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PATENT SPECIFICATION

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(54) A PLATFORM FOR USE IN A TEMPERATURE-CONTROLLED HOLD OF A SHIP

(71) We, O & K ORENSTEIN & KOPPEL AKTIENGESELLSCHAFT WERK LÜBECK, a German company, of Einsiedelstrasse 6, 2400 Lübeck, Federal Republic of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a platform for insertion into guides for containers in a temperature-controlled hold of a ship.

A known type of refrigerated container ship includes guides for stowing the containers in a refrigerated hold, and a cooling, *i.e.* refrigerating plant to cooling air connections of the containers.

A refrigerated container ship of this type is known wherein a cooling air installation is secured to one or more bulk-heads or walls in the hold which extend in the longitudinal or transverse direction of the ship. Connected to these are one or more air ducts on which there are arranged pressure or suction unions for connection to inlet or outlet unions of the containers to be cooled. The air ducts can be constructed as double ducts, one of which conducts the cooling air and the other the return air. The air ducts are provided with thermal insulation. Each container is provided with two air connections, one of which is used for connection to a cooling air duct and the other for connection to a return air duct. (See Federal German Laid-Open Specification 1 953 866).

A ventilation system is also known for preventing water of condensation in stacked containers on board ship, comprising an air conveying installation and if appropriate an air conditioning plant. With this system there is an air distribution system with main and secondary ducts and with connections for introducing the air into the containers, and the air introduced into the containers escapes into the hold through openings in the container walls after passing through the containers. The air is conducted by way of the secondary ducts, which are arranged in a double bottom of the ship, into vertical riser pipes for the air which is taken through each container stack. Each riser pipe is formed of several sections which are respective component parts of containers, and which are connected to form a continuous air riser pipe by pressure connections when the containers are stacked. Each section of each riser pipe is provided in the container with outlet slots for introducing the air into the container in question. The air entering a container can be conducted further within the container by conduits and can finally escape outwards into the hold through apertures provided in the container wall (See Federal German Published Specification 2 149 475).

It is also known to use for storage or refrigerating chambers in ships, gratings which are placed on the bottom of a hold of a ship to allow a flow about stacked goods. The goods are stored slightly spaced above the bottom of the ship. Gratings made either of wood or of extruded aluminium sections with a perforated supporting surface are known. Gratings made of shaped steel strip and provided with a perforated horizontal supporting wall are also known for storage and refrigerating compartments of ships. The supporting wall is carried by downwardly extending side walls and perforated transverse bars arranged between. These gratings are provided with air through-flow apertures in the transverse bars and/or between the bars (see Federal German published Specification 1 197 344).

If a container ship is loaded with bulk material, it is also known to arrange removable intermediate platforms in the ship's hold. These are secured in a suitable manner on the guides for stowing the containers. The guides are connected to one another by means of horizontally arranged supports on which it is possible to lay the intermediate platforms which are stiffened or are constructed in the manner of latticework structures (see Federal German Laid-Open Specification 1 531 643).

Another known constructional form, wherein it is possible in a container ship to load the

hold with goods together with containers of the usual dimensions, consists in that there are provided panel-like pallets whose plan area corresponds to the sum of the plan areas of several containers of standard dimensions. Each pallet consists of a plurality of supports crossing one another at right angles, connected to one another and forming the pallet frame. Each pallet is provided with corner fittings with which it is secured in the container guides (see Federal German Laid-Open Specification 2 211 452).

According to the present invention, there is provided a platform constructed to be inserted into guides for containers in a temperature controlled hold of a ship, including in its top surface apertures for the passage of temperature-controlled gas, and below its top surface ducting communicating with said apertures, and a connection communicating with said ducting for connecting to a temperature controlling plant of said ship and for conducting said temperature-controlled gas.

Owing to the invention, it is possible to insert in the guides provided for stowing the containers in a refrigerated container ship, platforms which on the one hand are used for storing bulk material and on the other hand for distribution of cooling air within the space filled by the bulk material. Thus, all the bulk material can be uniformly cooled. The platforms each comprise one or mare connections for connecting to the refrigerating plant. These may be the same connections as are known for insulated refrigerated containers.

If the refrigerating plant is provided in the manner described hereinbefore with suction unions which can be connected to the outlet unions of refrigeratd containers, with the present platform the air is removed by suction through those suction unions in the region of the stack of bulk material.

It is also possible to insulate the entire hold of the refrigerated container ship, as is already known.

A hollow connection unit can be arranged at the top of the present platform and can be detachable.

