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54 **Mixed cargo vessel.**

57 Mixed cargo vessel comprising at least one oil tank, fully separated from any other cargo deck, for example for roll-on/roll-off vessels. All piping from any oil tank is passed through the superstructure, fully separated from all other cargo. The oil tank is provided with a manhole with cooperating passageway for inspection, maintenance and cleaning. Optionally the oil tank may be used for other bulk material, in which case the tank should be of a material inert for all intended bulk material, preferably stainless steel.

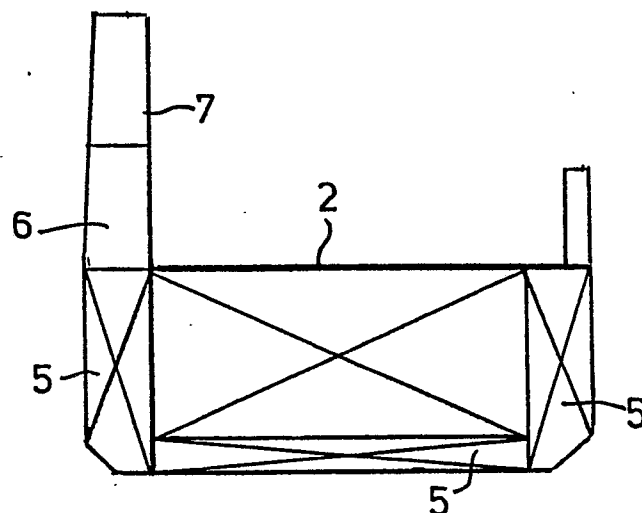


FIG. 2

Mixed cargo vessel.

The invention relates to a mixed cargo vessel, such as for example roll-on/roll-off ships, hereinafter referred to as ro-ro ships.

It would be desirable to be able to transport oil in a vessel with a mixed cargo, such as a ro-ro ship, to make optimal use of such a vessel, but hitherto no satisfactory solution has been found.

A number of rigid regulations apply for oil-tankers. Thus it must be prevented that oil might spill if a collision would occur, as this might, and on occasion does, cause substantial damage to the environment. To that end it is required that the oil tanks are provided with protective water tanks which are wide enough to protect the relevant oil tank in at least most and preferably all types of collisions.

For a mixed cargo vessel it is not just this requirement that should be complied with, but in addition the oil tank should be completely separated from all other cargo decks, specifically the car deck(s) of a ro-ro vessel.

Hitherto no satisfactory solution has been provided or suggested for meeting the problems arising for mixed cargo vessels, intended for carrying oil as well.

According to the present invention it has now been found possible to provide vessels with mixed cargo with at least one oil tank while obeying all requirements set. This is achieved by completely isolating the oil tank from any other deck present, whereby all piping inclusive venting being achieved by way of the superstructure, the relevant section of the superstructure being completely separated from any other deck present.

In order to prevent oil from spilling after a collision, the oil tank or tanks should of course be protected by water tanks in the manner customary for oil tankers. According to the invention a completely safe and reliable oil tank is provided without any hatches to any other deck, thus providing an unrestricted cargo-deck above the level of the oil tank or tanks, all piping to and from the oil tank or tanks being kept separated from the other cargo areas of the vessel. This is achieved by passing all piping through an area of the superstructure of the ship completely isolated from the other cargo areas, thus preventing any contact with their contents.

in a modification of the above the oil tank or tanks may optionally be used for other bulk material transport. To that end it should of course be possible to remove any oil residue or for that matter alternative content from both the tank or tanks as well as all piping. In addition the material from which the tank or tanks as well as the piping

are made should be inert for all materials intended to be transported in that way, such as for example and preferably stainless steel. This will provide the ship with an even larger versatility with respect to the goods to be transported. If the ship comprises a plurality of oil tanks as described above, and it is intended to use one or more of them for different bulk material, it is required that each tank is provided with its own independent piping if only to prevent contamination with the contents of other tanks. In that way it is possible to adapt the ship to whatever alternative cargo offered for its return journey, avoiding sailing in ballast.

Any and each oil tank should, in addition to the required piping, be provided with a manhole for access to the relevant tank and wherever required monitoring the tank on possible residues of the previous cargo carried therein.

In order to avoid imbalance of the ship while at high sea it is important that the tank or tanks is or are filled for at least 95% preferably 98% or more, to prevent substantial amounts of oil or other bulk material from shifting to one side of the ship.

The piping and the manhole of the oil tank are preferably located at one side of the ship. Moreover they may be positioned between the oil tank and the corresponding water tank at that location, or alternatively they may be passed through said water tank, though this latter alternative requires additional precautions for proper fitting of the piping and the passage from the manhole towards the oil tank where they enter and leave the relevant water tank. The solutions therefore are well known and are thus not further described.

Having thus given an outline of the present invention the latter will now be elucidated by means of the accompanying drawing, wherein

Fig.1 shows a side-view of a ro-ro ship according to the invention, and

Fig.2 shows a cross-section of Fig.1.

In Fig.1 a ship 1 is provided with a car deck 2 with gangways 3 in closed position. Below car deck 2 that is free of any passageways to lower areas of the ship, oil tanks 4 are positioned behind water tanks 5. All piping (not shown) as required for filling and discharging the oil tank or tanks as well as venting them, pass through the superstructure 6, shown more distinctly in Fig.2.

In Fig.2 an oil tank 4 is surrounded at both sides and at the bottom by water tanks 5. The car deck 2 together with the joining walls 7 provide an uninterrupted surface, separating the oil tank 4 completely from the car deck (upper deck) 2. All piping required for the oil tank 4 is passed through the water tank 5 at the left hand side of the drawing

and from there upwards through the upper structure 6, which is completely separated from the car deck 2 (or any other upper deck as the case may be) by wall 7 at the left hand side of the drawing. Thus any risk of contamination, let alone serious incidents by contact between the oil cargo area and the upper cargo area or areas is prevented. Similarly a manhole for access to the oil tank is positioned at the top of the water tank and provided with a passageway to the oil tank for the potential user. Alternatively all piping may be positioned between the water tank and the oil tank, thus avoiding the necessity of making the piping fully watertight.

