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(54) A SHIP ADAPTED FOR THE TRANSPORT OF HEAVY CARGO

(71) I, DR. ALBERT WINSEMIUS, of Mechelsestraat 1, The Hague, the Netherlands, and a Netherlands citizen, do hereby declare the invention, for which I pray that a patent may be granted to me, 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 ship adapted for the transport of heavy cargo on its weather deck.

It is normal practice to prepare a stowage plan before cargo is loaded on a weather deck in order to ensure a good weight distribution as well as to see whether the deck requires additional support from below. However, the entire deck cannot be used because it is obstructed by hatch coamings, so that it is not usually possible to obtain an optimum stowage and support of a heavy cargo.

According to the invention there is provided a ship adapted for the transport of heavy cargo on the weather deck of the ship, said weather deck having port and starboard sides and a hatch opening defined by a coaming surrounding the hatch opening, the ship further comprising a pair of spaced apart parallel fore and aft extending beams arranged one on each side of the deck with their top surfaces above the upper surfaces of the hatch coaming and a plurality of transverse beams releasably secured to said fore and aft beams for supporting cargo on the deck of the ship.

Accordingly, the fore and aft and transverse beams facilitate the stowage of a heavy cargo on the weather deck since it can rest on any desired number of transverse beams, and the weight of the cargo can be taken-up by the fore and aft beams which are well supported by the ship structure thereunder.

The fore and aft and the transverse beams may be provided with groups of bolt holes so that they can be interconnected by bolts at a number of preselected locations. The area afforded by the beams which is available for stowing cargo may be further ex-

tended beyond the beam of the weather deck, for the transport of heavy cargo pieces whose dimensions are greater than the ship's beam. For example where the transverse beams have a length equal to the deck beam, they may be arranged alternately to project outboard on each side of the ship.

The ship may further include one or more carriages which are adapted to roll athwartships over at least one pair of the transverse beams to carry cargo load. A track for said carriages may be formed between the weather deck and the shore in that the transverse beams may be provided at their ends with a connection eyelet, so that the two aligned transverse beams can be pivotally connected by means of a turnbuckle which is hooked onto the eyelets. By this arrangement when a ship is moored alongside the shore, one end of a transverse beam is secured to one of the fore and aft beams, and its other end is pivotally connected to a second transverse beam which rests at its ends on supports ashore. The pivot between the two transverse beams is secured on the support ashore which is nearest to the ship, and the fore and aft beam which is located at the shore side may be lowered by tilting the ship so that the first mentioned transverse beam does not contact the ship during the upward and downward motions of the ship in the water. There may be provided two or more carriages coupled together which are adapted to roll along two or more pairs of transverse beams for loading and unloading very heavy loads.

An embodiment of a ship according to the invention will now be described in more detail, by way of example only, with reference to the accompanying drawings, in which:—

Figure 1 is a plan view of part of the weather deck of the ship;

Figure 2 is a transverse cross-sectional view of the ship moored along side a loading and/or unloading quay;

Figure 3 is a plan view corresponding to Figure 2;

Figure 4 is a plan view of a transverse

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(17) beam provided on the deck of the ship; and

Figures 5a and 5b are side and end views respectively of the end of a transverse beam resting on a support provided on the quay.

The ship 1 as represented in Figures 1 and 2, is adapted for the transport of heavy loads (cargo) on the weather deck 2. Heavy loads are considered to be pieces weighing over 30 tons, and it may occur that pieces over 600 tons having a length of more than 50 meters are to be transported. The weather deck of a ship is rarely designed with sufficient strength to carry such a weight. Thus it is normal practice to arrange vertical supports below the weather deck to support it when a heavy load is to be carried. However in so doing the hold below the weather deck will be obstructed by the supports.

In the ship 1 as here represented such a heavy load is not directly stowed on the weather deck 2, but the weight of the load is transferred to the boardsides of the deck which are well supported. For that purpose fore and aft or longitudinally extending beams 3 are arranged one along the port and starboard sides of the deck, so that their upper surfaces are at a level higher than that of hatches 4. Transverse or cross beams 5 are releasably secured at selected locations to the longitudinally extending beams 3. Thus, any required number of beams 5 can be located under a heavy load. All the beams 3 and 5 are provided with groups of holes which are indicated at 6 in Figure 4. Due to this the beams 5 can be fixed by bolts on the longitudinal beams at substantially any location.