When not in use, the insertable platforms can if necessary be stacked on one another on the bottom of the hold or they can be deposited at specific stations in the hold. The hollow connecting units are detached in these cases. Containers can be placed over the platforms. The platforms can be made of correspondingly rigid construction. The platforms can be moved with loading gear or cranes situated on the ship itself or on land.

The platforms can be swingably secured to the hull of a ship at suitable points.

The gas connections for connection with the cooling gas unions can be variously constructed. They can be constructed to be capable of being detached or of being swung away into another position.

The platform can be of double-walled construction, the space between the double walls providing the ducting communicating with the aperture in the top surface of the platform.

The double-walled platform can consist of an encircling part closely receiving a likewise double-walled hatch cover provided with apertures in its top surface for the throughflow of cooling air, the hollow space between the double walls of the encircling part being in communication with the hollow space in the double-walled hatch cover through holes, the holes in the two parts registering with one another. Providing hatch connections between the individual platform facilitates the use of the ship for bulk material which has to be refrigerated. It is not necessary to remove the platforms in their entirety, it being sufficient to open the hatch covers to load the ship.

Each hatch cover can be provided with a projecting edge portion which rests in a suitable recess on the adjacent edge portion of the encircling part, and the edge portions of the hatch cover and of the encircling part which abut on one another are provided with holes registering with one another. This form has the advantage that the guiding of the air in the platform is not interrupted by the hatch cover; instead the hatch cover is included in the air guiding arrangement.

In order to ensure satisfactory cooling of the bulk material, the top wall of the platform (which may of course consist of the top wall of the encircling part and/or the top wall of the hatch cover) can be adapted to be released easily from the particular lower part in each case. This makes it possible in a simple manner to detach the top wall, and to remove any foreign matter preventing the throughflow of cooling air, so that there is always a satisfactory cooling of the stored bulk material. In order not to disturb the cooling effect in other compartments when loading the ship or in the event of failure of the cooling arrangement in one of the compartments formed by the platform, the bottom wall of each platform (which may of course consist of the bottom wall of the encircling part and/or the bottom wall of the hatch cover) is provided with thermal insulation. The desired cooling temperature is thus ensured in each compartment even if the temperature of the neighbouring compartment varies for some reason or other.

In order that the invention may be clearly understood and readily carried into effect, reference will now be made, by way of example, to the accompanying drawings, wherein:—

Figure 1 shows a diagrammatic longitudinal, vertical section through a ship with a guide frame for 40′ containers,

Figure 2 shows a similar section through a ship with two guide frames for 20′ containers,

Figure 3 shows a similar section through another ship with guide frames for 20′ con-

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iners and illustrating an air flow system within part of the ship,

Figure 4 shows a diagrammatic perspective view of a platform with the plan area of a 20' container,

Figure 5 shows a similar view of a platform with the plan area of six 20' containers or three 40' containers,

Figure 6 shows a diagrammatic plan view of a platform including a hatch cover,

Figure 7 shows a diagrammatic side view of the platform of Figure 6,

Figures 8*a* and 8*b* shows respective vertical sections through differing hatch cover edges,

Figure 9 shows a diagrammatic perspective view of a platform with a top wall thereof shown detached, and

Figure 10 shows a diagrammatic perspective view of a platform according to Figure 9, but with a thermally insulating layer.

In each of Figures 1 to 3, a refrigerated container ship 1 includes a double bottom 2 with a bottom deck 3. Guide frames 4 for the containers extend through a hold from the bottom deck 3 up to about the height of a hatch coaming 5 which bounds the main deck 6 and supports a hatch cover 7. 8 indicates a middle deck. The refrigerated hold is between the bulkheads 9 and 10. Cooling air is prepared in a plant not shown here and introduced through a distribution system 11, or 11 and 12, this being arranged fore and/or aft of the guide frame 4 for the containers.

The cooling air is guided in the distribution system in ducts not shown in detail to pressure unions 13 of the system whilst the outgoing air is removed through suction unions 14 of the system. Double-walled platforms 15 communicate with the unions 13. These platforms thus have top walls 16 and bottom walls 17. Each top wall 16 is provided with apertures 18 for the passage of cooling air. The platforms 15 are provided with hollow connecting units 19 the interiors of which communicate with the hollow spaces 20 between the walls 16 and 17. As can be seen from Figures 4 and 5, the connecting units 19 comprise connecting elements 21 with which the connecting units can be connected in a suitable manner to the unions 13. The connecting units 19 are provided with securing straps 19*a* with which they are secured to the walls 16 in a readily detachable manner. The platforms 15 are provided at their four corners 22 with securing means not shown in detail, by means of which they can be hooked into or otherwise secured in the guide frames 4 for the containers. After securing, the connecting elements 21 are connected to the unions 13.

