the container 1 with the aid of attachment elements. This will be explained below with reference to Figures 3, 4a, 4b, 5a and 5b.

Correct positioning of the tank 2 with respect to the outer walls of the container 1 is achieved not only by means of the supports 15 on the outer wall of the tank 2, but also can be achieved by the wall of the tank 2 being designed in such a manner that it can swell slightly under the influence of a load which is introduced into the tank 2. This can be achieved by providing the wall of the tank 2 with a certain degree of flexibility. During filling, the wall of the tank 2 will seek to swell outwards and, as a result, will be clamped securely against the inner walls of the walls 3, 4, 5 and 6. It is also possible for filler elements 16 to be positioned between the inner wall of the container 1 and the outer wall of the tank 2. These filler elements are diagrammatically indicated with the aid of dot-dashed lines in Figures 1 and 2. In use, it is possible to consider plastic elements which are designed, for example, in the form of elements made from foamed plastic. It is also possible for the elements 16 to be designed in such a manner that they are inflatable, so that the elements clamp themselves securely between the walls of the tank 2 and the container 1 under an internal air pressure.

As shown in Figure 1, the manhole 14, the cleaning pipe connector 13, the filling pipe connector 10 and the safety valve 11 are all attached on the right-hand side of the tank 2. The advantage of this measure is that in use only the right-hand door (not shown) of the insulated container 1 has to be opened. The left-hand door can remain

closed. If there is not much space for opening the tank or if there is another reason for leaving the left-hand door closed, this arrangement offers numerous advantages.

Figure 2 shows a side view of the container 1 (in cross section), inside which there is a tank 2 (the outside of which is shown). It can be seen in Figure 2 that the top wall 3 and the bottom wall 4 are of relatively thick design, on account of the presence of an insulating layer in these walls 3 and 4. It can also be seen that a cooling device 20 is integrated in the end wall 7.

Figure 2 also shows that the tank 2 is attached against the wall of the container 1 with the aid of supports 15. Two first supports 15 are situated in the vicinity of the end wall 7 of the container 1. In the in-use position, these supports 15 are situated a long way from the opening 21 of the container 1, and therefore it is stated in the present text that these supports 15 are situated at the rear side of the tank 2. The other supports 15 are situated in the vicinity of the opening 21 in the container 1. Therefore, it is stated in the present text that these supports 15 are situated in the vicinity of the front side of the tank 2. Figure 2 also shows that the elements 16 can not only extend between the wall of the tank 2 and the walls 3, 4, 5 and 6 of the container, but also these elements 16 may be situated between, for example, an end wall 23 of the tank 2 and the end wall 7 of the container 1. Furthermore, Figure 2 shows that the cleaning pipe connector 13 is connected to more than one cleaning pipe 12. Side views of the manhole 14 and the filling opening 10 are also shown.

Figure 3 shows a possible way of attaching a support 15 to the outer wall of the tank 2. Attachment elements 30, with the aid of which the support 15 can be attached in this case to the bottom wall 4 (cf. Figures 1 and 2) of the container 1 can be seen on the underside of the support 15.

One possible way of attaching the supports 15 in the vicinity of the end wall is shown in Figures 4a and 4b. It will be clear that when a tank 2 is placed inside the container 1, there is no possibility of tightening attachment elements in the vicinity of the end wall 7. Therefore, attachment elements are provided which ensure that the tank is securely attached with respect to the container 1 as a result of a longitudinal movement of the tank with respect to the container. An attachment of this type is shown in Figures 4a and 4b. Before the tank 2 is pushed into the container 1, attachment elements 31, which are provided with a section 32 which rises in the form of a wedge, are arranged on a baseplate which is formed, for example, from I-shaped or

T-shaped elements and is arranged on the bottom wall 4 of the container 1. As a result, a wedge-shaped space is formed between this section 32 which rises in the form of a wedge and the top side 33 of the I-shaped or T-shaped elements. When the tank 2 is then pushed into the container 1, a corresponding wedge-shaped section 36 can be received in this wedge-shaped space. This wedge-shaped section 36 is attached, for example, to the supports 15 which are arranged in the vicinity of the rear side of the tank 2. In this way, even that section of the tank 2 which is situated in the vicinity of the end wall 7 of the container in use is securely fixed to at least one of the walls of the container 1 and cannot be moved with respect to these walls.