The beams 5 may have a length which is greater than the deck beam, so that the supporting area can be extended beyond the deck for loads of greater dimension than this beam.

A heavy cargo may be roller on and off the weather deck 2 by means of a rolling carriage 7 which is retained by means of tackles 8, 9. A track for the carriage 7 is formed between the ship 1 and a quay 10 by means of beams 5 similar to the beams on which the load is stowed on the deck.

For this purpose the beams 5 are provided at their ends with a connection eyelet 11 as represented in Figures 5a and 5b. Two aligned beams 5 can thus be connected by means of a turnbuckle which is hooked onto the eyelets 11. On the quay 10 the beams 5 bear on shore supports 12.

There is a particular problem which has to be overcome with roll-on and roll-off systems because the ship will move relative to the stationary quay. The motion of the ship is caused not only by the tide and by the swell and wave motion, but also by the

movement of the cargo from the ship to shore or vice versa.

In the roll-on, roll-off system described herein, this problem is solved in that cargo transfer between the ship 1 and the quay 10 is divided into two stages:

The heavy cargo supported on the beams 5 on the ship is first moved to rest partially on the ship and partially on the quay. This is effected after tilting of the ship towards the shore side, as indicated by the arrow 13 in Figure 2. The beams 5 then rest with one end on the longitudinal beam 3 which is remote from the shore side of the ship. Their other ends come to rest on and are connected to a shore support 12, and none of the beams 5 rest on the longitudinal beam 3 which is located at the shore side of the ship. Hence, there will not ordinarily be any contact of the beams 5 with the shore side of the ship under the motion of the ship in the water. The cargo can then be transferred entirely from the ship to the quay.

Thus, although the ship remains mobile, the movement of the ship can only be transmitted to one end of the installation, the other end resting on the quay. In order to accommodate any up and down motion of the ship, a pivot 11 is provided between the shore support 12 and each beam 5 on the ship.

As shown in Figure 3, a carriage 7 runs on more than one pair of beams 5 and is moved there along by running the tackles 8, 9 in and out.

An example of a run-out or unloading situation is described hereinafter, in which a piece is placed on a number of carriages which each move on two or more beams 5.

Under each carriage are two or more of the beams 5 which are positioned with one end on the longitudinal beam 3 on the side of the ship away from the quay and with their other ends overhanging the quay.

The ends of the beams 5 at each side of the ship are jointly mounted on a strip with two depending ribs (similar to strip 15 shown in Figures 5a and 5b), and the securing of the beams 5 to the strips is facilitated by means of the groups of holes 6.

A further strip (similar to strip 14 shown in Figures 5a and 5b) is mounted on the longitudinal beam at the ship's side remote from the quay, the further strip being rounded at the top to be received between the ribs of the first mentioned strip which is secured to the ends of the beams 5 remote from the quay. In this manner the joint beams having loaded thereon the carriages with the cargo, cannot slide away, but are able to carry out pivotal motion relative to the longitudinal beam 3 at the side of the ship remote from the quay.

Shore rolling beams similar to the beams 5 are positioned with their ends on the shore

supports 12 and in alignment with the beams 5 on the ship which extend over the quay.

On the shore supports are a pair of I-beams, on which a strip 14 is mounted, and on the lower side of the beams 5 which extend over the quay, a strip 15 is secured, similar to the one which is secured at the other end. These strips are indicated in Figures 5a and 5b, but are not visible in Figure 2.

Next thereto, at the quay side a second strip (not shown) is mounted, having recesses in which the shore beams are received to be restrained from relative lateral movement.

The connection of the beams 5 of the ship and on the quay takes place as follows:

The shore side of the ship is ballasted by pumping-in water, so that the ship is tilted towards the quay until the strip (15) at the protruding ends of the ship's beams 5 arrive just above the strip 14 on the shore supports 12. The pumping is continued until the strips are nesting. After that each of the ship's beams 5 is secured to the respective shore beam 5 by means of a turnbuckle, whereby the restricted pivotal action between the two beams is possible.

Then the pumping is continued and the cargo-load applied to the longitudinal beam at the shore side is transferred to the shore supports, so that the cargo is then no longer only resting on the ship, but partially on the ship and partially on the quay.