Bulk material is stored in the space between the platforms 15. Figure 4 shows a platform for replacing a 20' container, whereas Figure 5 shows a platform for replacing six 20' containers. The platform in this latter case is provided with three connecting units 19 so that there are sufficient connections available for the cooling air to allow uniform supply of cooling air over the plan area of the platform.

Figure 3 shows the way in which air flows in the spaces between the platforms, the cooling air supplied being indicated by open arrows 23 and the movement of the outgoing air by black arrows 24. The outgoing air is removed by suction through the unions 14.

The construction illustrated has the advantage that the bulk material stored between the plaforms is uniformly cooled and is kept throughout at the same temperature.

In the constructional examples shown in Figures 6 to 8*b*, there is formed in the central portion of the platform 15 an aperture 30 which is closed by a likewise double-walled hatch cover 31. The top wall 32 is provided in the same way as the wall 16 with apertures 44 for the passage of cooling air. The bottom wall 33 is imperforate. The edge 34 of the hatch cover 31 in the constructional example shown in Figure 8*a* is inclined in cross-section and lies with an upper portion 33 of the inclined surface on a correspondingly inclined supporting surface 36 of the edge 37 of the aperture 30. The hatch cover is supported in this way. In the constructional example of Figure 8*b*, the hatch cover 31 is provided with a projection 38 which with its underside 39 bears on the lower edge portion 40 of the encircling part of the platform 15. The surface 34 and 37, or 39 and 40 which are opposite one another or bear on one another are provided with corresponding apertures 41 and 42, respectively, so that the air from the space 20 of the encircling part of the platform 15 can enter the interior space 43 of the double-walled hatch cover and flow out upwards through the apertures 44. Encircling sealing elements 45 provide a seal between the edge portions which lie on or opposite one another.

In the constructional example shown in Figures 9 and 10, the wall 16 of the platform 15 is connected in a readily releasable manner to the lower part of the platform. The latter can be of box-form construction as shown. The wall 16 can carry the connecting unit 19, but this may instead be secured on the box-form lower part.

In the constructional example according to Figure 10, the wall 17 has its underneath surface covered with a heat-insulating layer 46.

WHAT WE CLAIM IS:—

1. A platform constructed to be inserted into guides for containers in a temperature-controllel hold of a ship, including in its top surface apertures for the passage of temperature-controlled gas, and below its top surface ducting communicating with said apertures, and a connection communicating with said ducting for connecting to a temperature controlling plant of said ship and for conducting said temperature-controlled gas.

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2. A platform according to claim 1, wherein said connection comprises a hollow connecting unit at the top of said platform.

3. A platform according to claim 2, wherein said hollow connecting unit is detachable from the rest of said platform.

4. A platform according to any preceding claim, and of double-walled construction, the space between the double walls providing said ducting.

5. A platform according to any preceding claim, and comprising an encircling part and a hatch cover closely received in said encircling part.

6. A platform according to claim 5 as appended to claim 4, wherein each of said encircling part and said hatch cover is of double-walled construction, includes some of said apertures in its top surface, and has the gap between its double walls provide part of said ducting, said ducting including holes in an edge portion of said hatch cover in register with holes in an adjacent edge portion of said encircling part.

7. A platform according to claim 6, wherein said edge portion of said hatch cover rests in a complementary recess on said adjacent edge portion.

8. A platform according to claim 6 or 7, and further comprising a sealing element encircling said hatch cover and interposed between said edge portion of said hatch cover and said adjacent edge portion.

9. A platform according to claim 6, 7, or 8, wherein the top wall(s) of the double walls of said hatch cover and/or said encircling part are/is readily releasable from the rest of said platform.

10. A platform according to any one of claims 5 to 9, wherein said hatch cover and/or said encircling part include(s) substantially horizontal, thermal insulation.

11. A platform according to claim 10, as appended to claim 6, wherein said thermal insulation is provided on the bottom wall(s) of the double walls of the hatch cover and/or said encircling part.

12. A platform according to claim 4, wherein the top wall of said double walls is readily releasable from the rest of said platform.

13. A platform according to claim 1, 2, 3, 4 or 12, and further comprising substantially horizontal, thermal insulation.

14. A platform according to claim 13 as appended to claim 4, wherein said thermal insulation is provided on the bottom wall of said double walls.

15. A platform constructed to be inserted into guides for containers in a refrigerated ship, substantially in accordance with any example hereinbefore described with reference to the accompanying drawings.

16. In a temperature-controlled hold of a ship, a platform as claimed in any preceding claim.

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