Attaching the supports 15 to a baseplate is even easier in the vicinity of the door opening 21 of the container 1. The supports 15 may, for example, be attached to a bottom plate using standard attachment elements, such as nuts and bolts, or, for example, using eccentric attachment elements (not shown). This is illustrated in Figures 5a and 5b. In Figures 5a and 5b, the top side of the T-shaped elements is once again denoted by reference numeral 33. A projecting section 37 of the supports 15 can be fixed to this top side of the T-shaped elements. It will be clear that numerous other attachment elements can also be used in order to attach the tank 2 inside the container 1.

CLAIMS

1. Assembly of an insulated container (1) and a tank (2) which is positioned inside the container (1), the insulated container (1) being provided with a heating or cooling device (20) and being provided on at least one side with doors, characterized in that the tank (2) is arranged removably inside the container (1), and in that the tank comprises connections, such as an opening for filling and emptying a tank (2), which connections are arranged in the vicinity of an end wall of the tank (2), the tank (2) being positioned inside the container (1) with the connections in the vicinity of the doors, so that the connections can be reached as soon as the doors of the container (1) are opened.

2. Assembly according to Claim 1, characterized in that the connections are arranged in the vicinity of the end wall of the tank (2), in such a manner that the connections can be reached as soon as a door of the container (1) is opened.

3. Assembly according to Claim 1 or 2, characterized in that the external dimensions of the tank (1) substantially correspond to the internal dimensions of the insulated container.

4. Assembly according to Claim 1, 2 or 3, characterized in that the tank (2) is attached to at least one of the walls of the container (3, 4, 5, 6, 7).

5. Assembly according to Claim 4, characterized in that the tank (2) is provided with supports (15), the supports (15) being attached to one of the walls of the container (3, 4, 5, 6, 7).

6. Assembly according to one of the preceding claims, characterized in that the tank (2), in its longitudinal direction, comprises a front side and a rear side, the tank (2), in use, having its rear side pushed into the insulated container (1), the tank (2) being provided, in the vicinity of its rear side, with supports (15), which supports comprise wedge-shaped elements (36), one wall (4) of the container (1) being provided with corresponding elements (32), all this in such a manner that the wedge-shaped elements (36) on the tank (2), when the tank is being positioned in the container (1), are received in the corresponding elements (36) on the wall (4) of the container.

7. Assembly according to Claim 6, characterized in that the tank (2) comprises, on its front side, supports (15) which are attached, by attachment means (31), to one of the walls (4) of the container (1).



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8. Assembly according to one of the preceding claims, characterized in that the tank (2) is designed as an unpressurized vessel.

9. Assembly according to one of the preceding claims, characterized in that the wall of the tank (2) is designed in such a manner that it can be deformed under the influence of the fluid which is introduced into the tank (2).

10. Assembly according to one of the preceding claims, characterized in that the insulated container (1) includes filler cushions or bags (16) which are to be arranged between the inner walls (3, 4, 5, 6, 7) of the container (1) and the outer walls of the tank (2).

11. Insulated container (1) according to one of the preceding claims, characterized in that the tank (2) comprises a filling opening (10).

12. Insulated container (1) according to Claim 11, characterized in that the tank (2) comprises a safety valve (11).

13. Insulated container (1) according to one of Claims 11 or 12, characterized in that the tank (2) comprises a manhole (14).

14. Insulated container (1) according to one of Claims 11, 12 or 13, characterized in that the tank is provided with a cleaning device (12, 13) for cleaning the tank (2).

15. Insulated container (1) according to one or more of Claims 11, 12, 13 or 14, characterized in that the filling opening (10) and/or the safety valve (11) and/or the manhole (14) and/or the cleaning device (12, 13) are arranged in the vicinity of the front side of the tank (2), to one side of a vertical centre line of the tank (2).



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