The carriages can now roll-off the ship, though care must be taken that the diminishing load of the cargo on the ship is compensated by pumping-in further amounts of water.

WHAT I CLAIM IS:—

1. A ship adapted for the transport of heavy cargo on the weather deck of the ship, said weather deck having port and starboard sides and a hatch opening defined by a coaming surrounding the hatch opening, the ship further comprising a pair of spaced apart parallel fore and aft extending beams arranged one on each side of the deck with their top surfaces above the upper surfaces of the hatch coaming and a plurality of transverse beams releasably secured to said fore and aft beams for supporting cargo on the deck of the ship.

2. A ship according to claim 1, in which the transverse beams are securable at pre-selected locations on the fore and aft beams.

3. A ship according to claim 1 or 2, in which the fore and aft and the transverse beams are provided with corresponding groups of bolt holes in order to be interconnected by bolts at selected locations.

4. A ship according to any one of the preceding claims, in which the transverse

beams have a length equal to the beam of the deck and alternately project outboard to each side.

5. A ship according to any one of the preceding claims, including a carriage which is capable of rolling athwartships over at least one pair of said transverse beams to load and unload the ship, and tackles for controlling the movement of the carriage.

6. A ship according to claim 5, including two or more of said carriages coupled together.

7. A ship according to any one of the preceding claims, in which at least one of the transverse beams is provided at its end with a connection eyelet, and including a further beam pivotally connectable thereto by means of a turnbuckle engageable with the eyelet.

8. A method of loading or unloading a ship according to claim 7, comprising the steps of supporting said further beam at a loading and unloading installation, pivotally connecting said further beam to an end of a transverse beam of the ship projecting outwardly of the ship towards said installation by means of said turnbuckle, tilting the ship so as to raise said transverse beam above the fore and aft beam arranged on the ship side nearest to the installation in order that the transverse beam will not engage the fore and aft beam during loading of the ship, and loading or unloading the ship relative to the installation using said further beam and said transverse beam.

9. A method according to claim 8, employing a plurality of further beams pivotally connected to respective transverse beams pivotally connected to respective transverse beams, to facilitate movement of one or more loads thereover.

10. A ship according to claim 1 and substantially as hereinbefore described with reference to, and as shown in the accompanying drawings.

11. A method of loading or unloading a ship according to claim 1 and substantially as hereinbefore described with reference to, and as shown in the accompanying drawings.

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supports 12 and in alignment with the beams 5 on the ship which extend over the quay.

On the shore supports are a pair of I-beams, on which a strip 14 is mounted, and on the lower side of the beams 5 which extend over the quay, a strip 15 is secured, similar to the one which is secured at the other end. These strips are indicated in Figures 5a and 5b, but are not visible in Figure 2.

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2. A ship according to claim 1, in which the transverse beams are securable at pre-selected locations on the fore and aft beams.

3. A ship according to claim 1 or 2, in which the fore and aft and the transverse beams are provided with corresponding groups of bolt holes in order to be interconnected by bolts at selected locations.

4. A ship according to any one of the preceding claims, in which the transverse

beams have a length equal to the beam of the deck and alternately project outboard to each side.

5. A ship according to any one of the preceding claims, including a carriage which is capable of rolling athwartships over at least one pair of said transverse beams to load and unload the ship, and tackles for controlling the movement of the carriage.

6. A ship according to claim 5, including two or more of said carriages coupled together.

7. A ship according to any one of the preceding claims, in which at least one of the transverse beams is provided at its end with a connection eyelet, and including a further beam pivotally connectable thereto by means of a turnbuckle engageable with the eyelet.

8. A method of loading or unloading a ship according to claim 7, comprising the steps of supporting said further beam at a loading and unloading installation, pivotally connecting said further beam to an end of a transverse beam of the ship projecting outwardly of the ship towards said installation by means of said turnbuckle, tilting the ship so as to raise said transverse beam above the fore and aft beam arranged on the ship side nearest to the installation in order that the transverse beam will not engage the fore and aft beam during loading of the ship, and loading or unloading the ship relative to the installation using said further beam and said transverse beam.

9. A method according to claim 8, employing a plurality of further beams pivotally connected to respective transverse beams pivotally connected to respective transverse beams, to facilitate movement of one or more loads thereover.

10. A ship according to claim 1 and substantially as hereinbefore described with reference to, and as shown in the accompanying drawings.

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