As an alternative the areas to be used as oil tanks may also be used for general cargo, the latter as a consequence of the piping being restricted to bulk material. Of course the relevant tank or tanks should be cleaned meticulously prior to use for another type of bulk material and similarly all piping should be cleaned. As a consequence hereof the tanks and all piping should consist of a material inert to all intended bulk material. As such stainless steel is eminently suited.

Claims

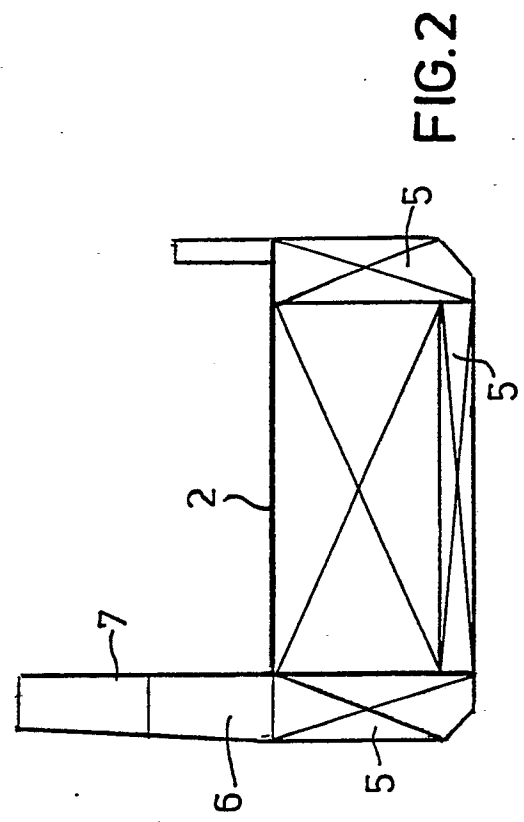
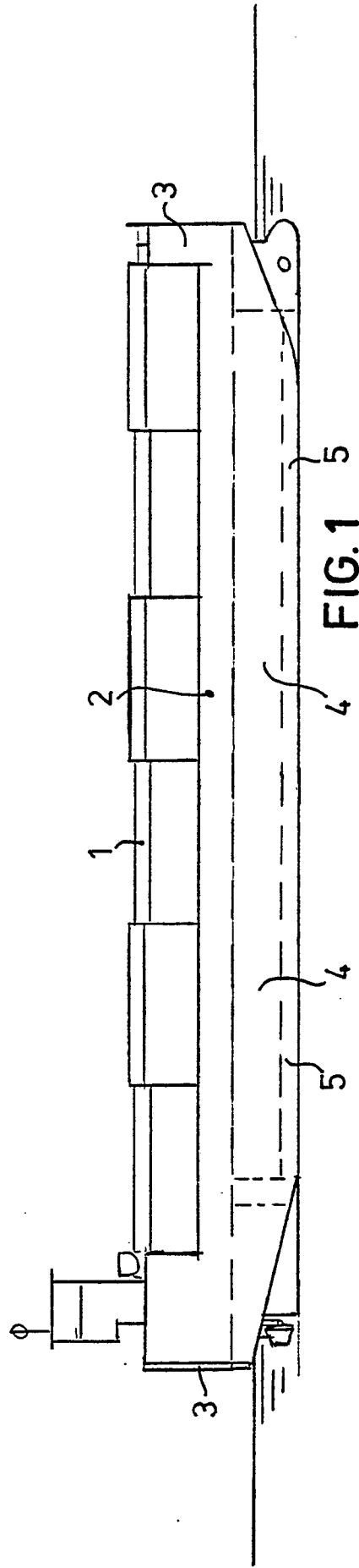
1. A mixed cargo vessel, such a rool-on/roll-off ship, characterised in that it comprises at least one oil tank (4), protected by water tanks (5) in a manner known as such, fully separated from the upper deck (2) and forming an uninterrupted surface with walls (7), all piping and optionally a passageway to a manhole passing between the oil tank (4) and the water tank (5) or optionally through said water tank (5), and subsequently through the superstructure.

2. A mixed cargo vessel according to claim 1, characterised in that the oil tank (4) is provided with a passageway of adequate diameter, passing between the oil tank (4) and a water tank (5) or through said water tank (5), to a manhole.

3. A tank for carrying alternative cargo as may be used in a mixed cargo vessel according to claim 1 or 2, characterised in that the tank and all its piping are of stainless steel.

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	FR-A-2 186 378 (AKTIEBOLAGET MALAGA) * Page 2, line 31 - page 3, line 17; figures 1-3 *	1	✓ B 63 B 11/00
Y	---	2,3	
X	GB-A-2 071 580 (VAN BAALEN) * Page 1, lines 33-45; page 1, lines 115-127; figures 1-6 *	1	
Y	---	2	
Y	A Group of Authorities, "SHIP DESIGN AND CONSTRUCTION", 1969, The Society of Naval Architects and Marine Engineers, New York. * Page 67, left column, lines 13-16; page 81 complete; page 255, paragraph 2.4 *	3	
A	---	3	
A	A Group of Authorities, "MARINE ENGINEERING", 1971, The Society of Naval Architects and Marine Engineers, New York. * Page 828, right column, lines 6-9 * -----		TECHNICAL FIELDS SEARCHED (Int. Cl.5) B 63 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25-01-1990	Examiner DE SENA Y HERNANDORENA A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			